A G E N D A
ISLE OF WIGHT COUNTY PLANNING COMMISSION
November 28, 2023

1. CALL TO ORDER

INVOCATION

PLEDGE OF ALLEGIANCE

2. ROLL CALL/DETERMINATION OF A QUORUM

BRIAN CARROLL, CHAIRMAN
BOBBY BOWSER, VICE-CHAIRMAN
CYNTHIA TAYLOR
JAMES FORD
JENNIFER S. BOYKIN
GEORGE RAWLS
THOMAS J. DISTEFANO
RICK SIENKIEWICZ
RAYNARD GIBBS
MATTHEW SMITH

3. ACTION ON REQUESTS TO WITHDRAW OR TABLE PENDING AGENDA ITEMS

4. APPROVAL OF AGENDA

5. CONSENT AGENDA

A. October 24, 2023 Planning Commission Regular Meeting Minutes

B. November 16, 2023 Board of Supervisors Work Session Action List

6. CITIZENS' COMMENTS

7. PUBLIC HEARINGS

A. Moonlight Solar Conditional Use Permit

The application of Moonlight Solar, LLC (CUP-10-23), applicant, and George Benjamin Edwards, Jeanette J. Edwards, George W. Edwards, LeAnne Ricks Edwards Wait, and Dana Louise Edwards, property owners, for a conditional use permit to establish a major utility service, specifically a 44 MW utility-scale solar energy generation facility and substation, on approximately 523 acres located on Moonlight Road (Rte. 627) and Burwells Bay Road (Rte. 621) on tax parcels 11-01-017, 11-01-018, 11-01-023 and 11-01-023A in the Rural Agricultural Conservation zoning district. The application includes a request to withdraw approximately 523 acres from the Moonlight Agricultural/Forestal District.

8. OLD BUSINESS

A. ZA-6-19 Sweetgrass Conditional Planned Development - Mixed Use Rezoning Request

Application of NVR, Inc., applicant, and, Henry Layden, special trustee for the William

Grover Yeoman, III Trust, property owner, for a Conditional Rezoning (ZA-06-19) of approximately 250 acres of property with tax map number 32-01-009 located on Benns Grant Boulevard (Rte. 10) from the Rural Agricultural Conservation (RAC) zoning district to the Conditional - Planned Development - Mixed Use (C-PD-MX) zoning district

9. NEW BUSINESS

A. Russell Height Exception Request

Application of Elizabeth K. Russell, property owner, for a height exception to Section 4-2006.A of the Zoning Ordinance for a proposed single-family dwelling, to be located at 9615 Old Stage Highway on property with tax map number 13-01-048C which will exceed the maximum height of 35 feet by eight feet, eight inches for a total height of 43 feet, 8 inches.

B. SAWCO South Self Storage NDSO Exception Request

Application of Carrollton Ventures, LLC, applicant and owner, for an exception to Section 6-2010.A.1.b, Section 6-2010.A.1.c, and Section 6-2010.A.3 of the Zoning Ordinance, Newport Development Service Overlay (NDSO) District regulations, for the property located on Carrollton Boulevard with Tax Map Number 34-01-108. The purpose of the application is to allow for an exception to the NDSO design standards for building facades, building materials, and building entryway design elements.

C. COUNTY ATTORNEY'S REPORT

D. PLANNING DIRECTOR'S REPORT

10. CLOSED MEETING

11. ADJOURNMENT

PLANNING REPORT

ATTACHMENTS:

Description	Type	Upload Date
October 24, 2023 Planning Commission Regular Meeting Minutes	Minutes	11/21/2023

MINUTES OF THE MEETING OF THE ISLE OF WIGHT COUNTY PLANNING COMMISSION HELD ON THE TWENTY-FOURTH DAY OF OCTOBER IN THE YEAR TWO THOUSAND AND TWENTY-THREE

CALL TO ORDER

Brian Carroll, Chairman, called the Isle of Wight County Planning Commission meeting to order at 6:00 PM on September 26, 2023, in the Board of Supervisors Room at the Isle of Wight County Courthouse, Isle of Wight, Virginia.

INVOCATION

Raynard Gibbs delivered the invocation.

PLEDGE OF ALLEGIANCE

Chairman Carroll invited everyone present to join in the Pledge of Allegiance.

ROLL CALL/DETERMINATION OF A QUORUM

PRESENT
Brian Carroll, Chairman
Bobby Bowser, Vice-Chairman
Cynthia Taylor
James Ford
Jennifer Boykin
George Rawls
Thomas Distefano
Rick Sienkiewicz
Raynard Gibbs
Matthew Smith

ABSENT

A quorum was determined.

ALSO IN ATTENDANCE
Bobby Jones, County Attorney
Amy Ring, Community Development Director
Trenton Blowe, Planner II
Amanda Landrus, Secretary

ACTION ON REQUESTS TO WITHDRAW OR TABLE PENDING AGENDA ITEMS

Chairman Carroll asked if there were any requests to table or withdrawal agenda items. Amy Ring, Community Development Director, stated there were no requests.

APPROVAL OF AGENDA

Chairman Carroll called for a vote to approve the agenda. Commissioner Bowser made a motion to approve the agenda. Commissioner Boykin seconded the motion. Chairman Carroll asked for all in favor to signify by saying aye. The motion passed unanimously.

APPROVAL OF CONSENT AGENDA

Chairman Carroll called for a vote to approve the consent agenda. Commissioner Bowser made a motion to approve the consent agenda. Commissioner Taylor seconded the motion. Chairman Carroll asked for all in favor to signify by saying aye. The motion passed unanimously.

CITIZENS' COMMENTS

There being no comments, Chairman Carroll closed citizens' comment.

PUBLIC HEARINGS

Chairman Carroll called for the public hearing on the following item:

> Application of Courthouse Hwy Solar 1, LLC, applicant, and Micheal S. Doggett, property owner, for a conditional use permit for a major utility service, specifically a 3 MW utility-scale solar energy generation facility, on eighteen acres located at 16419 Courthouse Highway with tax parcel number 39-01-017 in the Rural Agricultural Conservation (RAC) zoning district. The application includes a request to withdraw eighteen acres from the Courthouse Agricultural/Forestal District.

Trenton Blowe, Planner II, gave the following presentation:

CUP-03-23
New Leaf Energy

Major Utility Service
(UTILITY SCALE Solar energy facility)
Conditional Use Permit request

PLANNING COMMISSION MEETING

OCTOBER 24, 2023

Details

Location:	16419 Courthouse Highway
Tax Map Number:	39-01-017
Zoning:	Rural Agricultural Conservation (RAC)
Election District:	District 3
Request:	CUP to establish a utility-scale solar generation facility on a parcel currently zoned RAC. Application includes a request to withdraw 18 acres from the Courthouse Agricultural/Forestal District.

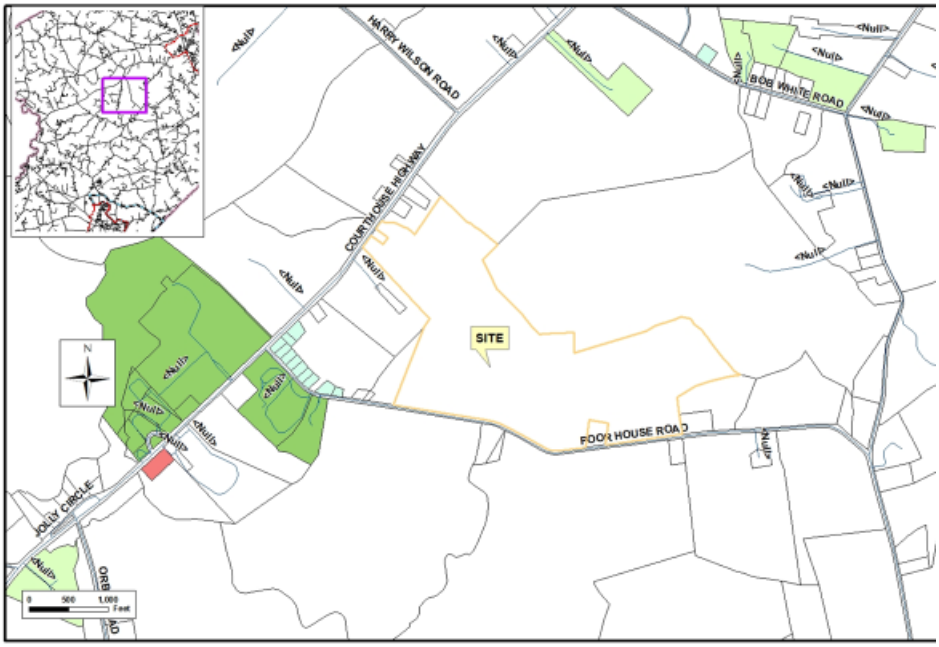
Background

- Project sited on a parcel consisting of approximately 148 acres primarily consisting of pastures and agricultural fields.
- Remaining 130.97 acres not proposed as part of the facility will continue to be used for agriculture.
- Agricultural and Forestal District Advisory Committee recommended approval of the withdrawal of 18 acres from the Courthouse Agricultural district at the October 4th meeting

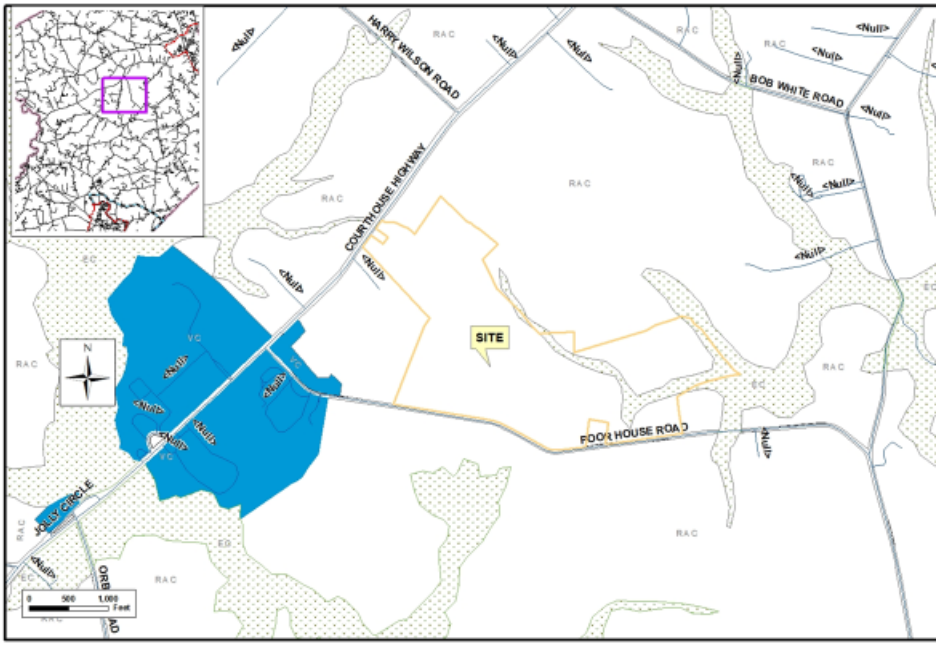
CUP-3-23 - Conditional Use Permit- Location Map

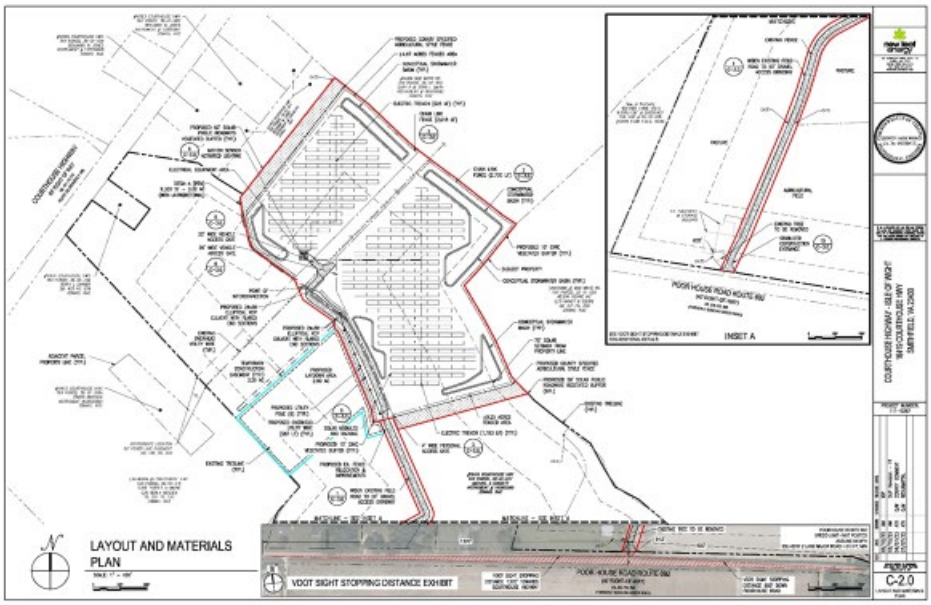
CUP-3-23 - Conditional Use Permit- Location Closeup Map

CUP-3-23 - Conditional Use Permit - Zoning Map



CUP-3-23 - Conditional Use Permit - Land Use Map





VISUAL IMPACT

PROPOSED PANEL LOCATION

LOOKING NORTH TOWARDS
COURTHOUSE HWY

The Planning Commission and Board of Supervisors shall consider the following criteria before the granting of a conditional use permit:

1. Will not be detrimental to or endanger the public health, safety, and general welfare;
2. Will not be injurious to the use and enjoyment of other property in the immediate vicinity for the purposes already permitted, nor substantially impair the use of other property within the immediate proximity;
3. Adequate utilities, water, sewer or septic system, access roads, storm drainage and/or other necessary public facilities and improvements will be provided;
5. Ingress and egress so designed as to minimize traffic congestion on the public streets;
6. Not contrary to the goals and objectives of the Isle of Wight County Comprehensive Plan;
7. Shall conform to all other applicable regulations of the zoning district classification in which it is located and to the special requirements established for the specific use; and
8. Will not result in a multiplicity or saturation of similar uses in the same general neighborhood of the proposed use.

Board may impose additional conditions or limitations on CUPs. Such conditions may include, but are not limited to:

1. Number of persons living or working in the immediate area and the proposed hours of operation;
2. Traffic conditions, sidewalks, parking facilities, vehicle access, peak periods of traffic; and proposed roads, but only if construction of such roads will commence within the reasonably foreseeable future;
3. Orderly growth of the neighborhood and community and the fiscal impact on the County;
4. Effect of odors, dust, gas, smoke, fumes, vibration, glare, and noise upon the use of surrounding properties;
5. Facilities for police, fire protection, sewerage, water, trash and garbage collection and disposal, and the ability of the County or persons to supply such services
6. The degree to which the development is consistent with generally accepted engineering and planning principles and practices;
7. The structures in the vicinity such as schools, houses of worship, theaters, hospitals, and similar places of public use;
8. The purposes set forth in this ordinance, the County's Comprehensive Plan, and related studies for land use, roads, parks, schools, sewers, water, population, recreation, and the like;
9. The environmental impact, the effect on sensitive natural features, and opportunities for recreation and open space; and
10. The preservation of cultural and historic resource landmarks.

Agency Review

Utility Services – No Concerns. Site plan to include new state stormwater regulations

Economic Development – No Concerns

Envi. Planner – All concerns addressed.

VDOT – Recommends that all roads be inspected prior to starting construction and after construction is complete and video documented in accordance with Isle of Wight Zoning Ordinance 5-5003, Section M – 4.G.ii. All roads damaged by solar farm construction to be repaired by the applicant. Also recommend this provision be clearly stated in conditions.

Emergency Services - Staff will work with the applicant during site plan review on required Emergency Response Plan including annual training.

Strength & Weaknesses

Strengths

1. The proposed use is consistent with the County's adopted Comprehensive Plan for the Rural Agricultural Conservation (RAC) future land use designation.
2. The proposed use is consistent with the County's Conditional Use Permit criteria as set forth in the Zoning Ordinance.
3. The amount of acreage for the proposal is minimal and a majority of the site will continue to be agricultural.

Weaknesses

1. The proposed use would remove agricultural land from production.
2. Temporary impact to residential development in the area from construction traffic and noise is expected during the construction phase.
3. There is a concern with the ability of the secondary roads to handle the type of traffic related to the construction of this nature.

Recommendations

Staff recommends approval of the CUP with the following conditions:

1. Topsoil shall be stockpiled on the site and shall be stored out of view from adjacent properties and public roads
2. The applicant shall submit an invasive species management plan as recommended by DCR with the submission of the final site plan.
3. The applicant will work directly with Isle of Wight County's Chamber of Commerce the Paul D. Camp Community College, and the Economic Development Department to ensure inclusion of local contractors in the bidding process.
4. The applicant shall submit a seed mix for site groundcover that includes native pollinators blooming in spring/summer as recommended by DCR.
5. A sign shall be installed at the entrance of the site with contact information for the facility.

Recommendations CTD.

6. A laminated Emergency Response Poster will be mounted near the front gate. The poster will include a general site map, evacuation routes and Muster Points. Emergency Response Chain of Command, directions to the closest hospital, coordinates to closest designated life flight landing area, and other pertinent information associated with the facility during an emergency response.
7. Adherence to the proposed Transportation Plan shall be required for all facility traffic. Truck traffic shall be limited to only the routes shown in the transportation plan. No other local routes in Isle of Wight County may be used.
8. Excluding the bufferyards, the ground between the panels and in areas not otherwise covered by gravel or infrastructure shall be planted and maintained with a vegetative cover. This vegetative cover will be managed with moving and/or grazing.

9. Hours of operation for construction and post-construction operation shall be limited to Monday through Friday, 7:00 a.m. to 6:00 p.m. Saturdays from 7:00 a.m. to 5:00 p.m. No construction is to occur on Sundays by any party involved with the project.
10. As part of the site plan review, the Applicant shall provide documentation that the selected panels and all power-generating equipment onsite are "Tier 1" modules, as established by the most recent "PV Module Tier 1 List" issued by Bloomberg NEF or a similar third party analysis widely accepted in the solar industry. Additionally, the make and model of the selected panels and all power-generating equipment initially installed and replaced on the site must qualify, for disposal purposes only, as non-hazardous waste under applicable U.S. Environmental Protection Agency tests (e.g., TCLP).

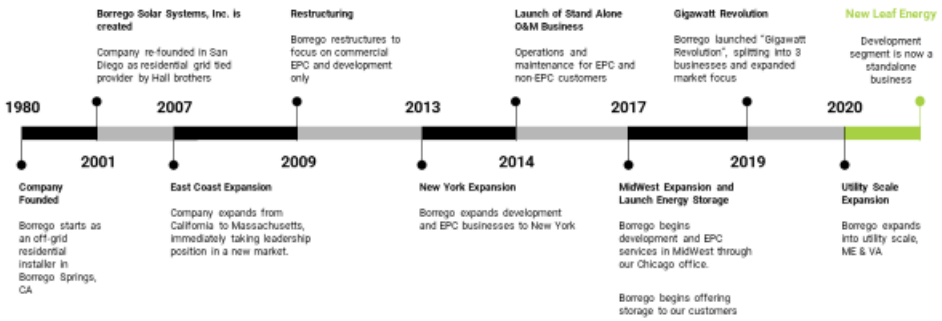
11. The applicant shall implement a program for the collection of baseline data establishing pre-construction soil conditions for the production of row crops for the agricultural areas within the project area. The program shall establish the relevant characteristics of the topsoil. The baseline data shall be derived from field and laboratory testing of soil conditions, including depth, density and quality from representative locations. Laboratory testing shall be conducted by an accredited laboratory. Parameters for assessing soil quality may include the following: infiltration rate, bulk density, water holding capacity, pH, percent organic matter, cation exchange capacity, Phosphorous/Phosphate (P), Nitrogen (N), and Potassium/Potash (K). After 30 years of operation and again after 35 years of operation, soil conditions shall be determined for the same sampling locations using the same parameters and the results used to plan soil restoration activities. After equipment is removed as part of decommissioning, soil conditions shall be determined for the same sampling locations using the same parameters. Soil restoration activities shall be performed as necessary during operations or decommissioning to return soil conditions to at least baseline conditions. The County will be provided with data of soil conditions within 30 days after the receipt of results.
12. The facility perimeter fencing will be equipped with push bar pedestrian gates to permit emergency exits from the facility.

Chairman Carroll opened the public hearing and invited the applicant to speak.

Jessie Robinson, Project Developer and Quentin Wood, Project Engineer, 55 Technology Drive, Lowell, MA, gave the following presentation:

ABOUT US

Borrego History, New Leaf's Beginning



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Virginia Clean Economy Act

- Increased solar adoption is state mandated
- VCEA passed April 2020
- **Dominion Energy to procure 1,100 MW of 1 to 3 MW solar projects by 2035**
- Dominion Energy to produce 100% carbon-free electricity by 2045

Source: Borrego Barre, MA

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Drivers of Solar Projects in Virginia

Types of Solar	Description	Probable MW of development by 2025	Size limit per project per legislation
Residential Rooftop Solar	System is on the customer's roof (main building or accessory structure). In rare instances, a residential customers may want to put solar on the ground.	500 MW PPA cap in legislation	25 kW or below
Commercial & Industrial Solar	System is on the customer's property, either on the roof (main building or accessory structure) or the ground.	500 MW PPA cap in legislation for VA jurisdictional customers, 500 MW for non-jurisdictional customers, and 40 MW for APCo or ODP	3 MW or below
Community Solar	Generally a larger system where a combination of several entities (residents, businesses, governments) have a partial interest (subscription) in the output of a system. System can be located on a roof or on the ground, but do not have to be located near the subscribers.	Current legislation allows for 200 MW of shared solar in Dominion's service territory	5 MW or below
Dominion DG RFP	Either behind-the-meter or front-of-meter	1,100 MW by 2035	**3 MW or below**
Brownfield Solar	System is located on blighted land that is not suitable for redevelopment, such as closed landfills or Superfund sites.	200 MW of solar under Dominion's large scale requirement has to be brownfield	No size cap
Utility Scale Solar	Large scale systems are either developed for the Dominion and APCo solicitations: they may also be built for corporate offtakers or to participate in the PJM wholesale market	15,000 MW for Dominion and 600 MW by 2030 for APCO	5 MW - 200+ MW

Project Location

16419 Courthouse Highway, Smithfield, VA 23430

Parcel ID: 39-01-017

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Why This Parcel?

- Interested landowner
- 88% of property will remain in farming
- Sited on least productive ag land
- Interconnection infrastructure on-site
- Zoned Agriculture
- Minimal impacts to wetlands and outside floodplain
- Located more than 500' from Courthouse Hwy

Conceptual Site Plan Model

Conceptual Site Plan Model

Project Layout

- System size: **3 MW**
- Access off Poor House Rd
- **±18.23 acres** (ac) total site footprint
  - ±14.21 ac fenced area
  - ±2.22 ac Landscape Easement
  - ±1.80 ac Access Easement
- ±3.3 ac Temporary Construction Area

FACILITY LAYOUT

Access - ±2,390 ft from Poorhouse Rd.

Silicon Based Photovoltaic Panels
- Panel height - 15ft. Max
- Setback Variable Width 50ft min.

Inverter/Transformer Equipment
- ±300 ft from closest property line
- ±600 ft from nearest residence

Landscaping
- Agricultural Fence
- Civic and 50ft Public Roadways Buffer

Stormwater
- Use existing channels
- Proposed basins

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Sample of Built Small-Scale Solar Projects

Preserving Farmland

- Facility area does not impact owner's active crop fields.
- Owner desired to use his least productive hay field.
- Facility access uses existing field road.
- County's required 50ft Landscaping extends into active field.

Pre-Construction			Post Construction								
Type	Area	Total	Under Panel & Interrow Pollinator Vegetation	Native Grass	Native Vegetative Firebreak	50' Solar Public Roadway Vegetated Buffer	10' Civic Vegetated Buffer	Cattle Grazing	Field Road & Equipment Access Area	Total	Remaining AC
Cattle	1.01	1.01	----	----	----	----	----	----	----	0	1.01
Corn & Soy	0.62	0.62	----	----	----	0.55	----	----	0.02	0.57	0.05
Hay	16.18	16.18	7.54	4.67	1.97	1.54	0.46	----	----	16.18	0
Field Road & Equipment Access Area	2.41	2.41	----	----	0.16	----	0.09	----	----	0.25	2.16

*Note: all units are in Acres (AC)

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Conceptual Landscape Plan

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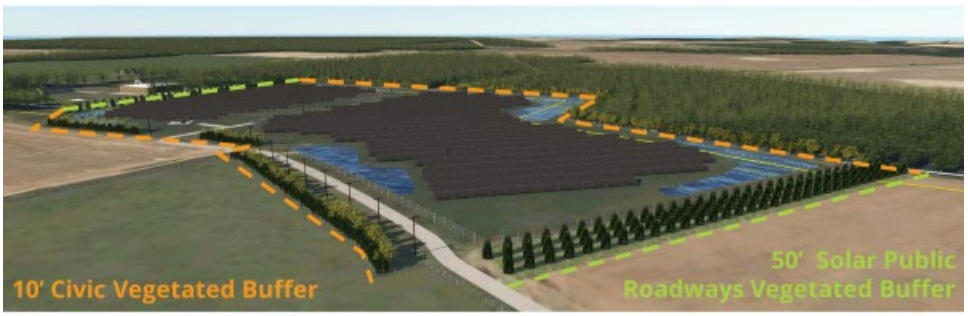
Conceptual Landscape Plan



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Conceptual Landscape Plan

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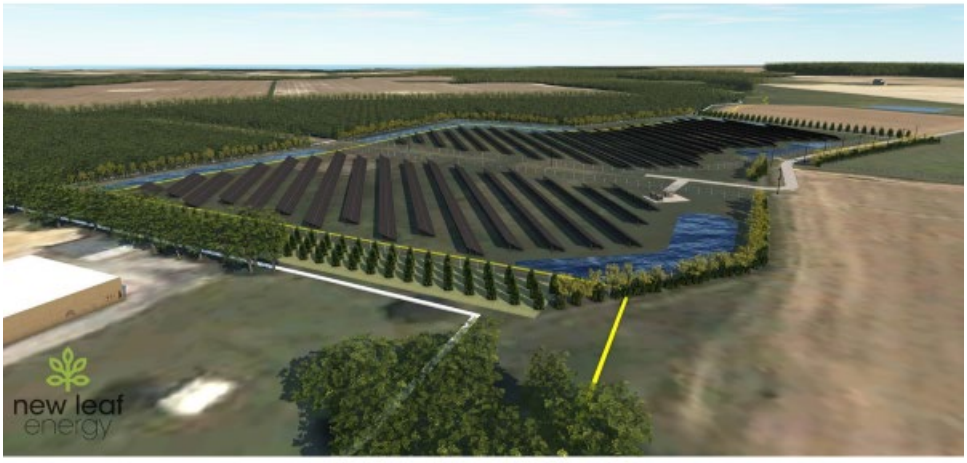
Conceptual Site Plan Model



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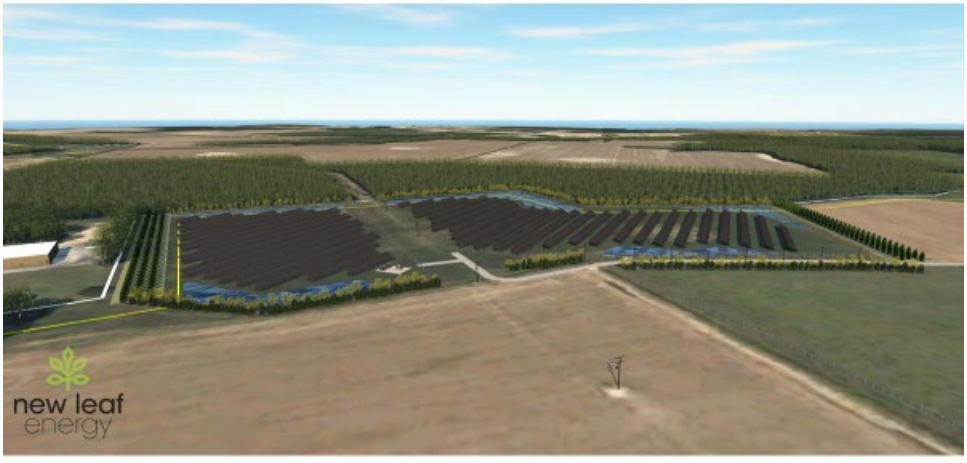

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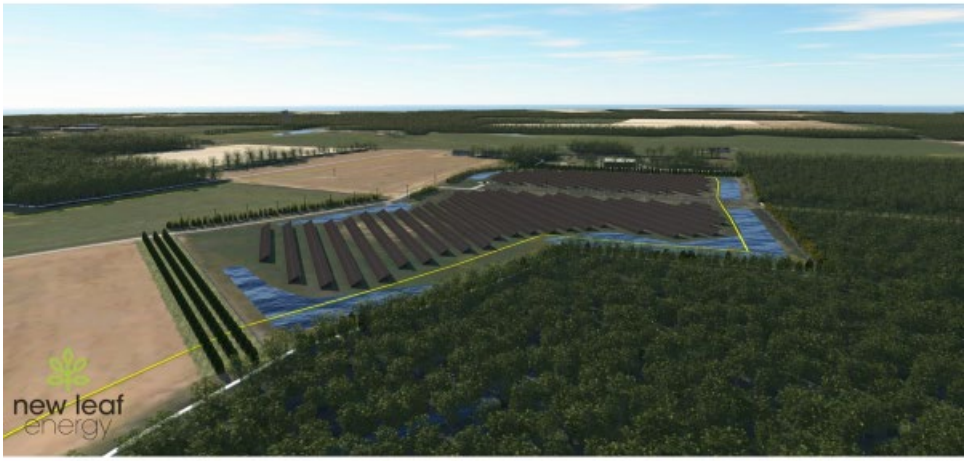

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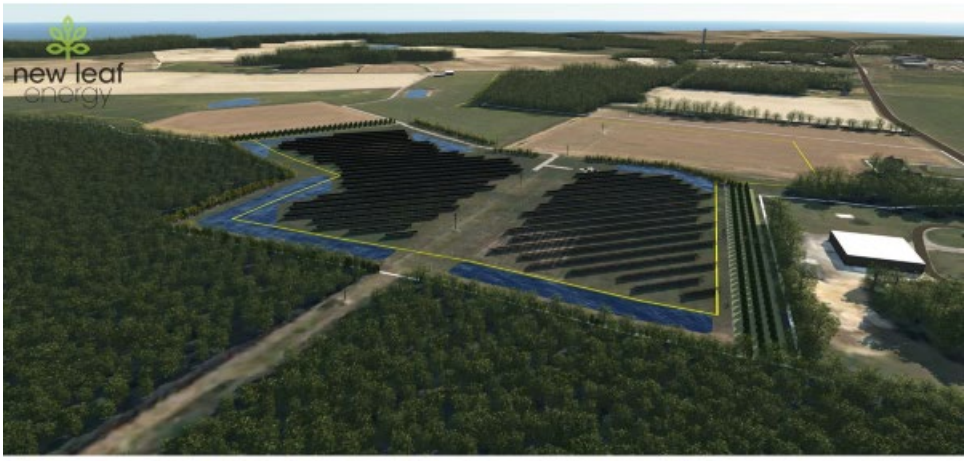

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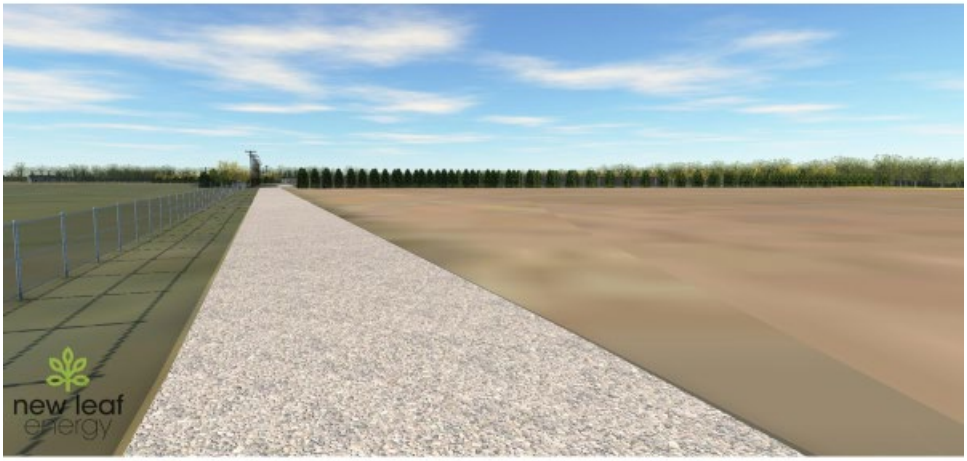


Access to Project

VIA US Route 258 to Poorhouse Road
→ Average Daily Traffic (ADT) 5,500 vehicles and 360 vehicles , respectively

Anticipated ADT for project - 1 to 2 vehicles

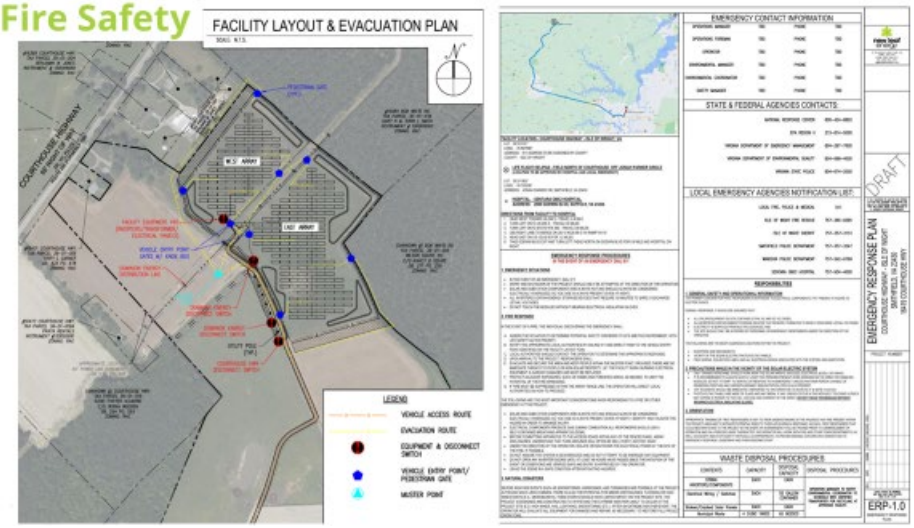
Access to Project - Construction

Permitted Construction Hours:
→ M-F 7:00AM to 6:00PM
→ Saturday 7:00AM to 5:00PM
→ No Construction on Sundays

6 to 8 months construction timeline

Pre-construction & post-construction video log and inspection of road. Applicant to make all necessary road repairs.

Fire Safety



Decommissioning

- Removal cost is bonded with County before construction can begin.
- Project owner responsible to remove equipment and restore the site.
- Project will use panels rated Tier 1 and that meet Toxic Characteristic Leaching Procedure (TCLP) requirements for non-hazardous waste.
- Soil tests conducted before construction, during project life, and after decommissioning.
- The bulk of material is considered recyclable, the solar panels may be upcycled, reused as secondhand, recycled or disposed of at an approved facility.

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Community Outreach

- Adjacent property owners notified
- **Virtual Community Meeting** - held on March 20, 2023
  - **Mailer #1** - Sent February 15
  - **Mailer #2** - Sent March 2

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Will this affect my property value?

- Cohn Reznick, a third-party accounting firm, conducted a study for projects in Isle of Wight, including Woodland Solar
- Study considered home property value before and after solar installation comparing:
  - Homes adjacent to the solar farm
  - Homes not adjacent to solar farm

Conclusion: No impact to the sales price of adjoining properties after installation of the solar project.

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Small-Scale Solar Benefits

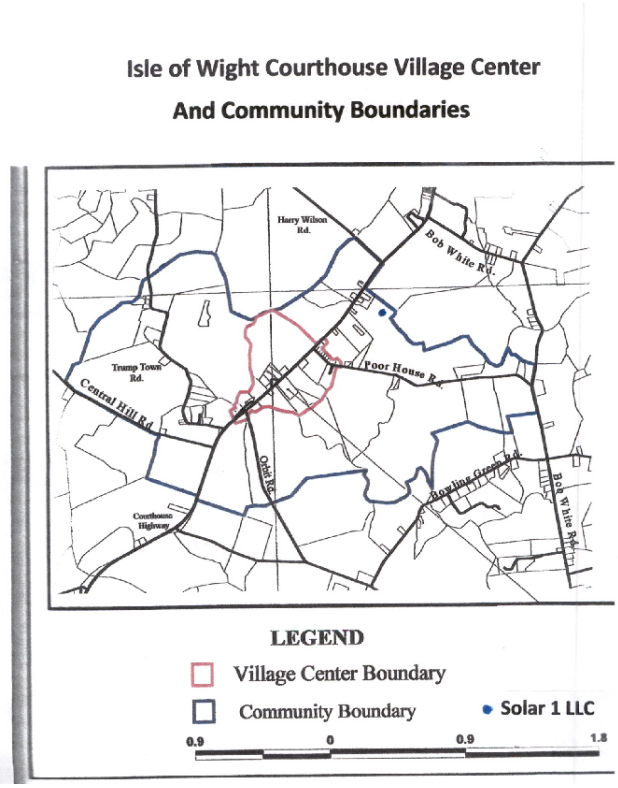
- Provides additional tax revenue for the County, estimating **$370k** over the project lifetime
- Allows the landowner to diversify his income while continue farming
- Quiet neighbor and no increase to traffic
- Diversifies the local economy without burdening infrastructure
- Creates 30-40 construction jobs; 2-4 long term jobs
- Provides clean energy to the grid, powering local homes, restaurants, and businesses
- Improves reliability of the interconnection grid
- Native seed mix allows for increase to groundwater recharge and reduced runoff

new leaf energy

Jessie Robinson
Sr. Project Developer
jrobinson@newleafenergy.com

Quentin Wood
Project Engineer

June Doggett Moody, 16342 Courthouse Hwy, spoke in opposition to the application and distributed the following document to the Planning Commission:



Ms. Moody stated she had concerns that the proposed solar facility is in the Village Center Community, and it is not compatible with the historic structures within the Village and asked for the Planning Commission to deny this application.

Michael Doggett, applicant, 11553 Central Hill Road, Windsor, stated he believed the solar facility is an excellent use of the land and a good tax revenue for the County. Mr. Doggett asked for the Planning Commission to approve this application.

Jessie Robinson, Project Developer with New Leaf Energy, stated that staff recommended approval of the application and have found it in compliance with the comprehensive plan and asked the Planning Commission to recommend approval. Ms. Robinson added that over the life of this project it would bring $370,000 in tax revenue and the land would remain in Mr. Doggett's name, allowing it to be decommissioned and used however the owner would like at the end of the project. Ms. Robinson stated that a phase 1B study was submitted to the Department of Historical Resources, and the Department had no concerns.

Chairman Carroll asked for the two following letters of support to be entered into the minutes.

new leaf energy

Supporting Small-Scale Solar in Isle of Wight County at 16419 Courthouse Hwy

April 27, 2023

Dear Planning Commission and Board Members,

As a member of this community, I am writing in support of New Leaf Energy's proposed 3 MWac small-scale solar project at 16419 Courthouse Highway, Smithfield, VA 23430. I endorse the project and encourage you to approve its application for a Conditional Use Permit. I am in favor of this project because it provides the following benefits to Isle of Wight County that are important to me (check all that apply):

- ✓ Promotes landowner rights to use their property as desired in accordance with local ordinances.
- ✓ Increases local tax revenue through higher real estate tax assessments and voluntary contributions to the County.
- ✓ Diversifies the local economy without burdening infrastructure.
- ✓ Increases the reliability of the local grid, reducing brownouts and blackouts.
- ✓ Creates 30 to 40 temporary construction jobs, and 2 to 4 local, long term jobs.
- ✓ Includes native plants on-site, which increases groundwater recharge and reduces runoff.
- ✓ Contributes clean energy to the local grid, powering homes, local restaurants, and businesses.
- ✓ Leads to cleaner air and a healthier environment for current and future generations.

I encourage the Planning Commission and Board Members to approve this project as it is beneficial to both our local economy and our environment. Please take my support into consideration.

Sincerely,

B. W. Sam Jones

Name: B. W. Sam Jones

Address: 16363 Courthouse Hwy

new leaf energy

Supporting Small-Scale Solar in Isle of Wight County at 16419 Courthouse Hwy

October 10, 2023

Dear Planning Commission and Board Members,

As a member of this community, I am writing in support of New Leaf Energy's proposed 3 MWac small-scale solar project at 16419 Courthouse Highway, Smithfield, VA 23430. I endorse the project and encourage you to approve its application for a Conditional Use Permit. I am in favor of this project because it provides the following benefits to Isle of Wight County that are important to me (check all that apply):

- Promotes landowner rights to use their property as desired in accordance with local ordinances.
- Increases local tax revenue through higher real estate tax assessments and voluntary contributions to the County.
- Diversifies the local economy without burdening infrastructure.
- Increases the reliability of the local grid, reducing brownouts and blackouts.
- Creates 30 to 40 temporary construction jobs, and 2 to 4 local, long term jobs.
- Includes native plants on-site, which increases groundwater recharge and reduces runoff.
- Contributes clean energy to the local grid, powering homes, local restaurants, and businesses.
- Leads to cleaner air and a healthier environment for current and future generations.

I encourage the Planning Commission and Board Members to approve this project as it is beneficial to both our local economy and our environment. Please take my support into consideration.

Sincerely,

Name: Charles L Owens

Address: 15433 Carroll Bridge Rd.
Smithfield, VA. 23430

Chairman Carroll closed the public hearing and asked for comments from the Planning Commission.

Commissioner Distefano asked why the production is more efficient MW per acre is than previous applications.

Quinten Wood stated the previous applicants could have been more conservative on their initial design. Mr. Wood added that with the smaller acreage with this project, they had to fine tune the inner row spacing and more particular the modules that will be chosen.

Commissioner Distefano asked if the number that was stated for the financial impact to the County doesn't include a siting agreement.

Bobby Jones stated that was correct.

Commissioner Bowser asked where the panels were manufactured.

Jessie Robbinson stated that the exact panels will be determined in the site plan process. Ms. Robinson stated at this time most panels are manufactured overseas, but they are financially incentivized to pursue domestic panels.

Commissioner Boykin asked that the following letter of opposition be entered into the legal minutes as well.

(no subject)

DS Debbie Szymanski <debbieszy29@gmail.com>
To **Planning Commission**
Cc George Rawls

Reply | Reply All | Forward
Tue 10/24/2023 1:57 PM

Follow up. Start by Wednesday, October 25, 2023. Due by Wednesday, October 25, 2023.
You forwarded this message on 10/27/2023 9:52 AM.

Caution: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Are we ever going to say no to these solar farms? Is this our legacy to our children and grandchildren? Look at the ones that already exist, can you look at them and say "This is nice" Absentee landlords that are not vested in Isle of Wight county. Have we ever seen one dismantled at the end of the term?

Technology will improve and we will not need acres of solar panels. Isle of Wight receives no benefit.

Please start saying NO.

Otherwise just rename Orbit Road Solar Alley and Route 258 Solar Boulevard.

Isle of Wight county, Nature no more.

Regards,

Debbie Szymanski

Commissioner Boykin asked if there will be salvage value used in the bond.

Trenton Blowe stated that the supplemental use regulations prevent salvage value from being used.

Commissioner Boykin asked what could be implemented now to prevent the traffic impacts similar to what happened from Cavalier from happening again.

Trenton Blowe stated that the proposed conditions mandate the routes to be used are what was approved in their application.

Amy Ring stated that Cavalier hired a third-party traffic management firm that staged flaggers at key intersections to prevent roads that were not approved from being used. Ms. Ring added the proposed application has a more direct route, since traffic will be coming right off route 258.

Commissioner Boykin asked if there have been grass complaints at Longview Solar.

Ms. Ring stated that no complaints have been reported.

Bobby Jones clarified that due to the size of this application, a siting agreement would not be required.

Commissioner Distefano stated that previously he has expressed concern for saturation of use but feels differently in this case due to the size, and that the project is going to a distribution line.

Commissioner Boykin made the motion to recommend denial of the application to the Board of Supervisors. Commissioner Rawls seconded the motion, which was tied with Commissioners Boykin, Ford, Rawls, Sienkiewicz, and Carroll voting in favor of the motion, and Commissioner Bowser, Distefano, Taylor, Gibbs and Smith voting against the motion (5-5). The motion failed.

Commissioner Bowser made the motion to recommend approval to the Board of Supervisors with the recommendations from staff. Commissioner Gibbs seconded the motion, which was adopted with Commissioners, Bowser, Distefano, Ford, Taylor, Gibbs and Smith voting in favor of the motion and Commissioners Boykin, Rawls, Sienkiewicz and Carroll voting against the motion (6-4).

The motion passed, and the item will go to the November 16, 2023, Board of Supervisors meeting.

Chairman Carroll called for the next public hearing for the following item:

> An ordinance to amend the following sections of Appendix B. Zoning: Article III, Section 3-6000 (Use Types), for the purpose of defining short term rental as a commercial use, Article IV (Zoning Districts and Boundaries) for the purpose of allowing short term rentals as a permitted or conditional use in certain zoning districts, and Article V (Supplementary Use Regulations), Section 5-5005, for the purpose of including performance criteria for short term rental uses in the commercial supplemental use type regulations.

Amy Ring stated that at the Board of Supervisors June 2023 regular meeting, they discussed additional changes to the proposed short term rental ordinance and sent the ordinance back to the Planning Commission for additional review and discussion. Ms. Ring stated that the Planning Commission discussed these changes at their July, August and September regular meetings.

Following their discussion in September, they directed staff to advertise the proposed short term rental ordinance for public hearing.

Chairman Carroll opened the public hearing.

David Eich 2425 North Shore Drive, spoke against the ordinance and is opposed to commercial businesses in residential neighborhoods. Mr. Eich shared his concern about the intent of the renter as well as the responsibilities that go along with managing this activity and questioned the respect for the law and community. Mr. Eich stated he stands united with his neighbors and asked the Planning Commission to deny the short-term rental concept.

Dan Milton, 2407 North Shore Drive, stated he understands the short-term rental business but doesn't agree with it everywhere. Mr. Milton stated he wants to raise awareness of safety, and the fact Airbnb does not have background checks. He stated this is a concern especially in neighborhoods like his that are small, private, and secluded. Mr. Milton asked for the Planning Commission to reconsider some of the language proposed.

Larry Morris, 2451 North Shore Drive, spoke against the proposed short-term rental ordinance mirroring what his neighbors have previously said and asked the Planning Commission to deny this ordinance.

Chairman Carroll closed the public hearing and asked for discussion from the commissioners.

Commissioner Taylor asked for the zoning designation of the North Shore neighborhood.

Ms. Ring stated it is zoned Neighborhood Conservation, and according to the proposed ordinance, any short-term rental in this zoning district would require a Conditional Use Permit.

Commissioner Taylor asked if the property that has the concerns had a use permit.

Ms. Ring stated it does not. She also stated that staff has been telling people that since the Planning Commission and Board of Supervisors are currently considering an ordinance change, and once a decision is made, a notice would be sent out to the known short term rental operations stating they are in violation of the ordinance.

Commissioner Distefano asked if enforcement action can be taken on the mentioned property, even if a permit has not been issued.

Ms. Ring confirmed that enforcement action can be taken. Ms. Ring added the property is currently under enforcement for violations separate from the short-term rental.

Commissioner Ford asked if a decision is made on an application, would that standard be set for all future applications.

Ms. Ring stated each conditional use permit stands on its own merit.

Commissioner Gibbs asked if the property in question is a standalone short-term rental.

Ms. Ring stated that there have also been complaints that this property is being used as an event center, and the proposed ordinance would prohibit that.

Bobby Jones stated that in the NC zoning district, event center is not a permitted use and is currently in violation.

Commissioner Distefano asked how this ordinance would deal with preexisting complaints in regard to the first, second and third offense.

Ms. Ring stated that there are currently no short-term rental offenses, so once this ordinance goes into effect that will begin the first offense if the property doesn't come into compliance.

Commissioner Distefano asked if the Planning Commission would know if a property currently has violations when applying for a Conditional Use Permit.

Ms. Ring stated an application wouldn't be accepted for another use on the property, until the violation was abated.

Commissioner Rawls asked if it was possible to require a Conditional Use Permit for all short-term rentals regardless of the zoning district.

Ms. Ring stated that was possible, and the decision to allow RAC and RR by right was decided previously because the lots tend to be larger, and the houses spread out.

Commissioner Rawls stated that after hearing stories like the one shared in North Shore, a Conditional Use Permit should be required for all zoning districts.

Commissioner Ford agreed that it should be required for all zoning districts.

Commissioner Boykin asked if this ordinance did not pass, would a cease-and-desist letter be sent.

Ms. Ring said if this ordinance did not pass, a cease-and-desist letter would be sent out to all known short-term rentals requiring them to apply for a Special Use Permit.

Commissioner Bowser made the motion to recommend approval to the Board of Supervisors with the recommendations from staff along with the amended condition that short-term rentals require a Conditional Use Permit in all residential zoning districts. Commissioner Gibbs seconded the motion, which was adopted with Commissioners, Bowser, Boykin, Distefano, Ford, Rawls, Taylor, Sienkiewicz, Gibbs, Smith and Carroll voting in favor of the motion, and no commissioners voting against (10-0).

The motion passed, and the item will go to the November 16, 2023, Board of Supervisors meeting.

Chairman Carroll called for the next public hearing item.

Proposed Revisions to Appendix B. Zoning: Article I (General Provisions), Section 1-1011, to clarify the power to conduct inspections, Section 1-1013, to clarify penalties and remedies for zoning violations, and to Appendix B-1. Chesapeake Bay Preservation Area Ordinance: Article 5 (Administrative Procedures and Enforcement), Section 5003, to clarify penalties and remedies for violations.

Bobby Jones gave a brief presentation on the proposed language to clarify enforcement provisions in the Zoning and Chesapeake Bay Preservation Area Ordinances.

Chairman Carroll opened the public hearing.

There being no comment, Chairman Carroll closed the public hearing.

Commissioner Taylor made the motion to recommend approval to the Board of Supervisors. Commissioner Smith seconded the motion, which was adopted with Commissioners, Bowser, Boykin, Distefano, Ford, Rawls, Taylor, Sienkiewicz, Gibbs, Smith and Carroll voting in favor of the motion, and no commissioners voting against (10-0).

The motion passed, and the item will go to the November 16, 2023, Board of Supervisors meeting.

OLD BUSINESS

Chairman Carroll called for the following old business item:

Application of NVR, Inc., applicant, and, Henry Layden, special trustee for the William Grover Yeoman, III Trust, property owner, for a Conditional Rezoning (ZA-06-19) of approximately 250 acres of property with tax map number 32-01-009 located on Benns Grant Boulevard (Rte. 10) from the Rural Agricultural Conservation (RAC) zoning district to the Conditional - Planned Development - Mixed Use (C-PD-MX) zoning district.

Amy Ring stated that following last month's meeting, the commissioners developed a list of questions that they wanted schools to answer. Ms. Ring stated that list was sent to schools, however they indicated they needed more time to answer. Ms. Ring stated they will be presenting an updated report at the November 8th School Board meeting and will be able to share that report with the Planning Commission after that meeting. She added that the applicant sent revised documents to the Planning Commission yesterday in response to the additional information requested from them. She stated staff had a more in depth conversation with fire and rescue staff about the significant increase in call volume this development would generate, and after a more detailed look, they believe the increased call volume will not negatively impact their level of service and response time.

Commissioner Taylor asked if there was a timeline for the proposed grant for the intersection at Turner and Route 10.

Ms. Ring responded that a private party completed the master traffic impact analysis, and the County applied for a grant to fund some intersection improvements with the potential for a roundabout.

Chairman Carroll stated Jamie Oliver gave a proposal that would be worthy for the Planning Commission to see.

Ms. Ring stated that Jamie Oliver would be speaking at the retreat, and she will ask her to touch on this.

Chairman Carroll stated that this is an agricultural community, and farm equipment and roundabouts don't always go together.

Commissioner Sienkiewicz stated a single lane roundabout may not work for a ladder truck either.

Commissioner Bowser asked if VDOT has had any comments about the proposed growth within the town and county.

Ms. Ring stated that these applications come in with a traffic impact analysis which are sent to VDOT for review. VDOT reviews these and either confirms the findings or has recommendations or concerns for the applicant to address before coming to public hearing. Ms. Ring added that with the potential development that could happen along this corridor, staff felt like a big picture view would be best, and a few of the property owners agreed to perform a master traffic plan analysis.

Commissioner Boykin stated she feels like we do our community a disservice when each development application is looked at independently instead of all the development applications together as a whole. Ms. Boykin asked for an updated development pipeline to include the ones from Smithfield as well.

Commissioner Rawls shared his concern about not taking into consideration the developments already approved, and if ever built, the additional traffic impact they will create.

Chairman Carroll asked if those numbers go to the schools.

Ms. Ring confirmed the numbers do go to the schools.

Commissioner Gibbs asked if VDOT takes into consideration all the development projects.

Ms. Ring stated yes, it is assumed they are looking at the regional development pipeline.

Commissioner Distefano shared that it is helpful to know the cumulative impacts for the traffic and schools.

Ms. Ring stated that traffic impact analysis is required to include a certain percentage of background growth, but they are not required to take anything in the pipeline into consideration.

Commissioner Rawls asked how this increased activity is affecting staff and their workflow.

Ms. Ring stated the department is short staffed but was able to promote some planners to help manage the workflow.

Commissioner Smith asked for a current price point for the homes.

Tim Trant of Kaufman & Canoles, representing the applicant, stated the projected home prices are $277,000 for the townhomes and $370,000 for the age restricted single-family homes.

Commissioner Ford asked what the age restriction was.

Mr. Trant stated at least one member of the home is required to be aged 55 years old per the Federal Fair Housing Law with no occupants under the age of nineteen.

Commissioner Smith asked for insight on the Town of Smithfield's comments.

Mr. Trant stated that this application meets all the County's requirements for street widths and parking and feels like there is more than adequate parking.

Commissioner Gibbs stated the Town's concern is it is looking like Benns Grant.

Mr. Trant said this application is the product of a lot of thought and collaboration with staff and believe this is a high-quality project and will compliment that corridor.

Jason Grimes of AES Engineering, 5248 Old Town Road, Williamsburg, representing the applicant, stated all the roads associated with the entrance and the single-family section of the project are all designed to VDOT standards. He added that the alleys behind the townhomes are not to VDOT standards to allow for additional parking on the roads.

Commissioner Distefano made the motion to table this application to the next meeting, in hopes to have the schools' responses. Commissioner Bowser seconded the motion, which was adopted with Commissioners, Bowser, Boykin, Distefano, Ford, Rawls, Taylor, Sienkiewicz, Gibbs, Smith and Carroll voting in favor of the motion, and no commissioners voting against (10-0).

NEW BUSINESS

Amy Ring Confirmed there were no items to discuss in new business.

COUNTY ATTORNEY'S REPORT

Bobby Jones asked the Planning Commission to adopt a motion to set the time and place for the retreat.

Chairman Carroll called for a vote to approve the 2023 Planning Commission Retreat for Friday November 3, 2023, at the Windsor Castle Manor House, 705 Cedar Street, Smithfield, VA, beginning at 9:00 AM. Commissioner Rawls made a motion to approve the retreat date and location. Commissioner Boykin seconded the motion. Chairman Carroll asked for all in favor to signify by saying aye. The motion passed unanimously.

PLANNING DIRECTORS REPORT

Amy Ring confirmed there were no items to discuss.

CLOSED MEETING

Chairman Carroll confirmed there were no items to discuss in closed meeting.

ADJOURNMENT

There being no further information to discuss, Chairman Carroll adjourned the meeting at 7:50 PM.

Adopted this _____day of _____, 2023.

_____

Brian Carroll, Chairman, Isle of Wight County Planning Commission

Attest: _____

Amanda Landrus, Secretary

PLANNING REPORT

ATTACHMENTS:

Description	Type	Upload Date
November 16, 2023 Board of Supervisors Work Session Action List	Backup Material	11/21/2023

Action List
Board of Supervisors
November 16, 2023

1. *Approval of Agenda*

   On motion of Supervisor Jefferson, the agenda was adopted (5-0) as presented with Supervisors McCarty, Acree, Jefferson, Grice and Rosie voting in favor of the motion and no Supervisor voting against the motion.

2. *Closed Meeting*

   No action followed the closed meeting.

3. *Citizens' Comments*

   A. Wayne Custison of Ivor expressed concern with AES's Sycamore Cross 240 MW solar project. He was requested by Chairman McCarty to provide his contact information to the County Attorney

   B. Brian Hill of the Windsor District requested the Board's consideration of veterans receiving tax exemptions for two vehicles. He was requested by Chairman McCarty to provide his contact information to the County Attorney.

   C. Herb DeGroft of the Carrsville District spoke against the Board providing additional funding to the School Board.

4. *Consent Agenda*

   Following an overview of the Consent Agenda by County Administrator Keaton, Vice-Chairman Acree moved to adopt the following Consent Agenda as presented which passed unanimously (5-0) with Supervisors McCarty, Acree, Jefferson, Grice and Rosie voting in favor of the motion and no Supervisor voting against the motion:

A. Resolution to Amend the FY2023-2024 Grant Fund Budget and Appropriate Funding from the Virginia Department of Motor Vehicles Alcohol Enforcement Program ($12,850)

Assignment: B&F

B. Resolution to Amend the FY 2023-2024 Grant Fund Budget and Appropriate Funding from the Virginia Department of Motor Vehicles Police Traffic Services Enforcement Program ($29,815)

Assignment: B&F

C. Resolution to Amend the Budget and Appropriate Funding for the Fifth District Court Juvenile Detention Agreement ($571,800)

Assignment: B&F

D. Resolution to Amend the FY2023-2024 Budget and Appropriate Funding for the Smithfield Sidewalk Project $255,893)

Assignment: B&F

E. Acquisition of Trucks for the Department of Parks & Recreation ($124,855)

Assignment: B&F

5. *Regional and Inter-Governmental Reports*

For the Board's information

6. *Appointments*

A. Blackwater Regional Library Board: Chairman McCarty moved to appoint Rita Gibson to replace Catherine Funk as the at-large member. The motion passed unanimously (5-0) with Supervisors McCarty,

Acree, Jefferson, Grice and Rosie voting in favor of the motion and no Supervisor voting against the motion.

Assignment: Storm

B. Historical Architectural Review Committee: Supervisor Grice moved that Carolyn Keen be reappointed to the Historical Architectural Review Committee serving the Smithfield District. The motion passed unanimously (5-0) with Supervisors McCarty, Acree, Jefferson, Grice and Rosie voting in favor of the motion and no Supervisor voting against the motion.

Assignment: Storm

C. Adults with Special Needs: Vice-Chairman Acree recommended that interested candidates reach out to the Board indicating their interest in serving.

7. *Special Presentations / Appearances*

A. Presentation on Medicare Benefits: A representative from the Bonnie Dozier, Virginia Insurance Counseling and Assistance Program, provided information on the Medicare program in terms of eligibility and other components of that Program.

B. A report on the 2023 County Fair was presented by Jenna Lee.

C. A presentation on VDOT's "Paint the Plow" Program was provided by Julie Boswell, Transportation Department.

8. *County Attorney's Report*

January 2024 Isle of Wight County Board of Supervisors' By-Laws and Rules of Procedure: The Board was requested to review and advise County Attorney Jones of any proposed changes or revisions to its by-laws and rules of procedure for adoption at its organizational meeting in January 2024.

9. *Public Hearings*

A. Application of Courthouse Hwy Solar 1, LLC, Applicant, and Michael S. Doggett, Property Owner, for a Conditional Use Permit for a Major Utility Service, Specifically a 3 MW Utility-Scale Solar Energy Generation Facility, on Eighteen Acres Located at 16419 Courthouse Highway in the Rural Agricultural Conservation (RAC) Zoning District: Supervisor Grice moved that the Conditional Use Permit for the solar project, as well as the withdrawal of the acreage from the Forrestal District with the conditions as presented. The motion passed unanimously (5-0) with Supervisors McCarty, Acree, Jefferson, Grice and Rosie voting in favor of the motion and no Supervisor voting against the motion.

   Assignment: Ring

B. Ordinance to Amend Appendix B. Zoning: Article III, Section 3-6000 (Use Types), Article IV (Zoning Districts and Boundaries), Article V (Supplementary Use Regulations), and Section 5-5005: Chairman McCarty moved that the Ordinance be tabled until the Board's December 14, 2023 regular meeting. In the meantime, the County Attorney is to develop the proper language. The motion passed unanimously (5-0) with Supervisors McCarty, Acree, Jefferson, Grice and Rosie voting in favor of the motion and no Supervisor voting against the motion.

   Assignment: Ring

C. Ordinance to Amend and Reenact Chapter 10, Licenses, Short Term Rental Registry of the Isle of Wight County Code: Vice Chairman Acree moved that the Ordinance be tabled to the Board's December 14, 2023 regular meeting. The motion passed unanimously (5-0) with Supervisors McCarty, Acree, Jefferson, Grice and Rosie voting in favor of the motion and no Supervisor voting against the motion.

   Assignment: Ring

D. Ordinance to Amend and Reenact the Isle of Wight County Code by Amending and Reenacting Appendix B. Zoning and Appendix B-1.

Chesapeake Bay Preservation Area Ordinance: Supervisor Jefferson moved that the Ordinance be adopted. The motion passed unanimously (5-0) with Supervisors McCarty, Acree, Jefferson, Grice and Rosie voting in favor of the motion and no Supervisor voting against the motion.

Assignment: Ring

E. Ordinance to Amend and Reenact Chapter 15, Taxes of the Isle of Wight County Code: Supervisor Jefferson moved that the Ordinance be adopted. The motion passed unanimously (5-0) with Supervisors McCarty, Acree, Jefferson, Grice and Rosie voting in favor of the motion and no Supervisor voting against the motion.

Assignment: Ring

10. *County Administrator's Report*

A. An update on what the State is requesting was provided by Jamie Oliver, Transportation Manager, and it was recommended that this be discussed in more detail at the Board's December meeting.

Assignment: Oliver

B. Matters for the Board's Information were highlighted as follows: 1.) Incidents by Zone Map – October 2023; 2.) Incidents by Zone Data (October 2023); Station Activity Report (October 2023); and, Museum Report (October 2023).

11. *Unfinished / Old Business*

A. Resolution to Establish Isle of Wight County's Legislative Priorities for the 2024 General Assembly Session: Supervisor Grice moved that the Resolution be adopted with the modification to "Additional Sales Tax." The motion passed unanimously (5-0) with Supervisors McCarty, Acree, Jefferson, Grice and Rosie voting in favor of the motion and no Supervisor voting against the motion.

Assignment: Ring

B. Water and Sewer Agreement/Town of Smithfield: Supervisor Grice moved to authorize execution of the Water and Sewer Agreement with the Town of Smithfield. The motion passed unanimously (5-0) with Supervisors McCarty, Acree, Jefferson, Grice and Rosie voting in favor of the motion and no Supervisor voting against the motion.

Assignment: Ring

12. *New Business*

A. Resolution to Amend the Budget and Appropriate Funding for School Employees' Compensation ($485,616): Supervisor Grice moved that two members of the BOS (McCarty/Grice) and two members from the School Board meet in order to discuss how to fund the request; what are the non-SOQ positions the Board is being requested to provide; the job titles; the number of people; the number of positions and their average wage. The motion passed unanimously (5-0).

Assignment: Keaton

B. Certification Letter for the School Construction Assistance Program: Chairman McCarty moved to authorize the Chairman to execute the letter.

PLANNING REPORT

APPLICATION:

The application of Moonlight Solar, LLC (CUP-10-23), applicant, and George Benjamin Edwards, Jeanette J. Edwards, George W. Edwards, LeAnne Ricks Edwards Wait, and Dana Louise Edwards, property owners, for a conditional use permit to establish a major utility service, specifically a 44 MW utility-scale solar energy generation facility and substation, on approximately 523 acres located on Moonlight Road (Rte. 627) and Burwells Bay Road (Rte. 621) on tax parcels 11-01-017, 11-01-018, 11-01-023 and 11-01-023A in the Rural Agricultural Conservation zoning district. The application includes a request to withdraw approximately 523 acres from the Moonlight Agricultural/Forestal District.

ELECTION DISTRICT:

D5

LOCATION:

The proposed project is located on four properties approximately ¼ mile from the County of Surry jurisdictional boundary at its closest point. The project will have frontage on Moonlight Road and Burwells Bay Road. It is adjacent to agricultural and forestal lands and single-family residences. The project lies approximately 1/2 mile east of the existing Cavalier Solar Project. Property location and proximity maps are attached to this staff report.

BACKGROUND:

The properties on which the proposed project is located are currently in agricultural uses. The properties are zoned Rural Agricultural Conservation (RAC). The project sites are secured by lease agreements with the landowners. On October 4, 2023, the Agricultural and Forestal District Advisory Committee held a public meeting to consider an application by the property owners to withdraw the entirety of the subject parcels from the Moonlight Agricultural/Forestal District. The Committee recommended approval of the request.

This application was submitted on May 16, 2023 and reviewed under the zoning ordinance language prior to the Board of Supervisors adopting amendments to the supplementary use regulations for major utility services at their May 18, 2023 meeting.

DESCRIPTION:

The applicant has proposed a 44 MW solar energy generation facility on a total of 522.96 acres that spans across four different parcels. The project will consist of solar panels along with their racking systems and metal posts, inverters, collection lines, a substation, fencing, underground conduits lines, and access roads that will connect different sections of the project. The substation area will include a transformer, utility interconnection lines, and switching station which will allow the electrical system to interconnect to the 230kV Surry to Chuckatuck Dominion Energy powerline running directly through the interior of the project site. A project narrative provided by the applicant is attached to this staff report.

The applicant has largely designed the application to be in compliance with the recently amended zoning ordinance language as it relates to major utility services.

Public Facility Impacts:

The impacts of the proposed facility on public roads will occur primarily during construction and will be minimal once the use is established. In establishing the use, the enjoyment of neighboring properties may also be temporarily impacted by construction traffic and noise generation. The applicant has provided a proposed construction transportation route which has been reviewed and approved by the Virginia Department of Transportation. The plan is attached to the staff report. The applicant states that deliveries will be coming from the east along Old State Highway (Rte. 10) and westward down Burwells Bay Road (Rte. 621). Hours of construction are proposed to be limited from 7:00 a.m. to 6:00 p.m. In order to ensure safety and neighborhood welfare, staff recommends that no construction should occur on Sundays by any party involved with the project, to include the solar developer, its contractors, and Dominion Energy contractors.

Environmental Assessment:

The project lies within the Blackwater River watershed area and has several wetland areas within. A Jurisdictional Waters Determination Request form has been submitted to the U.S. Army Corp. of Engineers for review and necessary permits will be required prior to site plan approval. The project is designed to avoid impacts to wetlands and streams. There are two instances of underground collection lines crossing wetlands, of which one of these two instances includes the underground collection line crossing a Zone A floodplain.

The Department of Conservation and Recreation's Division of Natural Heritage

(DCR) confirms that the proposed activity will not affect any documented state-listed plants or insects that are threatened or endangered.

The proposed project will impact ecological cores classified in importance as high, moderate, and general (C3, C4, C5) as identified in the Virginia Natural Landscape Assessment. Ecological core areas are classified into five categories of ecological integrity: C1 – Outstanding; C2 – Very High; C3 – High; C4 – Moderate; and C5 – General. Scores are enhanced if the core or habitat fragment is part of a larger complex of natural lands. Scores also increase for those cores and habitat fragments that contribute to water quality enhancement. In general, larger, more biologically diverse areas are given higher scores. DCR recommends avoidance of impacts to cores. However, when avoidance cannot be achieved, DCR recommends minimizing the area of impacts overall and concentrating the impacted area at the edges of cores, so that the most interior remains intact. The proposed project will impact 36 acres of "high" importance ecological core, 4.4 acres of "moderate" core, and 12.7 acres of core with "general" importance. A map of the impact acreage to each type of ecological core impact is included in the staff report.

When considering soil classifications inside the fence of the project, there are 212.3 acres of prime farmland, 60.1 acres of prime farmland, if drained, 1.2 acres of farmland of statewide importance, and the remaining 31.4 acres are neither prime farmland or farmland of statewide importance. As soil assessment map showing the different soils is included in the staff report.

Additional environmental reports provided by the applicant and state agency responses are attached to the staff report.

Historical Resources Assessment:

A phase 1B archeological survey was conducted for the project area and are included in the attachments to this report. The phase 1B survey resulted in the identification of five archeological sites within the project area. None of these sites are considered eligible for listing in the National Register of Historic Places (NRHP), and no additional work is recommended for the project area. The applicant has stated that Moonlight Solar will work with the landowners to give the Isle of Wight County Museum the opportunity to be a repository for any new finds.

A phase 1 architecture survey and effects assessment was conducted for the project area and are included in the attachments to this report. The phase 1 study

resulted in the identification of 21 historic architecture resources. Eleven previously recorded resources were identified within the ½ mile buffer around the project. Of those eleven resources, nine had been surveyed within the past five years. None of the surveyed resources were eligible for listing in the National Register of Historic Places (NRHP).

The analysis identified previously recorded historic structures within the vicinity of the project site. The Carroll Plantation (VDHR #046-0064) has been listed as eligible for the National Register of Historic Places (NRHP) and is located on a parcel adjacent to the project site. This resource has previously been determined potentially eligible as a good example of an early to mid-nineteenth century plantation home.

The phase 1B archeological survey and phase 1 architectural survey are included as attachments to the staff report.

Economic Impact Assessment:

According to the applicant's economic impact analysis, the project encompasses approximately 523 acres, of which the actively-used portion of the project and required buffers would be approximately 492.38 acres. The economic impact assessment states the project will generate two permanent full-time jobs. The County's current assessment value of affected acreage is approximately $505,600. Based on the assessed value, the properties generate about $1,577.50 in real estate tax revenue for agricultural use per year, or $63,100 over forty years. The July 1, 2023, General Reassessment of Real Estate established new criteria for assessment of land associated with conditional use permits. The new methodology for solar farms establishes an assessment of $15,000 per acre for the entire area approved for the conditional use permit, which in this case would be 492.38 acres per the application. This will result in an increased amount of taxes, higher than the project's financial analysis projects. Under the County's previous assessment criteria which only included fenced-in acreage, the solar facility use would have generated approximately $26,600 annually, or $1,065,000 annually in addition to a one-time amount of $31,000 in rollback taxes. This does not include any sort of siting agreement. The County would also derive machinery and tax revenue from capital investments on site which would generate approximately $3,241,400 over forty years.

In addition to the base tax revenue, Moonlight Solar, LLC, is proposing a siting agreement of an upfront payment of $25,000 per megawatt which would commence at the beginning of commercial operation which would result in

approximately $1.1 million in the first year of operation.

The economic impact assessment uses the IMPLAN model to generate economic impact projections based on assumptions of direct annual economic impacts along with indirect impacts, or "ripple effects." The project's total estimated input to the County would include 1) 2 full-time, permanent jobs, 2) $84,600 in wages and benefits, and 3) $297,800 in economic output.

According to the 2017 Census of Agriculture (USDA-NASS), Isle of Wight County has 237 farms totaling 80,672 aces of land. The average farm size is 340 acres. The average annual market value of agricultural products sold per farm is $270,985. Using the same data to derive market values for crops cultivated on 184.2 acres within the fence of this project, the farmland generates an estimated $146,832 in market value.

Currently, agriculture and silviculture are two of the County's top industries. The Moonlight Solar Facility would be the tenth solar energy generation facility in the County and represents a subtraction of approximately 0.61% of the County's cultivated land (USDA-NASS, 2017). While this project represents approximately 15.7% of the collective 3,129 acres of cultivated land encompassed by all ten solar projects, longer-term cumulative land conversions could create adverse effects on the local agricultural industry. A table showing the previously approved and proposed solar energy facilities is attached to the staff report.

Viewshed Analysis:

The applicant provided several viewshed renderings comparing how the existing site looks currently to what it would look immediately after the landscaping buffers are planted and again at the time of maturity. The analysis includes perspectives from Moonlight Road and Burwells Bay Road. The analysis is included as an attachment to the staff report.

COMPREHENSIVE LAND USE PLAN:

The future recommended land use designation for these properties is Rural Agricultural Conservation (RAC) and Environmental Conservation (EC) under the adopted Comprehensive Plan. Appropriate uses for the RAC land use designation include agriculture, horticulture, forest lands, and scattered low-density residential uses. Other uses such as resource extraction and utility-scale solar facilities are also permitted when appropriately sited. Appropriate uses for the EC land use designation include wetlands, farms, forest uses, open space, and

limited park facilities.

Solar Energy facilities are considered compatible with the RAC land use when properly sited and with the application of appropriate development criteria. The area designated as EC should be preserved due to environmental constraints unless site-specific analysis demonstrates there are no environmental concerns in a specific area.

ORDINANCE REVIEW:

The zoning district classification for the subject properties is Rural Agricultural Conservation (RAC). The RAC zoning district is intended to preserve an protect areas of the County that are predominantly in agricultural and forestall use and to maintain the existing land base to support those activities.

The applicant proposes to establish a 44MW solar energy facility, which is classified as a major utility serve use type in the Zoning Ordinance. These facilities are permitted as conditional uses in the RAC, RR, and GC zoning districts and may be considered compatible with appropriate conditions to mitigate any potential negative impacts on the surrounding community.

Section 1-1017 of the Zoning Ordinance provides standards for review of a conditional use application that the Planning Commission and Board of Supervisors shall consider before granting a conditional use permit. They are as follows:

1. That the establishment, maintenance, and operation of the conditional use will not be detrimental to or endanger the public health, safety, and general welfare;
2. That the conditional use will not be injurious to the use and enjoyment of other property in the immediate vicinity for the purposes already permitted, nor substantially impair the use of other property within the immediate proximity;
3. That adequate utilities, water, sewer or septic system, access roads, storm drainage and/or other necessary public facilities and improvements have been or will be provided;
4. That adequate measures have been or will be taken to provide ingress and egress so designed as to minimize traffic congestion on the public streets;
5. That the proposed conditional use is not contrary to the goals and objectives of the Isle of Wight County Comprehensive Plan;
6. That the conditional use shall, in all other respects, conform to the applicable regulations of the zoning district classification in which it is located and to the

special requirements established for the specific use; and
7. That the use(s) at the location proposed will not result in a multiplicity or saturation of similar uses in the same general neighborhood of the proposed use

In addition to the standards and other guidelines described in the Zoning Ordinance, the Board may impose conditions or limitations on any approval, including the posting of performance guarantees. Such conditions may include, but are not necessarily limited to:

1. The number of persons living or working in the immediate area and the proposed hours of operation, as may applicable;
2. Traffic conditions, including facilities for pedestrians, such as sidewalks and parking facilities; the access of vehicles to roads; peak periods of traffic; and proposed roads, but only if construction of such roads will commence within the reasonably foreseeable future;
3. The orderly growth of the neighborhood and community and the fiscal impact on the County;
4. The effect of odors, dust, gas, smoke, fumes, vibration, glare, and noise upon the use of surrounding properties;
5. Facilities for police, fire protection, sewerage, water, trash and garbage collection and disposal, and the ability of the County or persons to supply such services;
6. The degree to which the development is consistent with generally accepted engineering and planning principles and practices;
7. The structures in the vicinity such as schools, houses of worship, theaters, hospitals, and similar places of public use;
8. The purposes set forth in this ordinance, the County's Comprehensive Plan, and related studies for land use, roads, parks, schools, sewers, water, population, recreation, and the like;
9. The environmental impact, the effect on sensitive natural features, and opportunities for recreation and open space; and
10. The preservation of cultural and historic resources of landmarks.

Should the CUP be approved, the applicant will be required to submit a site plan for review and approval in accordance with Zoning Ordinance requirements and conditions of approval.

AGENCY REVIEW:

The application was forwarded to the following departments for their review:

- Economic Development: No concerns
- Emergency Services: All concerns have been addressed in the application.
- Environmental Planner: All concerns have been addressed in the application.
- Commissioner of the Revenue: The July 1, 2023, General Reassessment of Real Estate established new criteria for assessment of land associated with conditional use permits. The new methodology for solar farms establishes an assessment of $15,000 per acre for the entire area approved for the conditional use permit. Moonlight Solar designates a 250-acre fenced-in site as solar use property. The use permit application applies for 492.28 acres. The $15,000 per acre assessment will apply to the 492.38 acres. This will result in an increased amount of taxes, higher than the project's financial analysis projects.
- Sheriff's Department: Increase in patrol during the construction phase and the traffic impacts on proposed transportation routes. These are primarily secondary roads with no to minimal shoulders and are also shared with farm vehicles. During the construction phase they will be bringing in heavy equipment and large vehicles which will require escorts or even road closures. Also, there being multiple sites there is a concern of the operation of heavy equipment on the roads from one parcel to another.
- County Attorney: Only include conditions that go above what is now required under the zoning ordinance.
- VDOT: All concerns have been addressed in the application.
- Isle of Wight County Museum: After review of archeological and architectural surveys, no additional archeological work is recommended within the project area. Should the project proceed, the potential within the project area for archeological artifacts is highly likely. If the landowner is willing, the Isle of Wight County Museum should be considered a repository for discovered artifacts and future finds on this site as they could further the interpretation or discovery of Isle of Wight County history.

Please note that, should this CUP be approved, it will be subject to review and approval from all associated agencies during site plan review.

STAFF CONCLUSIONS:

Strengths:

1. The application is generally consistent with the Comprehensive Plan and can meet all ordinance requirements.

2. The proposed use will have minimal impact on community facilities and resources.

Weaknesses:

1. The proposed use would remove agricultural land from production.
2. Temporary impact to residential development in the area from construction traffic and noise is expected during the construction phase.
3. The project will create visual impacts to historical properties which can be substantially mitigated upon landscaping maturity.
4. The project will impact identified ecological core areas, including 36 acres of cores with high importance, 4.4 acres of cores with moderate importance, and 12.7 acres of cores with a general importance.
5. Approval of the project would result in a multiplicity and saturation of similar uses within a 1/2 mile distance to another solar energy generation facility.
6. With no to minimal shoulders and deep ditches at several points along the proposed transportation route there may be safety issues that arise as construction vehicles meet along the route.

STAFF RECOMMENDATION:

Based on the identified weaknesses, staff recommends denial of the Conditional Use Permit and the Moonlight ADF withdrawal request. However, should the CUP and withdrawal be approved staff recommends the following conditions: 1) Topsoil shall be stockpiled on the site and shall be stored out of view from adjacent properties and public roads. 2) The applicant shall submit an invasive species management plan as recommended by DCR with the submission of the final site plan. 3) The applicant shall submit a habitat assessment relative to the Barking treefrog as recommended by DCR. 4) The applicant shall submit a seed mix for site groundcover that includes native pollinators blooming in spring/summer as recommended by DCR. 5) The applicant will work directly with the Isle of Wight County Chamber of Commerce, Paul D. Camp Community College, and the Economic Development Department to ensure inclusion of local contractors in the bidding process. 6) A laminated Emergency Response Poster will be mounted near the front gate. The poster will include a general site plan, evacuation routes and muster points, emergency response chain of command, directions to the closest hospital, coordinates to the closest life flight landing area, and other pertinent information associated with the facility during an emergency response. 7) The facility perimeter fencing will be equipped with push bar pedestrian gates to permit emergency exits from the facility. 8) Adherence to the proposed transportation plan shall be required for all facility traffic. Truck traffic

shall be limited to only the routes shown in the transportation plan. No other local routes in Isle of Wight County may be used. 9) Excluding the bufferyards, the ground between the panels and in areas not otherwise covered by gravel or infrastructure shall be planted and maintained with a vegetative cover. This vegetative cover will be managed with mowing and/or grazing. 10) Hours of operation for construction and post-construction operation shall be limited to Monday through Friday, 7:00 a.m. to 6:00 p.m. Saturdays from 7:00 a.m. to 5:00 p.m. No construction is to occur on Sundays by any party involved with the project. 11) As part of the site plan review, the applicant shall provide documentation that the selected panels and all power-generating equipment on-site are "Tier 1" modules, as established by the most recent "PV Module Tier 1 List" issued by Bloomberg NEF or a similar third party analysis widely accepted in the solar industry. Additionally, the make and model of the selected panels and all power-generating equipment initially installed and replaced on the site must qualify, for disposal purposes only, as non-hazardous waste under applicable U.S. Environmental Protection Agency tests (e.g. TCLP). 12) The applicant shall implement a program for the collection of baseline data establishing pre-construction soil conditions for the production of row crops for the agricultural areas within the project area. The program shall establish the relevant characteristics of the topsoil. The baseline data shall be derived from field and laboratory testing of soil conditions, including depth, density, and quality from representative locations. Laboratory testing shall be conducted by an accredited laboratory. Parameters for assessing soil quality may include the following: infiltration rate, bulk density, water holding capacity, pH, percent organic matter, cation exchange capacity, Phosphorous/Phosphate (P), Nitrogen (N), and Potassium/Potash (K). After 30 years of operation and again after 35 years of operation, soil conditions shall be determined for the same sampling locations using the same parameters and the results used to plan soil restoration activities. After equipment is removed as part of decommissioning, soil conditions shall be determined for the same sampling locations using the same parameters. Soil restoration activities shall be performed as necessary during operations or decommissioning to return soil conditions to at least baseline conditions. The County will be provided with data of soil conditions within 30 days after the receipt of results. 13) Any recommendations provided by VDHR during site plan review will be adhered to, in addition to requirements in the zoning ordinance.

ATTACHMENTS:

Description	Type	Upload Date
Application	Backup Material	11/1/2023
Agricultural/Forestal District Withdraw Request	Backup Material	11/1/2023

Narrative and Response Comments	Backup Material	11/1/2023
Concept Plan and Maps	Backup Material	11/1/2023
Visual Impact Analysis	Backup Material	11/1/2023
Transportation Plan	Backup Material	11/1/2023
Economic Impact Analysis	Backup Material	11/1/2023
Environmental Resources Impact Analysis and DCR Response	Backup Material	11/1/2023
Historical and Cultural Resources Impact Analysis and DHR Response	Backup Material	11/1/2023
Transmission Capacity Report	Backup Material	11/1/2023
Appraisal Report	Backup Material	11/1/2023
Decommissioning Plan	Backup Material	11/1/2023
Site Images	Backup Material	11/2/2023
Location Map	Backup Material	11/2/2023
Closeup Map 1	Backup Material	11/2/2023
Closeup Map 2	Backup Material	11/2/2023
Cavalier Solar and Moonlight Solar Proximity Map	Backup Material	11/16/2023
Zoning Map	Backup Material	11/2/2023
Land Use Map	Backup Material	11/2/2023
Solar Farms Acreage Table	Backup Material	11/16/2023
PC Resolution	Resolution	11/14/2023
Commissioner of the Revnue Comments	Backup Material	11/16/2023
Isle of Wight County Museum Comments	Backup Material	11/16/2023
Sheriff Department Comments	Backup Material	11/16/2023

Local Roots, Global Reach
ISLE OF WIGHT
COUNTY, VIRGINIA
DEPARTMENT OF PLANNING AND ZONING

APPLICATION FOR CONDITIONAL / SPECIAL USE PERMIT

This application should be used to petition for a permit for certain uses which, because of their unique characteristics or potential impacts on adjacent land uses, are not generally permitted in certain zoning districts as a matter of right, but which may, under the right set of circumstances and conditions be acceptable in certain specific locations. The following application requirements are consistent with the procedures set forth in Section 1-1017, *Conditional Uses,* and Section 1-1018, *Special Use Permits for Uses Not Provided For,* of the Isle of Wight County Zoning Ordinance, as amended.

A. APPLICATION FOR (CHECK ALL THAT APPLY):

[X] Conditional Use Permit (Are applicant proposed conditions attached?): X Yes _____ No

The proposed use or activity is listed as a conditional use in the RAC zoning district as per Section 4-1005 in Article IV of the Isle of Wight County Zoning Ordinance.

[ ] Special Use Permit (Are applicant proposed conditions attached?): _____ Yes _____ No

Proposed Use or Activity: 44MWac Utility Scale Solar Project

B. PROJECT DESCRIPTION:

Project Name: Moonlight Solar

Property Address (if any): _____

Election District: District 5

Comprehensive Plan Designation: Rural Agricultural Conservation (RAC)

The use permit will apply to 492.26 acres out of 522.96 total acres

Tax Parcel Identification # 11-01-017 Number of acres to be effected: 114.26

Tax Parcel Identification # 11-01-018 Number of acres to be effected: 163.95

Tax Parcel Identification # 11-01-023 Number of acres to be effected: 77

Tax Parcel Identification # 11-01-023(A) Number of acres to be effected: 137.75

Proposed Utilities (check all that apply): Public Water _____ Private Well _____

Public Sewer _____ Private Septic _____

C. **APPLICATION INFORMATION:**

Applicant(s) Name(s): Moonlight Solar, LLC

Address: 4446 Hendricks Ave #356

City, State, Zip Code: Jacksonville, Florida 32207

Phone No.: 772-274-2405 Email: czajicek@pd46energy.com Fax No.:

Property Owner(s) Name(s): George Benjamin Edwards, Jeanette J. Edwards, George W. Edwards , LeAnne Ricks Edwards Wait, Dana Louise Edwards

Address: 8266 Moonlight Rd

City, State, Zip Code: Smithfield, VA, 23430

Phone No.: 757-377-7799 Email: jil1020@aol.com Fax No.:

5/3/23

Applicant Signature **Date**

5/3/23

Owner Signature ***if different*** **Date**

George Benjamin Edwards

NOTICE: THE ATTACHED CHECKLIST MUST BE COMPLETED, CERTIFIED, AND SUBMITTED OR THE APPLICATION WILL BE CONSIDERED INCOMPLETE.

Remit Application to: Isle of Wight County Central Permitting, 17140 Monument Circle, Suite 100
P. O. Box 80, Isle of Wight, Virginia 23397

FOR OFFICE USE ONLY:

Complete Application Received On:_____ Fees Paid: _____
Tax Query: [ ] Current [ ] Delinquent Distribution Date: _____
Posted/Date to Post: _____

AGENCIES REFERRALS:

_____ Department of Conservation & Recreation
_____ Economic Development
_____ Emergency Services
_____ General Services
_____ Environmental Planner
_____ Health Department
_____ Transportation Manager
_____ Commission of Revenue
_____ Other _____

_____ Inspections
_____ Sheriff's Office
_____ Town of Smithfield
_____ Town of Windsor
_____ VDOT
_____ Schools
_____ Budget & Finance
_____ County Attorney

Verified By:_____ Date: _____

C. **APPLICATION INFORMATION:**

Applicant(s) Name(s): Moonlight Solar, LLC

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City, State, Zip Code: Jacksonville, Florida 32207

Phone No.: 772-274-2405 Email: czajicek@pd46energy.com Fax No.:

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Address: 8266 Moonlight Rd

City, State, Zip Code: Smithfield, VA, 23430

Phone No.: 757-377-7799 Email: jil1020@aol.com Fax No.:

5/3/23

Applicant Signature **Date**

5/9/23

Owner Signature *if different* **Date**

Dana Louise Edwards

NOTICE: THE ATTACHED CHECKLIST MUST BE COMPLETED, CERTIFIED, AND SUBMITTED OR THE APPLICATION WILL BE CONSIDERED INCOMPLETE.

Remit Application to: Isle of Wight County Central Permitting, 17140 Monument Circle, Suite 100
P. O. Box 80, Isle of Wight, Virginia 23397

FOR OFFICE USE ONLY:

Complete Application Received On: _____ Fees Paid: _____
Tax Query: [ ] Current [ ] Delinquent Distribution Date: _____
Posted/Date to Post: _____

AGENCIES REFERRALS:

_____ Department of Conservation & Recreation
_____ Economic Development
_____ Emergency Services
_____ General Services
_____ Environmental Planner
_____ Health Department
_____ Transportation Manager
_____ Commission of Revenue
_____ Other _____

_____ Inspections
_____ Sheriff's Office
_____ Town of Smithfield
_____ Town of Windsor
_____ VDOT
_____ Schools
_____ Budget & Finance
_____ County Attorney

Verified By: _____ Date: _____

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Applicant(s) Name(s): Moonlight Solar, LLC

Address: 4446 Hendricks Ave #356

City, State, Zip Code: Jacksonville, Florida 32207

Phone No.: 772-274-2405 Email: czajicek@pd46energy.com Fax No.:

Property Owner(s) Name(s): George Benjamin Edwards, Jeanette J. Edwards, George W. Edwards , LeAnne Ricks Edwards Wait, Dana Louise Edwards

Address: 8266 Moonlight Rd

City, State, Zip Code: Smithfield, VA, 23430

Phone No.: 757-377-7799 Email: jil1020@aol.com Fax No.:

5/3/23

Applicant Signature **Date**

5/7/23

Owner Signature *if different* **Date**

George W. Edwards

NOTICE: THE ATTACHED CHECKLIST MUST BE COMPLETED, CERTIFIED, AND SUBMITTED OR THE APPLICATION WILL BE CONSIDERED INCOMPLETE.

Remit Application to: Isle of Wight County Central Permitting, 17140 Monument Circle, Suite 100
P. O. Box 80, Isle of Wight, Virginia 23397

FOR OFFICE USE ONLY:

Complete Application Received On:_____ Fees Paid: _____
Tax Query: [ ] Current [ ] Delinquent Distribution Date: _____
Posted/Date to Post: _____

AGENCIES REFERRALS:

_____ Department of Conservation & Recreation
_____ Economic Development
_____ Emergency Services
_____ General Services
_____ Environmental Planner
_____ Health Department
_____ Transportation Manager
_____ Commission of Revenue
_____ Other _____

_____ Inspections
_____ Sheriff's Office
_____ Town of Smithfield
_____ Town of Windsor
_____ VDOT
_____ Schools
_____ Budget & Finance
_____ County Attorney

Verified By:_____ Date: _____

C. **APPLICATION INFORMATION:**

Applicant(s) Name(s): Moonlight Solar, LLC

Address: 4446 Hendricks Ave #356

City, State, Zip Code: Jacksonville, Florida 32207

Phone No.: 772-274-2405 Email: czajicek@pd46energy.com Fax No.:

Property Owner(s) Name(s): George Benjamin Edwards, Jeanette J. Edwards, George W. Edwards , LeAnne Ricks Edwards Wait, Dana Louise Edwards

Address: 8266 Moonlight Rd

City, State, Zip Code: Smithfield, VA, 23430

Phone No.: 757-377-7799 Email: jil1020@aol.com Fax No.:

5/3/23

Applicant Signature **Date**

LeAnn Ricks Edwards Wait 5/7/23

Owner Signature *if different* **Date**

LeAnn Ricks Edwards Wait

NOTICE: THE ATTACHED CHECKLIST MUST BE COMPLETED, CERTIFIED, AND SUBMITTED OR THE APPLICATION WILL BE CONSIDERED INCOMPLETE.

Remit Application to: Isle of Wight County Central Permitting, 17140 Monument Circle, Suite 100
P. O. Box 80, Isle of Wight, Virginia 23397

FOR OFFICE USE ONLY:

Complete Application Received On: _____ Fees Paid: _____
Tax Query: [ ] Current [ ] Delinquent Distribution Date: _____
Posted/Date to Post: _____

AGENCIES REFERRALS:

_____ Department of Conservation & Recreation
_____ Economic Development
_____ Emergency Services
_____ General Services
_____ Environmental Planner
_____ Health Department
_____ Transportation Manager
_____ Commission of Revenue
_____ Other _____

_____ Inspections
_____ Sheriff's Office
_____ Town of Smithfield
_____ Town of Windsor
_____ VDOT
_____ Schools
_____ Budget & Finance
_____ County Attorney

Verified By: _____ Date: _____

C. **APPLICATION INFORMATION:**

Applicant(s) Name(s): Moonlight Solar, LLC

Address: 4446 Hendricks Ave #356

City, State, Zip Code: Jacksonville, Florida 32207

Phone No.: 772-274-2405 Email: czajicek@pd46energy.com Fax No.:

Property Owner(s) Name(s): George Benjamin Edwards, Jeanette J. Edwards, George W. Edwards , LeAnne Ricks Edwards Wait, Dana Louise Edwards

Address: 8266 Moonlight Rd

City, State, Zip Code: Smithfield, VA, 23430

Phone No.: 757-377-7799 Email: jil1020@aol.com Fax No.:

5/3/23

Applicant Signature **Date**

Jeanette J. Edwards 5/7/2023

Owner Signature *if different* **Date**

Jeanette J. Edwards

NOTICE: THE ATTACHED CHECKLIST MUST BE COMPLETED, CERTIFIED, AND SUBMITTED OR THE APPLICATION WILL BE CONSIDERED INCOMPLETE.

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_____ Department of Conservation & Recreation
_____ Economic Development
_____ Emergency Services
_____ General Services
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_____ Other _____

_____ Inspections
_____ Sheriff's Office
_____ Town of Smithfield
_____ Town of Windsor
_____ VDOT
_____ Schools
_____ Budget & Finance
_____ County Attorney

Verified By: _____ Date: _____

COUNTY OF ISLE OF WIGHT
DISCLOSURE OF REAL ESTATE HOLDINGS

Applicant Moonlight Solar, LLC

Address 4446 Hendricks Ave #356
Street

Jacksonville Florida 32207
City State Zip

REAL ESTATE HOLDINGS TO BE AFFECTED

Location or Address	Description
11-01-017	Agriculture- RAC
11-01-018	Agriculture- RAC
11-01-023	Agriculture- RAC
11-01-023(A)	Agriculture- RAC

OTHER OWNERS OF AFFECTED REAL ESTATE
(Not Required for Corporation whose stock is traded on a national or local stock exchange or having more than 500 shareholders.)

Name of Individuals Corporation/Partnership Business Association	Address
George Benjamin Edwards, Jeanette J. Edwards,George W. Edwards, LeAnne Ricks Edwards Wait, Dana Louise Edwards	c/o Moonlight Bay Farm, 8266 Moonlight Rd. Smithfield, VA, 23430

Does any member of the Isle of Wight County Planning Commission or governing body have any interest in such property, either individually, by ownership of stock in a corporation owning such land, partnership, as the beneficiary of a trust, or the settlor of a revocable trust, or whether a member of the immediate household of any member of the Planning Commission or governing body has any such interest? Yes[ ] No[X]
If yes, names of members:

I do solemnly swear that the foregoing statement(s) and attachments(s), if any, are complete, correct, and true.

Applicant: Mark Mirabito (Printed or Typed Name) Applicant: [signature] (Signature) Date: 5/3/23

State of Florida
County of St Johns

Subscribed and sworn to before me Matt Behrens, A Notary Public in and for the County of St Johns, State of Florida, this 3 day of May, 2023.

[signature]
Notary Public

My Commission Expires 04-26-25

MATT BEHRENS
Notary Public-State of Florida
Commission # HH 122310
My Commission Expires
April 26, 2025

Local Roots, Global Reach
ISLE OF WIGHT
COUNTY, VIRGINIA

SUBMITTAL CHECKLIST FOR CONDITIONAL / SPECIAL USE PERMIT APPLICATIONS

****Both checklist and application required upon submission to central permitting or application will notbe accepted****

In conjunction with Section 1-1017, *Conditional Uses*, and Section 1-1018, *Special Uses Permits for Uses Not Provided For*, of the Isle of Wight County Zoning Ordinance, as amended, the following information shall be submitted for a Conditional / Special Use Permit Application. Please note that it is the applicant's responsibility to ensure that the application is in compliance with all Federal, State and County regulations.

No application for an exception shall be certified as complete unless the following information is provided. ***The required number of copies may be increased or reduced with permission of the Zoning Administrator, depending on the review needs.*** Applicant(s) must have their signature(s) notarized on the disclosure of real estate holdings.

- ☒ **Ten (10) copies of the following**
  - ☒ original, executed application
  - ☒ a statement of the reasons for seeking conditional or special use permit
  - ☒ narrative description of the property which shall include the tax parcel identification number
  - ☒ full size concept plan of the site to show all existing and proposed physical improvements and such otherinformation as is necessary to clearly indicate to the reviewing body that adequate provisions have been made for compliance with all standards for that particular use, the extent of the property to beso used on a given parcel or parcels, and information defining the requested exceptions. The plan shall be prepared by the appropriate authorized design professional licensed to practice in Virginia. No person shall prepare or certify design elements of site plans which are outside the limits of their professional expertise and license. Such document shall be drawn to scale and shall include the following information:
    - A vicinity map at a scale of no less than one (1) inch equals two thousand (2,000) feet
    - Title of drawing
    - Date of drawing
    - Existing wood line
    - North arrow

- Scale bar
- Current zoning of parcel(s), including tax map number(s) and owner(s)
- Current zoning of adjacent parcel(s), including tax map number(s) and owner(s)
- Street names including route number and width(s) of the right-of-way(s)

☒ **One (1) original executed application**

☒ **One (1) digital copy of ALL application documents**

☒ **One (1) reduced 11"x17" copy of concept plan**

☒ **Application fee submitted with the application. Checks should be made payable to treasurer, Isle of Wight, County**

☐ N/A **A WQIA (Water Quality Impact Assessment) if located in the Chesapeake Bay Preservation Area.**

☒ Other information may be necessary to demonstrate compliance with all other applicable federal, state and County standards and regulations.

☒ All real estate taxes must be paid and current at the time of submittal; otherwise, the submittal willbe refused at the counter. Proof of the most recent tax payment to the County must accompany the application.

Please note that additional information on the site layout may be requested by the Zoning Administrator during the review process in order to more effectively review the application and prepare the staff reports for the appropriate reviewing body.

I, the undersigned, certify that this application is complete, accurate and contains all required and requested information, documents, and other submittals, and that all statements made herein are, to the best of my knowledge, true and correct. I further certify that I have exercised due diligence to obtain the most recent, complete, and correct information available. I understand that any section not completed in its entirety may delay the processing of this application.

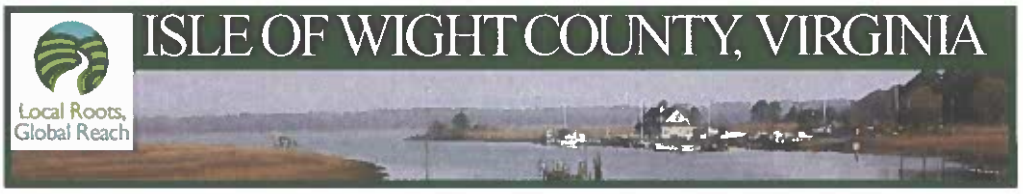
Mark Mirabito

Printed or Typed Name

Signature

5/3/23

Date



Real Estate

View Bill

As of	5/2/2023
Bill Year	2022
Bill	5852
Owner	EDWARDS GEORGE W & JEANETTE J L/E
Parcel ID	11-01-017

Installment	Pay By	Amount	Payments/Credits	Balance	Interest	Due
1	12/5/2022	$534.03	$534.03	$0.00	$0.00	$0.00
2	6/5/2023	$534.02	$534.02	$0.00	$0.00	$0.00
TOTAL		$1,068.05	$1,068.05	$0.00	$0.00	$0.00

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Real Estate

View Bill

As of	5/2/2023
Bill Year	2022
Bill	5848
Owner	EDWARDS G W & JEANNETTE J L/E
Parcel ID	11-01-018

Installment	Pay By	Amount	Payments/Credits	Balance	Interest	Due
1	12/5/2022	$782.23	$782.23	$0.00	$0.00	$0.00
2	6/5/2023	$782.22	$782.22	$0.00	$0.00	$0.00
TOTAL		$1,564.45	$1,564.45	$0.00	$0.00	$0.00

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Real Estate

View Bill

As of	5/2/2023
Bill Year	2022
Bill	5854
Owner	EDWARDS GEORGE W L/E &
Parcel ID	11-01-023

Installment	Pay By	Amount	Payments/Credits	Balance	Interest	Due
1	12/5/2022	$340.65	$340.65	$0.00	$0.00	$0.00
2	6/5/2023	$340.65	$340.65	$0.00	$0.00	$0.00
TOTAL		$681.30	$681.30	$0.00	$0.00	$0.00

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Real Estate

View Bill

As of	5/2/2023
Bill Year	2022
Bill	5855
Owner	EDWARDS GEORGE W L/E &
Parcel ID	11-01-023A

Installment	Pay By	Amount	Payments/Credits	Balance	Interest	Due
1	12/5/2022	$417.78	$417.78	$0.00	$0.00	$0.00
2	6/5/2023	$417.77	$417.77	$0.00	$0.00	$0.00
TOTAL		$835.55	$835.55	$0.00	$0.00	$0.00

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TO: Agricultural and Forestal District Advisory Committee

FROM: George Benjamin Edwards, Jeanette J. Edwards, George W. Edwards, LeAnn Ricks Edwards Wait, and Dana Louise Edwards

RE: Withdrawal of Land from Moonlight Agricultural/Forestal District

DATE: May 4, 2023

Please accept this written request to withdraw the following tax parcels from the Moonlight Agricultural/Forestal District (AFD). This request is made pursuant to Isle of Wight County's requirement for voluntary withdrawal from an AFD prior to or concurrent with submittal of a Conditional Use Permit application. Per information provided by the Isle of Wight County Commissioner of Revenue's office, removal of these parcels of land from the agricultural tax deferment system will take place once the use of the land changes – in this instance, construction of a utility-scale solar energy facility. Until such time, the land will continue to be farmed.

Tax Parcel Number	Record Owner
11-01-017	George Benjamin Edwards, LeAnn Ricks Edwards Wait and Dana Louise Edwards with George W. Edwards and Jeanette J. Edwards reserving a life estate
11-01-018	George Benjamin Edwards with George W. Edwards and Jeanette J. Edwards reserving a life estate
11-01-023	George Benjamin Edwards with George Wesley Edwards reserving a life estate
11-01-023A	George Benjamin Edwards with George W. Edwards reserving a life estate

By: George Benjamin Edwards
George Benjamin Edwards

By: Jeanette J. Edwards
Jeanette J. Edwards

By: George W. Edwards
George W. Edwards

By: LeAnn Ricks Edwards Wait
LeAnn Ricks Edwards Wait

By: Dana Louise Edwards
Dana Louise Edwards

PALLADIUM ENERGY

Moonlight Solar

Agency Review Comments and Responses

The following are responses to the agency review of Moonlight Solar's Conditional Use Permit Application. Additionally, to address agency comments, several Exhibits to Moonlight Solar's CUP application have been updated. The updated Exhibits have been identified and provided with the revised Project Overview and Narrative.

Planning and Zoning Comments:

1) Our tax records show that the combined acreage for these parcels is 522.96. Please revise and resubmit page 1 of the application with the correction.

- Page 1 of the application has been revised to reflect Isle of Wight County Tax records and has been included with the correction.

2) Please provide exact acreage for each different type of crop, pasture, and timberland that is being converted for solar panel coverage within the fence.

- Acreage of the land cover classes provided below:

Land Cover Class	Acreage within Fence
Impervious	0.2
Mixed Forest	60.9
Shrub/Scrub	1.1
Pasture	3.7
Cropland	184.2

- This information has also been added to the Moonlight Solar Project Overview in the "Property Description" section.

3) Does this project impact any state-designated conservation unit or ecological core areas?

- No; Moonlight Solar does not impact any state-designated conservation unit or ecological core areas.

4) Have you received any comments from Dominion Energy in regards to capacity, or do you have an interconnect agreement?

- No, we have not received any comments from Dominion Energy regarding capacity, nor do we have an interconnection agreement. We had Timmons Group evaluate the available capacity on the line we plan to interconnect, which was included with the application as Exhibit G.

5) As it relates to the concept plan, what is the dark green line on parcel 11-01-017 that runs south of the existing culvert and parallel to the Carroll Plantation house? Please clarify and provide symbology in the legend.

- The dark green line on parcel 11-01-017 that runs south of the existing culvert and parallel to the Carroll Plantation house is a delineated wetland. The concept plan has been updated to depict delineated wetlands using the same color.

6) Thank you for list of recommended conditions. Appropriate conditions will be determined by Planning and Zoning and please be advised that we will not include any conditions that are less than what is required by the zoning ordinance at the time of site plan review.

- The CUP application for Moonlight Solar was submitted prior to the adoption of the revisions to the solar zoning ordinance being voted into effect. As such, inclusion of these proposed conditions was a voluntary, good faith effort by Moonlight Solar.

7) Please forward this project to the Virginia Department of Historic Resources for review and comment and provide them in your resubmittal. You can submit to VDHR Archeologist Mike Clem, and his email address is mike.clem@dhr.virginia.gov

- Moonlight Solar has been forwarded to VDHR for review. VDHR's review and comments have now been included.

8) Please forward this project to the Virginia Department of Conservation and Recreation (https://vanhde.org/) and the Virginia Department of Wildlife Resources (https://dwr.virginia.gov/gis/werms/ and https://services.dwr.virginia.gov/fwis/) for their review and comments and provide them in your resubmittal.

- Moonlight Solar has been forwarded to VDCR for review. VDCR's review and comments have now been included.

9) Since this application was submitted for review, the Isle of Wight County Board of Supervisors has adjusted both the real estate tax rate to $0.71 per $100 of assessed value and the machinery and tools tax rate to $1.95 per $100 of assessed value for fiscal year 2023-2024. Accordingly, the projections outlined in the economic impact analysis are no longer accurate. Please resubmit this analysis using the current tax rates.

- The Economic Impact Analysis has been revised to reflect the updated real estate and machinery and tools tax rates. The updated Economic Impact Analysis has been included for review.

Fire/Rescue/EMS Comments:

All concerns have been addressed in the application.

Environmental Planner Comments:

1) Please provide the wetland delineation report and associated maps.

- Wetland delineation report and associated maps have now been included.

2) Please indicate on the maps who delineated the wetlands and when.

- delineated by Timmons Group environmental personnel on December 9-14, 2021 for the areas west of Moonlight Rd. and on March 27-28, 2023 for the areas east of Moonlight Rd. Wetland delineation report and associated maps have now been included.

3) Are the thin green lines (ex. near 046-0064) considered wetlands? If so, how will you avoid them? Wetlands should be avoided if possible.

- Yes, the thin green lines (ex. near 046-0064) are delineated wetlands. These wetlands are avoided in the site plan as they fall outside the fenced area. The maps have been updated to more clearly identify these lines as delineated wetlands. Please see C3.1-C3.3 in the Concept Plan for the updated labels on the maps.

4) Are you proposing any connections through wetlands or floodplains between parcels?

- Yes, there are two instances of underground collection lines crossing wetlands, one of these two instances includes the underground collection line crossing a Zone A floodplain.

5) How will the streams be impacted that are not protected by a wildlife corridor?

- There is one instance of a stream occurring inside the fenced area, which is crossed by an underground collection cable. The remaining streams have been avoided by being left outside the fenced in area, even when not part of a wildlife corridor. The maps have been updated to include and more clearly identify the delineated streams. Please see C3.1-C3.3 in the Concept Plan for the updated labels on the maps.

6) Some of the streams are shown as isolated small areas. Are those actually streams?

- Yes, the streams were delineated by Timmons Group environmental personnel on December 9-14, 2021 for the areas west of Moonlight Rd. and on March 27-28, 2023 for the areas east of Moonlight Rd.

7) USACE confirmation is needed by the time of site plan review.

- A Jurisdictional Waters Determination Request form has been sent to USACE and the confirmation will be provided when the site plan is submitted for review.

8) I see flood zones are indicated in the legend, but they are not observed on the maps. Please add and label zones.

- Maps have been updated to show the flood zone and labeled accordingly.

9) Parcel 11-01-017 is listed as a 2 on the Cultural resource preservation index which means "contributing to, or eligible for listing on the National Register of Historic Places/Virginia Landmarks Register". Has this been evaluated (area shown below in purple)? It appears a full Phase 1 is required based on Apogee recommendations.

- Full phase 1 has now been completed and included, along with Virginia Landmarks Register (VLR) and VDHR review and comment

Commissioner of the Revenue Comments:
I have reviewed the Conditional Use Application for the above-referenced project and did not find any deficiencies in the economic impact analysis. Please let me know if you have any questions as the application moves through the process. (Reminder that these comments are in regards to the economic impact analysis that was submitted. These comments may change upon submission of revised analysis requested above.)

- Please note the Economic Impact Analysis has been revised to reflect the updated real estate and machinery and tools tax rates. The updated Economic Impact Analysis has been included for review.

Economic Development Comments:
No Concerns

Sheriffs Department Comments:
after review of the submitted plan the only needs and concerns of the Sheriff's Office will be the increase in patrol during the construction phase and the traffic situation on the selected routes although they have done a complete study as far as the amount of traffic and past traffic accidents in the area. These are primarily secondary roads with no to minimal shoulders and are also shared with farm vehicles. During the construction phase they will be bringing in heavy equipment and large vehicles which will require escorts or even road closer. Also, there being multiple sites the concern of the operation of heavy equipment on the roads from one site to the other.

- Moonlight Solar will work closely with VDOT and the Sheriff's office to address the increased traffic and transportation of heavy equipment and large vehicles.

VDOT Comments:
1) All entrances onto the public right of way must be designed in accordance with Appendix F of the VDOT Road Design Manual and will be reviewed during the site plan process.

- Entrances onto the public right of way will be designed in accordance with Appendix F of the VDOT Road Design Manual and will be submitted for review with the final site plan.

2) Any utility installations within the public right of way will need to be owned and maintained by a public utility company registered with Virginia 811.

3) The application does not provide useable exhibits clearly showing proposed locations and types of overhead/underground electrical crossings, any new transmission lines, etc., that will cross or otherwise occupy the public right of way.

- The map exhibits in the application have been updated to more clearly show locations and types of electrical crossings of the public right of way. Please see C3.1-C3.3 in the Concept Plan for the updated labels on the maps.

4) A culvert will be required within the existing ditch lines to maintain roadside drainage. The minimum culvert size within State maintained right of way shall be 15" unless otherwise approved by the Department. Pipe sizing calculations should be submitted as part of the site plan. 9" of cover over the culvert pipe is required and the culvert pipe should extend a minimum of one foot beyond the toe of the stabilized slope.

- Culvert and drainage design will be submitted for review as part of the final site plan. The design will include, at a minimum, a 15" culvert size along with pipe sizing calculations.

5) Sight distance for entrances must be evaluated for compliance in accordance with Appendix F of the VDOT Road Design Manual. Sight distance lines shall be shown to scale on the site plans.

- Prior to submittal of the project's site plan for final review, sight distances for entrances will be evaluated in accordance with the VDOT Road Design manual, and the sight distance lines will be shown to scale on the submitted site plans.

6) VDOT will assist Isle of Wight County in reviewing proposed Traffic Management Plans, roadway condition evaluations, and repair plans in accordance with the proposed CUP conditions, particularly number 19.

- Proposed condition 19 states: "During and at the end of project construction, any damage done to public roads by solar farm construction equipment shall be repaired in accordance with VDOT standards and specifications. Post construction damage shall be identified based on inspections by VDOT with the developer or their agent, prior to construction and upon completion, identifying the items for repair. Additionally, at the request of VDOT, in order to ensure the safety of the traveling public, some damages may need to be addressed immediately."
- Moonlight Solar is committed to correcting any damage caused to roadways by its construction activities and as such, recommends keeping proposed condition 19 in.

Isle of Wight County Museum Comments:

After reviewing the conditional use permit application and Phase IA cultural resources assessment for the proposed Moonlight Solar Facility as prepared by Apogee Environmental & Archaeological Inc., the Isle of Wight County Museum/Isle of Wight County Department of Historic Resources agrees with the conclusions of the report.

Further investigation and analysis should include a Phase IB archaeological survey as well as a Phase I historic architectural survey of the proposed facility's location. The latter should include a ½-mile buffer for the consideration of the project's visual radius.

While much of the proposed site that will contain the solar facility has been farmed and logged, there are sites of medium and high probability for archaeological discovery. Additionally, this study determined that there were 20 previously unidentified architectural resources within the proposed project boundary. These sites, as well as the Jordan cemetery, should be further evaluated.

The potential on the project site for archaeological artifacts is likely. If the landowner is willing, the Isle of Wight County Museum should be considered a repository for discovered artifacts and

future finds on this site as they could further the interpretation or discovery of Isle of Wight County history.

- Phase 1B has been completed by Apogee Environmental & Archaeological Inc., and has been included.
- Should any artifacts be discovered, Moonlight Solar will work with the Landowner to give the Isle of Wight County Museum the opportunity to be a repository for any new finds.

Isle of Wight County Public Utilities and Stormwater Division Comments:
No comments at this time. Comments will be provided during the site plan review after the conditional use permit is obtained.

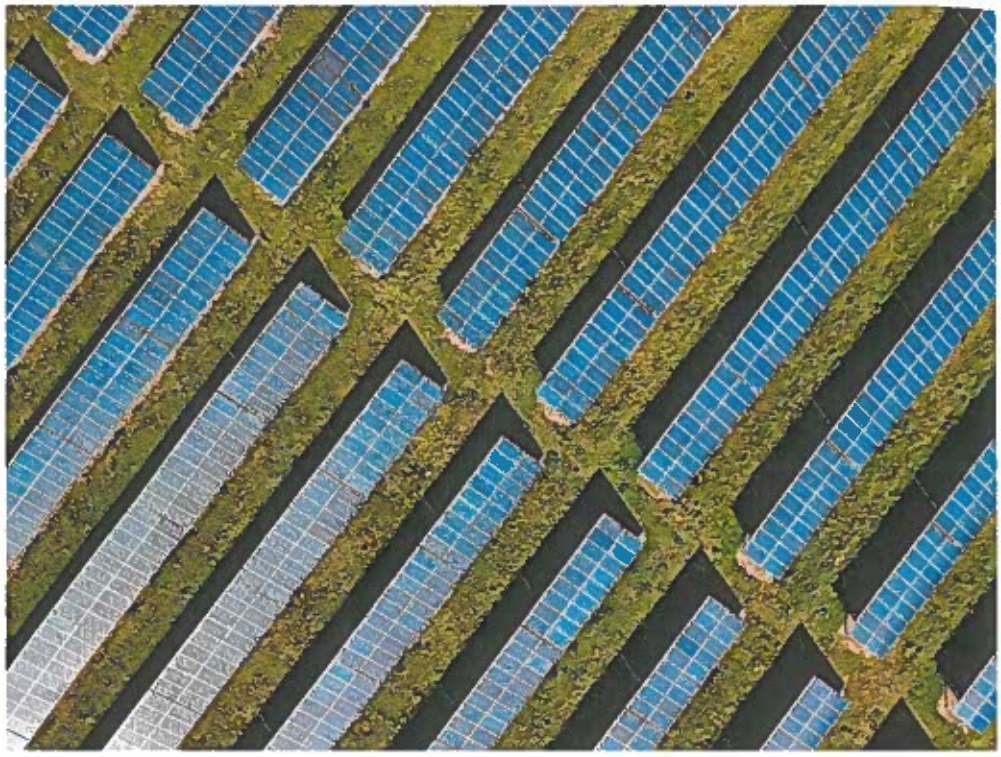
- Moonlight Solar will work diligently to proactively address any comments Isle of Wight County Public Utilities and Stormwater Division has during the site plan review.

Isle of Wight County Transportation Manager Comments:
Transportation Manager, Jamie Oliver, said she would defer to VDOT's comments for this project.

- Please find responses to VDOT's comments above.

PALLADIUM ENERGY

RES
Renewable Energy Services



MOONLIGHT SOLAR APPLICATION FOR CONDITIONAL USE PERMIT

Project Overview & Narrative (Revised: August 2023)

A summary of the key components of the Moonlight Solar project and its application for Conditional Use Permit approval.

Basic Project Details

The Moonlight Solar facility (the "Project") is a utility-scale solar PV facility that will be located on approximately 522.96 acres intersected in the north by Burwells Bay Rd. and intersected in the southeast by Moonlight Rd. In District Five (5) of Isle of Wight County, Virginia (the "Project Site"). Of these 522.96 acres, approximately 250 acres will be inside the fence line. The facility currently has a nameplate capacity of 44MWac, enough energy to power about 11,000 homes.

The facility will meet the County's amended zoning ordinance (the "Ordinance for Solar Energy Facilities in Isle of Wight County"), including setbacks of at least seventy-five (75) feet from property lines, one hundred twenty-five (125) feet from residential parcels, and two hundred fifty (250) feet from any structure with documented historical significance, cemeteries, cultural resources, and schools. New substations, inverters, and transformers will be kept at least five hundred (500) feet from non-participant property lines, any structure with documented historical significance, cemeteries, cultural resources, and schools. The project will also be screened with a vegetative buffer at least 50-feet wide consisting of three staggered rows of trees and shrubs installed a maximum of eight feet on center.

About the Applicant

Project Owner / Applicant

Moonlight Solar, LLC is a special purpose entity which owns the Project and serves as the applicant for this Conditional Use Permit. Moonlight Solar, LLC is owned and controlled by Palladium Energy, LLC and its affiliates ("Palladium").

Project Developer

Palladium is a Florida-based renewable energy development and investment company. Palladium is committed to providing clean and sustainable energy across the country for a brighter future through the origination, development, and financing of renewable energy projects. The Palladium team have an extensive track record of successfully developing, financing, constructing, and operating energy projects across markets (both in the U.S. and internationally) and technologies (solar, wind, natural gas, biomass).

Palladium has partnered with Renewable Energy Services, LLC (RES) to jointly develop Moonlight Solar. RES is a family-owned-and-operated utility-scale solar developer based in Durham, North Carolina. Founded in 2013, RES has fully developed over twenty-five projects, constituting over 240 megawatts and covering over two thousand acres. Since its inception, RES' development pipeline has grown greatly, with a significant portfolio of solar generation under development across Virginia, North Carolina, and South Carolina. As developers, RES focuses on quality over quantity, only pursuing renewable energy projects that meet our high standards in design,

minimized community impact, and grid connection feasibility. Additionally, RES strives to deliver projects that are community-friendly, so neighbor engagement is our priority.

Palladium and RES are responsible for developing the Project. Construction, operation, and maintenance of the Project will be the responsibility of the long-term owner of Moonlight Solar, bound by the Project's permits, approvals, and agreements.

The Project will lease the Project Site from local landowners. A table of the landowners can be found on page one of the Project's site plan.

Statement of Reasons for Seeking Conditional Use Permit

Palladium is developing the Project in District Five of Isle of Wight County. The Project Site is currently designated as Rural Agricultural Conservation ("RAC"). A Conditional Use Permit ("CUP") is required to construct a utility-scale solar energy facility on properties designated RAC. The Project intends to support the Commonwealth of Virginia's Renewable Energy Portfolio Standard established by the Virginia Clean Economy Act which mandates the two utilities in the Commonwealth (Dominion Energy and American Electric Power) produce their electricity from one hundred percent (100%) renewable sources by 2045 and 2050, respectively.

Project Siting - Why here?

This location for Moonlight Solar was selected for a variety of reasons:

- Landowner Interest and Benefit: The Project offers increased financial security to the landowners involved with the Project. The partnership between these landowners, their families, and the developers makes this project possible. If the Project is successful, all parties benefit.
- Minimized Visual Impact: The Project is proposed far from any neighborhoods or urban centers. The Project site is predominately surrounded by very low-density residential areas, with most adjoining land being undeveloped and used for agriculture and forestry. The Project will include a vegetative buffer at least 50-feet wide consisting of three staggered rows of trees and shrubs installed a maximum of eight feet on center further minimizing any visual impact.
- Proximity to Grid Infrastructure: The proposed Project Site offers direct access to several high-voltage powerlines.
- Proximity to Load: The proposed Project is in reasonable proximity to clusters of energy consumers, such as the communities of Smithfield, Suffolk, Norfolk and Newport News. This nearby load offers a local destination for the energy generated, making it easier for the utility to integrate the facility into their existing grid-management plans.

Property Description

The four (4) parcels fully or partially under lease option by the Project total approximately 522.96 acres (Parcel IDs 11-01-018, 11-01-017, 11-01-023, 11-01-023A).

Of that total parcel acreage, approximately 250 acres will be developed. The properties involved are primarily being used for row crop farming. These +/- 250 acres consist of 5 different land cover classes. Impervious represents 0.2 acres, Mixed Forest represents 60.9 acres, Shrub/Scrub represents 1.1 acres, Pasture represents 3.7 acres, and Cropland represents 184.2 acres. The Project Site is secured by lease agreements with the landowners. Concurrent with the submittal of this CUP application for Moonlight Solar, the landowners submitted a written request to the Agricultural and Forestal District Advisory Committee, pursuant to Isle of Wight County's requirements, for the voluntary withdrawal of the Project Site from the Moonlight Agricultural/Forestal District.

Nearby Properties

The land adjoining the proposed Project Site is largely undeveloped. There are approximately nine (9) adjoining single-family homes on individual parcels, four (4) owned and inhabited by a Project landowner. There are no nearby or adjoining neighborhoods, planned developments, or commercial centers. Surrounding undeveloped land is primarily managed timber, intermixed with small to medium sized agricultural fields.

Project Equipment

Moonlight Solar is a 44-megawatt (AC) facility. The facility will use bifacial solar modules, mounted to a single-axis tracking system, which enables the panels to track the movement of the sun as it crosses the sky, increasing total electricity production relative to stationary panels. The single-axis tracking system is comprised of racking tables to which the solar modules are mounted.

The electricity produced by the modules is converted from direct current (DC) to alternating current (AC) by electrical inverters, creating usable electricity for nearby residential and commercial customers.

To distribute the electricity generated, a project substation is needed. The substation includes a transformer capable of increasing the voltage of the electricity as it moves from the inverters to the transmission line. Adjacent to this substation are the utility interconnection facilities and switching station, which will allow the system to interconnect to the 230kV Surry to Chuckatuck Dominion Energy powerline running directly through the Project Site. These stations will be located alongside the powerline, in the interior of the Project site, away from property boundaries and viewsheds. Once the energy is generated, it will be distributed at the discretion of the grid operator.

Conceptual Plan

Moonlight Solar is sited on approximately 250 acres. The Project will be designed to substantially conform to the proposed revisions to the zoning ordinance, on a voluntary basis. All equipment and accessory structures are located a minimum of seventy-five (75) feet from all property lines, one hundred twenty-five (125) feet from residential parcels, two hundred fifty (250) feet from any structure of documented historical significance, and cultural resources. No schools or cemeteries are in the vicinity of the

project. New substations, connector stations, inverters, and transformers will be located a minimum of five hundred (500) feet from the property line of any non-participating properties, any structure of documented historical significance, and cultural resources.

The proposed locations of solar equipment, adjacent properties, screening, landscaping, internal roadways, easements, the proposed point of interconnection to the electrical grid, wildlife corridors, and environmentally sensitive features can be found on the Project's site plan in Exhibit A.

Visual Impact Analysis

A visual impact analysis was completed by Timmons Group to demonstrate through project siting and proposed mitigation that the Project minimizes impacts on the visual character of its surroundings. The reference photos and renderings for the visual impact analysis are included as Exhibit B.

Observation photos were taken in 4 different locations. The first set of photos were taken on Burwells Bay Rd. at approximately latitude : 37°1'59.64"N longitude: 76°44'8.15"W looking northeast. The second set of photos were taken on Burwells Bay Rd. at approximately latitude: 37°1'55.61"N longitude: 76°43'51.06"W looking southwest. The third set of photos were taken on Moonlight Rd. at approximately latitude: 37°1'28.32"N longitude: 76°43'13.15"W looking south-southeast. The fourth set of photos were taken on Moonlight Rd. at approximately latitude: 37°1'19.99"N longitude: 76°43'10.65"W looking northwest.

Landscaping Screening

Along roadways and where the Project abuts neighboring parcels a vegetative buffer at least 50-feet wide consisting of three staggered rows of trees and shrubs installed a maximum of eight feet on center will be included to further minimize any visual impact. Existing vegetation which meets or exceeds this standard will be retained. The reference photos in Exhibit B show the landscape screening at planting and at maturity from each of the four observation point locations. The landscape screening buffer will effectively screen the project from view when the trees and shrubs used reach maturity.

Transportation Plan

A transportation plan was commissioned from Timmons Group to identify and address potential transportation issues that could arise during the construction and operation of the Project. The transportation plan will also show vehicular access to the site, proposed construction traffic routes, parking areas, and laydown yards. The transportation plan evaluated existing conditions in the vicinity of the Project to identify four (4) site access points and to identify locations where temporary traffic control measures may be needed. Two (2) of the site access points will be located on Route 621 and two (2) will be located on Route 627.All temporary staging, parking and assembly areas will be located within the boundaries of the Project area.

Site access point #1 will be located on Route 621 approximately 0.72 miles west of the Route 621 and Route 627 intersection. Sight distance along Route 621 east and west of the proposed access point exceeds 500 feet.

Site access point #2 will be located on Route 621 approximately 0.59 miles west of the Route 621 and Route 627 intersection. Sight distance along Route 621 east and west of the proposed access point exceeds 500 feet.

Site access point #3 will be located on Route 627 approximately 0.81 miles south of the Route 621 and Route 627 intersection. Sight distance along Route 627 north and south of the proposed access point exceeds 500 feet. Site access point #3 will allow access to the site on the west side of Route 627.

Site access point #4 will be located on Route 627 approximately 0.81 miles south of the Route 621 and Route 627 intersection. Sight distance along Route 627 north and south of the proposed access point exceeds 500 feet. Site access point #4 will allow access to the site on the east side of Route 627.

Prior to and during construction of the Project, Moonlight Solar will coordinate with representatives from Isle of Wight County, including the Sheriff's Office, and VDOT to determine appropriate transportation management procedures. Anticipated construction traffic volumes will not exceed available roadway capacities. Construction related traffic will access the Project site via state-maintained roadways. Temporary traffic control measures are not anticipated but will be implemented as necessary to ensure public safety.

Moonlight Solar will take steps to maintain and repair roads as needed both during and upon completion of construction. Once constructed, internal access roads will be utilized as much as possible to minimize impacts to neighbors and the local road network.

The full transportation plan can be found in Exhibit C.

Construction

Construction of Moonlight Solar is anticipated to begin in Q1 2027, subject to utility timelines, and will take between 9-12 months to complete. Hours of operation for construction shall be limited to 7:00 a.m. to 6:00 p.m. No construction is to occur before 7:00 a.m. or after 6:00 p.m. When appropriate, a bidding process will be set up in coordination with the Isle of Wight County Economic Development Authority to ensure local firms have an opportunity to win business. As noted above, Moonlight Solar is responsible for repairing any road damage caused during construction.

Proper stormwater management measures will be in place in connection with any ground disturbance, and permanent measures will be installed to ensure there are no adverse impacts on adjoining waterways after construction is complete.

Economic Impact to Isle of Wight County

Taxes

An Economic Impact Analysis was completed by Mangum Economics. The results of the analysis show Moonlight Solar will provide a significant increase to the County's tax base compared to the land's current use.

Property Taxes

Use	Year 1	Cumulative Total by Year 40
Current Use	$ 1,580	$ 63,100
Moonlight Solar	**$ 26,600**	**$ 4,338,000**

** Forecasts are estimates and do not consider tax rate changes that may be imposed by the County at a later date.*

Additionally, the facility will pay Isle of Wight County any rollback taxes that may occur due to the change in land use which are estimated to be $31,600.

Siting Agreement

Pursuant to Virginia Code section 15.2-2316.7, Moonlight Solar submitted a Notice of Intent to Locate a Solar Project in Isle of Wight County. According to Section 15.2-2316.7, the siting agreement may include terms and conditions, including: *"(i) mitigation of any impacts of such solar facility; (ii) financial compensation to the host locality to address capital needs set out in the (a) capital improvement plan adopted by the host locality, (b) current fiscal budget of the host locality, or (c) fiscal fund balance policy adopted by the host locality; or (iii) assistance by the applicant in the deployment of broadband, as defined in §56-585.1:9, in such locality."* The Project is proposing to make an upfront payment of $25,000 per megawatt to Isle of Wight County upon commercial operation of the Project. Based on the proposed size of the Project, this would equate to an additional $1.1 million benefit paid directly to Isle of Wight County.

Construction-Related Economic Impact

In addition to providing an increase to the County's tax base, Moonlight Solar is poised to provide additional economic benefits to Isle of Wight County. The facility will take approximately one year to construct, and during that time, an estimated 125 construction workers will work on the facility. In addition to the construction labor, the extended construction schedule will foster significant spending in Isle of Wight County. Moonlight Solar will work with Isle of Wight County's Economic Development Authority to ensure that local companies and labor pools have an opportunity to participate in the Project, including, but not limited to:

- -Fuel
- -Grading and site preparation
- -Solid waste
- -Equipment maintenance and parts
- -Fencing
- -Lodging

-Food and beverage -Landscape materials

The full Economic Impact Analysis can be found in Exhibit D.

Environmental Impact Analysis

An Environmental Impact Analysis was completed by Timmons Group. The analysis concludes the Project does not intersect any federal, state, or local conservation easement or recreational lands, and that there are no such resources within a one (1) mile radius of the Project limits. The analysis also demonstrates the Project is not likely to impact state or federal endangered, threatened, listed, or candidate species.

The full Environmental Impact Analysis, along with the Wetland Delineation Report can be found in Exhibit E.

Conservation Land

The Environmental Impact Analysis found that Moonlight Solar does not intersect any federal, state, or local conservation easement or recreational lands, and that there are no such resources within a one (1) mile radius of the Project limits. A Wetland Reserve Program (WRP) site is found approximately 1.6 miles to the west of the Project. An Isle of Wight Purchase of Agricultural Conservation Easement (PACE) site is found approximately 2.5 miles to the southeast of the project site.

Wetlands and Streams

Wetlands and Streams within the Project boundary have been delineated by Timmons Group. The project will be designed to avoid impacts to streams and wetlands. A Jurisdictional Waters Determination Request form has been sent to USACE. If impact to wetlands or streams are unavoidable, the Project will obtain the proper USACE permit for impacts to USACE jurisdictional wetlands.

Wildlife

Federal and State agency databases were reviewed to determine whether any species listed by the State or by the Endangered Species Act (ESA) have the potential to occur onsite. This comprehensive search determined that there are three species with State or Federal protection with the potential to occur at the Project Site: the Northern Long-Eared Bat (Myotis septentrionalis), the Eastern Big-Eared Bat (Corynorhinus rafinesquii macrotis), and the Monarch Butterfly (Danaus plexippus).

The Northern Long-Eared Bat (NLEB) is a federally Endangered species. Based on a review completed by US Fish and Wildlife Service (USFWS) through the Information for Planning and Consultation (IPaC) system, the Northern Long-Eared Bat has the potential to occur onsite. Per the USFWS, there are no known hibernacula or roost trees for the Northern Long-Eared Bat within the vicinity of the Project, and USFWS determined Moonlight Solar is not reasonably certain to cause incidental take of the Northern Long-Eared Bat. Coordination with USFWS is complete. No further consultation or coordination between USFWS and the Project is required for the Northern Long-Eared Bat.

The Eastern Big-Eared Bat is listed as a State Endangered species. The VDCR assessment states the project contains predicted suitable habitat for the Eastern Big-Eared Bat. There are no known hibernacula or roost trees for the Eastern Big-Eared Bat within the vicinity of the Project.

The Monarch Butterfly is a Candidate Species and is not listed or proposed for listing. Based on a review completed by US Fish and Wildlife Service (USFWS) through the Information for Planning and Consultation (IPaC) system, the Monarch Butterfly has the potential to occur onsite. No further consultation is necessary to avoid impacts to the Monarch Butterfly.

In general, solar PV facilities, such as Moonlight Solar, do not pose a threat to fish or wildlife. While the facility's fencing may slightly alter the movement patterns of larger mammals, the proposed facility's site plan minimizes fenced areas and incorporates wildlife corridors along streams and wetlands throughout the site to minimize impacts on animal movement patterns. Additionally, a wildlife-friendly and pollinator-friendly buffer has been included along the planted portions of the Project's boundary in the site plan. This can benefit the Monarch Butterfly (Danaus plexippus), although it has no restrictions at this time. By implementing these measures and further coordinating with the USFWS and the VDWR, Moonlight Solar will work to minimize its impact on all species.

Soils

The Environmental impact Analysis found instances of prime farmland within the leased property for the Project. Prime Farmland totals 291.6 acres, farmland of statewide importance totals 2.5 acres, prime farmland if drained totals 120.6 acres, and the remaining 102.2 acres are neither prime farmland or farmland of statewide importance. When considering soil classifications inside the fence of the Project, prime farmland totals 180.5 acres, prime farmland if drained totals 49.4 acres, farmland of statewide importance totals 1.1 acres, and the remaining 19.1 acres are neither prime farmland or farmland of statewide importance.

Soil testing for any contaminants directly attributable to the Project will occur pre-construction, and post- construction. Soil testing will continue every 5 years during the operation of the Project. The initial baseline results and subsequent reports will be provided to the County's Zoning Administrator.

Historical and Cultural Resources

A Historical and Cultural Resources Analysis was completed by Apogee. The analysis found that in the total leased area there are approximately 176.92 acres of high probability areas, 135.23 acres of medium probability areas, 60.77 acres of areas with low probability, and 143.98 acres of areas designated as visual inspection only. High probability areas will require full shovel tests at fifty (50) foot intervals. Medium probability areas will require sampling covering approximately twenty-five (25) percent of the area. Low probability areas require cursory shovel test coverage of approximately ten (10) percent. Areas designated as visual inspection only require the area to be walked over and visually inspected. The analysis also identified previously recorded historic structures within the vicinity of the Project Site. The Carroll Plantation (DHR ID

046-0064) has been listed as eligible for the National Register of Historic Places (NRHP) and is located on a parcel adjoining the Project Site. The proposed concept plan establishes an increased setback of two hundred fifty (250) feet from this structure with documented historical significance, which includes a 50-foot-wide vegetative buffer consisting of three staggered rows of large and small canopy trees and medium shrubs installed a maximum of eight feet on center to create an effective visual screen. Additionally, new substations, connector stations, inverters and transformers will be at least five hundred (500) feet from this structure with documented historical significance.

A Phase 1B Archaeological Survey was conducted by Apogee. The report documents an archaeological survey of the Moonlight Solar site. During the course of the survey, five archaeological sites were identified (44IW0390, 44IW0391, 44IW0392, 44IW0393, and 44IW0394). Site 44IW0390 is a mid-19th to early-20th century domestic trash scatter. Site 44IW0391 is a low-density artifact scatter dating to the mid- to late-19th century. Site 44IW0392 and 44IW0393 are a low-density artifact scatters dating to the mid-19th to mid-20th century potentially associated with the agricultural structure across Moonlight Road. Site 44IW0394 is a late-19th to early 20th century domestic artifact scatter. Apogee recommends that all five sites (44IW0390, 44IW0391, 44IW0392, 44IW0393, and 44IW0394) are not eligible for listing the National Register of Historic Places (NRHP). No additional work is recommended for the project area. VDHR agrees with Apogee's recommendations.

A Phase 1 Historic Architecture Survey and Effects Assessment was completed by Apogee. Apogee identified a total of twenty-one (21) historic architectural resources. Eleven (11) previously recorded resources were identified within the 0.5-mile buffer. Of the eleven (11) resources, nine (9) had been surveyed within the past 5 years. The remaining two (2) previously recorded resources and nineteen (19) newly identified resources were surveyed. Apogee recommends none of the surveyed resources as eligible for listing in the National Register of Historic Places (NRHP). Virginia Landmarks Register (VLR) and VDHR concur with Apogee's recommendation.

The full Historical and Cultural Resources Impact Analysis, The Phase 1B Archaeological Survey Report, the Phase 1 Historic Architecture Survey and Effects Assessment Report, and the VDHR letter of concurrence are included as Exhibit F.

Detailed Capacity Information

A report detailing the available capacity of the interconnecting transmission system and potential impacts on future generation projects was completed by Timmons Group. The report analyzed the transmission system, existing and planned power generation projects, and near-term planned power generation project retirements. The report concludes that the existing transmission infrastructure has more than enough available capacity to accommodate the energy generated by Moonlight Solar.

The full report is included as Exhibit G.

Surrounding Property Value Impact Analysis

An analysis of the impact of Moonlight Solar on surrounding property values was completed by Kirkland Appraisals. The analysis shows no impact to surrounding properties where a solar farm is properly screened and buffered. The analysis states that noise, odor, and traffic are criteria which would typically correlate with a downward adjustment on property values, but due to the nature of solar farms the Project does not contribute to these criteria. The analysis concludes that the Project will have no impact on the value of adjoining or abutting properties because of the rural nature of where it is sited and that the proposed use is in harmony with the area in which it is located.

The full Property Impact Analysis is included as Exhibit H.

Health and Safety

Health

The toxicity of panels has been thoroughly investigated in scientific literature. While there are two heavy metal components present in panels, lead and silver, they are only present in very small quantities. The silver does not create a toxicity hazard, and the lead is part of tin-lead solder that is standard in the electronic industry. There is no risk of leaching from sealed, undamaged panels. The International Energy Agency researched worst-case leeching scenarios from damaged panels and their models showed the health risks created were significantly below public health standards set by the EPA meaning that solar poses no health threat to groundwater or surface water resources. The facility will not generate any other toxic or chemical byproducts.

The creation of electromagnetic fields, another common concern, has been shown to have no discernable impact on human health at the frequency and strength generated by the Project. Any electromagnetic field generated by the Project is not expected to leave the Project Site.

Solar energy facilities do not create heat island effects like those sometimes observed in urban areas, and do not affect the temperature of the surrounding area. Similarly, it creates no light pollution and any noise generated is generally undiscernible outside the fence line. If environmental noise is a concern, use of the property by a quiet solar farm often precludes other uses that create substantial environmental noise (e.g., farming equipment, lawnmowers and leaf blowers from a single-family subdivision, guns from hunters, etc.).

Moonlight Solar will produce emission-free electricity that would otherwise likely be produced through the combustion of fossil fuels. Solar farms also protect ground and surface waters from uses that could otherwise be developed as a matter of right (e.g., collection of manure from dairy farming; chemicals used in nurseries and greenhouses; or heavy application of chemicals used in crop production).

Safety

The only researched-backed physical safety concerns from a solar project are electric shock, arc flash, and fire. These concerns are not unique to solar, but rather come with any electrical use, including in any workplace or home and are mitigated with security fencing. The conditions that produce these hazards are rare, and the danger is localized to areas immediately surrounding the specific piece of malfunctioning equipment.

The facility is required to meet the high U.S. safety standards and will be constructed to meet or exceed all standards of the National Electric Code (NEC). All installed equipment is listed with and will contain the stamp of Underwriters Laboratories, a safety consulting and certification company that specializes in the public adoption and drafting of safety standards for electrical devices and components. Solar energy systems have little flammable material, and no special equipment is required to respond to a fire incident. The facility will be remotely monitored 24/7 to ensure that hazards are caught early on before public danger can occur.

Additionally, public access to the Moonlight Solar site will be restricted by security fencing. The fencing is harmonious with the rural, agricultural, and historical character of the county while meeting federal and state regulations for solar electric generating facility fencing, in compliance with both the Isle of Wight County ordinance and the NEC guidelines. This fence will protect wildlife, the public, and the facility by restricting access to qualified technicians trained to work safely around electrical equipment.

Each entrance will have notification signage stating the rated nameplate capacity, the name of the Project owner, the name of the Project operator (if different from the Project owner), the street address of the site, and a 24-hour emergency contact phone number for the operator. Electrical warning signs will also be posted along the perimeter. Fencing will be placed around the solar arrays, inverters, and substation only. Fencing will not be placed around the whole site to provide wildlife corridors.

Finally, glare from the solar panels is sometimes cited as a concern when a new solar project is being planned in a community. Moonlight Solar will be a single-axis tracking facility, which orients the panels to face the sun throughout the day. The effect of the tracking technology is that glare would only be a potential issue at dawn or dusk and only then when looking (through the vegetative buffers) across the panels towards the rising or setting sun, a very unlikely scenario given the required setbacks and vegetative buffers. The Project is not in the vicinity of any airports that utilize a control tower and thus does not pose a threat for aviation, and the security fence and vegetative buffer aid in shielding motorists from similar effects.

Emergency Services

Prior to the construction of Moonlight Solar, an Emergency Response Plan will be submitted for approval to the County. The Emergency Response Plan will detail fire suppression methods during both the construction and operation of the Project. The plan will include a training program which will be provided to emergency responders covering onsite incidence response. The Project will install a Knox Box or other remote access technology at the facility, ensuring emergency responders have 24/7 access to the facility to remedy any issues which could arise. No special equipment is necessary to respond to an issue at a solar farm.

Stormwater Management

A Stormwater Pollution Prevention Plan (SWPPP) including erosion and sediment control measures will be approved and the measures installed for the duration of land disturbing activities and until the site has been stabilized. For the duration of

construction these control measures will be inspected by the construction management team after any rain event of a quarter inch or more and a compliance report will be generated. The permitting agency (VA DEQ) also inspects the control measures on a routine basis or as needed. Any non-compliance is documented, and the authority having jurisdiction can issue a "Notice of Violation". It is likely that drones will be used to inspect the control measures and confirm that there are no impacts after significant storm events. The inspection and maintenance of all sedimentation and erosion control measures are critical components of the facility's construction, as they uphold the project's adherence to the SWPPP. Upon the conclusion of construction, the permanent SWPPP is implemented, including best management practices (BMPs) established by the Virginia Department of Environmental Quality. The permanent stormwater control measures are robust and designed to handle significant rain events.

Stormwater

Stormwater control and erosion mitigation is a common community concern with large solar facilities, primarily due to the total acreage that will be disturbed during construction and recent issues with a small number of projects in other parts of the Commonwealth. It is important to note, however, over 90% of the site will be covered with native grasses and vegetation, such as the grassy areas under panels, meaning that unlike traditional developments, the vast majority of the facility's footprint will be able to naturally absorb water, minimizing runoff.

Recent stormwater issues at other solar farms seem to stem from large rain events after construction is complete but before vegetative groundcover has been established. This issue is being studied by the VA DEQ and additional guidance on stormwater mitigation is expected to be issued prior to the facility's final site design. Neither Palladium nor RES has any involvement in or firsthand knowledge of the solar farms in Virginia at which stormwater issues have been noted. Sites developed by Palladium and RES, both jointly and separately, have not experienced any stormwater issues.

Prior to any ground-disturbing activities, the Project must receive approval of its proposed SWPPP from the VA DEQ, as well as comply with the Virginia Erosion and Sediment Control Program (VESCP), as mandated by Virginia Statute § 62.1-44.15:52. The SWPPP as well as the VESCP will outline the engineered control measures, based on exact land data, such as topography surveys, stream and wetland delineations, geological data, and geo-technical data, to create specific water flow calculations quantifying different levels of rainfall over varying time periods. These calculations inform the design and scale of stormwater mitigation and sediment and erosion control measures that are necessary to ensure that the construction and operation of the facility will not adversely impact the water system or adjoining landowners. Such control measures may include, but are not limited to, sediment basins, silt fencing, enhanced drainage swales, and bioretention areas. Some control measures, such as silt fencing, are specific to construction and others, such as retention ponds, are permanent. The ultimate design and location of each control measure is based on the final site design prepared by professional engineers.

To put it simply, Moonlight Solar must work closely with the VA DEQ to ensure the appropriate control measures are in place prior to any land disturbing activities, for all stormwater both during construction and during operation of the facility.

Decommissioning

A Decommissioning Plan for Moonlight Solar has been prepared by Timmons Group. Moonlight Solar bears exclusive responsibility for decommissioning and removing the system at the end of the facility's useful life, anticipated to be forty (40) years.

Decommissioning will be done in accordance with the approved decommissioning plan. Decommissioning includes the removal of modules, support columns, buildings, cabling, electrical components, and any associated facilities (e.g., foundations, conduit) plus the necessary grading, restoration, decompaction, and stabilization of soil through reseeding. No hazardous material is expected to be on-site.

The estimated timeframe for completion of the removal and decommissioning activities is six (6) to twelve (12) months (weather dependent) unless otherwise extended by Isle of Wight County.

All equipment and facility materials will be removed from the site such that it is returned to a condition suitable for continued agricultural and timber use, as was present prior to the construction of the facility, unless otherwise directed. Moonlight Solar will perform the decommissioning of the Project in accordance with all governing authorities, applicable local, state and federal requirements, and industry standards. Any required permits will be obtained, and environmental considerations will be adhered to prior to de-energizing and decommissioning the facility. Moonlight Solar does not anticipate any environmental impacts as a result of the decommissioning process.

The facility's components will be recycled, reused, salvaged, or transported to the appropriate facilities for disposal upon removal. Based on current salvage practices and industry standards, it is anticipated that most of the Project's materials will be able to be recycled or reused upon decommissioning.

Surety

To guarantee the removal of equipment and restoration of the land, Moonlight Solar will provide financial assurance in the form of a decommissioning bond, or other form of reasonably acceptable surety (e.g., irrevocable letter of credit, cash deposit, etc.) to cover the cost of the facility's decommissioning with a federally insured financial institution. The value of the security will be 100% of the estimated cost to decommission the facility, remove the equipment, and restore the land, as determined by an estimate by an independent third-party engineer licensed in the Commonwealth, with experience in preparing decommissioning estimates. The financial assurance will include an annual inflation factor. This surety will meet or exceed the County ordinance and the standards outlined in Virginia Statute § 15.2-2241.2. The surety amount will be updated not less than every five years to ensure its value is kept current.

The full Decommissioning Plan is included as Exhibit I.

Compliance with Comprehensive Plan

The Isle of Wight County Comprehensive Plan adopted January 16, 2020 (the "Plan") is a general, long-range, dynamic policy and implementation guide for decisions concerning the overall growth and development of the County. Moonlight Solar is in substantial accord with the Plan. Across the items discussed in the Plan, the Moonlight Solar project complies with the locational recommendations for solar projects, including: (1) located on RAC designated properties, (2) outside of the viewshed of any scenic, cultural, or recreational resource, (3) adjacent to existing electric transmission lines, and (4) outside of Development Service Districts. Moonlight Solar, as a renewable energy generation facility, also aligns with the following Plan policy: "*Encourage progressive, alternative, and environmentally compatible energy production and conservation practices that support the local economy and supports the foundation of a rural and scenic atmosphere that contributes to the desirable quality of life in Isle of Wight County.*"

According to the maps provided in the Plan, Moonlight Solar is in an area designated as RAC. The RAC land use consists of large contiguous areas of agricultural and forest land and is almost exclusively outside of the Development Service Districts. The Plan states that "*...uses reliant on large areas of land such as solar farms and agritourism activities may also be appropriate when sited correctly.*" Please refer to Exhibit A which contains maps showing the Project location and land use designation.

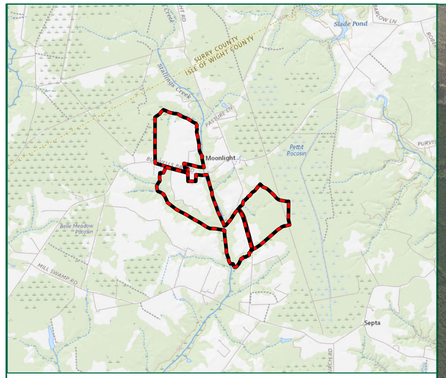
The secluded nature of Moonlight Solar would balance new economic growth while maintaining the rural character of the County.

Though Moonlight Solar will occupy land currently used for agriculture, that occupation is temporary and will not inhibit the land's potential to again be used for agriculture or silviculture. In accordance with the Plan, extensive environmental impact studies have been completed, as noted and discussed in previous sections of this narrative, to ensure no impact to the environment or surrounding properties.

The stated policy encouraging progressive, alternative and environmentally compatible energy production and conservation practices that support the local economy and Moonlight Solar represents an opportunity for Isle of Wight County to diversify its economy and tax base via an emerging, pollution-free industry. The emergence of this industry would not come at the expense of the other strategies in the Plan, which primarily encourage traditional development in town centers and industrial parks and would provide significant tax benefit to the County to expand infrastructure and other key services highlighted in the Plan.

Land use goals stated in the Plan include promoting a balance of land uses to meet economic and demographic needs and to promote a clean-living environment. This Project would help meet both of those goals by promoting diversity of land uses, improving air quality, and producing pollution-free energy likely to be consumed locally.

The Project's location also aligns with the Natural Resource goals by preserving flood plains, swamps, and other areas of environmental importance.



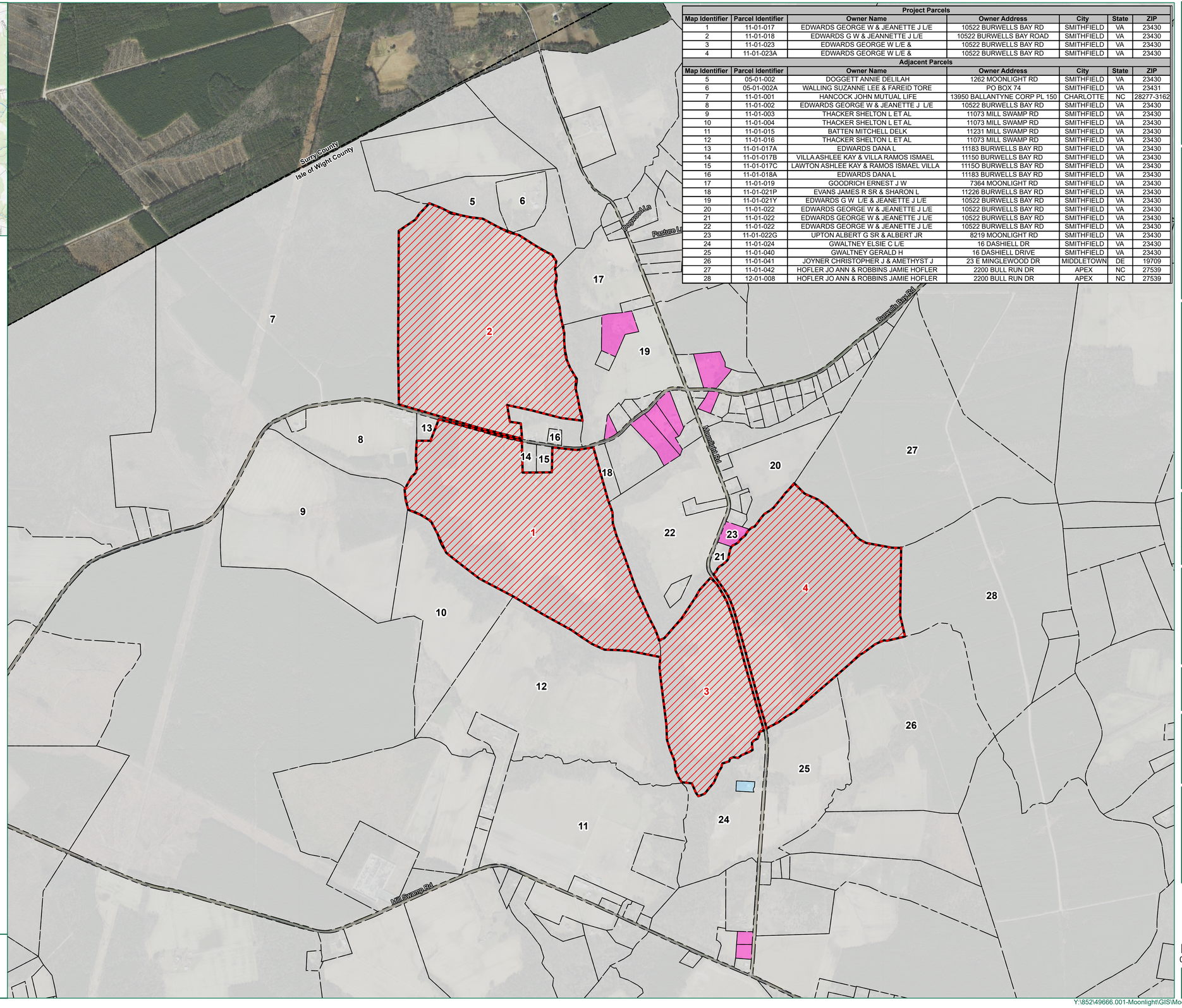
Legend

- Property Boundary - 522.96 Acres
- County Boundary
- Isle of Wight County Tax Parcels

Zoning

- Rural Agricultural Conservation District (RAC)
- Rural Residential District (RR)
- General Commercial District (GC)

NOTES:
1. PARCEL AND ZONING DATA FROM ISLE OF WIGHT COUNTY GIS.
2. COUNTY BOUNDARY FROM VDEM.
3. AERIAL IMAGERY FROM VGIN.



Project Parcels

Map Identifier	Parcel Identifier	Owner Name	Owner Address	City	State	ZIP
1	11-01-017	EDWARDS GEORGE W & JEANETTE J L/E	10522 BURWELLS BAY RD	SMITHFIELD	VA	23430
2	11-01-018	EDWARDS G W & JEANNETTE J L/E	10522 BURWELLS BAY ROAD	SMITHFIELD	VA	23430
3	11-01-023	EDWARDS GEORGE W L/E &	10522 BURWELLS BAY RD	SMITHFIELD	VA	23430
4	11-01-023A	EDWARDS GEORGE W L/E &	10522 BURWELLS BAY RD	SMITHFIELD	VA	23430

Adjacent Parcels

Map Identifier	Parcel Identifier	Owner Name	Owner Address	City	State	ZIP
5	05-01-002	DOGGETT ANNIE DELILAH	1262 MOONLIGHT RD	SMITHFIELD	VA	23430
6	05-01-002A	WALLING SUZANNE LEE & FAREID TORE	PO BOX 74	SMITHFIELD	VA	23431
7	11-01-001	HANCOCK JOHN MUTUAL LIFE	13950 BALLANTYNE CORP PL 150	CHARLOTTE	NC	28277-3162
8	11-01-002	EDWARDS GEORGE W & JEANETTE J L/E	10522 BURWELLS BAY RD	SMITHFIELD	VA	23430
9	11-01-003	THACKER SHELTON L ET AL	11073 MILL SWAMP RD	SMITHFIELD	VA	23430
10	11-01-004	THACKER SHELTON L ET AL	11073 MILL SWAMP RD	SMITHFIELD	VA	23430
11	11-01-015	BATTEN MITCHELL DELK	11231 MILL SWAMP RD	SMITHFIELD	VA	23430
12	11-01-016	THACKER SHELTON L ET AL	11073 MILL SWAMP RD	SMITHFIELD	VA	23430
13	11-01-017A	EDWARDS DANA L	11183 BURWELLS BAY RD	SMITHFIELD	VA	23430
14	11-01-017B	VILLA ASHLEE KAY & VILLA RAMOS ISMAEL	11150 BURWELLS BAY RD	SMITHFIELD	VA	23430
15	11-01-017C	LAWTON ASHLEE KAY & RAMOS ISMAEL VILLA	11150 BURWELLS BAY RD	SMITHFIELD	VA	23430
16	11-01-018A	EDWARDS DANA L	11183 BURWELLS BAY RD	SMITHFIELD	VA	23430
17	11-01-019	GOODRICH ERNEST J W	7364 MOONLIGHT RD	SMITHFIELD	VA	23430
18	11-01-021P	EVANS JAMES R SR & SHARON L	11226 BURWELLS BAY RD	SMITHFIELD	VA	23430
19	11-01-021Y	EDWARDS G W L/E & JEANETTE J L/E	10522 BURWELLS BAY RD	SMITHFIELD	VA	23430
20	11-01-022	EDWARDS GEORGE W & JEANETTE J L/E	10522 BURWELLS BAY RD	SMITHFIELD	VA	23430
21	11-01-022	EDWARDS GEORGE W & JEANETTE J L/E	10522 BURWELLS BAY RD	SMITHFIELD	VA	23430
22	11-01-022	EDWARDS GEORGE W & JEANETTE J L/E	10522 BURWELLS BAY RD	SMITHFIELD	VA	23430
23	11-01-022G	UPTON ALBERT G SR & ALBERT JR	8219 MOONLIGHT RD	SMITHFIELD	VA	23430
24	11-01-024	GWALTNEY ELSIE C L/E	16 DASHIELL DR	SMITHFIELD	VA	23430
25	11-01-040	GWALTNEY GERALD H	16 DASHIELL DRIVE	SMITHFIELD	VA	23430
26	11-01-041	JOYNER CHRISTOPHER J & AMETHYST J	23 E MINGLEWOOD DR	MIDDLETOWN	DE	19709
27	11-01-042	HOFLER JO ANN & ROBBINS JAMIE HOFLER	2200 BULL RUN DR	APEX	NC	27539
28	12-01-008	HOFLER JO ANN & ROBBINS JAMIE HOFLER	2200 BULL RUN DR	APEX	NC	27539

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JACKSONVILLE, FL 32207
(904) 659-4684
WWW.PDAENERGY.COM

PROJECT NAME & LOCATION

MOONLIGHT SOLAR

ISLE OF WIGHT COUNTY, VIRGINIA

DATE 04/26/2023

PROJECT NUMBER 49666.001

PROJECT NAME MOONLIGHT SOLAR

DESIGNED BY / DRAWN BY J. STICKLEY

NOTES

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REVISIONS

#	MM/DD/YY	DESCRIPTION
1	07/07/23	Revised per County feedback

DRAWING DESCRIPTION

PARCEL AND ZONING MAP

SCALE (FEET)

0 700 1,400

PLANS PRINTED AS 11X17 ARE HALF SCALE

SCALE H: 1" = 700'

SHEET NUMBER C2.0

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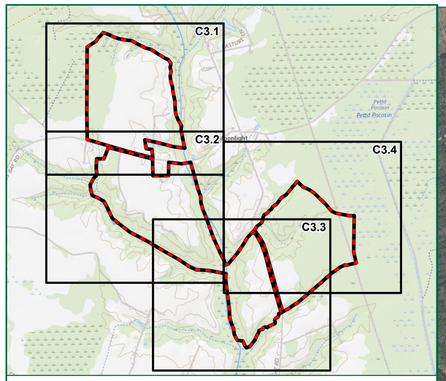
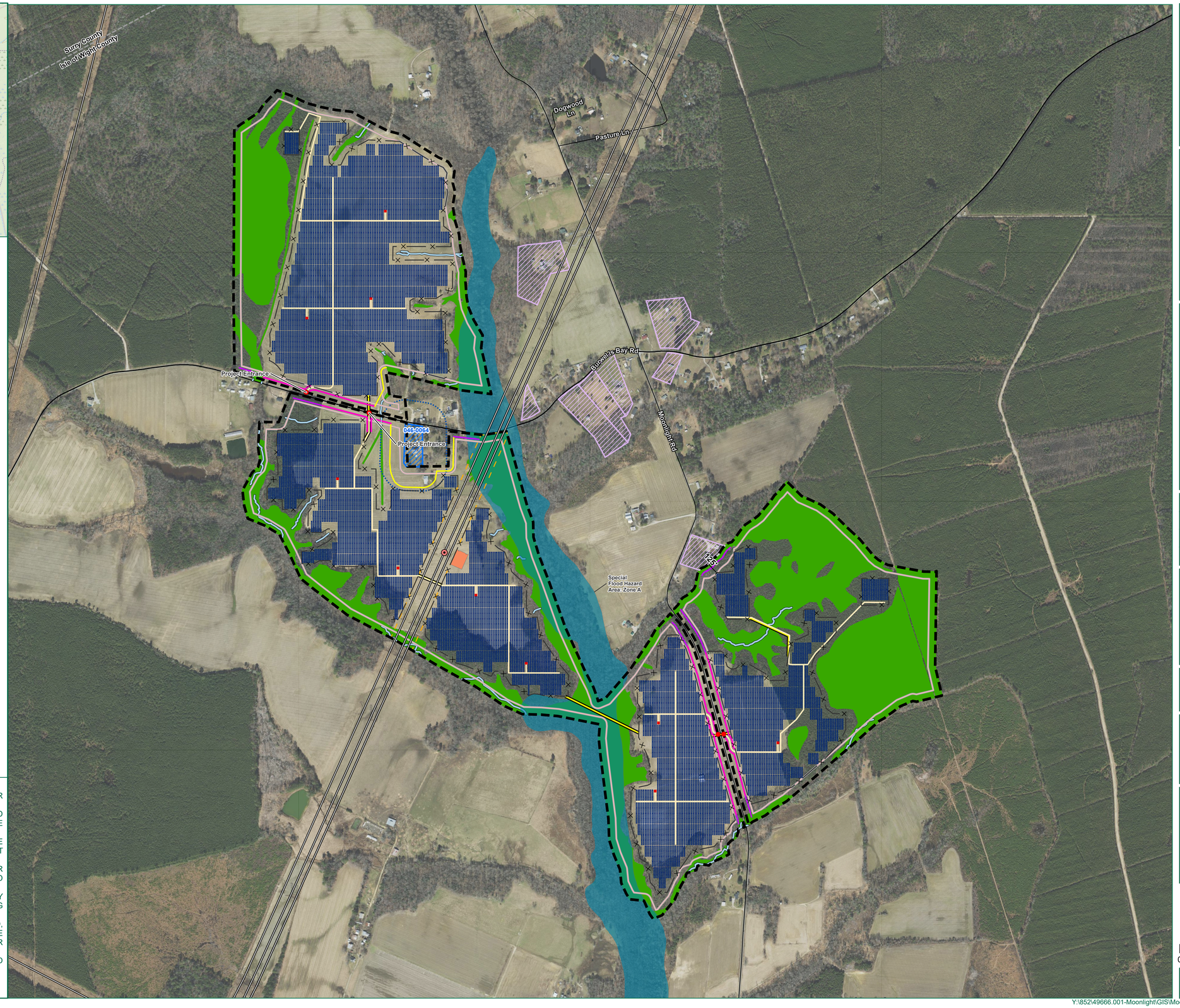


Legend

- Property Boundary - 522.96 Acres
- 75' Property Setbacks & 125' from Residential Parcels
- Entrance
- Point of Interconnection
- Inverters
- Delineated Stream
- Culverts
- Electric Transmission Lines
- Retained Vegetative Buffer
- Proposed Vegetative Buffer, Residential
- Proposed Vegetative Buffer, Road Frontage
- Internal Roads
- Panels
- Fence - 250.1 Acres
- Substation
- Transmission Line Easement
- NRHP Eligible Architectural Resource
- NRHP Eligible Architectural Resource Buffer - 250'
- Delineated Wetlands
- FEMA Flood Zone
- Rural Residential District (RR)
- County Boundary
- Proposed Underground Collection Line

NOTES:
1. LAYOUT IS PRELIMINARY AND SUBJECT TO CHANGE. NOT FOR CONSTRUCTION.
2. COLLECTION LINES WILL BE DIRECTIONALLY BORED UNDERGROUND. THE LOCATIONS OF THESE CROSSINGS ARE PRELIMINARY AND SUBJECT TO CHANGE.
3. ALL ENTRANCES ONTO THE PUBLIC RIGHT-OF-WAY WILL BE DESIGNED IN ACCORDANCE WITH APPENDIX F OF THE VDOT ROAD DESIGN MANUAL.
4. SETBACKS ARE FROM ISLE OF WIGHT COUNTY SOLAR ORDINANCE. SETBACKS ARE 75' FROM ALL PROPERTY LINES AND ROADWAYS AND ARE 125' FROM RESIDENTIAL PARCELS.
5. WETLANDS AND STREAMS HAVE BEEN DELINEATED BY TIMMONS GROUP IN MARCH 2023 AND ARE PENDING CONFIRMATION BY THE US ARMY CORPS OF ENGINEERS.
6. IMPACTS OF WATERS OF THE U.S. ARE NOT ANTICIPATED, EXCEPT FOR LINEAR ROAD CROSSINGS. MEDIUM VOLTAGE COLLECTION LINES WILL BE DIRECTIONALLY BORED UNDER WETLANDS AND STREAMS.
7. FLOOD ZONE DATA FROM FEMA'S NATIONAL FLOOD HAZARD LAYER.
8.. CULTURAL RESOURCE DATA FROM VDHR.
9. AERIAL IMAGERY FROM VGIN.



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PROJECT NAME & LOCATION

MOONLIGHT SOLAR

ISLE OF WIGHT COUNTY, VIRGINIA

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DESIGNED BY / DRAWN BY: J. STICKLEY

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REVISIONS

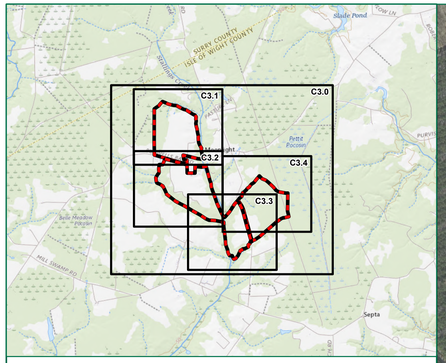
#	MM/DD/YY	DESCRIPTION
1	07/07/23	*Revised per County feedback*

DRAWING DESCRIPTION
CONCEPTUAL SITE PLAN

SCALE (FEET)
0 500 1,000
PLANS PRINTED AS 11X17 ARE HALF SCALE

SCALE	SHEET NUMBER
H: 1" = 500'	C3.0

Y:\852\49666.001-Moonlight\GIS\Moonlight CUP\Moonlight CUP.aprx



Legend

- Property Boundary - 522.96 Acres
- Retained Vegetative Buffer
- Proposed Vegetative Buffer, Residential
- Proposed Vegetative Buffer, Road Frontage
- Electric Transmission Lines
- Internal Roads
- Panels
- Fence - 250.1 Acres
- Substation
- Eligible Architecture Resources
- Eligible Cultural Resource Buffer - 250'

NOTES:
1. CULTURAL RESOURCE DATA FROM VDHR.
2. AERIAL IMAGERY FROM VGIN.

Dogwood Ln
Pasture Ln
Bluvelt Bay Rd
Moonlight Rd
046-0064

TIMMONS GROUP
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4446 HENDRICKS AVENUE, #356
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PROJECT NAME & LOCATION
MOONLIGHT SOLAR
ISLE OF WIGHT COUNTY, VIRGINIA

DATE: 04/26/2023
PROJECT NUMBER: 49666.001
PROJECT NAME: MOONLIGHT SOLAR
DESIGNED BY / DRAWN BY: J. STICKLEY

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REVISIONS

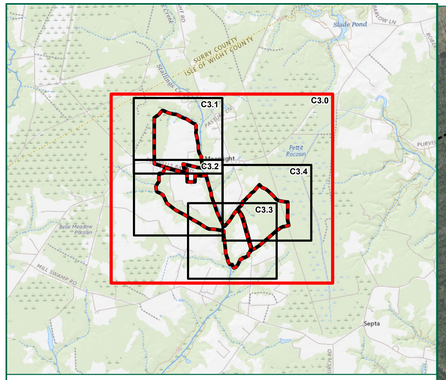
#	MM/DD/YY	DESCRIPTION
1	07/07/23	*Revised per County feedback*

DRAWING DESCRIPTION
PROPOSED LANDSCAPING MAP

SCALE (FEET)
0 500 1,000
PLANS PRINTED AS 11X17 ARE HALF SCALE

SCALE: H: 1" = 500'
SHEET NUMBER: C4.0

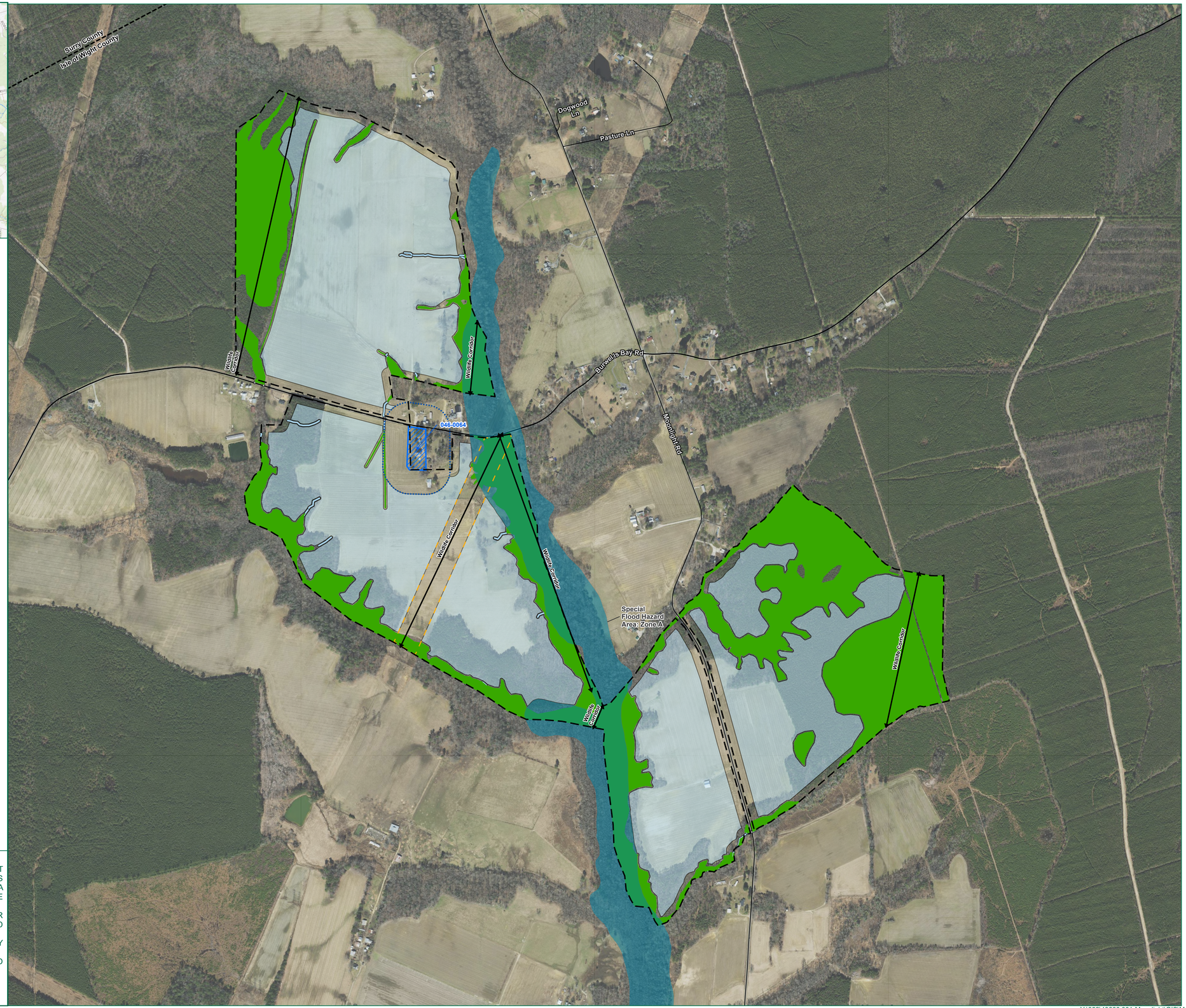
Y:\852\49666.001-Moonlight\GIS\Moonlight CUP\Moonlight CUP.aprx



Legend

- Property Boundary - 522.96 Acres
- Development Envelope - 305.0 Acres
- Culverts
- Delineated Stream
- Wildlife Corridor
- Delineated Wetlands
- Transmission Line Easement
- FEMA Flood Zone
- NRHP Eligible Architecture Resource
- NRHP Eligible Cultural Resource Buffer - 250'
- County Boundary

NOTES:
1. LAYOUT IS SUBJECT TO CHANGE WITHIN DEVELOPMENT ENVELOPE. THE DEVELOPMENT FOOTPRINT INCLUDES ALL AREAS OUTSIDE OF REQUIRED PROPERTY SETBACKS, FEMA FLOODPLAIN, AND DELINEATED WETLANDS AND STREAMS, ASIDE FROM PERPENDICULAR ROAD CROSSINGS WHERE NECESSARY.
2. SETBACKS ARE FROM ISLE OF WIGHT COUNTY SOLAR ORDINANCE. SETBACKS ARE 75' FROM ALL PROPERTY LINES AND ROADWAYS AND ARE 125' FROM RESIDENTIAL PARCELS.
3. WETLANDS AND STREAMS HAVE BEEN DELINEATED BY TIMMONS GROUP IN MARCH 2023.
4. FLOOD ZONE DATA FROM FEMA'S NATIONAL FLOOD HAZARD LAYER.
5. CULTURAL RESOURCE DATA FROM VDHR.
6. AERIAL IMAGERY FROM VGIN.



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1	07/07/23	*Revised per County feedback*

DRAWING DESCRIPTION
NOT TO EXCEED SITE PLAN

SCALE (FEET)
0 500 1,000
PLANS PRINTED AS 11X17 ARE HALF SCALE

SCALE	SHEET NUMBER
H: 1" = 500'	C5.0

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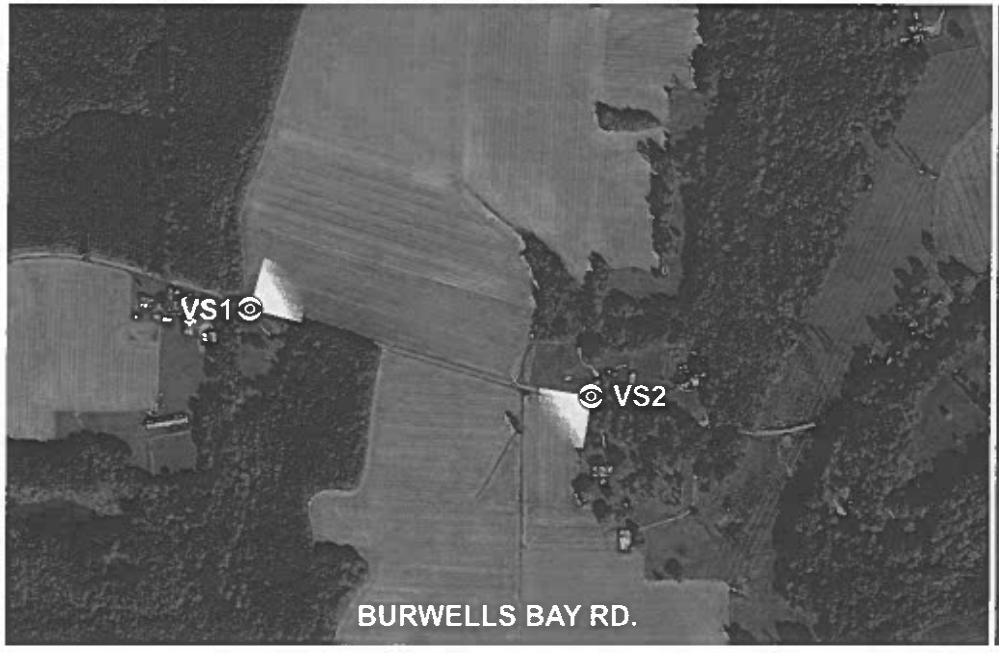
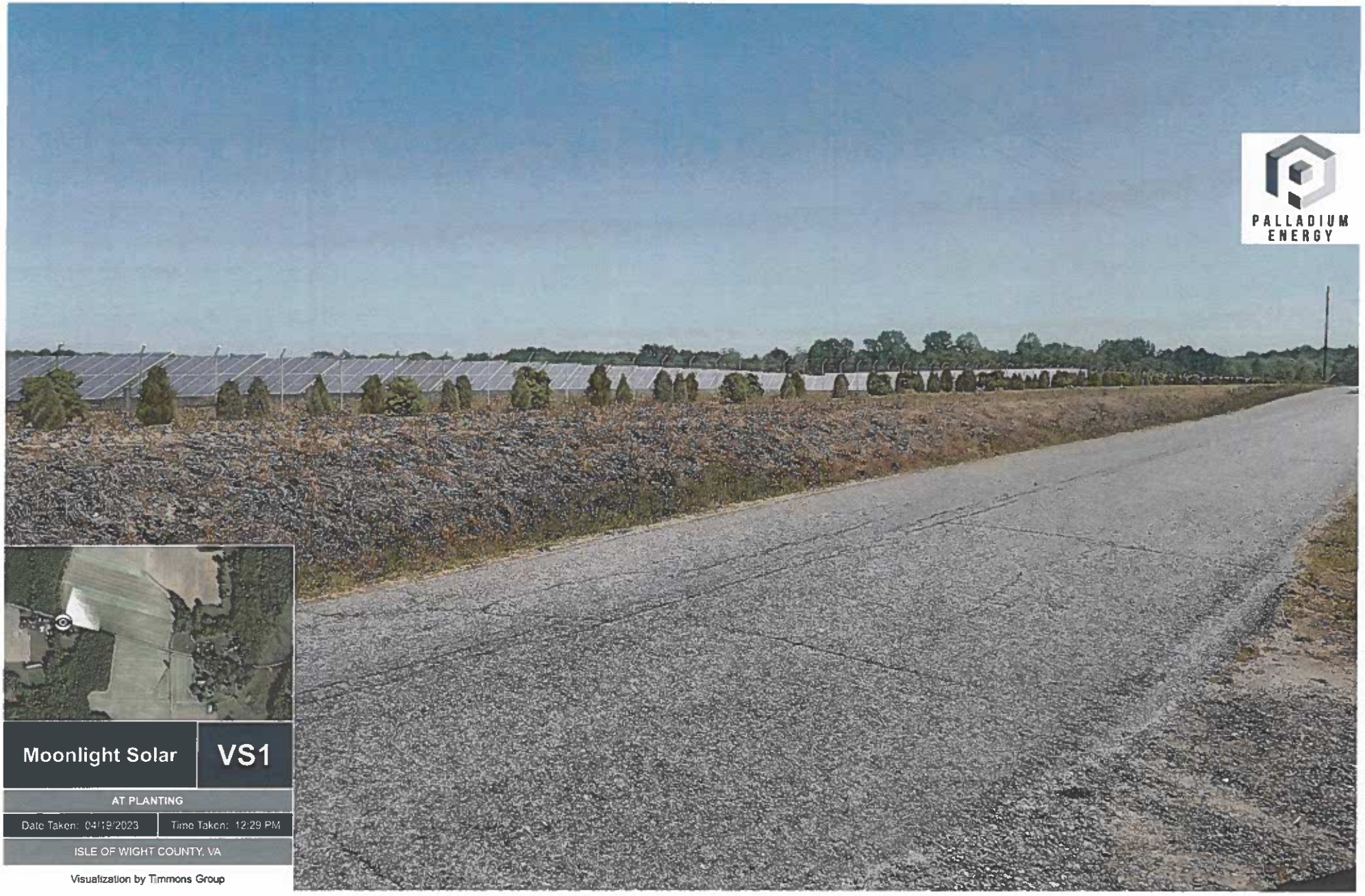
PALLADIUM ENERGY

VISUAL IMPACT ANALYSIS

MOONLIGHT SOLAR





PALLADIUM ENERGY

Moonlight Solar | **VS1**

AT PLANTING

Date Taken: 04/19/2023 | Time Taken: 12:29 PM

ISLE OF WIGHT COUNTY, VA

Visualization by Timmons Group

Visualization by Timmons Group

Moonlight Solar	VS2
AT MATURITY	
Date Taken: 04/19/2023	Time Taken: 12:20 PM
ISLE OF WIGHT COUNTY, VA	

Visualization by Timmons Group

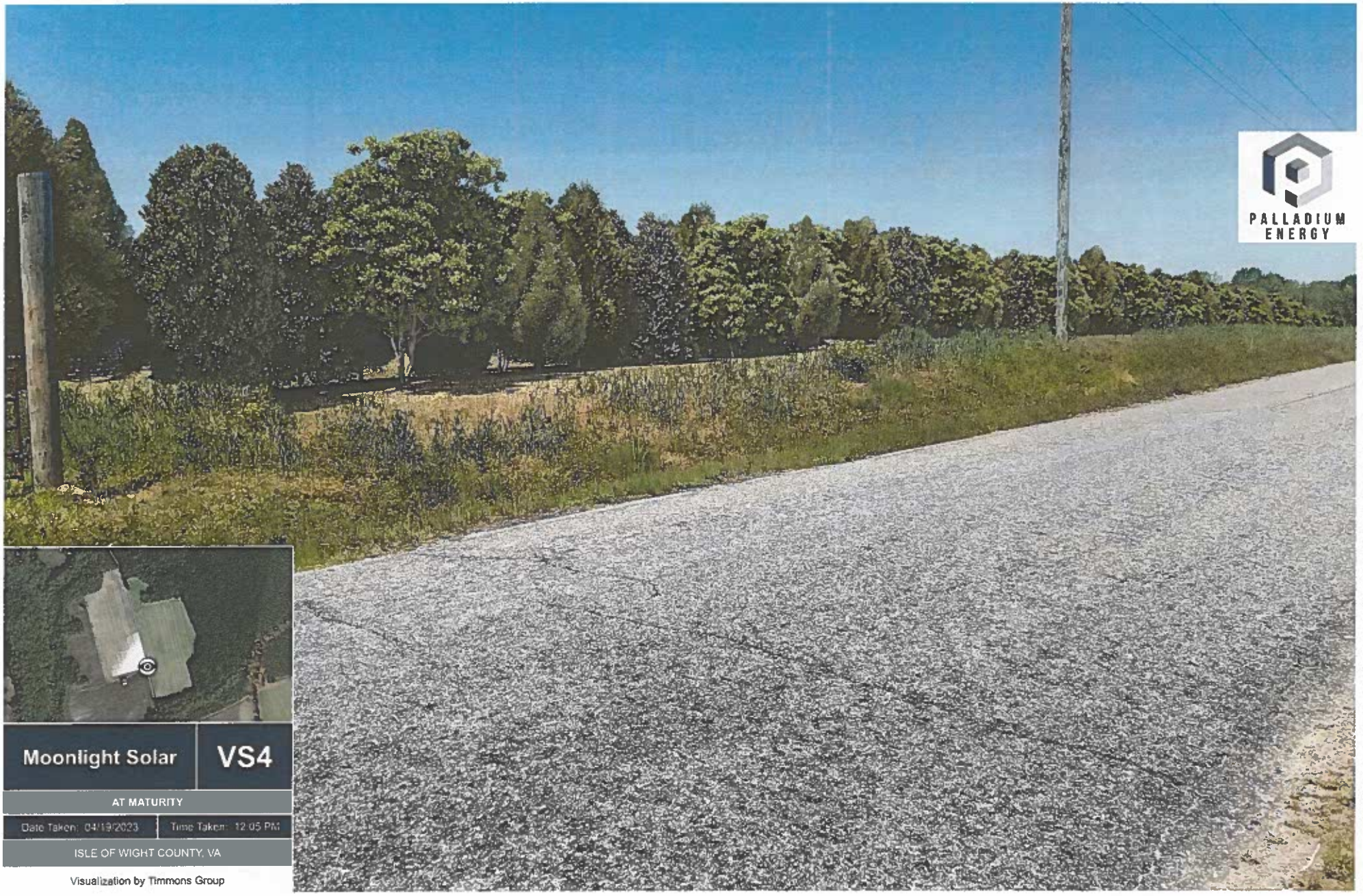
PALLADIUM
ENERGY
Moonlight Solar
VS2
AT MATURITY
Date Taken: 04/19/2023
Time Taken: 12:20 PM
ISLE OF WIGHT COUNTY VA
Visualization by Timmons Group

PALLADIUM ENERGY
Moonlight Solar
VS3
AT PLANTING
Date Taken: 04/19/2023
Time Taken: 12:00 PM
ISLE OF WIGHT COUNTY, VA
Visualization by Timmons Group

PALLADIUM
ENERGY
Moonlight Solar
VS3
AT MATURITY
Date Taken: 04/19/2023
Time Taken: 12:00 PM
ISLE OF WIGHT COUNTY, VA
Visualization by Timmons Group

Moonlight Solar	VS4
AT PLANTING	
Date Taken: 04/19/2023	Time Taken: 12:05 PM
ISLE OF WIGHT COUNTY, VA	

Visualization by Timmons Group



Moonlight Solar | **VS4**

AT MATURITY

Date Taken: 04/19/2023 | Time Taken: 12:05 PM

ISLE OF WIGHT COUNTY, VA

Visualization by Timmons Group

Traffic & Route Evaluation Study

Moonlight Solar Project

Isle of Wight County, Virginia

July 2023

Prepared For:

Palladium Energy, LLC

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Contact: Scott Dunn, AICP, PTP

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Traffic & Route Evaluation Study

Moonlight Solar Project

Isle of Wight County, Virginia

Prepared For:

Palladium Energy, LLC
4446 Hendricks Avenue, #356
Jacksonville, FL 32207

Prepared By:

Timmons Group
1001 Boulders Parkway
Suite 300
Richmond, Virginia 23225
(804) 200-6500

April 2023

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1 PROJECT OVERVIEW

Timmons Group, at the request of Palladium Energy, LLC completed a transportation assessment for the proposed Moonlight Solar Project, located in Isle of Wight County, VA. This work has been prepared in conjunction with the site's evaluation to identify any potential transportation issues and recommend solutions. The tasks associated with this assessment included:

- Review of data and documents provided by the Client relative to the project;
- Coordination with the Client on access, schedule, and other parameters that are reflected in the traffic assessment;
- Obtaining available geometric (roadway widths, intersection control, etc.) and speed limit data that is readily available via a review of available aerial imagery through Google Earth, Bing, or County GIS systems and a field visit conducted on Wednesday, April 12, 2023;
- Obtaining available VDOT traffic data for those roads adjacent to the site;
- Obtaining available VDOT crash data for those roads adjacent to the site; and
- Preparing a narrative summarizing (1) existing conditions, (2) traffic along the adjacent roadway network, (3) anticipated impacts, if any, associated with the site-related traffic, and (3) potential mitigation measures.

2 EXISTING CONDITIONS

Timmons Group compiled existing roadway conditions and crash data for facilities adjacent to the proposed Moonlight Solar project located approximately 5.5 miles northwest of Smithfield in Isle of Wight County, VA.

The site is comprised of four (4) parcels of land generally located along both sides of Routes 621 and 627. For the purposes of this work, the assumed delivery routes include direct access to the proposed site entrances from state-maintained roads - Route 10, Route 621, and Route 627

The project location is shown on Figure 1 (all figures are located at the end of the report) and a site plan can be found in Figure 2. It should be noted that there are two (2) proposed electrical connections associated with this site that will cross existing rights of way on Routes 621 and 627; these crossings align with proposed entrance locations and are shown on Figure 3.

EXISTING ROADWAYS

A visual assessment of the adjacent roadways was performed on April 12, 2023.

Route 10 (Old Stage Highway) is a two-lane, undivided minor arterial road with a posted speed limit of 55 mph. According to 2021 VDOT AADT data, Route 10 services 7,000 vehicles per day in the vicinity of the site between the Surry County Line and Business Route 10 in Smithfield. The pavement on Route 10 is approximately 25' wide with center and edge line markings.

Route 621 (Burwells Bay Road) is a two-lane, undivided minor collector with a posted speed limit of 45 mph. According to 2021 VDOT AADT data, Route 621 services 130 vehicles per day between Mill Swamp Drive and Moonlight Road and 310 vehicles per day between Moonlight Road and Route 10. The pavement on Route 621 is approximately 20' wide and neither center nor edge line pavement markings are present.

Route 627 (Moonlight Road) is a two-lane, undivided local road with no available posted speed limit signs and therefore assumed to be 55 mph. According to 2021 VDOT AADT data, Route 627 services 340 vehicles per day between the Surry County line and Route 626. The pavement on Route 627 is approximately 18' to 20' wide, and neither center nor edge line pavement markings are present.

Based on field observations, it was noted that the existing roadways had minor pavement deficiencies including typical alligator cracking, longitudinal cracking, and a few areas of rutting. Additionally, as noted above, pavement widths varied, with certain areas being narrower than others.

Overall, the existing roadways are acceptable for use by local traffic. However, due to narrow pavement widths along Routes 621 and 627, it is recommended that signage be posted alerting drivers to the presence of construction and heavy vehicles.

EXISTING STRUCTURES

There are three (3) identified culverts along the proposed haul route and one (1) bridge adjacent to the site that is not located along the proposed haul route.

The three (3) culverts are located on Route 621 and Route 627, adjacent to the site; each location was verified during our field visit and measured.

- The pavement over culvert #1 is approximately 17' wide.
- The pavement over culvert #2 is approximately 15' wide.
- The pavement over culvert #3 is approximately 16' wide.

The location of the crossings is shown in Figure 3 and photos of each crossing can be found in Figures 4 through 6.

One (1) bridge, which is located on Route 626, south of the site and not along the proposed haul route, crosses over Stallings Creek. Per the VDOT-maintained Bridge and Culvert Database, the bridge is rated in poor condition with a 15-ton weight restriction. The pavement over the bridge is approximately 17' wide.

The location of the bridge structure is shown in Figure 3 and photos of the bridge can be found in Figure 8.

Based on the field visit, two (2) of the existing culverts, #1 and #3, are constructed with corrugated plastic pipe and have limited cover. It is recommended that these structures be further evaluated for structural integrity and may need to be replaced prior to or during construction of the solar facility.

EXISTING INTERSECTIONS

Two (2) key intersections were identified within the study area and are included in this evaluation:

1. Route 10 and Route 621 (Unsignalized);
2. Route 621 and Route 627 (Unsignalized);

Route 10 (Old Stage Highway) and Route 621 (Burwells Bay Road)

At the unsignalized four-legged intersection of Route 10 and Route 621, Route 621 is the stop-controlled approach. Each approach consists of one (1) lane that serves all left/through/right movements. The pavement on Route 10 is approximately 25' wide and the pavement on Route 621 is approximately 20' wide. Photos of the intersection can be found on Figure 9.

Route 621 (Burwells Bay Road) and Route 627 (Moonlight Road)

At the unsignalized four-legged intersection of Route 621 and Route 627, all approached are stop-controlled. Each approach consists of one (1) lane in each direction that serves all left/through/right movements. The pavement on Route 621 is approximately 18' to 20' wide and the pavement on Route 627 is approximately 20' wide. Photos of the intersection can be found on Figures 10 and 11.

Crash Data

Based on VDOT crash data from the past five years there have been a total of 12 crashes in the vicinity of the Moonlight Solar project:

- five (5) were fixed object (off road) crashes;
- two (2) angle crashes;
- two (2) rear end crashed;
- one (1) deer;
- one (1) sideswipe crash; and
- one (1) other type crash.

With respect to crash severity:

- two (2) resulted in severe injury;
- three (3) resulted in visible injury;
- one (1) resulted in nonvisible injury; and
- six (6) resulted in property damage only.

An aerial showing the location/type of the 12 crashes can be found on Figure 11 and the location/severity of the crashes can be found on Figure 13.

Seven (7) occurred during daylight hours and five (5) occurred at night or dawn. During three (3) of the crashes the pavement was wet.

As expected, there is a cluster of crashes at the Route 10/Route 621 intersection; while the crash locations along Routes 621 and 627 appear to correspond with existing driveways.

3 SITE ACCESS

SITE ENTRANCES

Access to the site will be provided via four (4) entrances – two (2) on Route 621 and two (2) on Route 627. The locations of these entrances are shown on Figure 1.

The proposed site entrance locations are approximate and will require that new entrances/driveways be installed to accommodate site-generated construction traffic. It is anticipated that these entrances will remain in place following construction of the solar facility and be used for future operations/maintenance activities.

Note that temporary staging and assembly areas will be used during the construction period for the storage of construction vehicles and equipment, as well as staging of components of the solar facility. All temporary staging, parking, and assembly areas will be located within the project area boundaries and provide on-site accommodations so that construction-related traffic is not parked with state-maintained right-of-way.

Site Entrance #1 on Route 621

Site Entrance #1 on Route 621 is approximately 0.72 miles west of the Route 621 and Route 627 intersection; this entrance is currently not constructed. Sight distance along Route 621 to the east and west of the proposed entrance measured in excess of 500'. The portion of Route 621 in front of this proposed entrance is approximately 17' wide.

Photos of the proposed Site Entrance #1 location can be found in Figure 14.

Site Entrance #2 on Route 621

Site Entrance #2 on Route 621 is approximately 0.59 miles west of the Route 621 and Route 627 intersection; this entrance is currently not constructed. Sight distance along Route 621 to the east and west of the proposed entrance measured in excess of 500'. The portion of Route 621 in front of this proposed entrance is approximately 18' wide.

Photos of the potential location of Site Entrance #2 can be found in Figure 15.

Site Entrance #3 on Route 627

Site Entrance #3 on Route 627 is approximately 0.81 miles south of the Route 621 and Route 627 intersection; this entrance is currently not constructed. Sight distance along Route 627 to the north and south of the proposed entrance measured in excess of 500'. The portion of Route 627 in front of this proposed entrance is approximately 17.5' wide.

Photos of the potential location of Site Entrance #2 can be found in Figure 16.

Site Entrance #4 on Route 627

Site Entrance #4 on Route 627 is approximately 0.81 miles south of the Route 621 and Route 627 intersection; this entrance is currently not constructed. Sight distance along Route 627 to the north and south of the proposed entrance measured in excess of 500'. The portion of Route 627 in front of this proposed entrance is approximately 18' wide.

Photos of the potential location of Site Entrance #2 can be found in Figure 17.

TRAFFIC MITIGATION

Throughout construction of the site, Moonlight Solar will coordinate with the representatives from Isle of Wight County and VDOT to determine appropriate transportation management procedures which may include, but are not limited to, traffic control, lane closures, road access restrictions, truck restrictions, and temporary/short-term road closures.

Based on the existing roadway conditions, the locations for proposed access points, and the available average daily traffic numbers for the agreed upon access roads, the anticipated construction traffic volumes will not exceed available roadway capacities; the roadways should not be significantly impacted by standard construction traffic. During operation and maintenance, the facility will not generate a significant volume of traffic with the anticipation of only a few pickup trucks per month.

Construction-related traffic will access the Moonlight Solar site via state-maintained roadways. Given the existing posted speeds and anticipated slower entering/exiting traffic, temporary traffic control (TTC) measures may be necessary. Pertinent signage should be installed prior to the site preparation work and removed when mechanical/electrical work/inspections begin. It is not anticipated that daily vehicular traffic following construction will disrupt local traffic flows.

Outside of the previously noted mitigation efforts, should a traffic issue arise during construction, Moonlight Solar will work the County and VDOT appropriately address the specific concern.

4 CONCLUSIONS

Based on our review of available data relating to the site, existing conditions, and estimated traffic, the following is offered:

- The proposed Moonlight Solar Site is located northwest of the Town of Smithfield in Isle of Wight County, Virginia (see Figures 1 and 2).
- Access to the sites will be provided via Route 10, and Routes 621 and 627.
- Each of the three (3) previously mentioned roadway facilities has the available capacity to accommodate site-generated traffic, both during construction and operations/maintenance activities based on existing ADTs.
- While there is capacity available along both Routes 621 and 627, there are culverts located on both routes in the vicinity of the proposed site driveways that are constructed of black corrugated pipe with minimal cover. It is recommended that these culverts be evaluated prior to use by construction/heavy vehicle traffic.
- Assuming site-traffic is focused on Route 621 and Route 627, the potential exists for temporary traffic control measures to be implemented for the duration of the site preparation/construction phase to safely and effectively manage site-related traffic.

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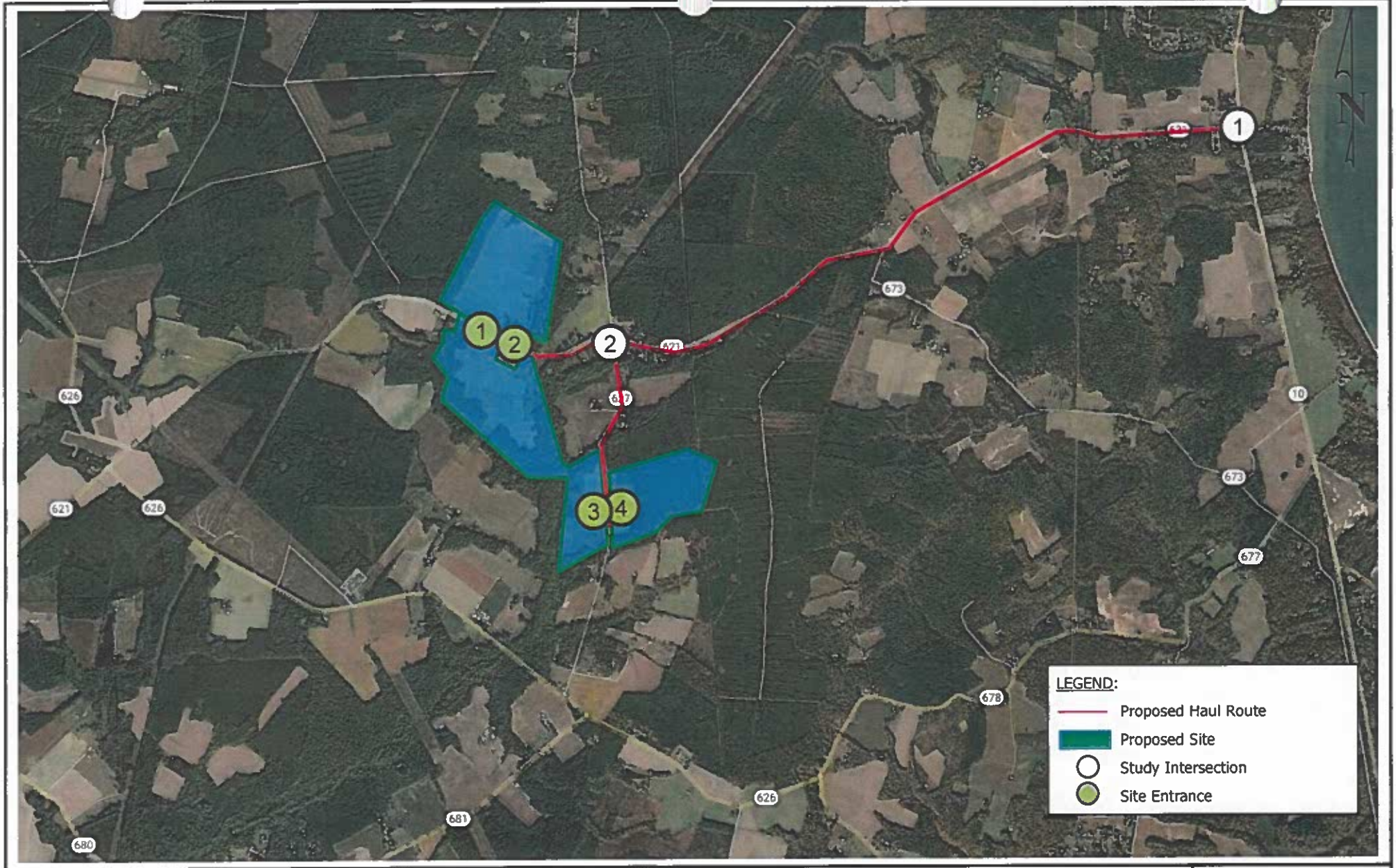

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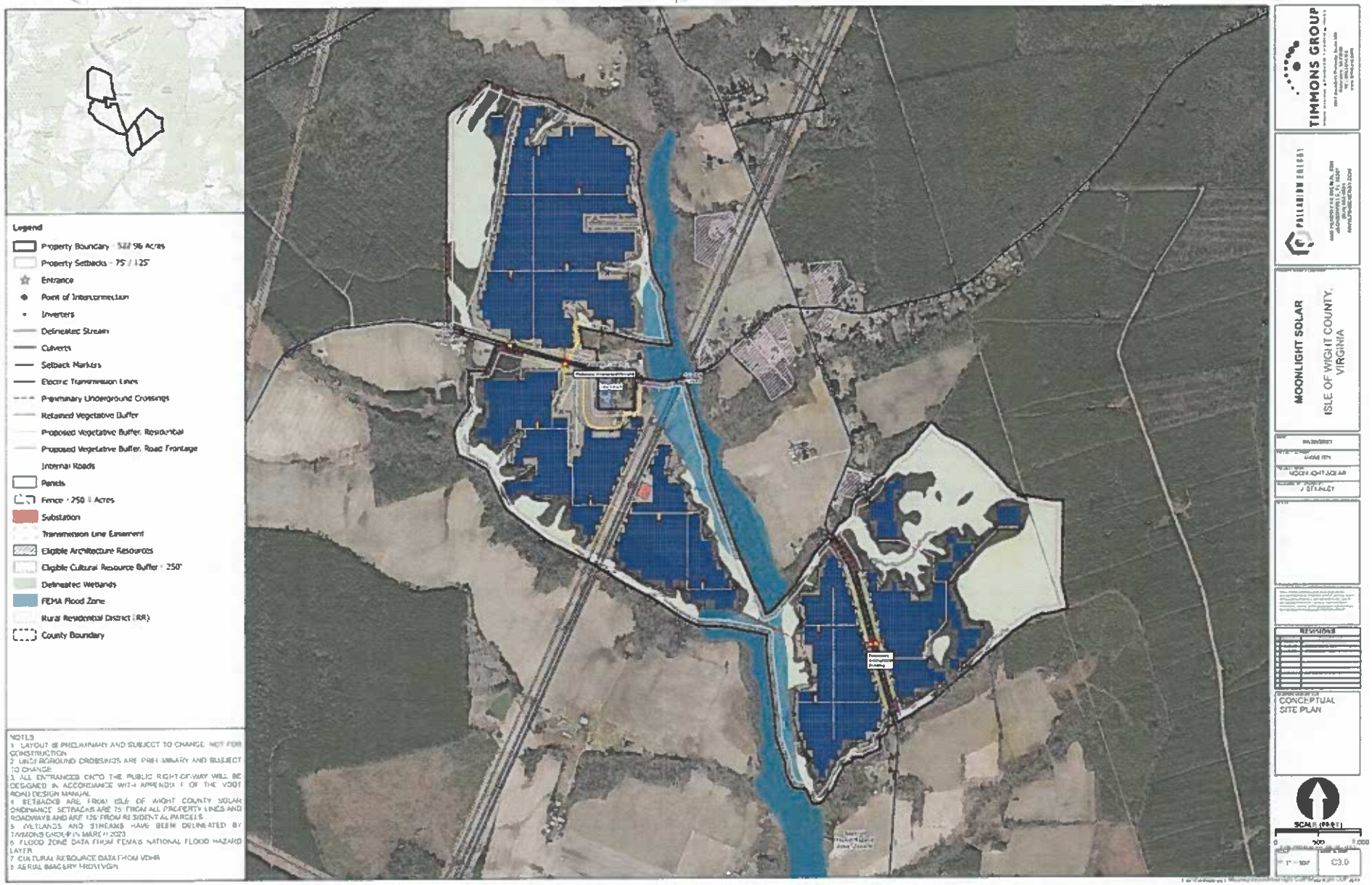
Surrounding Roadway Network and Site Location
Moonlight Solar
Isle of Wight County, Virginia

Figure
1



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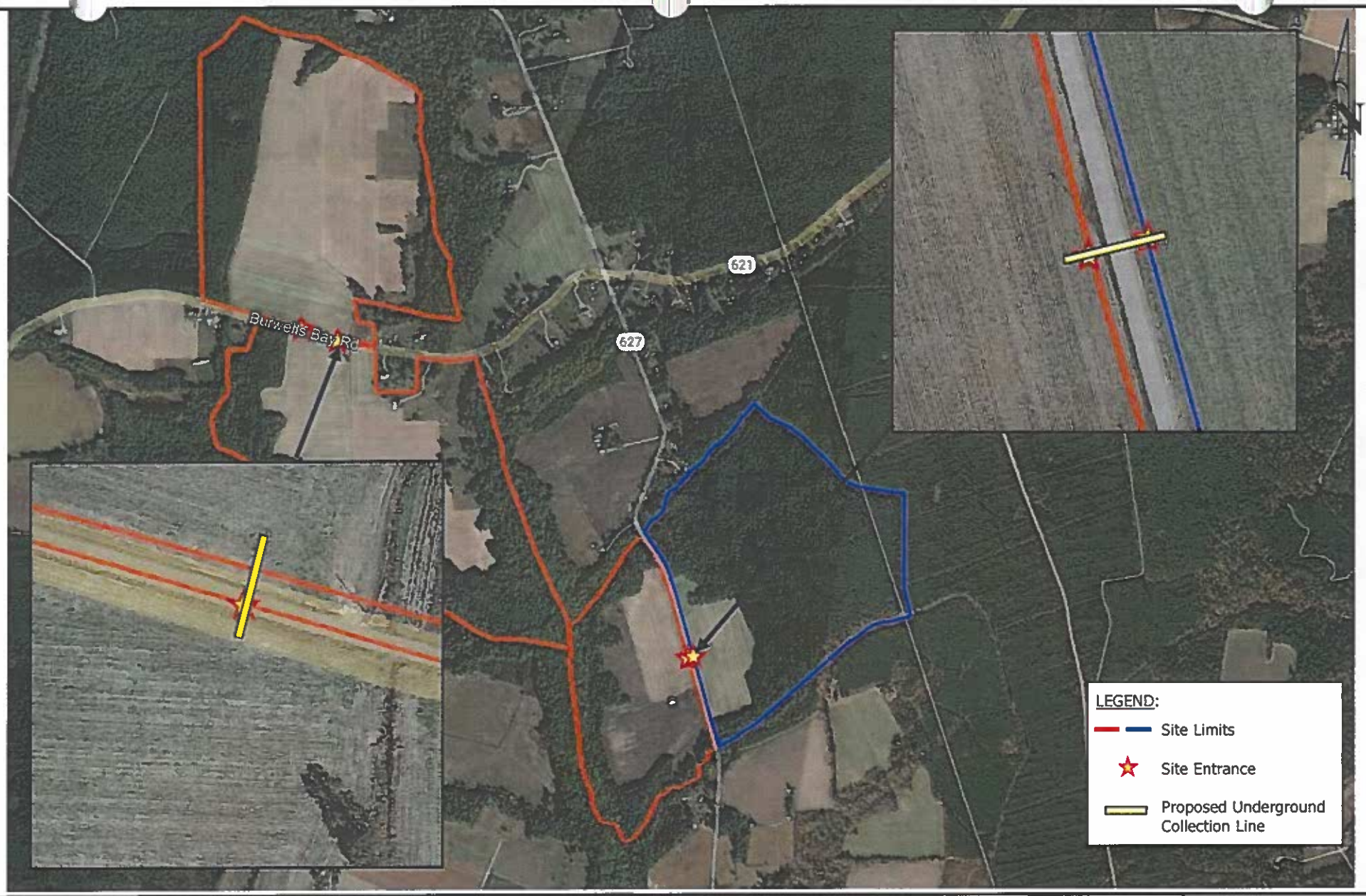
Concept Plan
Moonlight Solar
Isle of Wight County, Virginia

Figure
2



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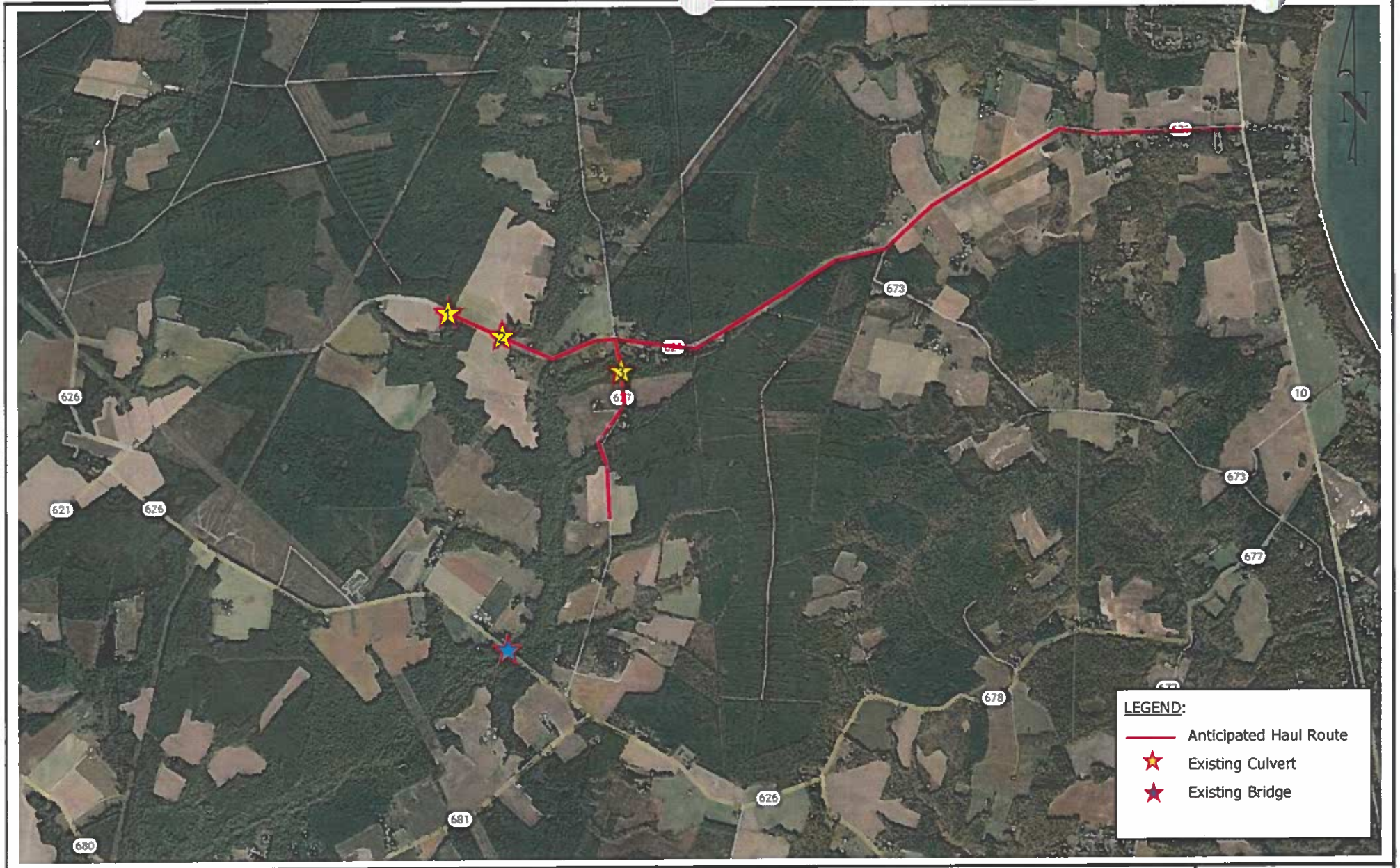
Location of Proposed Right of Way Crossings
Moonlight Solar
Isle of Wight County, Virginia

Figure
3



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Location of Existing Structures
Moonlight Solar
Isle of Wight County, Virginia

Figure
4

Culvert West of Site Entrance #1 on Route 621

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Existing Structure on Haul Route – Culvert on Route 621
Moonlight Solar
Isle of Wight County, Virginia

Figure
5

Culvert East of Site
Entrance #2 on Route 621

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Existing Structure on Haul Route – Culvert on Route 621
Moonlight Solar
Isle of Wight County, Virginia

Figure
6

Culvert North of Site Entrances
3 and 4 on Route 627

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Existing Structure on Haul Route – Culvert on Route 627
Moonlight Solar
Isle of Wight County, Virginia

Figure
7

Bridge over Stallings
Creek on Route 626

West along Bridge on
Route 626

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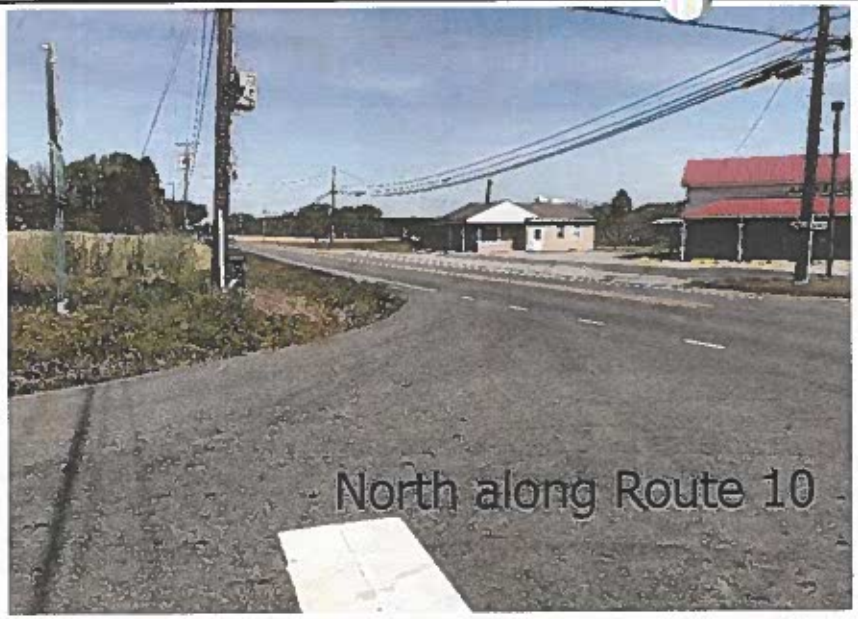
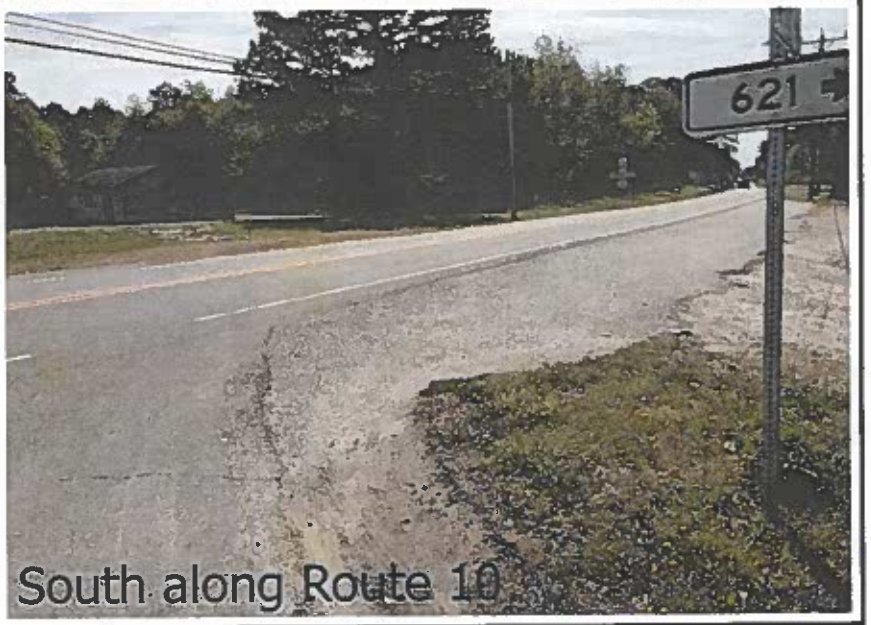
Existing Structure Adjacent to Haul Route
Moonlight Solar
Isle of Wight County, Virginia

Figure
8





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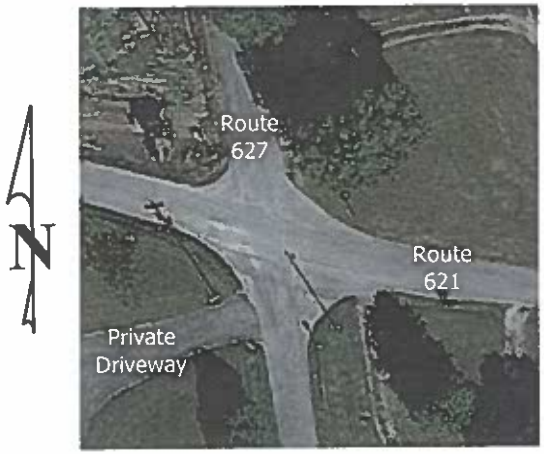
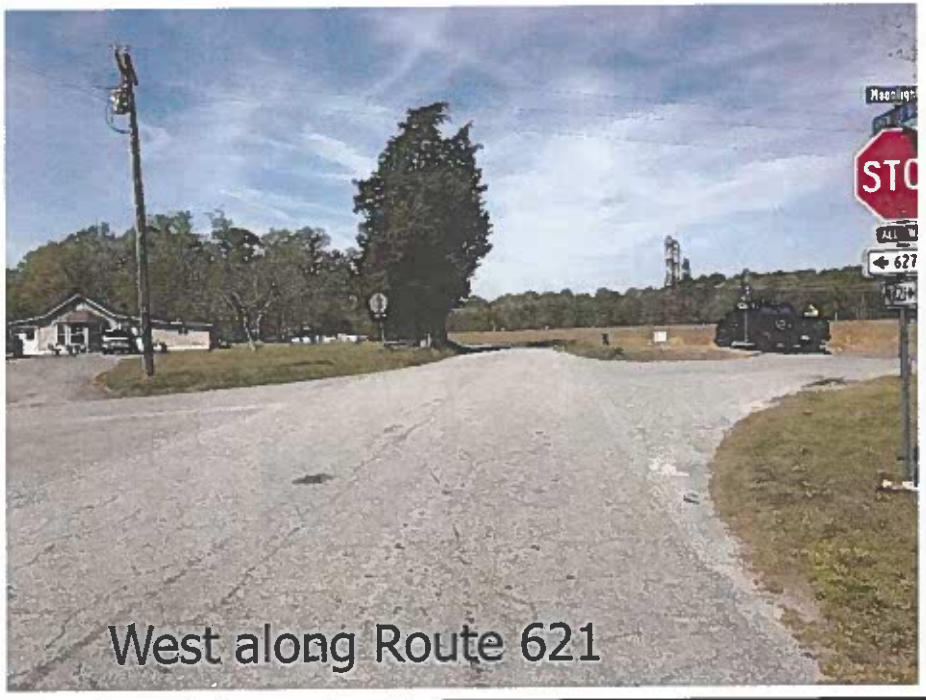
Intersection #1
Route 10 (Old Stage Highway) and Route 621 (Burwells Bay Road)
Moonlight Solar
Isle of Wight County, Virginia

Figure
9





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Intersection #2
Route 621 (Burwells Bay Rd) and Route 627 (Moonlight Road)
Moonlight Solar
Isle of Wight County, Virginia

Figure
10

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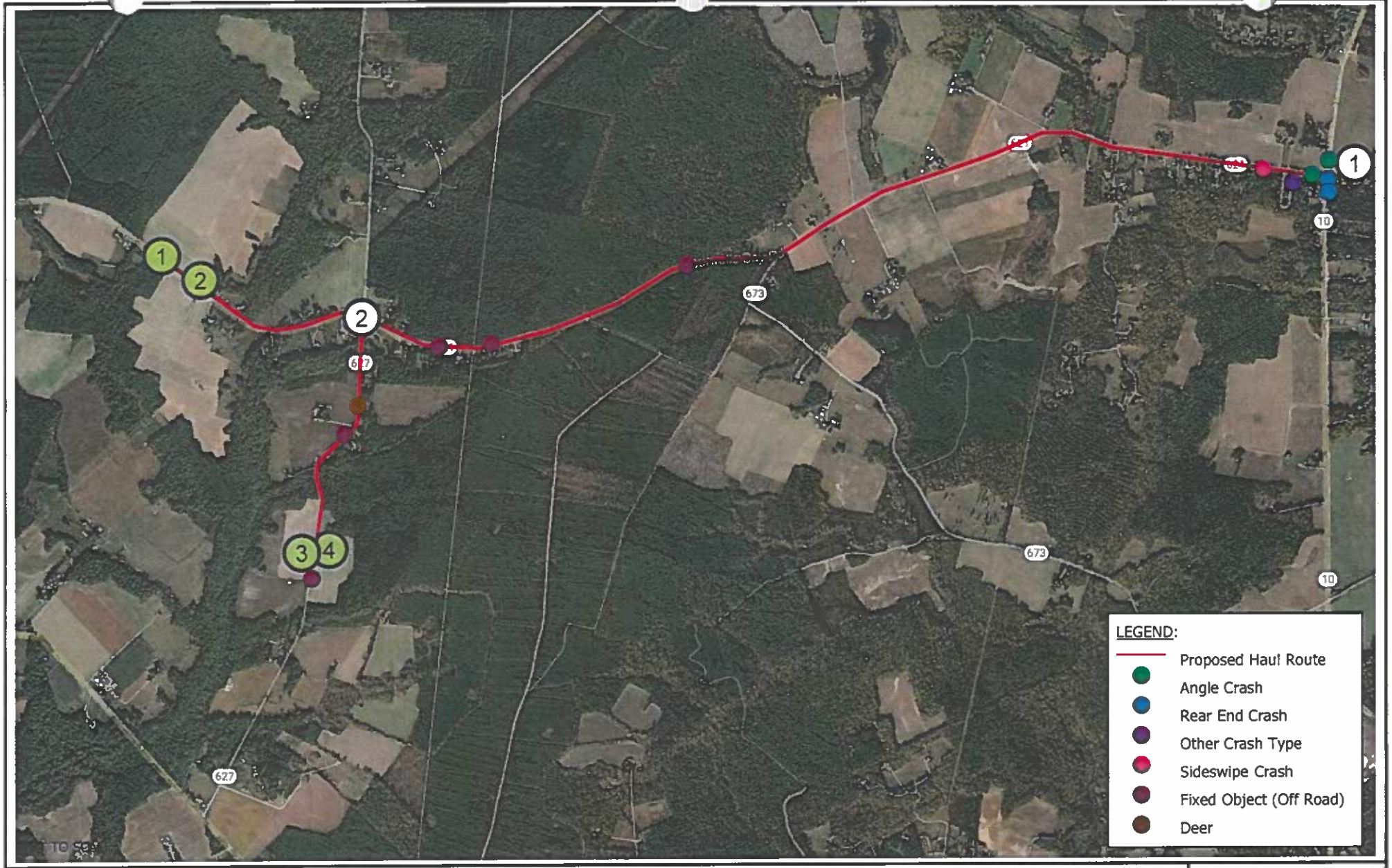
Intersection #2
Route 621 (Burwells Bay Rd) and Route 627 (Moonlight Road)
Moonlight Solar
Isle of Wight County, Virginia

Figure
11



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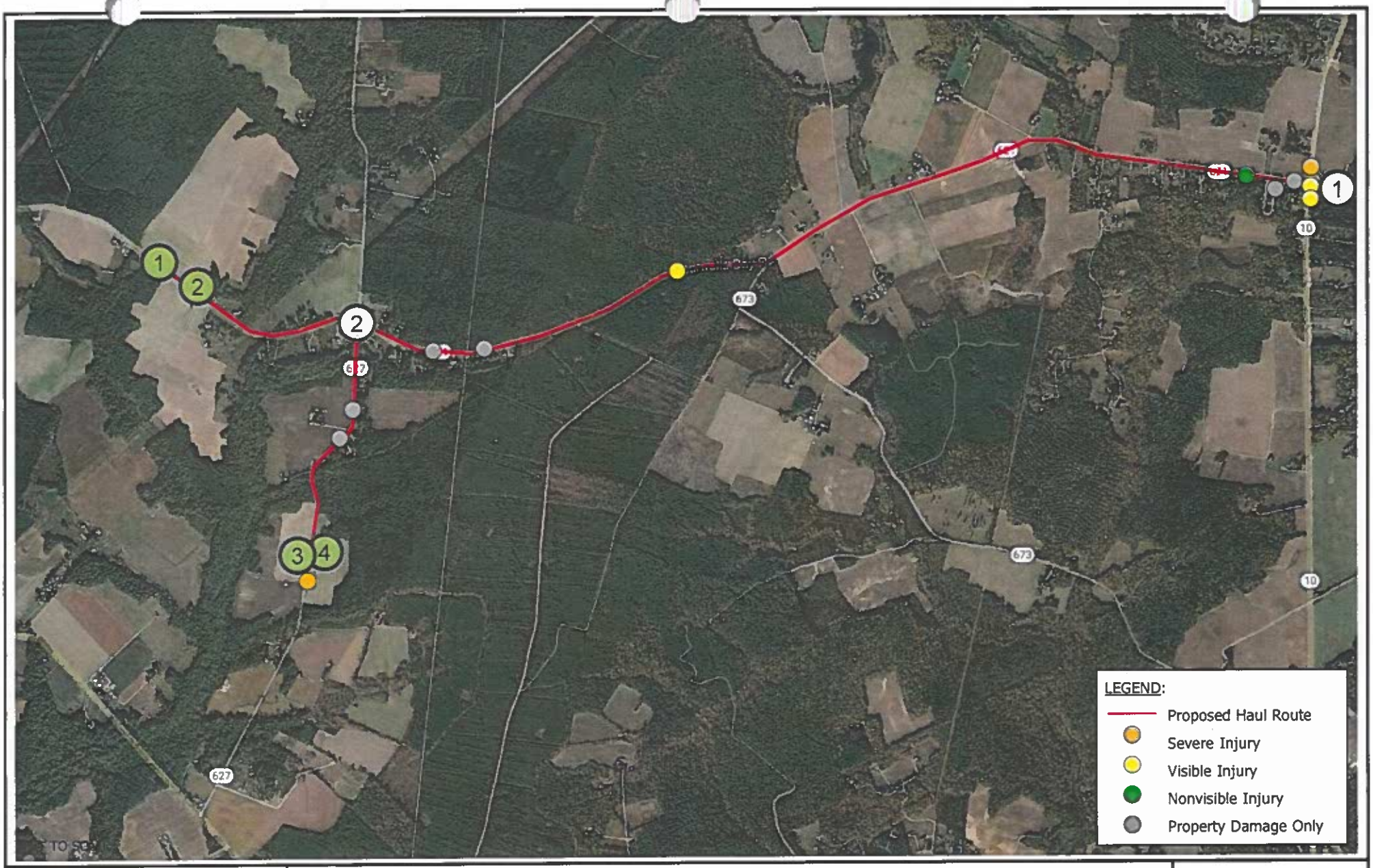
Crash Map – Crash Type
Moonlight Solar
Isle of Wight County, Virginia

Figure
12



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Crash Map – Crash Severity
Moonlight Solar
Isle of Wight County, Virginia

Figure
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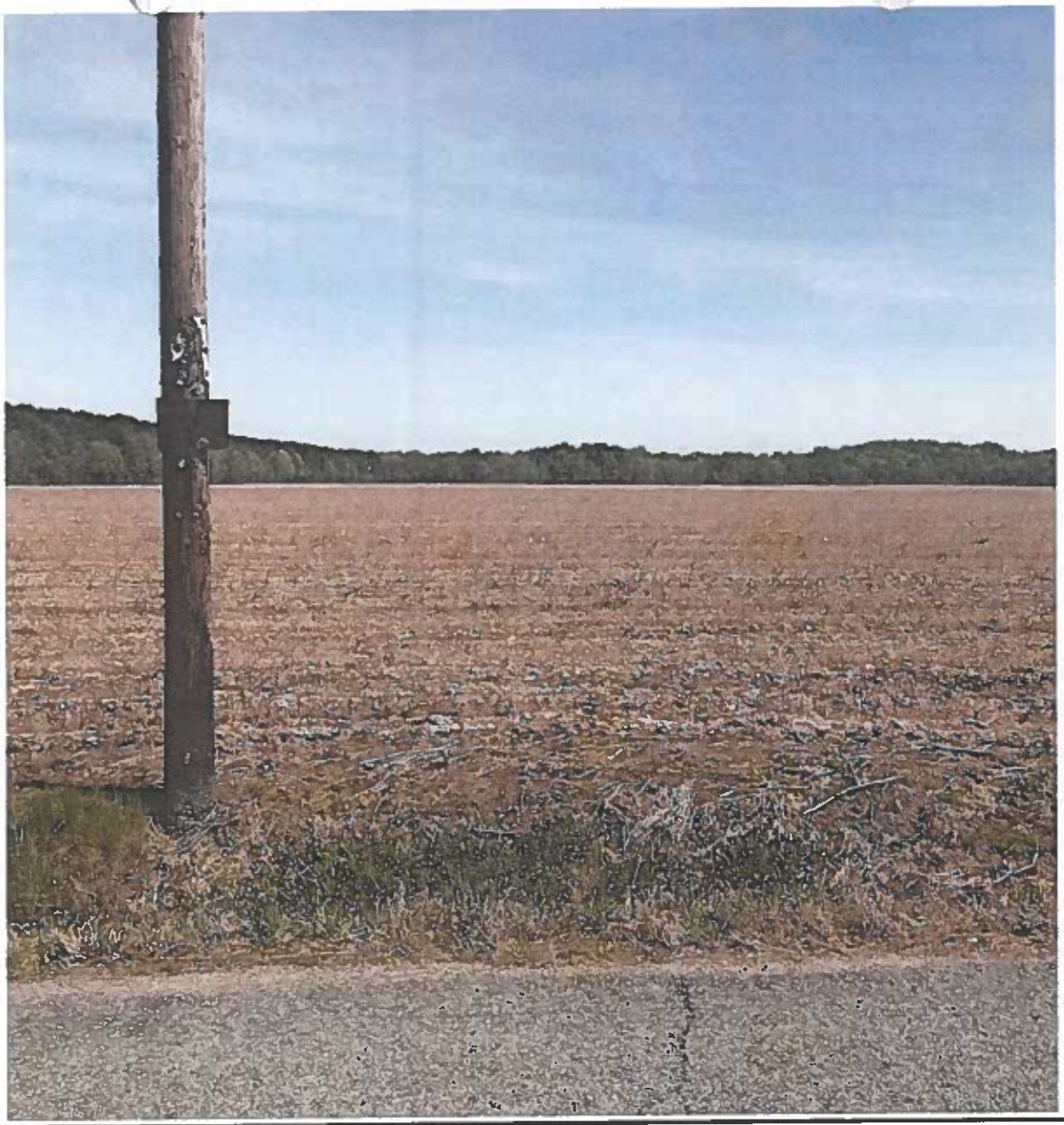

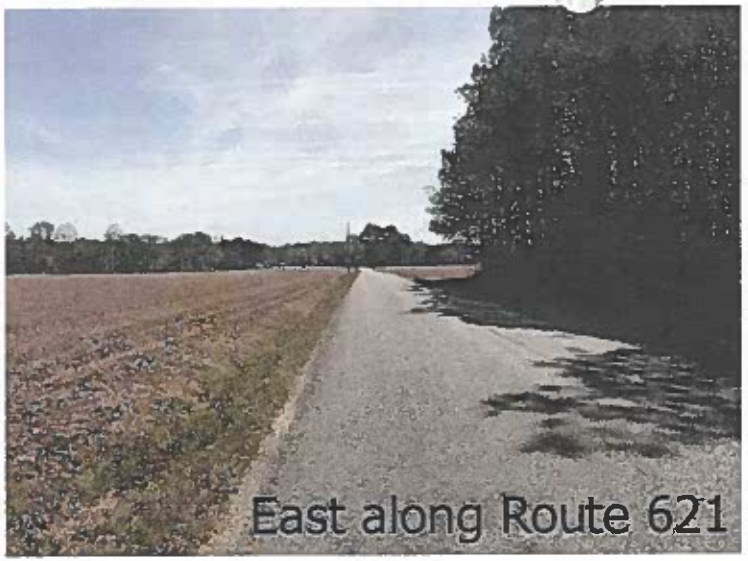

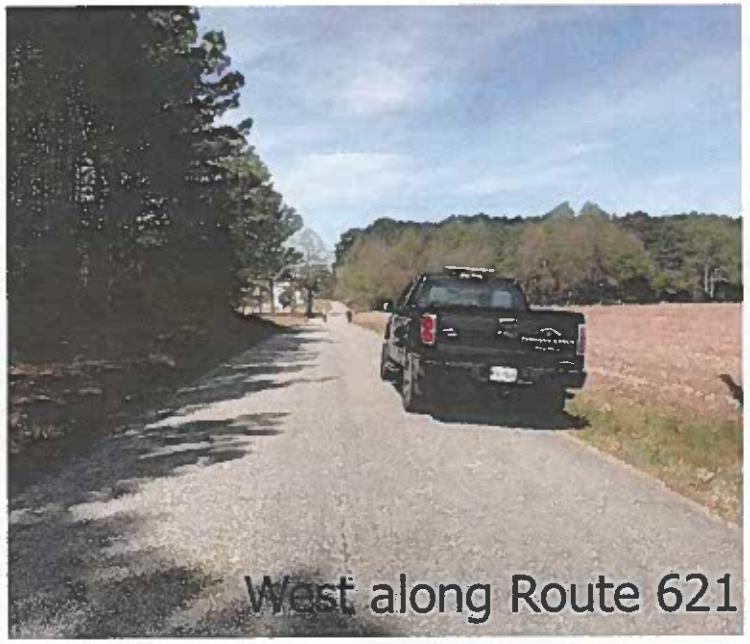

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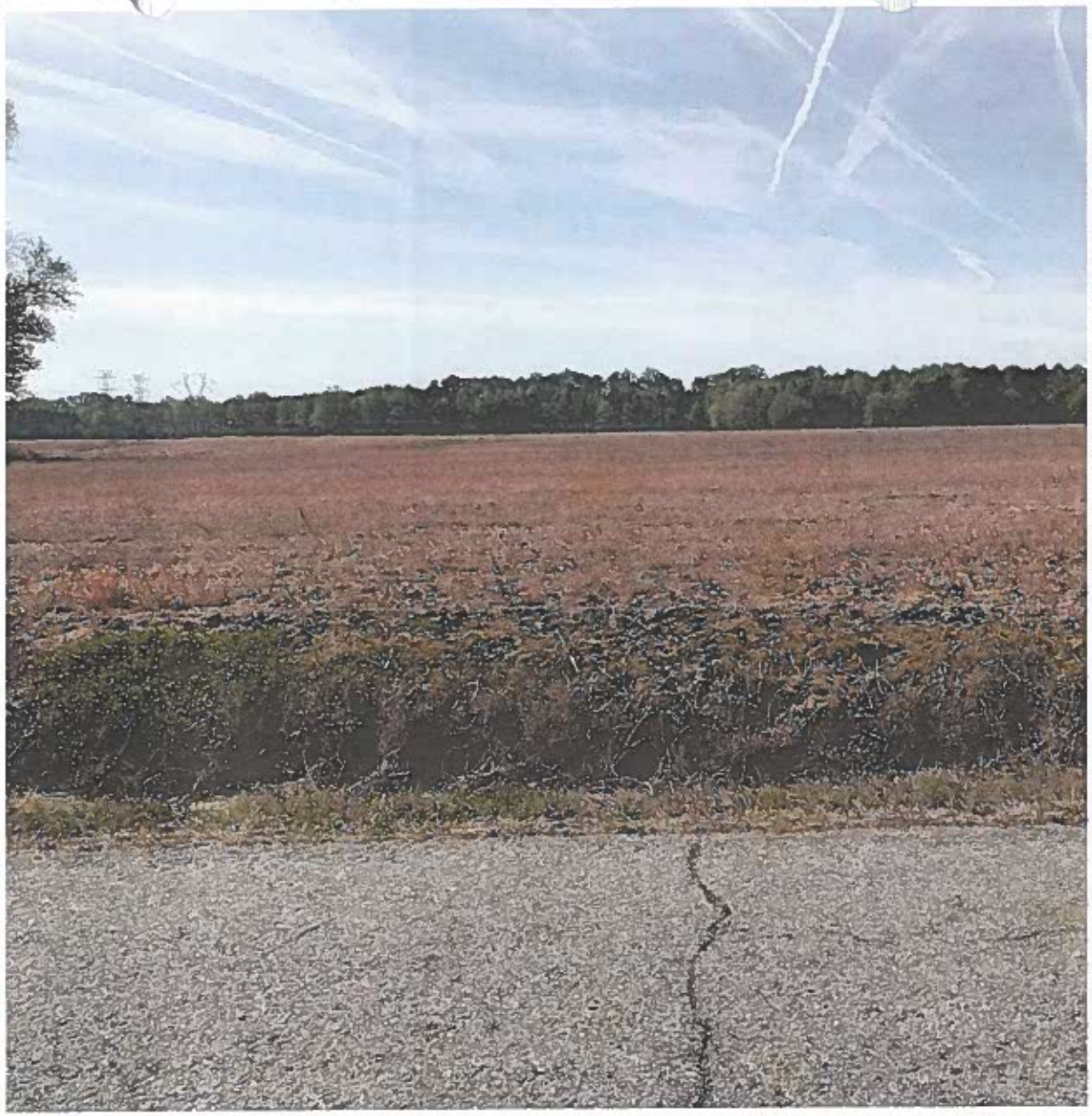
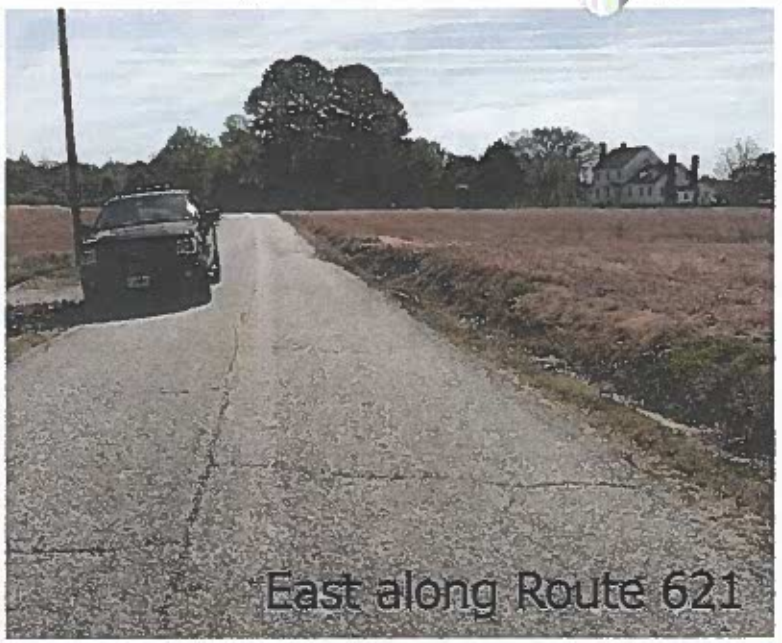
Site Entrance #1 - Route 621 (Burwells Bay Road)
Moonlight Solar
Isle of Wight County, Virginia

Figure
14





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Site Entrance #2 - Route 621 (Burwells Bay Road)
Moonlight Solar
Isle of Wight County, Virginia

Figure
15

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Site Entrance #3 Route 627 (Moonlight Road)
Moonlight Solar
Isle of Wight County, Virginia

Figure
16

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Site Entrance #4 Route 627 (Moonlight Road)
Moonlight Solar
Isle of Wight County, Virginia

Figure
17

MOONLIGHT SOLAR

ECONOMIC AND FISCAL CONTRIBUTION TO ISLE OF WIGHT COUNTY, VIRGINIA

Prepared for

PALLADIUM ENERGY

JUNE 2023

MANGUM economics

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About Mangum Economics, LLC

Mangum Economics is a Glen Allen, Virginia based firm that was founded in 2003. Since then, we have become known as a leader in industry analysis, economic impact assessment, policy and program evaluation, and economic and workforce strategy development. The Mangum Team specializes in producing objective and actionable quantitative economic research that our clients use for strategic decision making in a variety of industries and environments. We know that our clients are unique, and that one size does not fit all. As a result, we have a well-earned reputation for tailoring our analyses to meet the specific needs of specific clients, with a specific audience.

Most of our research falls into four general categories:

- **Information Technology:** Working with some of the largest names in the industry, to date the Mangum Team has produced analyses of the economic and fiscal impact of the data center industry in Virginia, home to the largest concentration of data centers in the world, and in five other states.
- **Energy:** The Mangum Team has produced analyses of the economic and fiscal impact of over 19 GW of proposed solar, wind, battery storage, and hydro projects spanning nineteen states. Among those projects was Dominion Energy's 2.6 GW Coastal Virginia Offshore Wind project off of Virginia Beach. In addition, the Mangum Team has also performed economic and fiscal impact analyses for the natural gas, nuclear, oil, and pipeline industries.
- **Economic Development and Special Projects:** The Mangum Team has performed hundreds of analyses of proposed economic development projects. Most recently, we were called upon by Henrico County to provide an analysis of the proposed $2.3 billion Green City "net-zero eco district." The Mangum Team has also authored multiple economic development plans, including identifying industries that were likely recruitment targets because of the high-speed MAREA and BRUSA sub-sea cable landings in Virginia Beach.
- **Education and Workforce:** The Mangum Team has worked with multiple post-secondary and secondary education institutions to quantify their economic contribution to their host communities as well as their impact on regional and statewide workforce needs.

The Project Team

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Executive Summary

This report assesses the economic and fiscal contribution that the proposed Moonlight Solar project would make to Isle of Wight County, Virginia. The primary findings from that assessment are as follows:

1) **Moonlight Solar is a proposed 44-megawatt (MW) alternating current (AC) solar photovoltaic power generating facility. The project would be located along Moonlight Road and Burwells Bay Road in Isle of Wight County, Virginia. The total acreage to be leased for the project encompasses approximately 523 acres of agricultural land. The actively used, fenced-in portion of the solar site would be approximately 250 acres.**

2) **The proposed Moonlight Solar project would make a significant economic contribution to Isle of Wight County:**

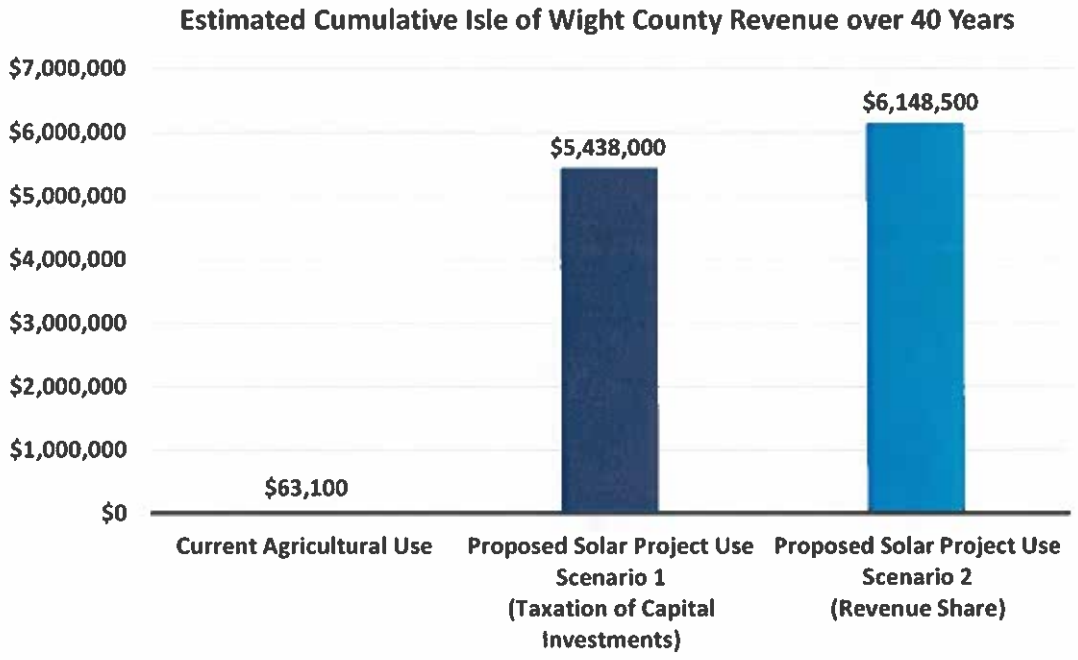
   - The proposed Moonlight Solar project would provide an estimated one-time pulse of economic activity to Isle of Wight County during its construction phase supporting approximately:
     - 25 direct, indirect, and induced jobs.
     - $1.2 million in associated wages and benefits.
     - $8.0 million in economic output.
   - The proposed Moonlight Solar project would provide an estimated annual economic impact to Isle of Wight County during its ongoing operational phase supporting approximately:
     - 2 direct, indirect, and induced jobs.
     - $84,600 in associated wages and benefits.
     - $297,800 in economic output.

3) **The proposed Moonlight Solar project would also make a significant fiscal contribution to Isle of Wight County. The proposed project would generate approximately:**

   - $140,900 in state and local tax revenue from the one-time pulse of economic activity associated with the project's construction.
   - $5.4 million in cumulative county revenue over the facility's anticipated 40-year operational life assuming revenues are generated from the reassessment of the real property, a siting agreement between Isle of Wight County and Moonlight Solar, and the taxation of the associated capital investments (Scenario 1); or
   - $6.1 million in cumulative county revenue over the facility's anticipated 40-year operational life assuming revenues are generated from the reassessment of the real property, a siting agreement between Isle of Wight County and Moonlight Solar, and payments associated with a locally adopted revenue share ordinance. The payments would be based on the project's generation capacity and would include a 10 percent escalator every five years (Scenario 2).

4) **The proposed Moonlight Solar project would have a significantly greater fiscal impact on Isle of Wight County than the property generates in its current agricultural use:**

- The proposed Moonlight Solar project would generate approximately $5.4 million in cumulative county revenue over the facility's anticipated 40-year operational life under Scenario 1 and approximately $6.1 million in cumulative county revenue over the facility's anticipated 40-year operational life under Scenario 2, as compared to approximately $63,100 in cumulative county revenue in the property's current agricultural use – a difference of approximately $5.4 million and $6.1 million respectively.



5) **The proposed Moonlight Solar project would provide a boost to Isle of Wight County's construction sector:**

- At 507 jobs, construction is Isle of Wight County's sixth largest major industry sector.[1]
- The construction sector also posted the third largest job gain of any industry sector in the county between the third quarter of 2021 and the third quarter of 2022 (a gain of 41 jobs).[2]
- The proposed Moonlight Solar project would directly support approximately 16 jobs and $1.2 million in wages and benefits in Isle of Wight County's construction sector.

[1] Data Source: U.S. Bureau of Labor Statistics.
[2] Data Source: U.S. Bureau of Labor Statistics.

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The estimates provided in this report are based on the best information available and all reasonable care has been taken in assessing the quality of that information. However, because these estimates attempt to foresee the consequences of circumstances that have not yet occurred, it is not possible to be certain that they will be representative of actual events. These estimates are intended to provide a good indication of likely future outcomes and should not be construed to represent a precise measure of those outcomes.

Introduction

This report assesses the economic and fiscal contribution that the proposed Moonlight Solar project would make to Isle of Wight County, Virginia. This report was commissioned by Palladium Energy and produced by Mangum Economics.

The Project

Moonlight Solar is a proposed 44-megawatt (MW) alternating current (AC) solar photovoltaic power generating facility. The project would be located along Moonlight Road and Burwells Bay Road in Isle of Wight County, Virginia. The total acreage to be leased for the project encompasses approximately 523 acres of agricultural land. The actively used, fenced-in portion of the solar site would be approximately 250 acres.

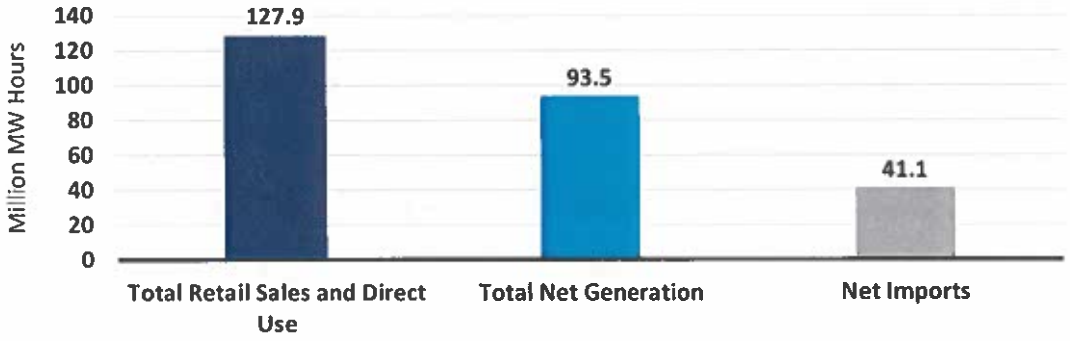
Electricity Production in Virginia

This section provides a backdrop for the proposed Moonlight Solar project by profiling Virginia's electricity production sector and the role that solar energy could play in that sector.

Overall Market

As shown in Figure 1, in 2021 electricity sales and direct use in Virginia totaled 127.9 million megawatt hours, ranking the state 10th among the fifty states in terms of electricity consumption. However, only 73 percent of that demand was met by in-state utilities, independent producers, and other sources. As a result, Virginia had to import the remaining electricity it consumed from producers in other states. As with all imports, this means that the jobs, wages, and economic output created by that production went to localities in those states, not to localities in Virginia.

Figure 1: Demand and Supply of Electricity in Virginia in 2021 (in millions of megawatt-hours)[3]



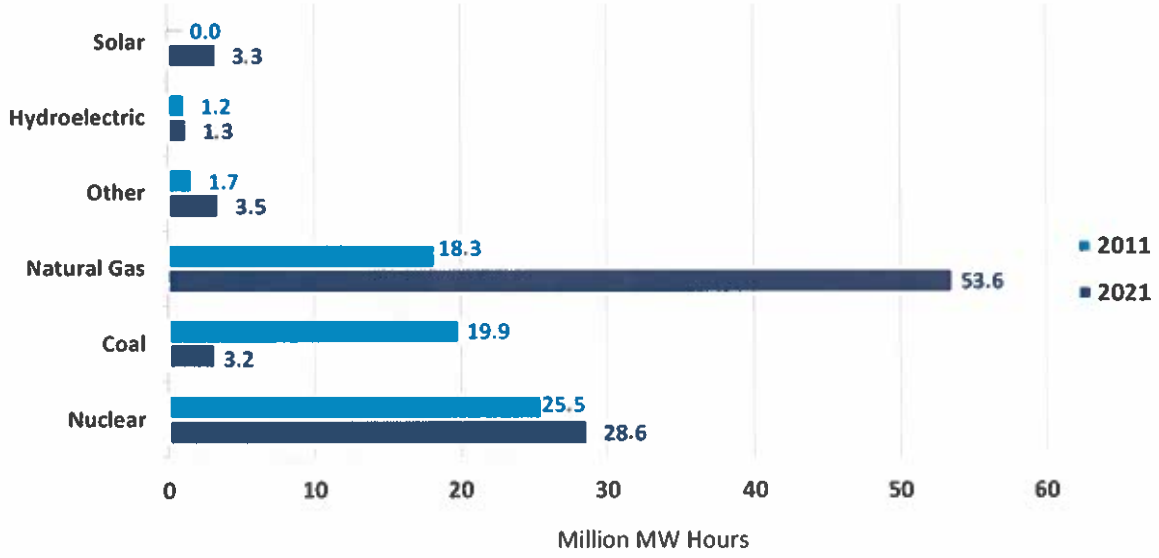
[3] Data Source: U.S. Energy Information Administration. In this chart, "Net Imports" also takes into account losses during transmission. As a result, it does not directly equal the residual of "Total Net Generation" minus "Total Retail Sales and Direct Use."

Sources of Production

Between 2011 and 2021, the total amount of electricity produced in Virginia increased from 66.7 to 93.5 million megawatt hours, while retail and direct consumption of electricity increased from 112.1 to 127.9 million megawatt hours. Consequently, imports of electricity decreased by 11.8 million megawatt hours (or 22 percent) during this time.[4] Figure 2 provides a comparison of the energy sources that were used to produce electricity in Virginia in each of those years. As these data show, the most significant change between 2011 and 2021 was a decrease in the use of coal and an increase in the use of natural gas. Where coal was the state's second largest source of electricity in 2011, accounting for 19.9 million megawatt hours (or 29.9 percent) of production, by 2021 production had fallen by 16.7 million megawatt hours, making coal a distant fifth place source of electricity with only 3.4 percent of production.

In contrast, the share of electricity produced using cleaner-burning low-emissions energy sources increased over the period. Where natural gas accounted for only 18.3 million megawatt hours (or 27.5 percent) of Virginia's electricity production in 2011, by 2021 that proportion had almost tripled to 53.6 million megawatt hours (or 57.3 percent of production), making natural gas the state's largest source of electricity. In addition, solar, which entered the Virginia electricity production market in 2016, increased its share to 3.3 million megawatt hours in 2021.

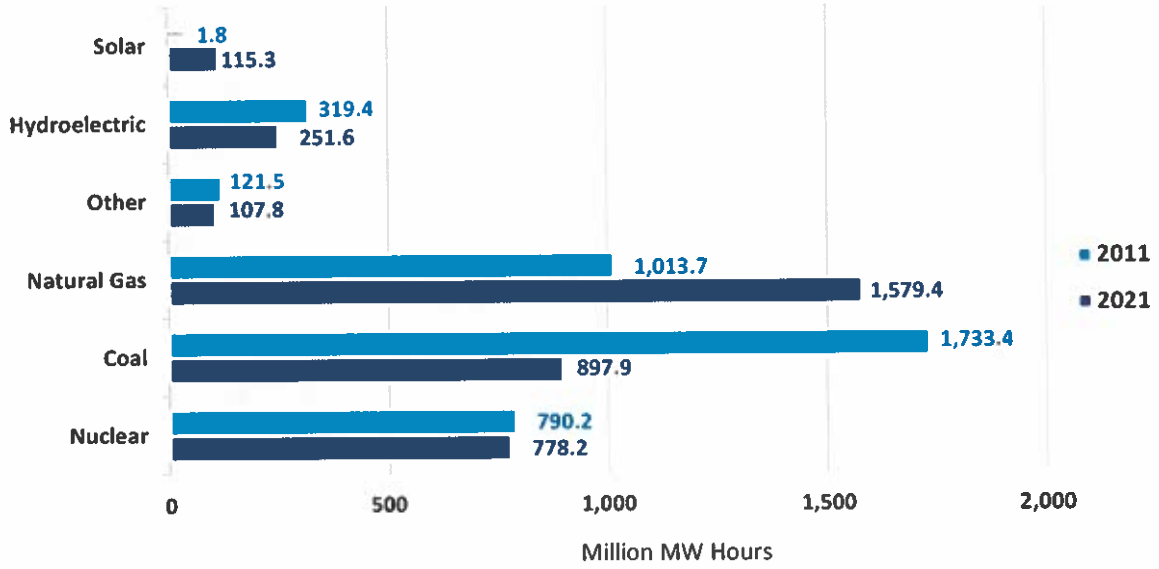
Figure 2: Electricity Generation in Virginia by Energy Source in 2011 and 2021 (in millions of megawatt-hours)[5]



[4] Imports also takes into account losses during transmission. As a result, totals do not equal sum of components.
[5] Data Source: U.S. Energy Information Administration. The "Other" category includes battery, wood, petroleum, other biomass, "other", and pumped storage.

Figure 3 provides similar data for the U.S. as a whole. A quick comparison of Figures 2 and 3 shows that although the degree of reliance on specific energy sources for electricity production is quite different between the U.S. and Virginia, the trend toward lower-emissions energy sources is the same. Nationally, between 2011 and 2021 the amount of electricity produced using coal declined by 835.5 million megawatt hours from 42 to 22 percent of production, while in contrast the amount of electricity produced using natural gas increased by 565.7 million megawatt hours from 25 to 38 percent of production. Nationwide, as in Virginia, the reliance on renewable energy sources such as solar increased during this time but at a slower pace than in Virginia. Between 2011 and 2021, the amount of electricity produced using solar increased by 113.5 million megawatt hours to 2.8 percent of total electricity production in the nation compared to 3.5 percent of total electricity production in Virginia.

Figure 3: Electricity Generation in the United States by Energy Source in 2011 and 2021 (in millions of megawatt-hours)[6]

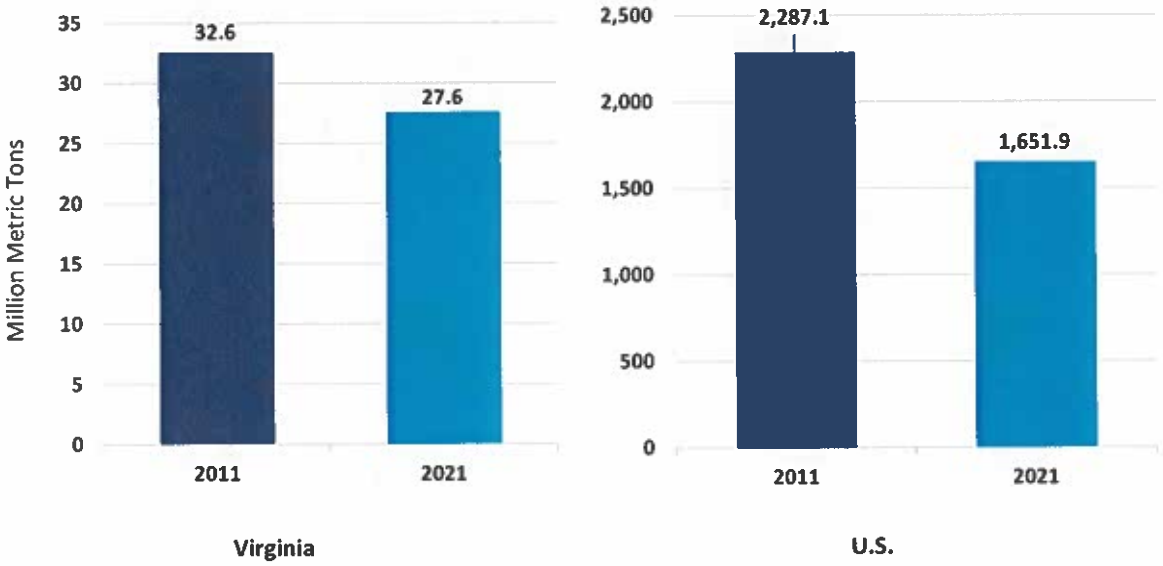


Impact on the Environment

In discussing the impact of these trends on the environment, it is important to realize that electricity production is one of the U.S.'s largest sources of greenhouse gas emissions. Figure 4 depicts carbon dioxide emissions from electricity production in 2011 and 2021 for both Virginia and the U.S. As these data indicate, between 2011 and 2021, as the share of electricity produced in Virginia by coal fell from 29.9 to 3.4 percent, carbon dioxide emissions from electricity production fell from 32.6 to 27.6 million metric tons. Where at the national level, as the share of electricity produced by coal fell from 42 to 22 percent, carbon dioxide emissions from electricity production fell from 2,287.1 to 1,651.9 million metric tons.

[6] Data Source: U.S. Energy Information Administration. "Other" includes battery, geothermal, hydroelectric, other, other biomass, other gas, petroleum, pumped storage, wind, and wood.

Figure 4: Carbon Dioxide Emissions from Electricity Production (millions of metric tons)[7]



[7] Data Source: U.S. Energy Information Administration.

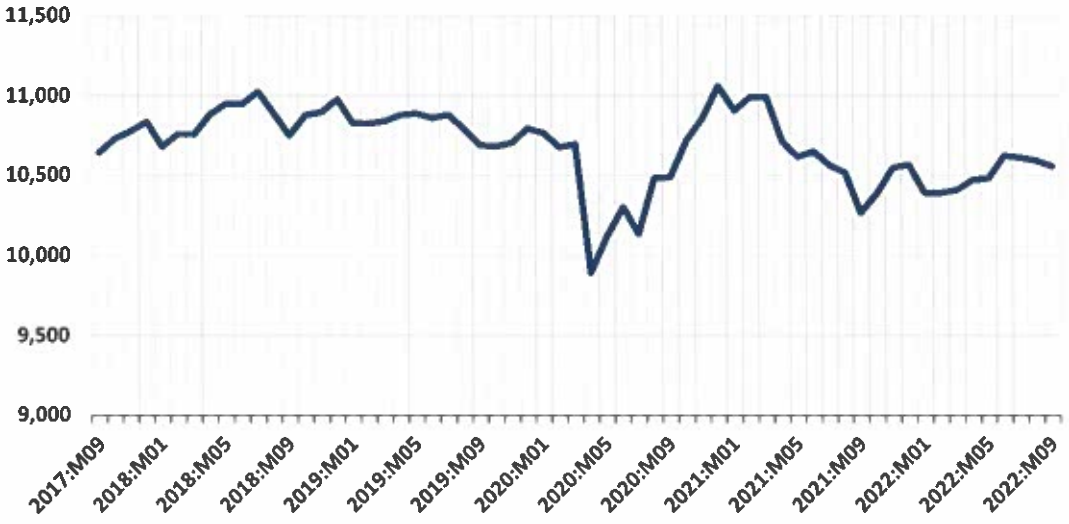
Local Economic Profile

This section provides context for the economic and fiscal impact assessments to follow by profiling the local economy of Isle of Wight County.

Total Employment

Figure 5 depicts the trend in total employment in Isle of Wight County during the five-year period from September 2017 through September 2023. With the exception of seasonal variations, employment in the county was fairly stable through 2019. Then, in April 2020 total employment declined significantly due to the lockdowns imposed as a result of the COVID-19 pandemic. Employment has since rebounded and recovered to pre-pandemic levels. As of September 2022, total employment in the county stood at 10,557 jobs, which represents an overall decrease in employment of 0.8 percent (or 87 jobs) over the five-year period. To put this number in perspective, over this same period, total statewide employment in Virginia increased by 3.4 percent.[8]

Figure 5: Total Employment in Isle of Wight County – September 2017 to September 2022[9]



To control for seasonality and provide a point of reference, Figure 6 compares the year-over-year change in total employment in Isle of Wight County to that of the state of Virginia over the same five-year period. Any point above the zero line in this graph indicates an increase in employment, while any point below the zero line indicates a decline in employment. As these data show, Isle of Wight County fluctuated around the statewide average for most of the period. As of September 2022, the year-over-year change in total employment in Isle of Wight County was 2.8 percent as compared to 3.4 percent statewide in Virginia.

[8] Data Source: U.S. Bureau of Labor Statistics.
[9] Data Source: U.S. Bureau of Labor Statistics.

Figure 6: Year-Over-Year Change in Total Employment – September 2017 to September 2022[10]

Employment and Wages by Industry Supersector

To provide a better understanding of the underlying factors motivating the total employment trends depicted in Figures 5 and 6, Figures 7 through 9 provide data on private employment and wages in Isle of Wight County by industry supersector.[11]

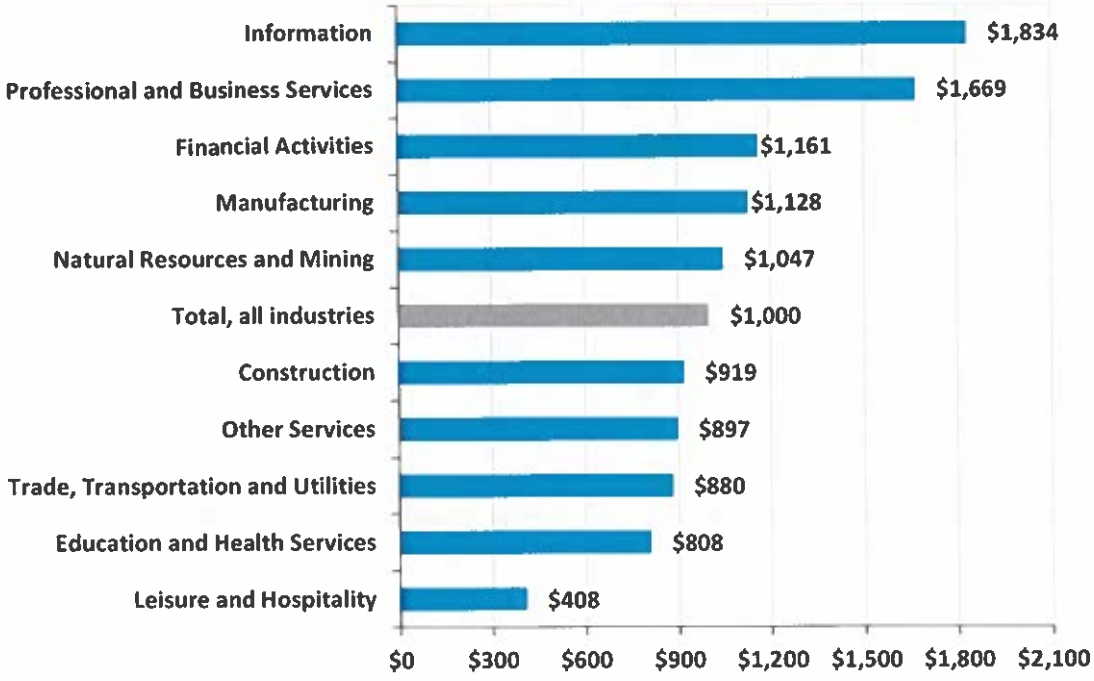
Figure 7 provides an indication of the distribution of private sector employment across industry supersectors in Isle of Wight County in the third quarter of 2022. As these data indicate, the county's largest industry sectors that quarter were Manufacturing (2,805 jobs), followed by Trade, Transportation and Utilities (1,663 jobs), and Leisure and Hospitality (1,259 jobs).

Figure 8 provides a similar ranking for average private sector weekly wages by industry supersector in Isle of Wight County in the third quarter of 2022. As these data show, the highest paying industry sectors that quarter were Information ($1,834 per week), Professional and Business Services ($1,669 per week), and Financial Activities ($1,161 per week). To provide a point of reference, the average private sector weekly wage across all industry sectors in Isle of Wight County that quarter was $1,000 per week.

[10] Data Source: U.S. Bureau of Labor Statistics.
[11] A "supersector" is the highest level of aggregation in the coding system that the Bureau of Labor Statistics uses to classify industries.

Figure 7: Private Employment by Industry Supersector in Isle of Wight County – 3rd Qu. 2022[12]

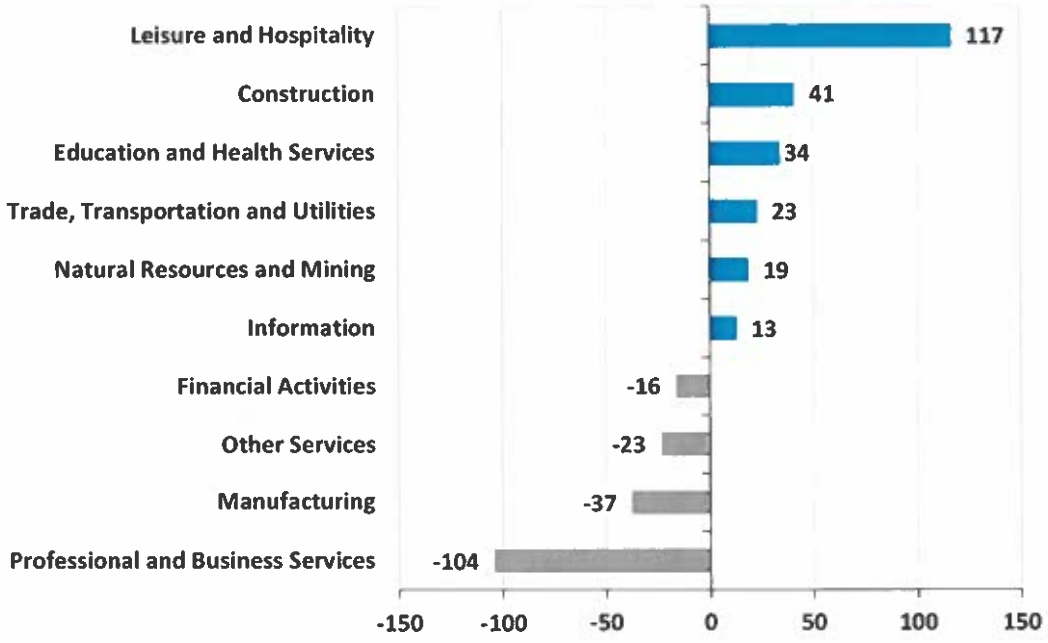
Figure 8: Average Private Weekly Wages by Industry Supersector in Isle of Wight County – 3rd Qu. 2022[13]



[12] Data Source: U.S. Bureau of Labor Statistics.
[13] Data Source: U.S. Bureau of Labor Statistics.

Figure 9 details the year-over-year change in private sector employment from the third quarter of 2021 to the third quarter of 2022 in Isle of Wight County by industry supersector. Over this period, the largest employment gains occurred in the Leisure and Hospitality (up 117 jobs), Construction (up 41 jobs), and Education and Health Services (up 34 jobs) sectors. The largest employment losses occurred in the Professional and Business Services (down 104 jobs), Manufacturing (down 37 jobs), Other Services (down 23 jobs) sectors.

Figure 9: Change in Private Employment by Industry Supersector in Isle of Wight County from 3rd Qu. 2017 to 3rd Qu. 2022[14]

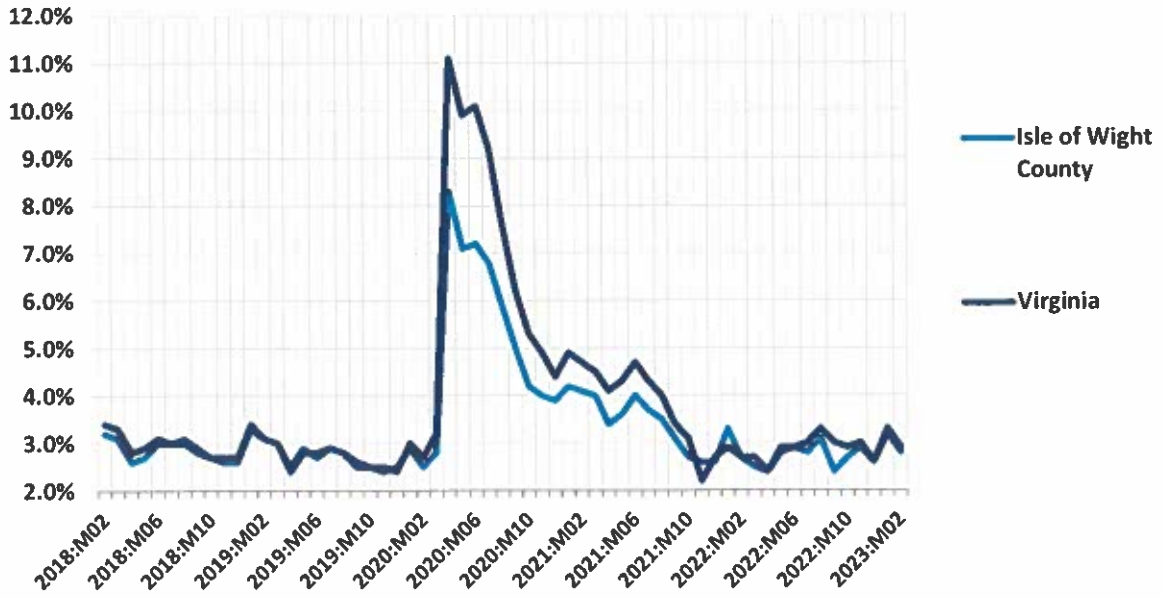


Unemployment

Figure 10 illustrates the trend in Isle of Wight County's unemployment rate over the five-year period from February 2018 through February 2023 and benchmarks those data against the statewide trend for Virginia. As these data show, unemployment rates in Isle of Wight County generally tracked closely with the statewide trend throughout the period. In April 2020 unemployment in the county and state significantly rose as a result of the labor dislocations caused by the COVID-19 pandemic. Isle of Wight County's unemployment rate peaked lower than the statewide rate and has mostly remained below the statewide average during the recovery from the pandemic. As of February 2023, unemployment stood at 2.8 percent in Isle of Wight County compared to 2.9 percent in Virginia as a whole.

[14] Data Source: U.S. Bureau of Labor Statistics.

Figure 10: Unemployment Rate – February 2018 to February 2023[15]



[15] Data Source: U.S. Bureau of Labor Statistics.

Economic and Fiscal Impact

This section quantifies the economic and fiscal contribution that the proposed Moonlight Solar project would make to Isle of Wight County. The analysis separately evaluates the one-time pulse of economic activity that would occur during the construction phase of the project, as well as the annual economic activity that the project would generate during its ongoing operational phase.

Method

To empirically evaluate the likely local economic impact attributable to the proposed Moonlight Solar project, the analysis employs a regional economic impact model called IMPLAN.[16] The IMPLAN model is one of the most commonly used economic impact simulation models in the U.S., and in Virginia is used by UVA's Weldon Cooper Center, the Virginia Department of Planning and Budget, the Virginia Employment Commission, and other state agencies and research institutes. Like all economic impact models, the IMPLAN model uses economic multipliers to quantify economic impact.

Economic multipliers measure the ripple effects that an expenditure generates as it makes its way through the economy. For example, as when the Moonlight Solar project purchases goods and services – or when contractors hired by the facility use their salaries and wages to make household purchases – thereby generating income for someone else, which is in turn spent, thereby becoming income for yet someone else, and so on, and so on. Through this process, one dollar in expenditures generates multiple dollars of income. The mathematical relationship between the initial expenditure and the total income generated is the economic multiplier.

One of the primary advantages of the IMPLAN model is that it uses regional and national production and trade flow data to construct region-specific and industry-specific economic multipliers, which are then further adjusted to reflect anticipated actual spending patterns within the specific geographic study area that is being evaluated. As a result, the economic impact estimates produced by IMPLAN are not generic. They reflect as precisely as possible the economic realities of the specific industry, and the specific study area, being evaluated.

In the analysis that follows, these impact estimates are divided into three categories. First round direct impact measures the direct economic contribution of the entity being evaluated (e.g., own employment, wages paid, goods and services purchased by the Moonlight Solar project). Second round indirect and induced impact measures the economic ripple effects of this direct impact in terms of business to business, and household (employee) to business, transactions. Total impact is simply the sum of the preceding two. These categories of impact are then further defined in terms of employment (the jobs that are created), labor income (the wages and benefits associated with those jobs), and economic output (the total amount of economic activity that is created in the economy).

[16] IMPLAN is produced by IMPLAN Group, LLC.

Construction Phase

This portion of the section assesses the economic and fiscal impact that the one-time pulse of activity associated with construction of the proposed Moonlight Solar project would have on Isle of Wight County.

Assumptions

The analysis is based on the following assumptions:

- Total capital investment in the Moonlight Solar project is estimated to be approximately $66.8 million.[17]
- Of that total:
    - Architecture, engineering, site preparation, and other construction and development costs are estimated to be approximately $34.0 million.[18]
    - Capital equipment costs are estimated to be approximately $32.8 million.[19] It is anticipated that no capital equipment would be purchased from vendors in Isle of Wight County.[20]
- All construction expenditures are assumed to take place during a 9-month period.

Economic Impact

Applying these assumptions in the IMPLAN model results in the following estimates of one-time economic and fiscal impact. As shown in Table 1, construction of the proposed Moonlight Solar project would directly provide a one-time pulse supporting approximately: 1) 16 jobs, 2) $0.8 million in wages and benefits, and 3) $6.6 million in economic output to Isle of Wight County.[21]

Taking into account the economic ripple effects that direct investment would generate, the total estimated one-time impact on Isle of Wight County would support approximately: 1) 25 jobs, 2) $1.2 million in wages and benefits, 3) $8.0 million in economic output, and 4) $140,900 in state and local tax revenue.

[17] Data Source: Palladium Energy. Investment estimate is subject to change based on final design and vendor contracts.
[18] Data Source: Palladium Energy.
[19] Data Source: Palladium Energy.
[20] Data Source: IMPLAN Group LLC.
[21] It is important to note that construction sector jobs are not necessarily new jobs, but the investments made can also support an existing job during the construction of the project.

Table 1: Estimated One-Time Economic and Fiscal Impact on Isle of Wight County from Construction of the Moonlight Solar Project

Economic Impact	Employment	Wages and Benefits	Output
1st Round Direct Economic Activity	16	$817,300	$6,613,200
2nd Round Indirect and Induced Economic Activity	9	$399,300	$1,366,300
Total Economic Activity	**25**	**$1,216,600**	**$7,979,500**
Fiscal Impact			
State and Local Tax Revenue			**$140,900**

**Totals may not sum due to rounding.*

Ongoing Operations Phase

This portion of the section assesses the annual economic and fiscal impact that the proposed Moonlight Solar project would have on Isle of Wight County during its anticipated 40-year operational phase.

Economic Impact Assumptions

The analysis is based on the following assumptions:

- The Moonlight Solar project would spend approximately $0.2 million each year for maintenance and repair, vegetative control, and other operational expenditures.[22]
- The Moonlight Solar project would make confidential lease payments to landowners.[23]

Economic Impact

Applying these assumptions in the IMPLAN model results in the following estimates of annual economic impact. As shown in Table 2, annual operation of the proposed Moonlight Solar project would on average directly support approximately: 1) 1 job, 2) $50,600 in wages and benefits, and 3) $156,500 in economic output to Isle of Wight County.

Taking into account the economic ripple effects that direct impact would generate, the total estimated annually supported impact on Isle of Wight County would be approximately: 1) 2 jobs, 2) $84,600 in wages and benefits, and 3) $297,800 in economic output.

[22] Data Source: Palladium Energy. Expenditure estimate is subject to change based on final design and vendor contracts.
[23] Data Source: Palladium Energy.

Table 2: Estimated Annual Economic Impact on Isle of Wight County from the Ongoing Operation of the Moonlight Solar Project

Economic Impact	Employment	Wages and Benefits	Output
1st Round Direct Economic Activity	1	$50,600	$156,500
2nd Round Indirect and Induced Economic Activity	1	$34,000	$141,300
Total Economic Activity	**2**	**$84,600**	**$297,800**

**Totals may not sum due to rounding.*

Fiscal Impact Assumptions

The analysis is based on the following assumptions:

- The Moonlight Solar project would involve an investment of approximately $66.8 million in capital equipment and improvements to the existing property.[24]
- The proposed Moonlight Solar project would be situated on approximately 250 fenced-in acres within an approximate 523-acre tract of leased land.[25]
- The actively used, fenced-in acreage would be removed from the land use program and reassessed at $15,000 per acre.[26]
- Tax rates and locality ratios remain constant throughout the analysis.
- The initial interconnection request for Moonlight Solar was filed in January 2021.[27]
- The Moonlight Solar project's total generation capacity would be 44 MW AC.
- The Moonlight Solar project would become operational in the fourth quarter of 2027.[28]

Fiscal Impact

This portion of the section quantifies the direct fiscal contribution that the proposed Moonlight Solar project would make to Isle of Wight County. The analysis considers two scenarios. Both scenarios include the additional revenue that the Moonlight Solar project would generate for Isle of Wight County over a 40-year period from the increased property assessments associated with reassessing the site as solar use property and a siting agreement negotiated between Isle of Wight County and Moonlight Solar. Scenario 1 then describes the additional revenue Moonlight Solar would generate for Isle of Wight County from taxes levied on the capital investment, while Scenario 2 assumes tax revenue generated from the capital investment will be replaced with revenue associated with a locally adopted revenue share ordinance and based on the project's total generation capacity.

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[24] Data Source: Palladium Energy. Investment estimate is subject to change based on final design and vendor contracts.
[25] Data Source: Palladium Energy.
[26] Data Source: Isle of Wight County Commissioner of Revenue's Office. Current assessment value of existing solar farm in the county.
[27] Data Source: Palladium Energy.
[28] Data Source: Palladium Energy.

Reassessment of Property

Table 3 details the increased tax revenue associated with removing the affected acreage from the land use program and reassessing the 250-acre fenced-in site as solar use property. The county real estate tax revenue from the project after reassessment is estimated to be approximately $26,600 per year, for a cumulative total of approximately $1.1 million over the project's anticipated 40-year operational life expectancy.[29] Adding one-time rollback taxes of approximately $31,600 increases that cumulative total to approximately $1.1 million. In contrast, the property currently generates approximately $1,580 per year in real estate tax revenue for the county, for a cumulative total of approximately $63,100 over 40 years.[30]

Table 3: Estimated County Revenue Generated by the Proposed Moonlight Solar Project over 40 Years from Real Estate Taxes

Estimated Increased Appraised Value of Property under Solar Use[31]	$3,750,000
Isle of Wight County Real Estate Tax Rate[32]	0.0071
Annual County Real Estate Tax – Solar Use	$26,600
Revenue over 40 years	**$1,065,000**
One-time Rollback Taxes[33]	**$31,600**
Total Cumulative Revenue over 40 years	**$1,096,600**

**Totals may not sum due to rounding.*

Siting Agreement

According to §15.2-2316.7 of the Code of Virginia, a host locality may negotiate a siting agreement with the applicant of a solar facility. Based on information provided by Moonlight Solar, LLC, Moonlight Solar is proposing to make an upfront payment of $25,000 per megawatt to Isle of Wight County at the beginning of commercial operation of the project. As shown in Table 4, this would total approximately $1.1 million in the first year of Moonlight Solar's operation.

[29] Assumes property will be reassessed at $15,000 per acre once it is under solar use.
[30] Derived from Isle of Wight County's Property Card database. Excludes value of existing structures as they will not be affected.
[31] Calculated as 250 acres times $15,000 per acre.
[32] Data Source: Isle of Wight County's Commissioner of Revenue's office.
[33] Rollback taxes are computed as the difference between the current land use value assessment tax and the tax on the fair market value for the affected acreage for five complete tax years plus the current year. Does not account for changes in assessment values over time. Includes simple interest.

Table 4: Proposed Value of Siting Agreement Between Moonlight Solar and Isle of Wight County

Moonlight Solar Total Generation Capacity in MW	44
Proposed Payment Per MW[34]	$25,000
Total Revenue from Upfront Payment	**$1,100,000**

Scenario 1: Taxation of Capital Investment

Table 5 separately details the additional annual revenue that the proposed Moonlight Solar project would generate for Isle of Wight County over a 40-year period from taxes levied on capital investment. This estimate is calculated as: 1) the taxable portion of capital investments based on the stepdown local tax exemption pursuant to Virginia Code §58.1-3660[35], times 2) the State Corporation Commission's utility assessment ratio for taxation of public utilities in Isle of Wight County, times 4) the State Corporation Commission's current depreciation guidelines for solar facilities, times 5) Isle of Wight County's real property tax rate of $0.71 per $100 of assessed value pursuant to Virginia Code §58.1-2606.

As the data in Table 5 indicate, based on these calculations the estimated additional county revenue from taxation of capital investments associated with the proposed Moonlight Solar project would be approximately $75,200 in the project's first year of operation, with that figure projected to increase to approximately $144,600 in year 11 of the project as the value of the exemption is reduced, and thereafter declining to approximately $16,700 in the project's 34th year of operation and thereafter as the value of the proposed capital investments is further depreciated, for a cumulative total of approximately $3.2 million

Table 5: Estimated County Revenue by Proposed Solar Investment Over 40 Years

Year	Total Capital Investment Subject to Exemption[36]	Depreciated Value of Taxable Capital Investment[37]	Additional Annual County Tax Revenue Solar Investment[38]
1	$66,818,707	$10,586,489	$75,164
2	$66,818,707	$10,586,489	$75,164

[34] Data Source: Palladium Energy.
[35] Virginia Code §58.1-3660 stipulates that solar facilities over 5MW and under 150MW are subject to a stepdown exemption from local property taxes if the interconnection request has been filed on or after January 1, 2019. The amount of the exemption is 80 percent in the first five years, 70 percent in years six through ten, and 60 percent thereafter.
[36] Data Source: Palladium Energy.
[37] Accounts for the State Corporation Commission's depreciation guidelines for solar facilities and the utility assessment ratio for taxation of public utilities in Isle of Wight County. Also accounts for the stepdown exemption from local property taxes pursuant to Virginia Code §58.1-3660 for projects over 5 MW and under 150 MW with an interconnection request on or after January 1, 2019. The amount of the exemption is 80 percent in the first five years, 70 percent in years six through ten, and 60 percent thereafter.
[38] Calculated pursuant to Virginia Code §58.1-2606 which stipulates that capital equipment owned by utilities is taxed as real property and the local tax rate on that capital equipment would be capped at Isle of Wight County's real property tax rate of $0.71 per $100 of assessed value.

Year	Total Capital Investment Subject to Exemption[36]	Depreciated Value of Taxable Capital Investment[37]	Additional Annual County Tax Revenue Solar Investment[38]
3	$66,818,707	$10,586,489	$75,164
4	$66,818,707	$10,586,489	$75,164
5	$66,818,707	$10,586,489	$75,164
6	$66,818,707	$15,879,733	$112,746
7	$66,818,707	$15,879,733	$112,746
8	$66,818,707	$15,879,733	$112,746
9	$66,818,707	$15,825,036	$112,358
10	$66,818,707	$15,556,845	$110,454
11	$66,818,707	$20,363,699	$144,582
12	$66,818,707	$19,963,765	$141,743
13	$66,818,707	$19,540,306	$138,736
14	$66,818,707	$19,088,615	$135,529
15	$66,818,707	$18,611,047	$132,138
16	$66,818,707	$18,105,248	$128,547
17	$66,818,707	$17,568,866	$124,739
18	$66,818,707	$17,001,901	$120,713
19	$66,818,707	$16,397,295	$116,421
20	$66,818,707	$15,759,753	$111,894
21	$66,818,707	$15,082,218	$107,084
22	$66,818,707	$14,364,689	$101,989
23	$66,818,707	$13,604,814	$96,594
24	$66,818,707	$12,797,889	$90,865
25	$66,818,707	$11,943,912	$84,802
26	$66,818,707	$11,035,826	$78,354
27	$66,818,707	$10,075,985	$71,539
28	$66,818,707	$9,057,329	$64,307
29	$66,818,707	$7,979,860	$56,657
30	$66,818,707	$6,834,167	$48,523
31	$66,818,707	$5,622,602	$39,920
32	$66,818,707	$4,338,108	$30,801
33	$66,818,707	$2,975,980	$21,129
34	$66,818,707	$2,352,553	$16,703
35	$66,818,707	$2,352,553	$16,703
36	$66,818,707	$2,352,553	$16,703
37	$66,818,707	$2,352,553	$16,703
38	$66,818,707	$2,352,553	$16,703
39	$66,818,707	$2,352,553	$16,703
40	$66,818,707	$2,352,553	$16,703
CUMULATIVE TOTAL			**$3,241,400**

**Totals may not sum due to rounding.*

Scenario 1: Total Fiscal Impact

Table 6 combines the results from the calculations depicted in Tables 3 through 5 to provide an estimate of the cumulative fiscal contribution that the proposed Moonlight Solar project would make to Isle of Wight County over its 40-year anticipated operational life under Scenario 1. As these data indicate, that cumulative total is approximately $5.4 million.

Table 6: Estimated Cumulative County Tax Revenue from the Proposed Moonlight Solar Project over 40 Years under Scenario 1

County Real Estate Tax	$1,096,600
County Revenue from Siting Agreement	$1,100,000
County Revenue from Taxation of Capital Investments	$3,241,400
TOTAL Cumulative Revenue over 40 Years	**$5,438,000**

**Totals may not sum due to rounding.*

Scenario 2: Revenue Share Ordinance

The following section describes the additional annual revenue that the proposed Moonlight Solar project would generate for Isle of Wight County assuming the county adopts an energy revenue share ordinance under Virginia Code §58.1-2636. The Virginia Code currently stipulates that a locality may assess an annual revenue share of up to $1,400 per megawatt (MW) alternating current (AC) generation capacity of a solar facility. However, legislation that was passed in the 2021 General Assembly (SB 1201/HB 2006) and went into effect on July 1, 2021, allows a 10 percent escalator to be applied to the $1,400 per MW revenue share every five years, beginning in 2026. Section 58.1-3660 further stipulates that capital investment associated with the solar project will be exempt from taxation if the county adopts an energy revenue share ordinance.

Table 7 details the revenue generated from a revenue share ordinance including the 10 percent escalator. Based on a total generation capacity of 44 MW AC and an assumed commissioning date of the fourth quarter of 2027, a revenue share ordinance would generate approximately $4.0 million over the anticipated 40-year operational life of the project.

Table 7: Estimated County Revenue Generated from a Revenue Share Ordinance over 40 Years

Year	MW	Revenue Share per MW with Escalator	Annual County Revenue
1	44	$1,540	$67,760
2	44	$1,540	$67,760
3	44	$1,540	$67,760
4	44	$1,540	$67,760
5	44	$1,694	$74,536

Year	MW	Revenue Share per MW with Escalator	Annual County Revenue
6	44	$1,694	$74,536
7	44	$1,694	$74,536
8	44	$1,694	$74,536
9	44	$1,694	$74,536
10	44	$1,863	$81,990
11	44	$1,863	$81,990
12	44	$1,863	$81,990
13	44	$1,863	$81,990
14	44	$1,863	$81,990
15	44	$2,050	$90,189
16	44	$2,050	$90,189
17	44	$2,050	$90,189
18	44	$2,050	$90,189
19	44	$2,050	$90,189
20	44	$2,255	$99,207
21	44	$2,255	$99,207
22	44	$2,255	$99,207
23	44	$2,255	$99,207
24	44	$2,255	$99,207
25	44	$2,480	$109,128
26	44	$2,480	$109,128
27	44	$2,480	$109,128
28	44	$2,480	$109,128
29	44	$2,480	$109,128
30	44	$2,728	$120,041
31	44	$2,728	$120,041
32	44	$2,728	$120,041
33	44	$2,728	$120,041
34	44	$2,728	$120,041
35	44	$3,001	$132,045
36	44	$3,001	$132,045
37	44	$3,001	$132,045
38	44	$3,001	$132,045
39	44	$3,001	$132,045
40	44	$3,301	$145,250
Cumulative Total			**$3,952,000**

Scenario 2: Total Fiscal Impact

Table 8 combines the results from the calculations depicted in Tables 3, 4 and 7 to provide an estimate of the cumulative fiscal contribution that the proposed Moonlight Solar project would make to Isle of Wight County over its 40-year anticipated operational life under Scenario 2. As these data indicate, that cumulative total is approximately $6.1 million.

Table 8: Estimated Cumulative County Revenue from the Proposed Moonlight Solar Project over 40 Years under Scenario 2

County Real Estate Tax	$1,096,600
County Revenue from Siting Agreement	$1,100,000
County Revenue from Revenue Share Ordinance	$3,952,000
TOTAL Cumulative Revenue over 40 Years	**$6,148,500**

**Totals may not sum due to rounding.*

Current Agricultural Use

This section provides a benchmark for the previous estimates of the economic contribution that the proposed Moonlight Solar project would make to Isle of Wight County by estimating the economic and fiscal contribution that the site makes to the county in its current agricultural use.

Economic Impact Assumptions

The analysis is based on the following assumptions:

- The proposed Moonlight Solar project would be situated on an approximate 250-acre tract of agricultural land used to produce cotton, corn, and soybeans.[39]

Economic Impact

Applying these assumptions in the IMPLAN model results in the following estimates of annual economic impact. As shown in Table 9, in its current use the proposed Moonlight Solar project site directly supports approximately: 1) 1 job, 2) $42,600 in wages and benefits, and 3) $148,600 in economic output to Isle of Wight County.

Taking into account the economic ripple effects that direct impact generates, on average, the total annually supported impact on Isle of Wight County is approximately: 1) 2 jobs, 2) $75,000 in wages and benefits, and 3) $232,900 in economic output.

Table 9: Total Estimated Annual Economic Impact of the Moonlight Solar Project Site on Isle of Wight County – Current Agricultural Use[40]

Economic Impact	Employment	Wages and Benefits	Output
1st Round Direct Economic Activity	1	$42,600	$148,600
2nd Round Indirect and Induced Economic Activity	1	$32,400	$84,300
Total Economic Activity	**2**	**$75,000**	**$232,900**

**Totals may not sum due to rounding.*

Fiscal Impact Assumptions

The analysis is based on the following assumptions:

- The current use assessment value of the affected acreage is approximately $222,100.[41]

[39] Data Source: Palladium Energy.
[40] Calculations based data from the U.S. Department of Agriculture and IMPLAN Group, LLC for Virginia and Isle of Wight County.
[41] Data Source: Derived from Isle of Wight County's Property Card database. Excludes value of existing structures as they will not be affected.

Fiscal Impact

Table 10 details the estimated tax revenue that the proposed Moonlight Solar site generates for Isle of Wight County in its current agricultural use. As the data in Table 10 indicate, the current county real estate tax revenue from the project site is estimated to be approximately $1,580 per year, for a cumulative total of approximately $63,100 over 40 years.

Table 10: Estimated County Revenue Generated by the Proposed Moonlight Solar Project Site over 40 Years from Real Estate Taxes – Current Agricultural Use

Estimated Assessed Value of Property – Agricultural Use[42]	$222,100
Isle of Wight County Current Real Estate Tax Rate	0.0071
Estimated Annual County Real Estate Tax – Agricultural Use	$1,580
Total Cumulative Revenue over 40 years	**$63,100**

**Totals may not sum due to rounding.*

The estimates provided in this report are based on the best information available and all reasonable care has been taken in assessing the quality of that information. However, because these estimates attempt to foresee the consequences of circumstances that have not yet occurred, it is not possible to be certain that they will be representative of actual events. These estimates are intended to provide a good indication of likely future outcomes and should not be construed to represent a precise measure of those outcomes.

[42] Data Source: Derived from Isle of Wight County's Property Card database. Excludes value of existing structures as they will not be affected.

TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS.

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MEMORANDUM

TO: Isle of Wight County Planning and Zoning Department

FROM: Timmons Group on behalf of Moonlight Solar

DATE: July 14, 2023

RE: Moonlight Solar Environmental Resource Impact Analysis

Timmons Group, on behalf of Moonlight Solar, has prepared a limited environmental review of resources that may be present within a one-mile radius of the proposed project location. This report includes a database review protected lands, wetlands and streams, prime farmland, and threatened and/or endangered species potentially present on site. Further review and analysis will be conducted with the appropriate resource agencies during permitting efforts at the state level.

Federal, State, and Local Conservation and Recreation Lands

Moonlight Solar does not intersect any federal, state, or local conservation easement or recreational lands, and there are no such resources within one mile of the project limits. The nearest managed lands are over one mile away: a Wetlands Reserve Program (WRP) site is found approximately 1.6 miles to the west of the site and Isle of Wight Purchase of Agricultural Conservation Easement (PACE) site that is approximately 2.5 miles southeast of the site.

Wetlands and Streams

Wetlands and streams onsite have been delineated by Timmons Group in March 2023 and are awaiting confirmation from the USACE. If wetland or stream impacts are unavoidable, the Applicant will obtain the proper USACE permit for impacts to jurisdictional wetlands and streams.

Wetlands and streams form a natural wildlife corridor, and as they will generally not be impacted by the project, will remain as interior corridors for wildlife utilization. Wetlands and streams are outside the fenced area so free passage of wildlife will be allowed for the duration of the project. The Virginia Department of Wildlife Resources advises that interior passages through solar projects helps reduce potential impacts to wildlife, to which this project will adhere.

Prime Farmland

Based on the Natural Resources Conservation Service (NRCS) soils layer shown on the Prime Farmland Map, there are areas of prime farmland within the development envelope of the site. Prime farmland[1] totals

[1] Prime farmland is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for those uses.

212.3 acres, farmland of statewide importance[2] totals 1.2 acres, prime farmland if drained totals 60.1 acres, and the rest of the development envelope, 31.4 acres, is neither prime farmland nor farmland of statewide importance. The Virginia Cooperative Extension recently developed a prime farmland dataset known as the Virginia Land and Energy Navigator (VaLEN). The results of our analysis of prime farmland using NRCS data is consistent with the VaLEN dataset.

Threatened and Endangered Species

Timmons Group has conducted a threatened and endangered (T&E) species review of the Moonlight Solar project. The following databases were reviewed for the potential presence of T&E species:

- Virginia Department of Conservation and Recreation (VDCR) – Natural Heritage Review Service
- Virginia Department of Wildlife Resources (VDWR) – Virginia Fish and Wildlife Information Service (VaFWIS)
- US Fish and Wildlife Service (USFWS) – Information for Planning and Consultation (IPaC)

Based on the queried databases, there is the potential for three T&E species to occur near the Project.

- Northern Long-eared Bat *Myotis septentrionalis* Federal Endangered USFWS
- Tri-Colored Bat *Perimyotis subflavus* State Endangered, Federal Proposed USFWS
- Eastern Big-eared Bat *Corynorhinus rafinesquii macrotis* State Endangered VDCR
- Barking Treefrog *Hyla gratiosa* Delisted VDCR
- Monarch Butterfly *Danaus plexippus* Candidate Species USFWS

According to USFWS IPaC results, the northern long-eared bat and the tri-colored bat have the potential to occur onsite. According to VDCR, the Project contains predicted suitable habitat for the eastern big-eared bat. There are no known hibernacula or roost trees for these species within the vicinity of the site. VDCR also notes there is predictive suitable habitat for the barking treefrog onsite; the barking treefrog has been delisted. According to VDCR, there are no protected plant or insect species within the project area. During permitting efforts at the state level, the Applicant will coordinate with resource agencies to ensure the protection and avoidance of T&E species.

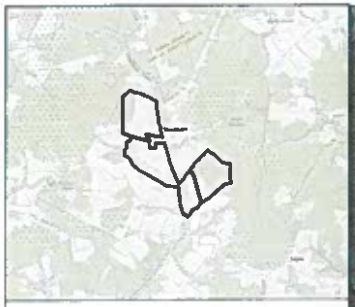
According to VDCR, the Moonlight Sinkhole Ponds Conservation Site is approximately 1,500LF east of the project area. It is a complex of sinkhole ponds in a matric of loblolly pines and has a biodiversity rank of B2, which represents a site of very high significance. There are no conservation sites within the project area. The project will have minimal impacts to Ecological Cores C3 (High), C4 (Moderate), and C5 (General).

Attachments

- Protected Lands Map
- Prime Farmland Map
- Virginia Land & Energy Navigator (VaLEN) Map
- Wildlife Environmental Review Map
- Ecological Cores Map
- T&E Species Database Reviews

[2] Farmland of statewide importance generally includes areas that almost meet the requirements for prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods.

Legend
Project Study Limits - 522.96 Acres
One Mile Buffer
County Boundary
Conservation Easements
Protected Areas of the US
Federal
Local Government
American Indian Areas - Not Present
State - Not Present
Regional Agency Special District - Not Present
Non-Governmental Organization - Not Present
Private - Not Present
Joint - Not Present
Territorial - Not Present
Unknown - Not Present
NOTES
PROTECTED AREAS OF THE US FROM ESRI
CONSERVATION EASEMENT DATA FROM VDCR
AERIAL IMAGERY FROM VGIN
TIMMONS GROUP
PALLADIUM ENERGY
MOONLIGHT SOLAR
ISLE OF WIGHT COUNTY, VIRGINIA
PROTECTED LANDS MAP
SCALE (FEET)
0
2,000
4,000



Legend

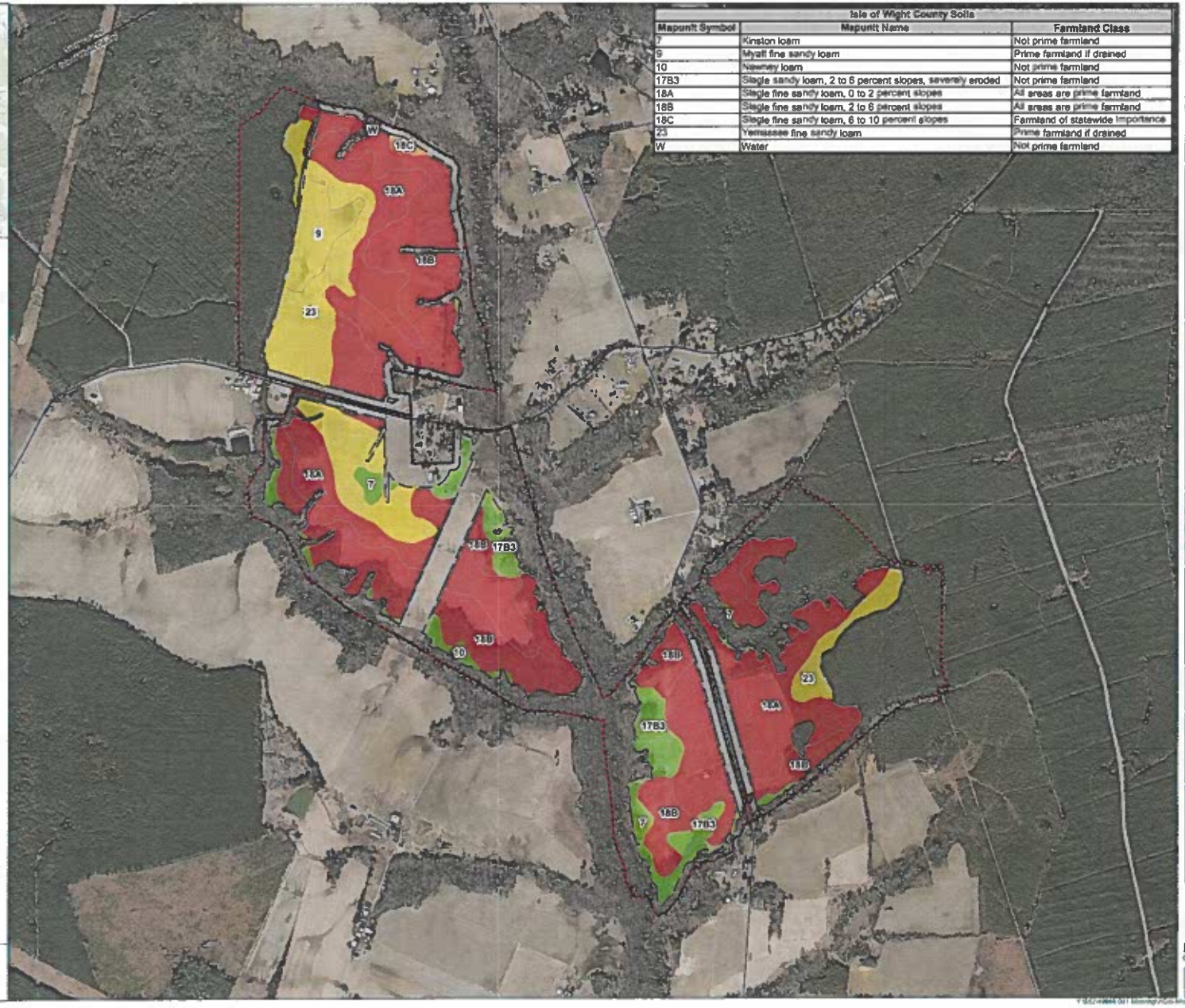
- Project Study Limits - 522.96 Acres
- Development Envelope - 305.8 Acres
- County Boundary

Farmland Class

- All Areas are Prime Farmland - 212.3 Acres
- Farmland of Statewide Importance - 1.2 Acres
- Prime Farmland if Drained - 60.1 Acres
- Not Prime Farmland - 31.4 Acres

NOTES:

SOILS DATA FROM SSURGO
COUNTY BOUNDARY DATA FROM VDEM
AERIAL IMAGERY FROM VGIN



Isle of Wight County Soils		
Mapunit Symbol	Mapunit Name	Farmland Class
7	Kinston loam	Not prime farmland
9	Myatt fine sandy loam	Prime farmland if drained
10	Newhurry loam	Not prime farmland
17B3	Slagle sandy loam, 2 to 6 percent slopes, severely eroded	Not prime farmland
18A	Slagle fine sandy loam, 0 to 2 percent slopes	All areas are prime farmland
18B	Slagle fine sandy loam, 2 to 6 percent slopes	All areas are prime farmland
18C	Slagle fine sandy loam, 6 to 10 percent slopes	Farmland of statewide importance
23	Yemassee fine sandy loam	Prime farmland if drained
W	Water	Not prime farmland

TIMMONS GROUP

PALLADIUM ENERGY

MOONLIGHT SOLAR
ISLE OF WIGHT COUNTY
VIRGINIA

03/17/2023

MOONLIGHT SOLAR

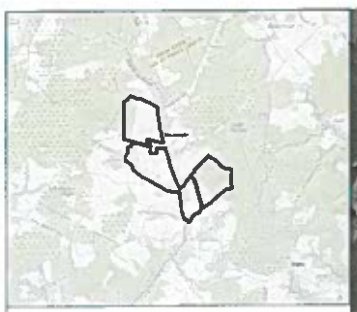
M. HILL

PRIME FARMLAND MAP

SCALE (FEET)

0 500 1,000

Legend
Project Study Limits - 522.96 Acres
Virginia Land & Energy Navigator (VaLEN) Dataset
County Boundary
NOTES
PRIME FARMLAND FROM VaLEN
AERIAL IMAGERY FROM VGIN
TIMMONS GROUP
PALLADIUM ENERGY
MOONLIGHT SOLAR
ISLE OF WIGHT COUNTY
VIRGINIA
MOONLIGHT SOLAR
VIRGINIA LAND & ENERGY NAVIGATOR (VaLEN) MAP
SCALE (FEET)
0
500
1,000



Legend

- Project Study Limits - 522.96 Acres
- Two Mile Buffer
- County Boundary
- NLEB Roost Trees - Not Present
- Trout Streams - Not Present
- Threatened/Endangered Waters - Not Present
- Anadromous Fish Use
- Bald Eagle Concentration Areas and Roosts
- Colonial Water Birds
- Federal or State Listed Observation Area - Not Present
- Bat Hibernacula (0.5 Mile Buffer) - Not Present
- Bat Hibernacula (5.5 Mile Buffer) - Not Present

Federal Status, State Status

- Non-Threatened, Non-Endangered

Species Observed within Two Miles		
Common Name	Federal Status	State Status
Bullhead, yellow	NT / NE	NT / NE
Chub, creek	NT / NE	NT / NE
Chubsucker, creek	NT / NE	NT / NE
Dace, blacknose	NT / NE	NT / NE
Dace, roayside	NT / NE	NT / NE
Darter, tessellated	NT / NE	NT / NE
Eagle, bald	NT / NE	NT / NE
Eel, American	NT / NE	NT / NE
Flier	NT / NE	NT / NE
Frog, southern cricket	NT / NE	NT / NE
Heron, great blue	NT / NE	NT / NE
Lamprey, least brook	NT / NE	NT / NE
Mosquitofish, eastern	NT / NE	NT / NE
Mudminnow, eastern	NT / NE	NT / NE
Pepper, spring	NT / NE	NT / NE
Perch, pirate	NT / NE	NT / NE
Pickerel, redfin	NT / NE	NT / NE
Pumpkinseed	NT / NE	NT / NE
Salamander, eastern red-backed	NT / NE	NT / NE
Shiner, golden	NT / NE	NT / NE
Sunfish, bluespotted	NT / NE	NT / NE
Sunfish, redear	NT / NE	NT / NE
Treefrog, barking	NT / NE	NT / NE
Treefrog, pine woods	NT / NE	NT / NE
Treefrog, squirrel	NT / NE	NT / NE
Warmouth	NT / NE	NT / NE

NT = Non-Threatened, NE = Non-Endangered

NOTES

WERMS DATA FROM DWR
BAT HIBERNACULA INCLUDE IDENTIFICATIONS OF NORTHER LONG-EARED BAT, TRI-COLORED BAT, LITTLE BROWN BAT, VIRGINIA BIG-EARED BAT, GRAY BAT AND INDIANA BAT
AERIAL IMAGERY FROM VGIN

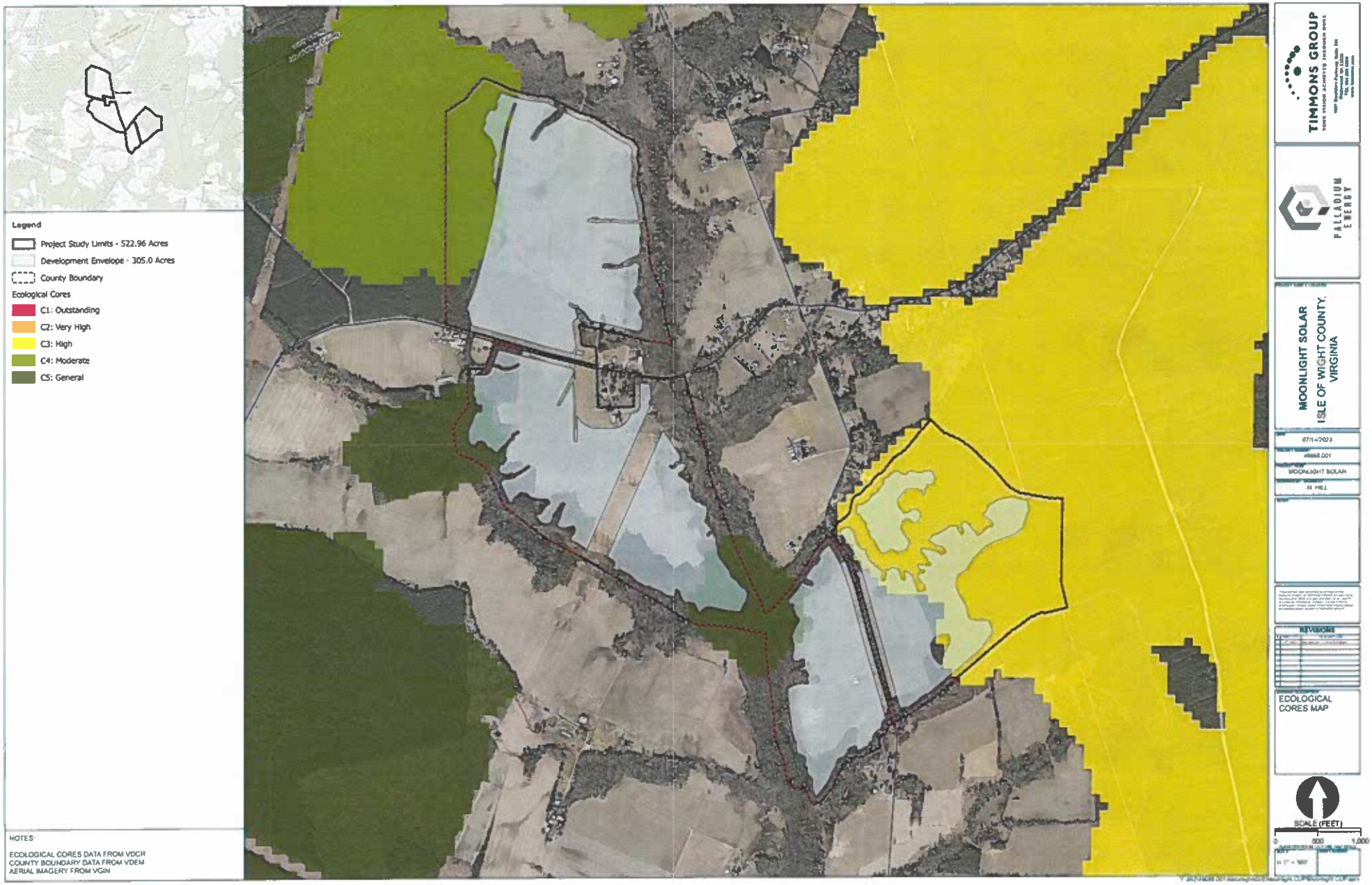
TIMMONS GROUP

PALLADIUM ENERGY

MOONLIGHT SOLAR
ISLE OF WIGHT COUNTY, VIRGINIA

WILDLIFE ENVIRONMENTAL REVIEW MAP

SCALE (FEET)
0 1,500 3,000
1" = 1,500'


Legend
Project Study Limits - 522.96 Acres
Development Envelope - 305.0 Acres
County Boundary
Ecological Cores
C1: Outstanding
C2: Very High
C3: High
C4: Moderate
C5: General
NOTES:
ECOLOGICAL CORES DATA FROM VDCR
COUNTY BOUNDARY DATA FROM VDEM
AERIAL IMAGERY FROM VGIN
TIMMONS GROUP
PALLADIUM ENERGY
MOONLIGHT SOLAR
ISLE OF WIGHT COUNTY, VIRGINIA
07/14/2023
48868.001
MOONLIGHT SOLAR
M HILL
REVISIONS
ECOLOGICAL CORES MAP
SCALE (FEET)
0
500
1,000

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Virginia Ecological Services Field Office
6669 Short Lane
Gloucester, VA 23061-4410
Phone: (804) 693-6694 Fax: (804) 693-9032

In Reply Refer To:
Project code: 2023-0061092
Project Name: Moonlight Solar
IPaC Record Locator: 578-124233281

March 28, 2023

Federal Nexus: no
Federal Action Agency (if applicable):

Subject: Technical assistance for 'Moonlight Solar'

Dear Timmons Group:

This letter records your determination using the Information for Planning and Consultation (IPaC) system provided to the U.S. Fish and Wildlife Service (Service) on March 28, 2023, for 'Moonlight Solar' (here forward, Project). This project has been assigned Project Code 2023-0061092 and all future correspondence should clearly reference this number. **Please carefully review this letter. Your Endangered Species Act (Act) requirements are not complete.**

Ensuring Accurate Determinations When Using IPaC

The Service developed the IPaC system and associated species' determination keys in accordance with the Endangered Species Act of 1973 (ESA; 87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.) and based on a standing analysis. All information submitted by the Project proponent into the IPaC must accurately represent the full scope and details of the Project. Failure to accurately represent or implement the Project as detailed in IPaC or the Northern Long-eared Bat Rangewide Determination Key (Dkey), invalidates this letter.

Determination for the Northern Long-Eared Bat

Based upon your IPaC submission and a standing analysis, your project is not reasonably certain to cause incidental take of the northern long-eared bat. Unless the Service advises you within 15 days of the date of this letter that your IPaC-assisted determination was incorrect, this letter verifies that the Action is not likely to result in unauthorized take of the northern long-eared bat.

Other Species and Critical Habitat that May be Present in the Action Area

The IPaC-assisted determination for the northern long-eared bat does not apply to the following ESA-protected species and/or critical habitat that also may occur in your Action area:

- Monarch Butterfly *Danaus plexippus* Candidate

You may coordinate with our Office to determine whether the Action may cause prohibited take of the animal species and/or critical habitat listed above. Note that if a new species is listed that may be affected by the identified action before it is complete, additional review is recommended to ensure compliance with the Endangered Species Act.

Next Steps

Coordination with the Service is complete. This letter serves as technical assistance. All conservation measures should be implemented as proposed. Thank you for considering federally listed species during your project planning.

We are uncertain where the northern long-eared bat occurs on the landscape outside of known locations. Because of the steep declines in the species and vast amount of available and suitable forest habitat, the presence of suitable forest habitat alone is a far less reliable predictor of their presence. Based on the best available information, most suitable habitat is now expected to be unoccupied. During the interim period, while we are working on potential methods to address this uncertainty, we conclude take is not reasonably certain to occur in areas of suitable habitat where presence has not been documented.

If no changes occur with the Project or there are no updates on listed species, no further consultation/coordination for this project is required for the northern long-eared bat. However, the Service recommends that project proponents re-evaluate the Project in IPaC if: 1) the scope, timing, duration, or location of the Project changes (includes any project changes or amendments); 2) new information reveals the Project may impact (positively or negatively) federally listed species or designated critical habitat; or 3) a new species is listed, or critical habitat designated. If any of the above conditions occurs, additional coordination with the Service should take place before project implements any changes which are final or commits additional resources.

If you have any questions regarding this letter or need further assistance, please contact the Virginia Ecological Services Field Office and reference Project Code 2023-0061092 associated with this Project.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the National Wildlife Refuge system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act[1] and the Bald and Golden Eagle Protection Act[2].

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

---

1. The Migratory Birds Treaty Act of 1918.
2. The Bald and Golden Eagle Protection Act of 1940.
3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

The birds listed below are birds of particular concern either because they occur on the USFWS Birds of Conservation Concern (BCC) list or warrant special attention in your project location. To learn more about the levels of concern for birds on your list and how this list is generated, see the FAQ below. This is not a list of every bird you may find in this location, nor a guarantee that every bird on this list will be found in your project area. To see exact locations of where birders and the general public have sighted birds in and around your project area, visit the E-bird data mapping tool (Tip: enter your location, desired date range and a species on your list). For projects that occur off the Atlantic Coast, additional maps and models detailing the relative occurrence and abundance of bird species on your list are available. Links to additional information about Atlantic Coast birds, and other important information about your migratory bird list, including how to properly interpret and use your migratory bird report, can be found below.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
American Kestrel *Falco sparverius paulus* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9587	Breeds Apr 1 to Aug 31
Bald Eagle *Haliaeetus leucocephalus* This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities.	Breeds Sep 1 to Aug 31

NAME	BREEDING SEASON
Bobolink *Dolichonyx oryzivorus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 20 to Jul 31
Brown-headed Nuthatch *Sitta pusilla* This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA	Breeds Mar 1 to Jul 15
Chimney Swift *Chaetura pelagica* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Mar 15 to Aug 25
Eastern Whip-poor-will *Antrostomus vociferus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Aug 20
Kentucky Warbler *Oporornis formosus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 20 to Aug 20
Prairie Warbler *Dendroica discolor* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 1 to Jul 31
Prothonotary Warbler *Protonotaria citrea* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds Apr 1 to Jul 31
Red-headed Woodpecker *Melanerpes erythrocephalus* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Sep 10
Wood Thrush *Hylocichla mustelina* This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska.	Breeds May 10 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read and understand the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Each green bar represents the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during a particular week of the year. (A year is represented as 12 4-week months.) A taller bar indicates a higher probability of species presence. The survey effort (see

below) can be used to establish a level of confidence in the presence score. One can have higher confidence in the presence score if the corresponding survey effort is also high.

How is the probability of presence score calculated? The calculation is done in three steps:

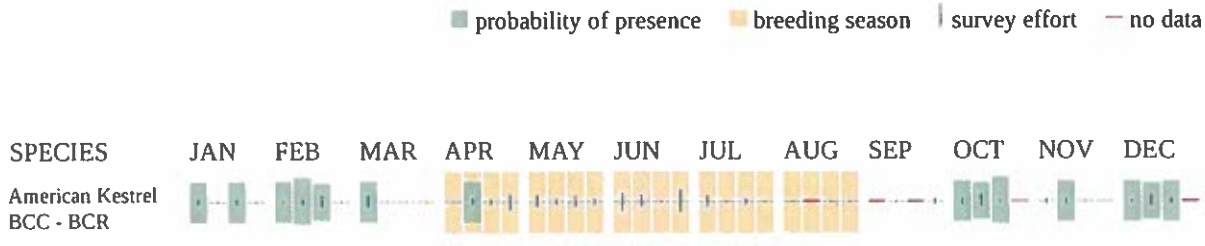
1. The probability of presence for each week is calculated as the number of survey events in the week where the species was detected divided by the total number of survey events for that week. For example, if in week 12 there were 20 survey events and the Spotted Towhee was found in 5 of them, the probability of presence of the Spotted Towhee in week 12 is 0.25.
2. To properly present the pattern of presence across the year, the relative probability of presence is calculated. This is the probability of presence divided by the maximum probability of presence across all weeks. For example, imagine the probability of presence in week 20 for the Spotted Towhee is 0.05, and that the probability of presence at week 12 (0.25) is the maximum of any week of the year. The relative probability of presence on week 12 is 0.25/0.25 = 1; at week 20 it is 0.05/0.25 = 0.2.
3. The relative probability of presence calculated in the previous step undergoes a statistical conversion so that all possible values fall between 0 and 10, inclusive. This is the probability of presence score.

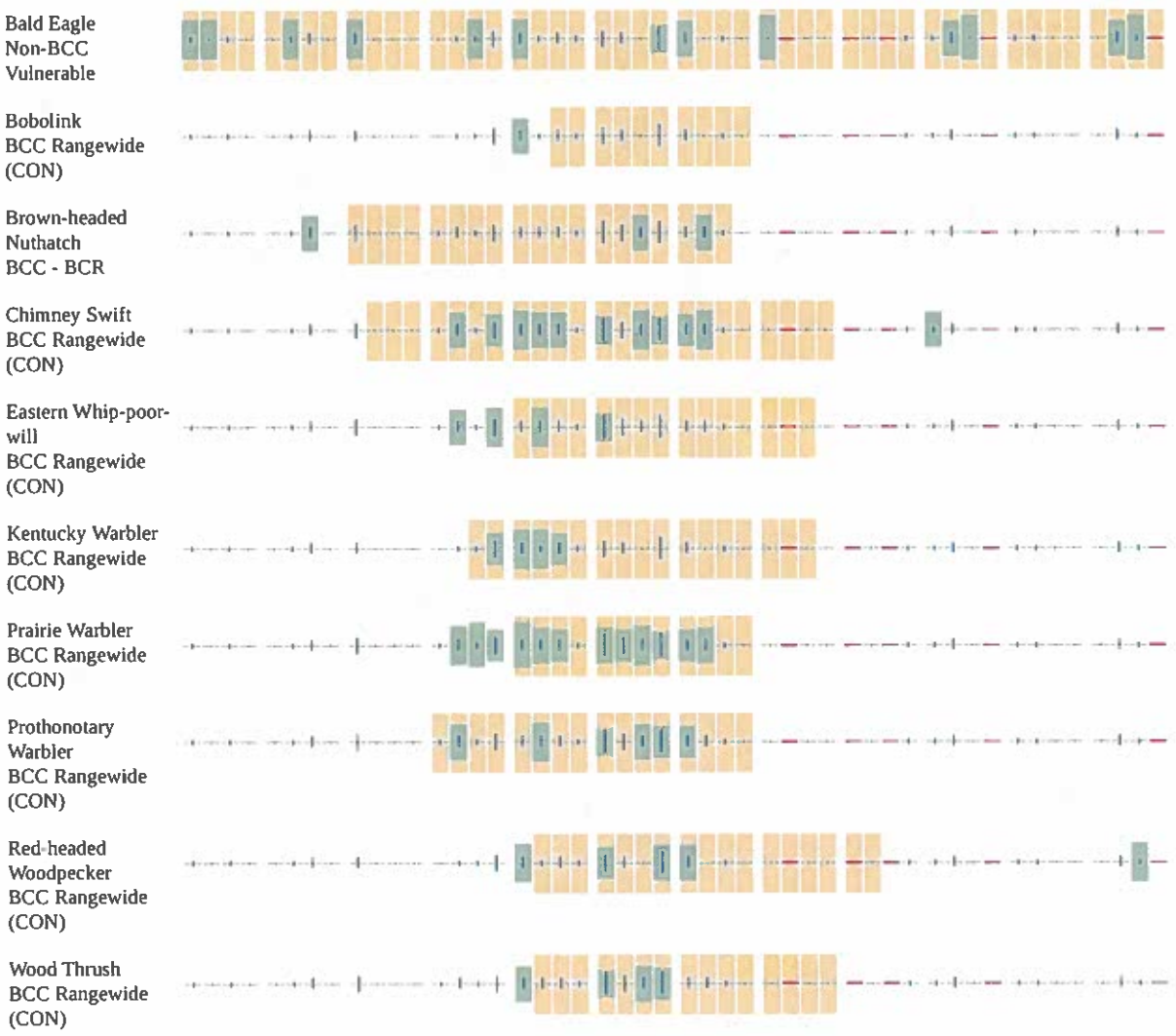
Breeding Season ( )
Yellow bars denote a very liberal estimate of the time-frame inside which the bird breeds across its entire range. If there are no yellow bars shown for a bird, it does not breed in your project area.

Survey Effort ( )
Vertical black lines superimposed on probability of presence bars indicate the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps. The number of surveys is expressed as a range, for example, 33 to 64 surveys.

No Data (–)
A week is marked as having no data if there were no survey events for that week.

Survey Timeframe
Surveys from only the last 10 years are used in order to ensure delivery of currently relevant information. The exception to this is areas off the Atlantic coast, where bird returns are based on all years of available data, since data in these areas is currently much more sparse.





Additional information can be found using the following links:

- Birds of Conservation Concern https://www.fws.gov/program/migratory-birds/species
- Measures for avoiding and minimizing impacts to birds https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds
- Nationwide conservation measures for birds https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf

MIGRATORY BIRDS FAQ

Tell me more about conservation measures I can implement to avoid or minimize impacts to migratory birds.

Nationwide Conservation Measures describes measures that can help avoid and minimize impacts to all birds at any location year round. Implementation of these measures is particularly important when birds are most likely to occur in the project area. When birds may be breeding in

the area, identifying the locations of any active nests and avoiding their destruction is a very helpful impact minimization measure. To see when birds are most likely to occur and be breeding in your project area, view the Probability of Presence Summary. Additional measures or permits may be advisable depending on the type of activity you are conducting and the type of infrastructure or bird species present on your project site.

What does IPaC use to generate the list of migratory birds that potentially occur in my specified location?
The Migratory Bird Resource List is comprised of USFWS Birds of Conservation Concern (BCC) and other species that may warrant special attention in your project location.

The migratory bird list generated for your project is derived from data provided by the Avian Knowledge Network (AKN). The AKN data is based on a growing collection of survey, banding, and citizen science datasets and is queried and filtered to return a list of those birds reported as occurring in the 10km grid cell(s) which your project intersects, and that have been identified as warranting special attention because they are a BCC species in that area, an eagle (Eagle Act requirements may apply), or a species that has a particular vulnerability to offshore activities or development.

Again, the Migratory Bird Resource list includes only a subset of birds that may occur in your project area. It is not representative of all birds that may occur in your project area. To get a list of all birds potentially present in your project area, please visit the Rapid Avian Information Locator (RAIL) Tool.

What does IPaC use to generate the probability of presence graphs for the migratory birds potentially occurring in my specified location?
The probability of presence graphs associated with your migratory bird list are based on data provided by the Avian Knowledge Network (AKN). This data is derived from a growing collection of survey, banding, and citizen science datasets.

Probability of presence data is continuously being updated as new and better information becomes available. To learn more about how the probability of presence graphs are produced and how to interpret them, go the Probability of Presence Summary and then click on the "Tell me about these graphs" link.

How do I know if a bird is breeding, wintering or migrating in my area?
To see what part of a particular bird's range your project area falls within (i.e. breeding, wintering, migrating or year-round), you may query your location using the RAIL Tool and look at the range maps provided for birds in your area at the bottom of the profiles provided for each bird in your results. If a bird on your migratory bird species list has a breeding season associated with it, if that bird does occur in your project area, there may be nests present at some point within the timeframe specified. If "Breeds elsewhere" is indicated, then the bird likely does not breed in your project area.

What are the levels of concern for migratory birds?

Migratory birds delivered through IPaC fall into the following distinct categories of concern:

1. "BCC Rangewide" birds are Birds of Conservation Concern (BCC) that are of concern throughout their range anywhere within the USA (including Hawaii, the Pacific Islands, Puerto Rico, and the Virgin Islands);
2. "BCC - BCR" birds are BCCs that are of concern only in particular Bird Conservation Regions (BCRs) in the continental USA; and
3. "Non-BCC - Vulnerable" birds are not BCC species in your project area, but appear on your list either because of the Eagle Act requirements (for eagles) or (for non-eagles) potential susceptibilities in offshore areas from certain types of development or activities (e.g. offshore energy development or longline fishing).

Although it is important to try to avoid and minimize impacts to all birds, efforts should be made, in particular, to avoid and minimize impacts to the birds on this list, especially eagles and BCC species of rangewide concern. For more information on conservation measures you can implement to help avoid and minimize migratory bird impacts and requirements for eagles, please see the FAQs for these topics.

Details about birds that are potentially affected by offshore projects

For additional details about the relative occurrence and abundance of both individual bird species and groups of bird species within your project area off the Atlantic Coast, please visit the Northeast Ocean Data Portal. The Portal also offers data and information about other taxa besides birds that may be helpful to you in your project review. Alternately, you may download the bird model results files underlying the portal maps through the NOAA NCCOS Integrative Statistical Modeling and Predictive Mapping of Marine Bird Distributions and Abundance on the Atlantic Outer Continental Shelf project webpage.

Bird tracking data can also provide additional details about occurrence and habitat use throughout the year, including migration. Models relying on survey data may not include this information. For additional information on marine bird tracking data, see the Diving Bird Study and the nanotag studies or contact Caleb Spiegel or Pam Loring.

What if I have eagles on my list?

If your project has the potential to disturb or kill eagles, you may need to obtain a permit to avoid violating the Eagle Act should such impacts occur.

Proper Interpretation and Use of Your Migratory Bird Report

The migratory bird list generated is not a list of all birds in your project area, only a subset of birds of priority concern. To learn more about how your list is generated, and see options for identifying what other birds may be in your project area, please see the FAQ "What does IPaC use to generate the migratory birds potentially occurring in my specified location". Please be aware this report provides the "probability of presence" of birds within the 10 km grid cell(s) that overlap your project; not your exact project footprint. On the graphs provided, please also look carefully at the survey effort (indicated by the black vertical bar) and for the existence of the "no data" indicator (a red horizontal bar). A high survey effort is the key component. If the survey effort is high, then the probability of presence score can be viewed as more dependable. In contrast, a low survey effort bar or no data bar means a lack of data and, therefore, a lack of

certainty about presence of the species. This list is not perfect; it is simply a starting point for identifying what birds of concern have the potential to be in your project area, when they might be there, and if they might be breeding (which means nests might be present). The list helps you know what to look for to confirm presence, and helps guide you in knowing when to implement conservation measures to avoid or minimize potential impacts from your project activities, should presence be confirmed. To learn more about conservation measures, visit the FAQ "Tell me about conservation measures I can implement to avoid or minimize impacts to migratory birds" at the bottom of your migratory bird trust resources page.

IPAC USER CONTACT INFORMATION

Agency: Timmons Group
Name: Timmons Group
Address: 1001 Boulders Pkwy
City: Richmond
State: VA
Zip: 23225
Email 804@timmons.com
Phone: 8042006500

VaFWIS - Department of Game and Inland Fisheries

37.02954 -76.72453
is the Search Point
Submit Cancel

Search Point
- Change to "clicked" map point
- Fixed at 37.02954 -76.72453

Show Position Rings
- Yes
- No

1 mile and 1/4 mile at the Search Point

Show Search Area
- Yes
- No

2 Search distance miles buffer

Search Point is at map center

Base Map Choices
BW Aerial Photography

Map Overlay Choices
Current List: Anadromous, TEWaters, BAEANests, BECAR, Trout, TierII, Habitat, Search

Map Overlay Legend

T & E Waters
- Federal
- State

Predicted Habitat WAP Tier I & II
- Aquatic
- Terrestrial

Trout Waters
- Class I - IV
- Class V - VI

Anadromous Fish Reach
- Confirmed
- Potential

Impediment

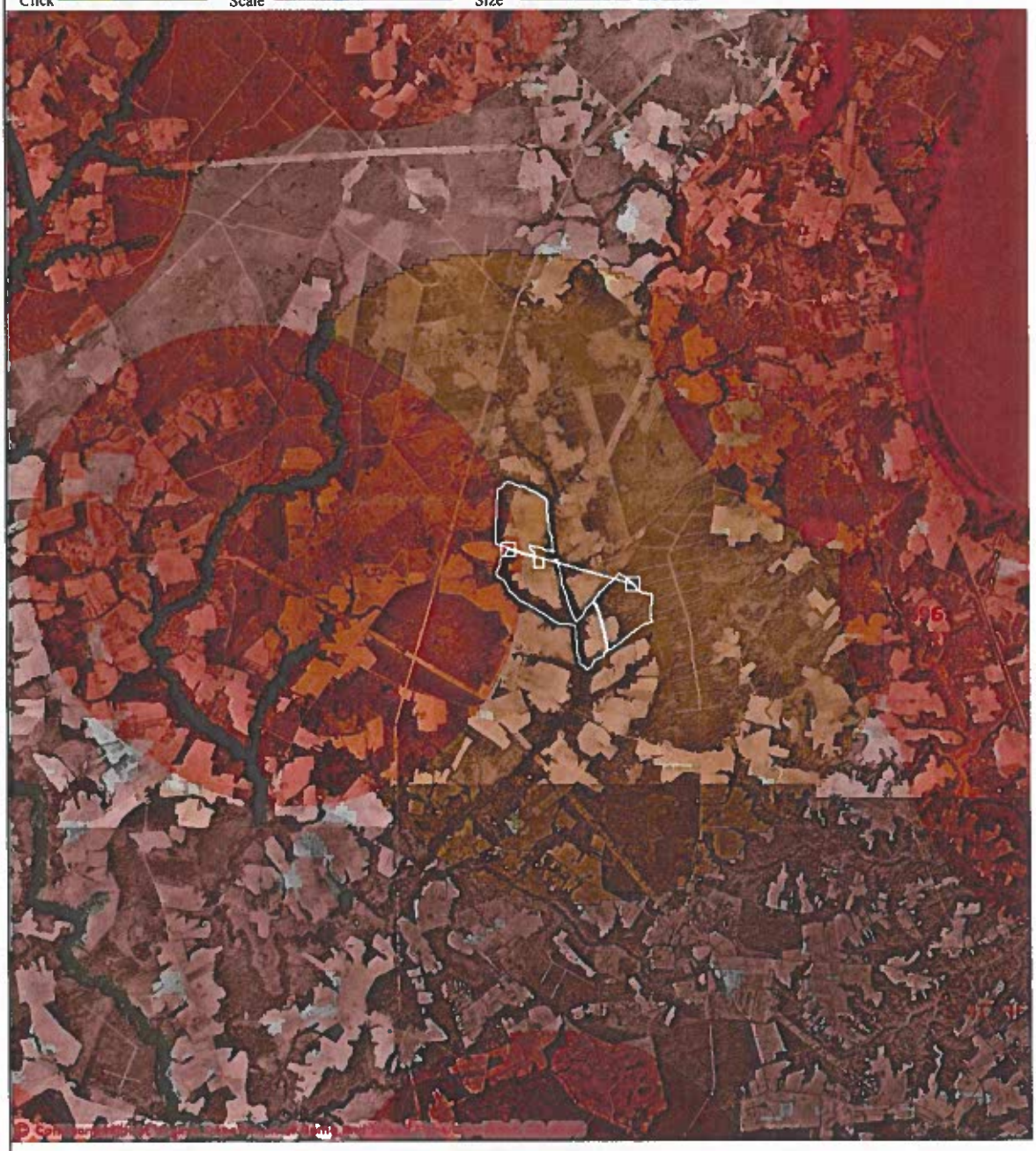
2 mile radius Search Area

Bald Eagle Concentration Areas and Roosts

Bald Eagle nests 660 and 330 foot management zones

Data Observation Site

back | Map Click: Pan | Refresh Browser Page | Map Scale: In Zoom Out | Screen Size: Small Size Big | Help



Point of Search 37.02954 -76.72453
Map Location 37.02954 -76.72453

Select Coordinate System:
- Degrees,Minutes,Seconds Latitude - Longitude
- Decimal Degrees Latitude - Longitude
- Meters UTM NAD83 East North Zone
- Meters UTM NAD27 East North Zone

Base Map source: Black & White USGS Aerial Photography (see Microsoft terraserver-usa.com for details)

Map projection is UTM Zone 18 NAD 1983 with left 338613 and top 4107540. Pixel size is 16 meters . Coordinates displayed are decimal Degrees North and West. Map is currently displayed as 1000 columns by 1000 rows for a total of 1000000 pixles. The map display represents 16000 meters east to west by 16000 meters north to south for a total of 256.0 square kilometers. The map display represents 52502 feet east to west by 52502 feet north to south for a total of 98.8 square miles.

Topographic maps and Black and white aerial photography for year 1990+-
are from the United States Department of the Interior, United States Geological Survey.
Color aerial photography aquired 2002 is from Virginia Base Mapping Program, Virginia Geographic Information Network.
Shaded topographic maps are from TOPO! ©2006 National Geographic
http://www.national.geographic.com/topo
All other map products are from the Commonwealth of Virginia Department of Game and Inland Fisheries.

map assembled 2023-03-20 13:19:21 (qa/qc March 21, 2016 12:20 - tn=1467810 dist=3218 I
)
$poi=37.0287900 -76.7151300

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VaFWIS Initial Project Assessment Report Compiled on 3/20/2023, 1:20:31 PM

Help

Known or likely to occur within a **2 mile buffer around line beginning 37.0287900 -76.7151299** in **093 Isle of Wight County, 181 Surry County, VA**

View Map of Site Location

533 Known or Likely Species ordered by Status Concern for Conservation (displaying first 33) (33 species with Status* or Tier I** or Tier II**)

BOVA Code	Status*	Tier**	Common Name	Scientific Name	Confirmed	Database(s)
040228	FESE	Ia	Woodpecker, red-cockaded	Picoides borealis		BOVA
010032	FESE	Ib	Sturgeon, Atlantic	Acipenser oxyrinchus		BOVA
030071	FTST	Ia	Turtle, loggerhead sea	Caretta caretta		BOVA
040144	FTST	Ia	Knot, red	Calidris canutus rufa		BOVA
040110	FTSE	Ia	Rail, eastern black	Laterallus jamaicensis jamaicensis		BOVA
050022	FTST	Ia	Bat, northern long-eared	Myotis septentrionalis		BOVA
010347	SE	Ia	Sunfish, blackbanded	Enneacanthus chaetodon		BOVA,Habitat
030064	SE	Ia	Turtle, eastern chicken	Deirochelys reticularia reticularia		BOVA
050020	SE	Ia	Bat, little brown	Myotis lucifugus		BOVA
050034	SE	Ia	Bat, Rafinesque's eastern big-eared	Corynorhinus rafinesquii macrotis		BOVA
050027	FPSE	Ia	Bat, tri-colored	Perimyotis subflavus		BOVA
020052	SE	IIa	Salamander, eastern tiger	Ambystoma tigrinum		BOVA
030013	SE	IIa	Rattlesnake, canebrake	Crotalus horridus		Habitat
040096	ST	Ia	Falcon, peregrine	Falco peregrinus		BOVA
040293	ST	Ia	Shrike, loggerhead	Lanius ludovicianus		BOVA
020044	ST	IIa	Salamander, Mabee's	Ambystoma mabeei		BOVA,Habitat
040292	ST		Shrike, migrant loggerhead	Lanius ludovicianus migrans		BOVA
100079	FC	IIIa	Butterfly, monarch	Danaus plexippus		BOVA
030067	CC	IIa	Terrapin, northern diamond-backed	Malaclemys terrapin terrapin		BOVA,Habitat
030063	CC	IIIa	Turtle, spotted	Clemmys guttata		BOVA
010077		Ia	Shiner, bridle	Notropis bifrenatus		BOVA
070131		Ic	Isopod, Phreatic	Caecidotea phreatica		BOVA
020063		IIa	Toad, oak	Anaxyrus quercicus		BOVA,Habitat
020002		IIa	Treefrog, barking	Hyla gratiosa	Yes	BOVA,SppObs
040052		IIa	Duck, American black	Anas rubripes		BOVA

040033		IIa	Egret, snowy	Egretta thula		BOVA
040029		IIa	Heron, little blue	Egretta caerulea caerulea		BOVA
040036		IIa	Night-heron, yellow-crowned	Nyctanassa violacea violacea		BOVA
040181		IIa	Tern, common	Sterna hirundo		BOVA
040320		IIa	Warbler, cerulean	Setophaga cerulea		BOVA
040140		IIa	Woodcock, American	Scolopax minor		BOVA
040105		IIb	Rail, king	Rallus elegans		BOVA
040304		IIc	Warbler, Swainson's	Limnothlypis swainsonii		BOVA

To view **All 533 species** View 533

*FE=Federal Endangered; FT=Federal Threatened; SE=State Endangered; ST=State Threatened; FP=Federal Proposed; FC=Federal Candidate; CC=Collection Concern

**I=VA Wildlife Action Plan - Tier I - Critical Conservation Need; II=VA Wildlife Action Plan - Tier II - Very High Conservation Need; III=VA Wildlife Action Plan - Tier III - High Conservation Need; IV=VA Wildlife Action Plan - Tier IV - Moderate Conservation Need
Virginia Widlife Action Plan Conservation Opportunity Ranking:
a - On the ground management strategies/actions exist and can be feasibly implemented.;
b - On the ground actions or research needs have been identified but cannot feasibly be implemented at this time.;
c - No on the ground actions or research needs have been identified or all identified conservation opportunities have been exhausted.

View Map of All Query Results from All Observation Tables

Bat Colonies or Hibernacula: **Not Known**

Anadromous Fish Use Streams

N/A

Colonial Water Bird Survey (1 records)

View Map of All Query Results Colonial Water Bird Survey

Colony_Name	N Obs	Latest Date	N Species			View Map
			Different Species	Highest TE*	Highest Tier**	
Warren Creek	1	Jun 1 1993	1			Yes

Displayed 1 Colonial Water Bird Survey

Threatened and Endangered Waters

N/A

Managed Trout Streams

N/A

Bald Eagle Concentration Areas and Roosts

N/A

Bald Eagle Nests (1 records)

View Map of All Query Results
Bald Eagle Nests

Nest	N Obs	Latest Date	DGIF Nest Status	View Map
IW8601	35	Apr 23 2008	Unknown	Yes

Displayed 1 Bald Eagle Nests

Habitat Predicted for Aquatic WAP Tier I & II Species (2 Reaches)

View Map Combined Reaches from Below of Habitat Predicted for WAP Tier I & II Aquatic Species

Stream Name	Tier Species						View Map
	Highest TE*	BOVA Code, Status*, Tier**, Common & Scientific Name					
Passenger Swamp (03010202)	SE	010347	SE	Ia	Sunfish, blackbanded	Enneacanthus chaetodon	Yes
Pouches Swamp (03010202)	SE	010347	SE	Ia	Sunfish, blackbanded	Enneacanthus chaetodon	Yes

Habitat Predicted for Terrestrial WAP Tier I & II Species (4 Species)

View Map of Combined Terrestrial Habitat Predicted for 4 WAP Tier I & II Species Listed Below

ordered by Status Concern for Conservation

BOVA Code	Status*	Tier**	Common Name	Scientific Name	View Map
030013	SE	IIa	Rattlesnake, canebrake	Crotalus horridus	Yes
020044	ST	IIa	Salamander, Mabee's	Ambystoma mabeei	Yes
030067	CC	IIa	Terrapin, northern diamond-backed	Malaclemys terrapin terrapin	Yes
020063		IIa	Toad, oak	Anaxyrus quercicus	Yes

Public Holdings:

N/A

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Travis A. Voyles
Secretary of Natural and Historic Resources

Matthew S. Wells
Director

Andrew W. Smith
Chief Deputy Director

Frank N. Stovall
Deputy Director for Operations

Darryl Glover
Deputy Director for Dam Safety, Floodplain Management and Soil and Water Conservation

Laura Ellis
Deputy Director for Administration and Finance

COMMONWEALTH of VIRGINIA

DEPARTMENT OF CONSERVATION AND RECREATION

July 11, 2023

Jillian Stickley
Timmons Group
1001 Boulders Parkway
North Chesterfield, VA 23225

Re: 49666.001, Moonlight Solar

Dear Ms. Stickley:

The Department of Conservation and Recreation's Division of Natural Heritage (DCR) has searched its Biotics Data System for occurrences of natural heritage resources from the area outlined on the submitted map. Natural heritage resources are defined as the habitat of rare, threatened, or endangered plant and animal species, unique or exemplary natural communities, and significant geologic formations.

According to a DCR biologist and predicted suitable habitat modeling, there is a potential for Barking treefrog (*Hyla gratiosa*, G5/S2S3/NL/NL) to occur in the project area if suitable habitat exists on site. The Barking treefrog ranges through the coastal plain from North Carolina to Florida and west to Mississippi and eastern Louisiana (NatureServe, 2009). There are disjunct populations in Delaware, Maryland, Kentucky and Tennessee, and southeastern Virginia (NatureServe, 2009). Across its range, it inhabits areas near shallow ponds in pine savannas and in low wet woods and swamps (Martof et al., 1980). In Virginia, this species breeds in fish-free vernal ponds (Pague & Young, 1991). When inactive during cold or dry seasons, they burrow under tree roots, vegetation, or in the soil; otherwise, this species is mostly arboreal and thus dependent on trees near the water (Pague & Young, 1991). Adult frogs feed on insects and other invertebrates; tadpoles consume primarily algae (VDGIF, 1993).

Major threats to the Barking treefrog include continued logging of native pine, destruction of breeding ponds, and over collecting (Pague & Young, 1991).

Due to the potential for this site to support populations of Barking treefrog, DCR recommends a habitat assessment for the resource in the study area. With the habitat assessment results we can more accurately evaluate potential impacts to natural heritage resources and offer specific protection recommendations for minimizing impacts to the documented resources. If possible, please include photos and plant and animal species composition information for the isolated pond in the wooded section of the northwest portion of the project site.

DCR-Division of Natural Heritage biologists are qualified to conduct inventories for rare, threatened, and endangered species. Please contact Anne Chazal, Natural Heritage Chief Biologist, at anne.chazal@dcr.virginia.gov or 804-786-9014 to discuss availability and rates for field work.

In addition, according to predicted suitable habitat modeling, there is potential for Eastern big-eared bat (*Corynorhinus rafinesquii macrotis*, G3G4T3/S2/NL/LE) to occur in the project area if suitable habitat exists on site. The Eastern big-eared bat is named for its enormous ears twice the length of its head, is extremely rare in Virginia and is currently known only from the southeastern portion of the state. Although widespread throughout the southeast, they are never found in large numbers. These bats roost singly or in small groups in hollow trees or abandoned buildings. They forage only after dark primarily in mature forests of both upland and lowland areas along permanent bodies of water (NatureServe, 2009). The details of this bat's feeding behavior and much of its natural history remain a mystery. Lack of information regarding the ecology of the Eastern big-eared bat, and their sensitivity to disturbance, make them particularly vulnerable to destruction of roost sites and feeding areas where their presence goes undetected (Handley and Schwab 1991, Harvey 1992).

Threats to this species include forest destruction, particularly hollow tree removal, decreasing availability of abandoned buildings, and possibly, insecticides. Please note that this species is currently classified as endangered by the Virginia Department of Wildlife Resources (VDWR).

DCR recommends avoiding tree removal in bottomland habitats along Stallings Creek and tributaries and assessing any large potential roost trees and/or abandoned structures on the property for bat presence/absence. DCR also recommends coordination with DWR if removal of potential roost habitat for the Eastern big-eared bat becomes necessary to ensure compliance with the Virginia Endangered Species Act (VA ST §§ 29.1-563 – 570).

DCR recommends the development of an invasive species management plan for the project and the planting of Virginia native pollinator plant species that bloom throughout the spring and summer, to maximize benefits to native pollinators. DCR recommends planting these species in at least the buffer areas of the planned facility, and optimally including other areas within the project site. For screening zones outside the perimeter fencing, DCR recommends native species appropriate for the region be used. Guidance on plant species can be found here: http://www.dcr.virginia.gov/natural-heritage/solar-site-native-plants-finder. In addition, Virginia native species alternatives to the non-native species listed in the Virginia Erosion and Sediment Control Handbook (Third Edition 1992), can be found in the 2017 addendum titled "Native versus Invasive Plant Species", here: https://www.deq.virginia.gov/home/showpublisheddocument?id=2466. Page 3 of the addendum provides a list of native alternatives for non-natives commonly used for site stabilization including native cover crop species (i.e. Virginia wildrye).

In addition, the proposed project will impact Ecological Cores **(C3, C4, C5)** as identified in the Virginia Natural Landscape Assessment (https://www.dcr.virginia.gov/natural-heritage/vaconvisvnla). Mapped cores in the project area can be viewed via the Virginia Natural Heritage Data Explorer, available here: http://vanhde.org/content/map.

Ecological Cores are areas of at least 100 acres of continuous interior, natural cover that provide habitat for a wide range of species, from interior-dependent forest species to habitat generalists, as well as species that utilize marsh, dune, and beach habitats. Interior core areas begin 100 meters inside core edges and continue to the deepest parts of cores. Cores also provide the natural, economic, and quality of life benefits of open space, recreation, thermal moderation, water quality (including drinking water recharge and protection, and erosion prevention), and air quality (including sequestration of carbon, absorption of gaseous pollutants, and production of oxygen). Cores are ranked from C1 to C5 (C5 being the least significant) using nine prioritization criteria, including the habitats of natural heritage resources they contain.

Impacts to cores occur when their natural cover is partially or completely converted permanently to developed land uses. Habitat conversion to development causes reductions in ecosystem processes, native biodiversity, and

habitat quality due to habitat loss; less viable plant and animal populations; increased predation; and increased introduction and establishment of invasive species.

DCR recommends avoidance of impacts to cores. When avoidance cannot be achieved, DCR recommends minimizing the area of impacts overall and concentrating the impacted area at the edges of cores, so that the most interior remains intact.

Under a Memorandum of Agreement established between the Virginia Department of Agriculture and Consumer Services (VDACS) and the DCR, DCR represents VDACS in comments regarding potential impacts on state-listed threatened and endangered plant and insect species. The current activity will not affect any documented state-listed plants or insects.

There are no State Natural Area Preserves under DCR's jurisdiction in the project vicinity.

New and updated information is continually added to Biotics. Please re-submit a completed order form and project map for an update on this natural heritage information if the scope of the project changes and/or six months (January 11, 2024) has passed before it is utilized.

A fee of $395.00 has been assessed for the service of providing this information. Please find attached an invoice for that amount. Please return one copy of the invoice along with your remittance made payable to the Treasurer of Virginia, DCR Finance, 600 East Main Street, 24th Floor, Richmond, VA 23219. Payment is due within thirty days of the invoice date. Please note late payment may result in the suspension of project review service for future projects.

The Virginia Department of Wildlife Resources (VDWR) maintains a database of wildlife locations, including threatened and endangered species, trout streams, and anadromous fish waters that may contain information not documented in this letter. Their database may be accessed from http://vafwis.org/fwis/ or contact Amy Martin at (804-367-2211) or amy.martin@dwr.virginia.gov.

Should you have any questions or concerns, please contact me at 804-225-2429. Thank you for the opportunity to comment on this project.

Sincerely,

Tyler Meader

Tyler Meader
Natural Heritage Locality Liaison

Cc: Amy Martin, VDWR
Susan Tripp, DEQ
Randy Keaton, Isle of Wight County Administrator

Literature Cited

Handley, C.O., and D. Schwab. 1991. Eastern big-eared bat. In Virginia's Endangered Species: Proceedings of a Symposium. K. Terwilliger ed. The McDonald and Woodward Publishing Company, Blacksburg, Virginia. p. 571-573.

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Martof, B.S., W.M. Palmer, J.R. Bailey, and J.R. Harrison, III. 1980. Amphibians and reptiles of the Carolinas and Virginia. The University of North Carolina Press, Chapel Hill, North Carolina. p. 120.

NatureServe. 2009. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. (Accessed: March 31, 2010).

Pague, C.A. and D.A. Young. 1991. Barking treefrog. In Virginia's Endangered Species: Proceedings of a Symposium. K. Terwilliger ed. The McDonald and Woodward Publishing Company, Blacksburg, Virginia. p. 424 - 426.

VDGIF. 1993. Draft *Hyla gratiosa* Recovery Plan. Nongame and Endangered Species Program, Virginia Department of Game and Inland Fisheries, Richmond, VA.

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1001 Boulders Parkway
Suite 300

P 804.200.6500
F 804.560.1016
www.timmons.com

July 27, 2023

Pete Kube
U.S. Army Corps of Engineers - Norfolk District
Norfolk District - Main Office
803 Front Street
Norfolk, VA 23510

Re: Wetlands and Waters Delineation Package
Moonlight Solar (Approx. 521.5 acres)
Isle of Wight County, Virginia

Applicant: Palladium Energy, LLC
c/o Garrett Weeks
4446 Hendricks Ave., #356
Jacksonville, FL 32207

Dear Mr. Kube,

Please find the enclosed Wetlands and Waters Delineation Package. On behalf of Palladium Energy, LLC, Timmons Group is submitting this package to you in order to obtain a preliminary jurisdictional determination for the delineation completed at the Moonlight Solar site (Site). Timmons Group environmental personnel conducted a field wetland delineation on December 9 and 14, 2021 on the study area west of Moonlight Road and on March 27 and 28, 2023 in the study area to the east of Moonlight Road to identify jurisdictional wetlands and/or waters within the project limits of the Site.

Moonlight Solar is located and intersected by Moonlight Road in Isle of Wight County, Virginia (see Figure 1: Vicinity Map). The Site is located within the headwaters of the Blackwater River watershed (HUC 03010202) in the Atlantic Coastal Plain physiographic province (see Figure 2: Hydrologic Unit Code Map). The project limits encompass approximately 521.5 acres, consisting of agricultural fields and mixed pine-deciduous forest. Surface water onsite drains to Stallings Creek, which intersects the Site from north to south, via unnamed tributaries and swamps. The Site is bound by agricultural and/or silvicultural lands on all sides (see Figure 3: Environmental Inventory Map).

Per the USACE Antecedent Precipitation Tool (Version 1.0), the site visits were conducted within the wet season, during a period of 'mild drought in December 2021 and 'moderate drought' in March 2023 (PDSI). The USACE Antecedent Precipitation Tool (Version1.0) indicates the Site was within "Drier than Normal" conditions with a precipitation normalcy index of 7 in December 2021 and 9 in March 2023 (see Appendix A: USACE Antecedent Precipitation Tool Data).

The Site was delineated based upon the methodology outlined in the 1987 U.S. Army Corps of Engineers (USACE) Wetland Delineation Manual, the Regional Supplement to the USACE Wetland Delineation Manual: Atlantic Gulf and Coastal Plain Region (Version 2.0), and subsequently issued USACE regulatory guidance regarding the identification of jurisdictional stream channels through the recognition of field indicators of an ordinary high water mark within drainage features. The wetland boundary was flagged with consecutively numbered pink and black ribbon at approximately 50-foot intervals. Field data stations were established within close proximity to the flagged wetland boundary in order to document upland and wetland conditions along the jurisdictional boundary. Field data stations were labeled and marked with blue flagging in the field. Field data sheets are included in Appendix B. Features identified in the field were located using sub-meter GPS equipment. Photographs were taken at field data stations to depict site conditions along the delineation boundary. Site photographs collected during the field delineation are available upon request.

Using these methodologies, delineation mapping was produced showing the location and size of jurisdictional areas identified onsite and is included as Figure 4: Wetlands and Waters Delineation Map. During our delineation, approximately 137.2 acres of palustrine forested (PFO) wetlands, 0.05 acres of palustrine scrub-shrub (PSS) and 5.11 acres of palustrine emergent (PEM) wetlands were observed onsite.

In addition, approximately 4,320 linear feet of perennial stream (R2), 2,461 linear feet of intermittent stream (R4), 1,792 linear feet of ephemeral stream (R6), and 284 linear feet of jurisdictional ditch were identified onsite.

The most common primary hydrology indicators observed within jurisdictional areas included Oxidized Rhizospheres on Living Roots (C3), High Water Table (A2), Saturation (A3), Drift Deposits (B3), and Water-Stained Leaves (B9). The most frequently observed secondary indicators included Drainage Patterns (D10), Geomorphic Position (D2), and FAC-Neutral Test (D5).

Dominant vegetation within the tree stratum consisted of loblolly pine (*Pinus taeda*), black gum (*Nyssa sylvatica*), red maple (*Acer rubrum*), and American sycamore (*Platanus occidentalis*). Vegetation within the sapling stratum was dominated by red maple, loblolly pine, sweetgum (*Liquidambar styraciflua*), and American holly (*Ilex opaca*). Dominant shrubs include American holly, red maple, sweetgum, and southern highbush blueberry (*Vaccinium formosum*). Dominant vegetation within the herbaceous stratum consisted of Japanese honeysuckle (*Lonicera japonica*), American holly, slender wood-oats (*Chasmanthium laxum*), Japanese stiltgrass (*Microstegium vimineum*), and southern highbush blueberry. Dominant woody vines include Japanese honeysuckle and muscadine grape (*Vitis rotundifolia*).

The soils observed within jurisdictional areas onsite exhibited low chroma matrix colors and concentrations characteristic of reducing anaerobic conditions associated with the formation of hydric soils. The majority of soils within wetlands onsite met the Depleted Matrix (F3) hydric soils indicator.

We respectfully request written confirmation detailing the verified location of onsite wetlands and waters within the Moonlight Solar site as presented in the provided mapping. Please contact Ben Crumrine at (804) 200-6370 or ben.crumrine@timmons.com if you would like to schedule a site visit or require any further documentation regarding the confirmation. Thank you in advance for the review of this package.

Sincerely,
Timmons Group

Madison Norris
Environmental Technician

Ben Crumrine
Environmental Scientist II

MAPS

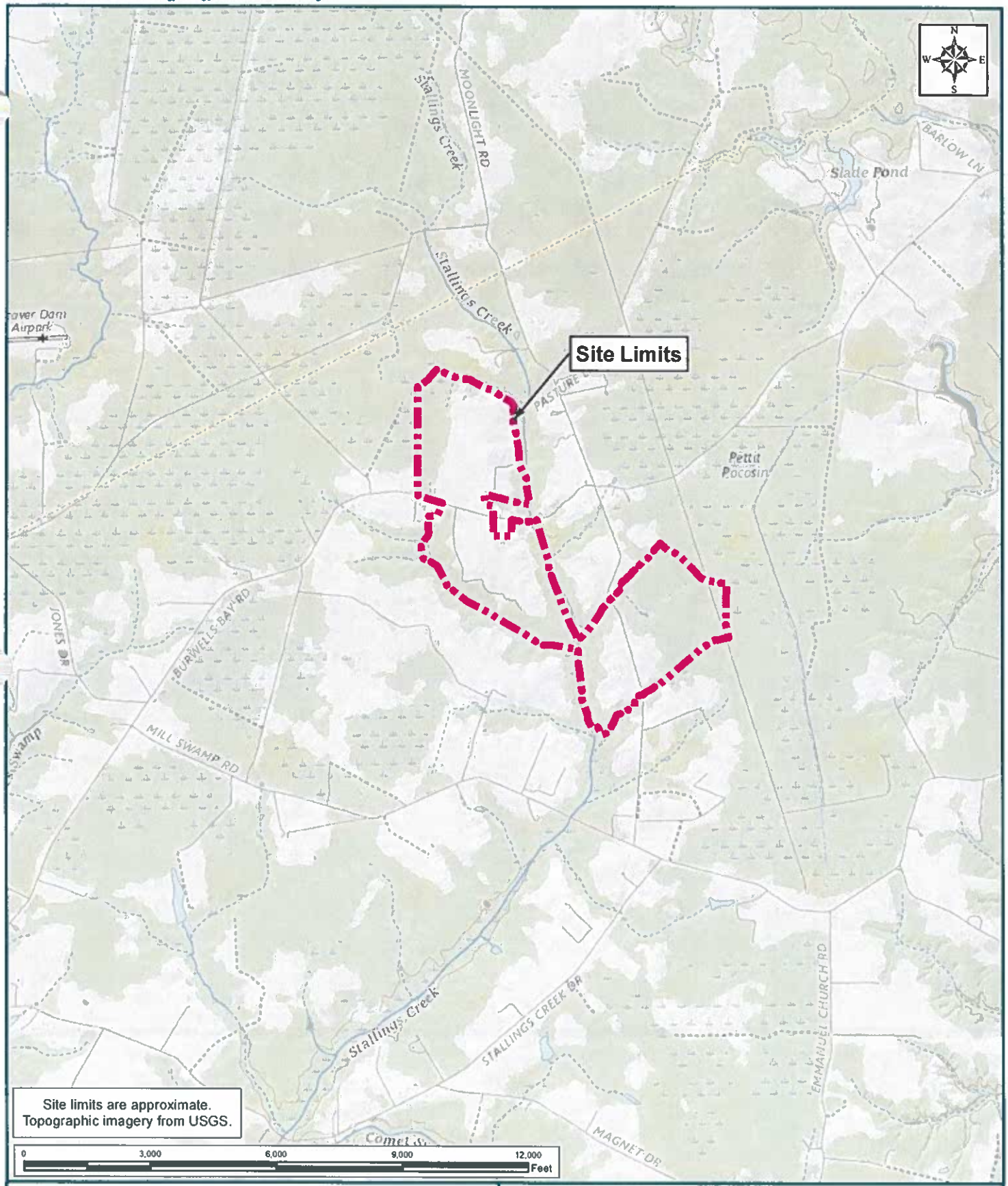
Figure 1	Vicinity Map
Figure 2	Hydrologic Unit Code Map
Figure 3	Environmental Inventory Map
Figure 4	Wetlands and Waters Delineation Map

APPENDICES

Appendix A	USACE Antecedent Precipitation Tool Data
Appendix B	Field Data Sheets
Appendix C	USACE JD Request Form

MAPS

Path: Y:\804\49666-Palladium_Energy\49666.001-Moonlight\GIS\49666.001-JD-VIC.mxd



PALLADIUM ENERGY - MOONLIGHT
ISLE OF WIGHT COUNTY, VIRGINIA
FIGURE 1: VICINITY MAP

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TIMMONS GROUP JOB NUMBER:*49666.001*
PROJECT STUDY LIMITS: *521.5 ACRES*
LATITUDE:*37.029659*
LONGITUDE:*-76.732308*

U.S.G.S. QUADRANGLE(S):*MEHERRIN*
DATE(S):*2019*
WATERSHED(S):*BLACKWATER (ALBEMARLE-CHOWAN RIVER BASIN)*
HYDROLOGIC UNIT CODE(S):*03010202*

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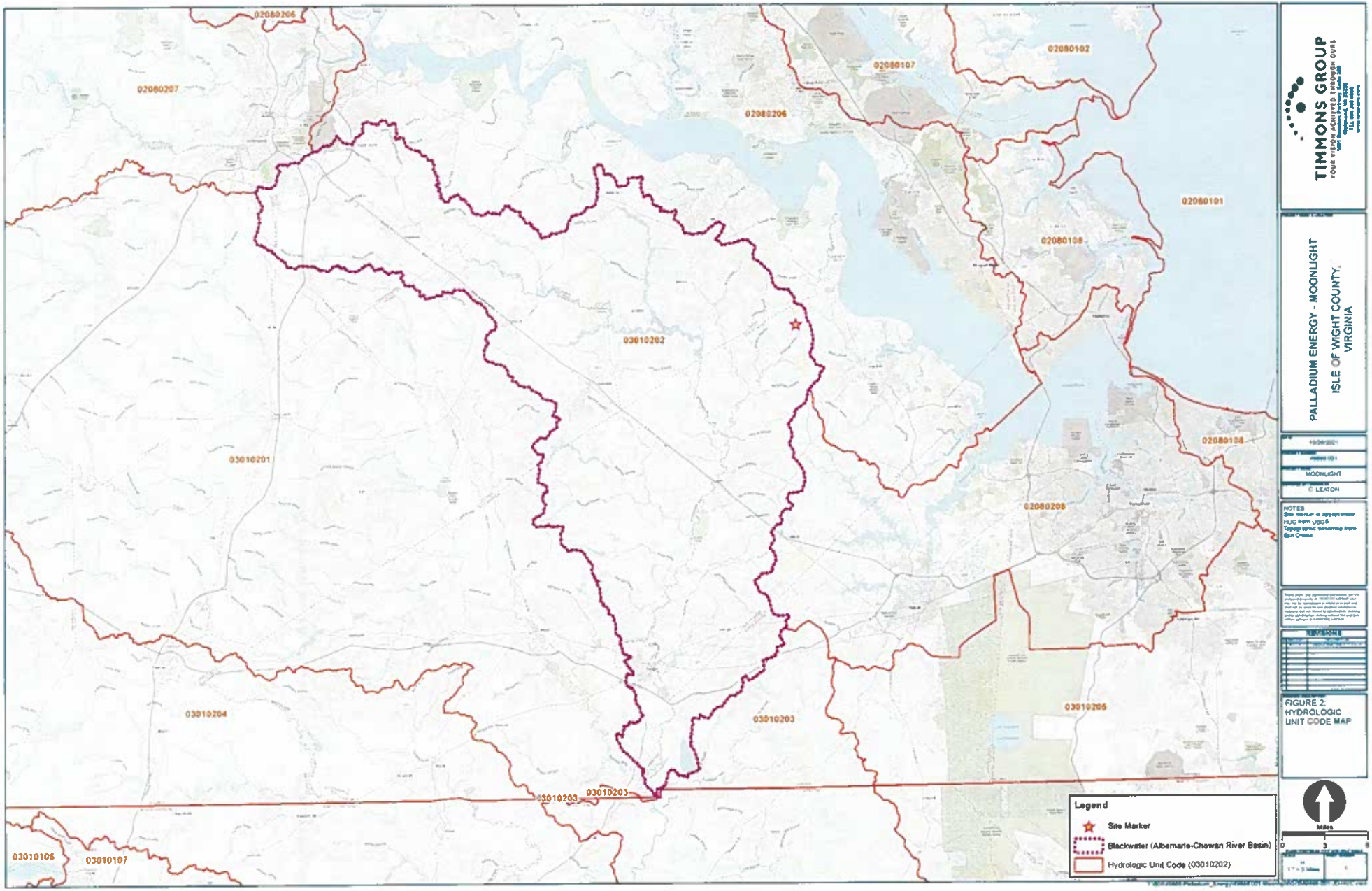

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PALLADIUM ENERGY - MOONLIGHT

ISLE OF WIGHT COUNTY, VIRGINIA

MOONLIGHT

C. LEATON

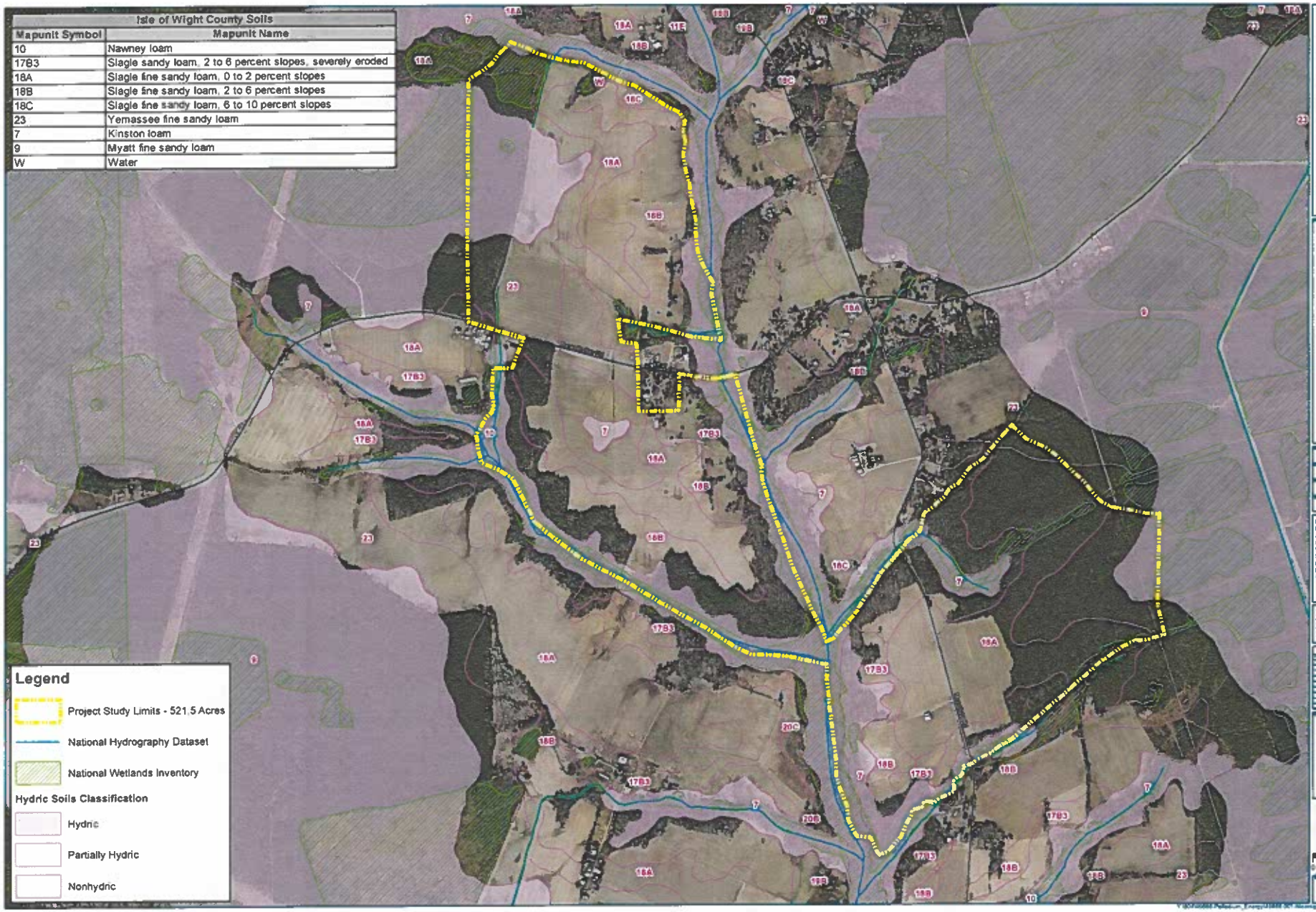
NOTES

Site location as appropriate

HUC from USGS

Topographic basemap from Esri Online

FIGURE 2:
HYDROLOGIC
UNIT CODE MAP



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PALLADIUM ENERGY - MOONLIGHT
ISLE OF WIGHT COUNTY - VIRGINIA

MOONLIGHT

E. LEATON

NOTES
Project Limits are approximate
NWI from US F ish and Wildlife Service
Soils data from SSURGO
National Hydrography Dataset from USGS
Aerial imagery from VGIN

FIGURE 3
ENVIRONMENTAL INVENTORY MAP

SCALE (FEET)
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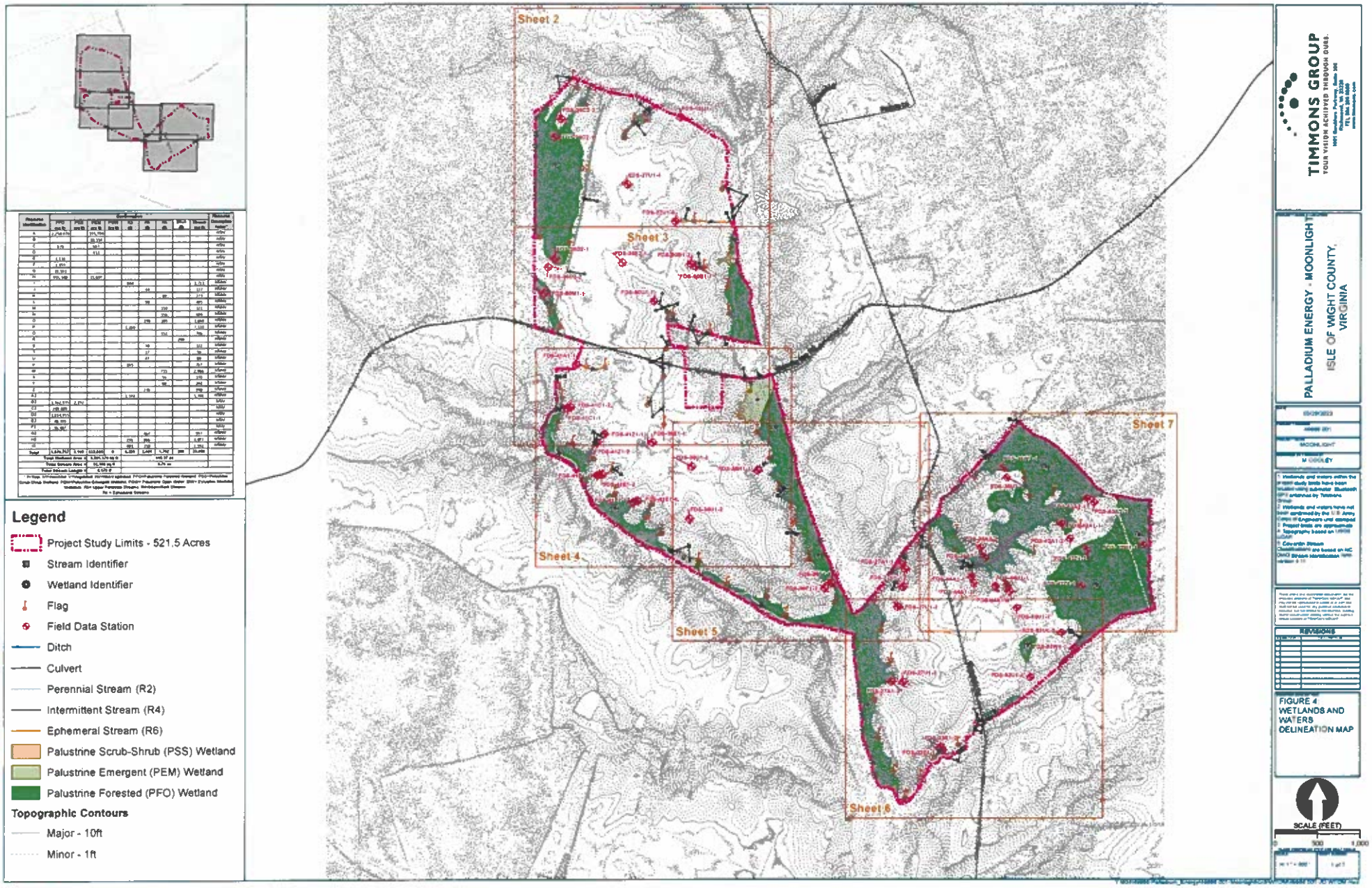
Sheet 2
Sheet 3
Sheet 4
Sheet 5
Sheet 6
Sheet 7
Legend
Project Study Limits - 521.5 Acres
Stream Identifier
Wetland Identifier
Flag
Field Data Station
Ditch
Culvert
Perennial Stream (R2)
Intermittent Stream (R4)
Ephemeral Stream (R6)
Palustrine Scrub-Shrub (PSS) Wetland
Palustrine Emergent (PEM) Wetland
Palustrine Forested (PFO) Wetland
Topographic Contours
Major - 10ft
Minor - 1ft
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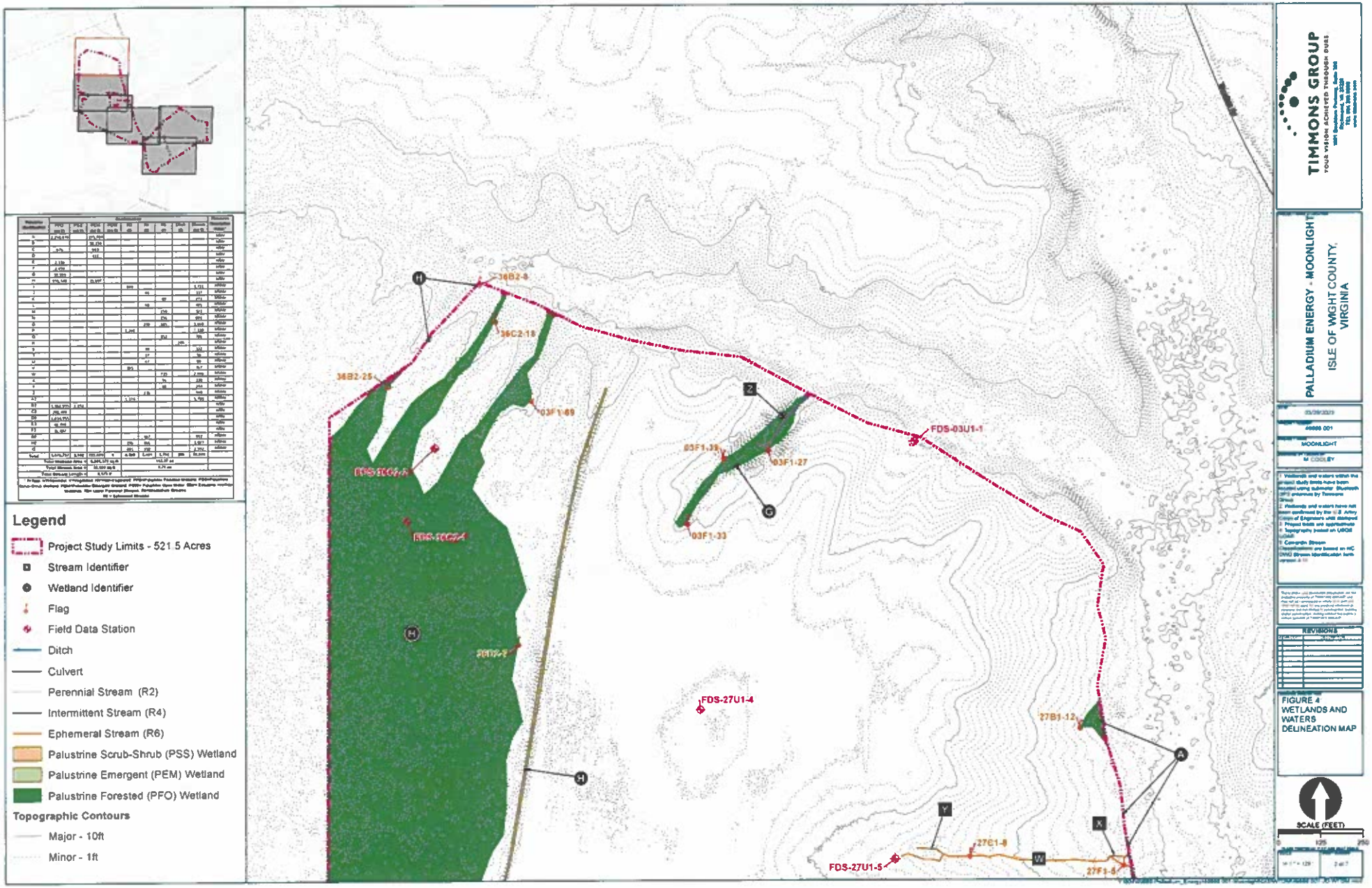
PALLADIUM ENERGY - MOONLIGHT
ISLE OF WIGHT COUNTY, VIRGINIA
FIGURE 4
WETLANDS AND WATERS DELINEATION MAP
SCALE (FEET)
0
500
1,000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Topographic Contours
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Minor - 1ft
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36C2-18
36B2-25
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03F1-27
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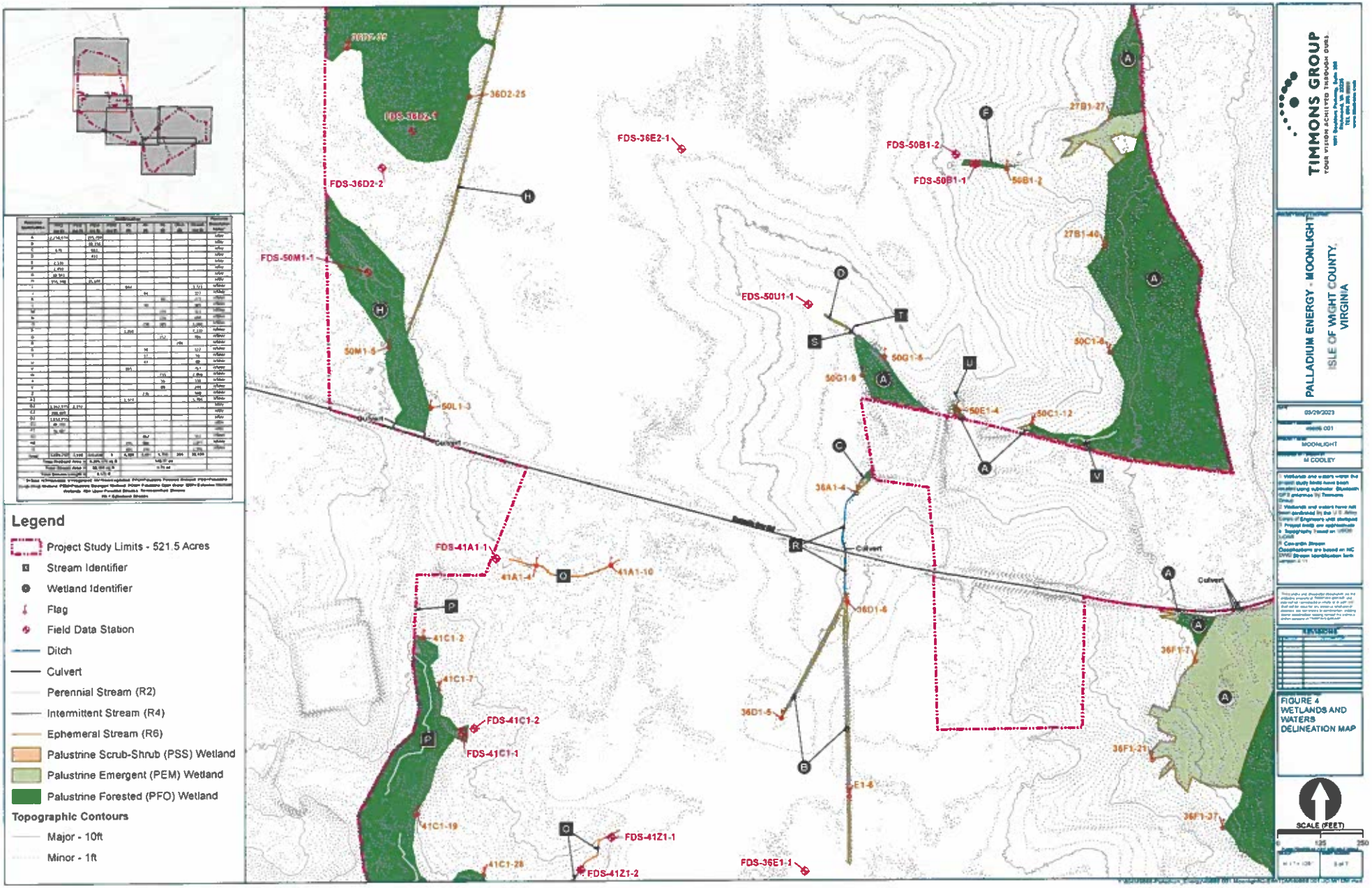
FDS-27U1-5
27C1-8
27F1-8
TIMMONS GROUP
YOUR VISION ACHIEVED THROUGH OURS
PALLADIUM ENERGY - MOONLIGHT
ISLE OF WIGHT COUNTY, VIRGINIA
MOONLIGHT
REVISIONS
FIGURE 4
WETLANDS AND WATERS DELINEATION MAP
SCALE (FEET)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50M1-5
50L1-3
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50B1-2
27B1-27
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50E1-4
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41C1-19
41C1-28
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FDS-41Z1-2
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36D1-6
36D1-5
E1-6
36F1-7
36F1-21
36F1-37
Culvert
TIMMONS GROUP
PALLADIUM ENERGY - MOONLIGHT
ISLE OF WIGHT COUNTY, VIRGINIA
03/29/2023
MOONLIGHT
M COOLEY
FIGURE 4
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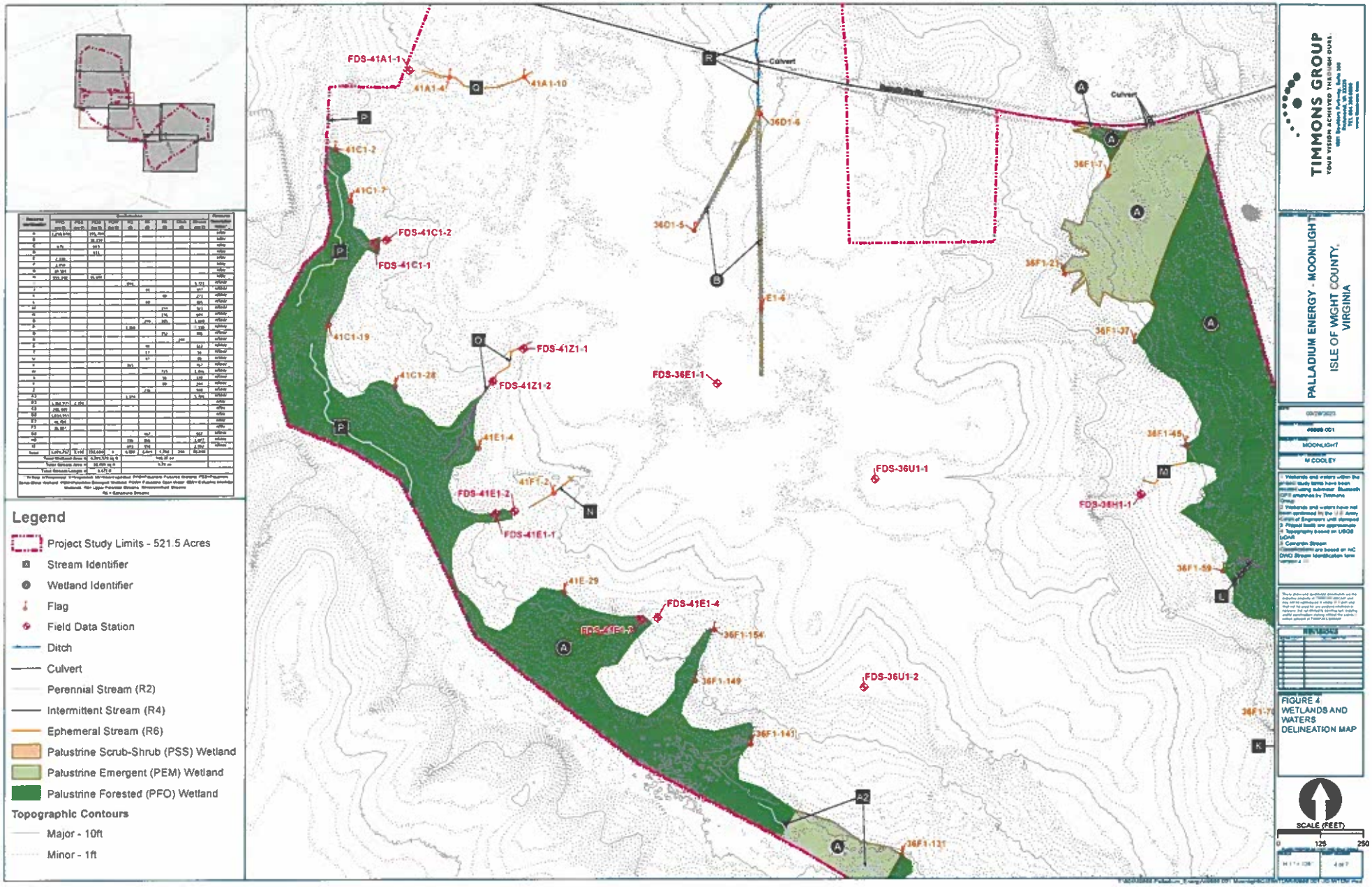
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36F1-131
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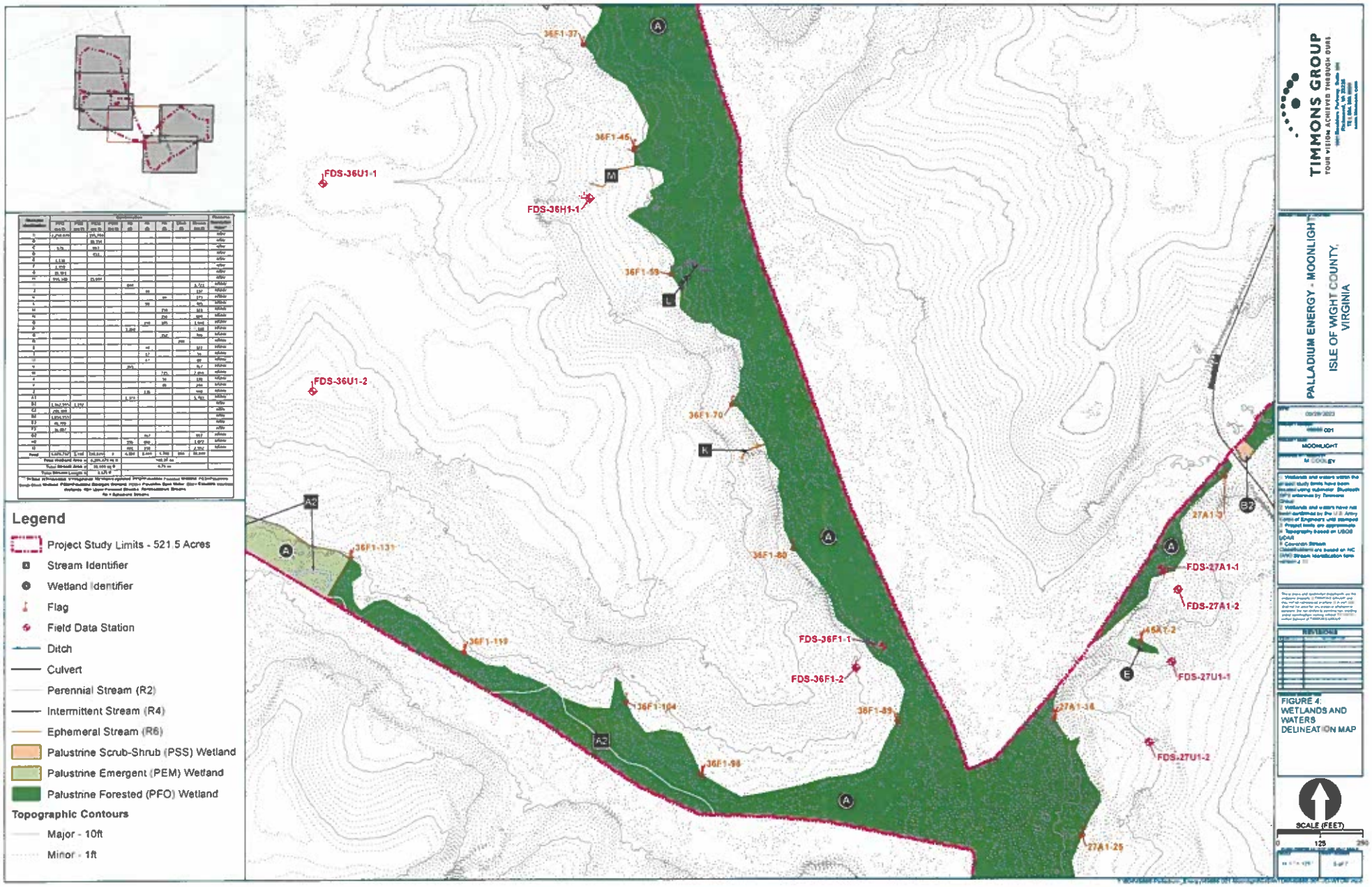
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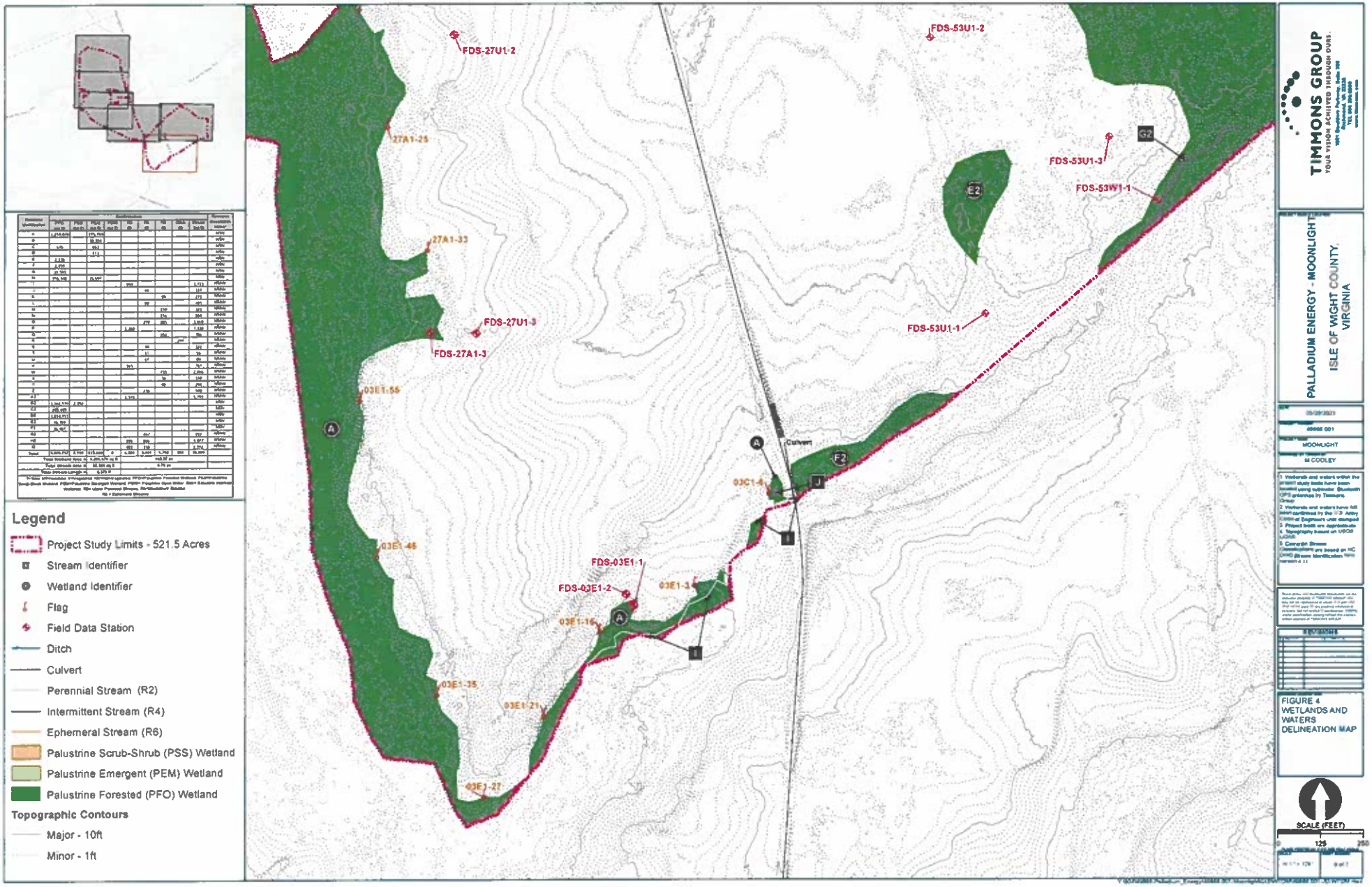
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03E1-55
Culvert
03C1-4
03E1-46
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FDS-03E1-2
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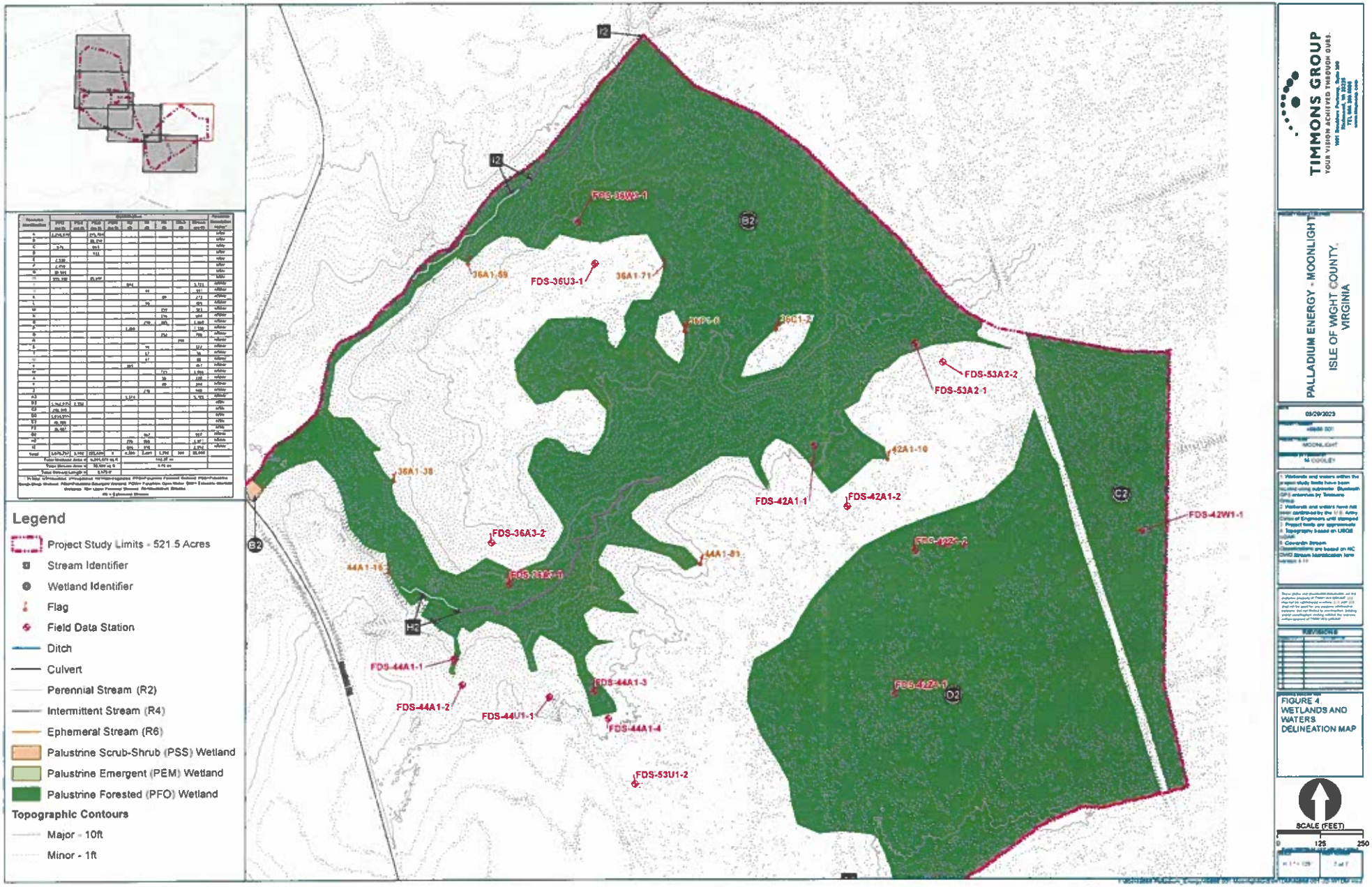
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05/29/2023
FIGURE 4
WETLANDS AND WATERS DELINEATION MAP
SCALE (FEET)
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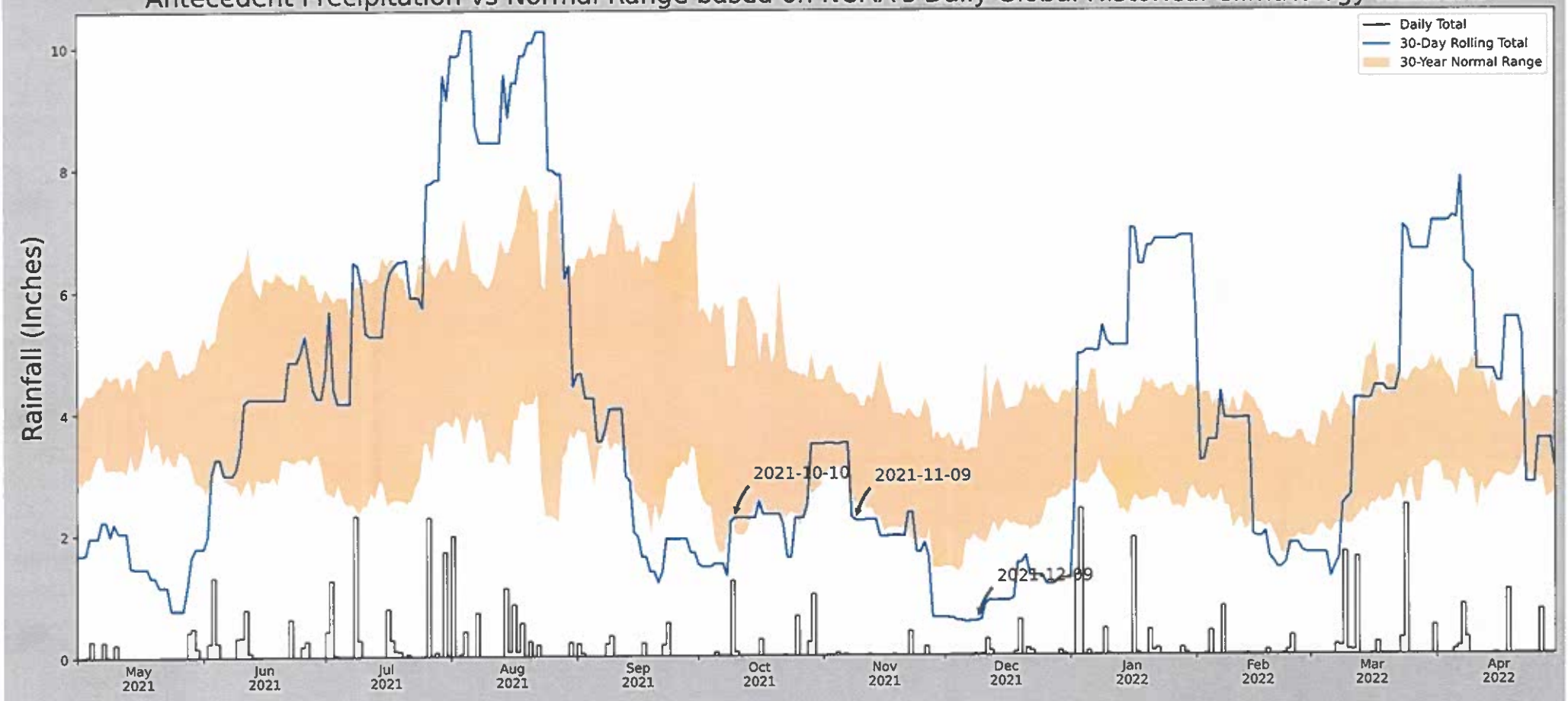
APPENDIX A
USACE ANTECEDENT PRECIPITATION TOOL DATA

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network



Coordinates	36.6823048143539, -76.7353589795031
Observation Date	2021-12-09
Elevation (ft)	78.592
Drought Index (PDSI)	Mild drought
WebWIMP H_2O Balance	Wet Season

30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2021-12-09	1.911417	3.365354	0.566929	Dry	1	3	3
2021-11-09	2.405906	4.266142	2.216536	Dry	1	2	2
2021-10-10	2.015748	4.745276	2.259843	Normal	2	1	2
Result							Drier than Normal - 7

Figure and tables made by the **Antecedent Precipitation Tool** Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
WAKEFIELD 1 NW	36.9839, -77.0078	112.861	15.399	34.269	7.457	11119	90
NORFOLK RICH	36.9842, -77.0072	254.921	0.039	142.06	0.023	30	0
HOLLAND 1 E	36.6831, -76.7683	80.052	24.645	32.809	11.899	204	0

Antecedent Precipitation vs Normal Range based on NOAA's Daily Global Historical Climatology Network

Coordinates	37.029659, -76.732308
Observation Date	2023-03-27
Elevation (ft)	81.772
Drought Index (PDSI)	Moderate drought
WebWIMP H_2O Balance	Wet Season

30 Days Ending	30th %ile (in)	70th %ile (in)	Observed (in)	Wetness Condition	Condition Value	Month Weight	Product
2023-03-27	2.490945	4.665354	1.574803	Dry	1	3	3
2023-02-25	1.991732	3.646851	3.027559	Normal	2	2	4
2023-01-26	2.445669	4.478347	3.019685	Normal	2	1	2
Result							Drier than Normal : 9

Figure and tables made by the **Antecedent Precipitation Tool** Version 1.0

Written by Jason Deters
U.S. Army Corps of Engineers

Weather Station Name	Coordinates	Elevation (ft)	Distance (mi)	Elevation Δ	Weighted Δ	Days Normal	Days Antecedent
WAKEFIELD 1 NW	36.9839, -77.0078	112.861	15.526	31.089	7.469	11150	90
NORFOLK RICH	36.9842, -77.0072	254.921	0.039	142.06	0.023	30	0
HOLLAND 1 E	36.6831, -76.7683	80.052	24.645	32.809	11.899	173	0

APOGEE

Environmental & Archaeological, Inc.

PHASE I HISTORIC ARCHITECTURE SURVEY AND EFFECTS ASSESSMENT FOR THE PROPOSED MOONLIGHT SOLAR FACILITY ISLE OF WIGHT COUNTY, VIRGINIA

Prepared For
Timmons Group, Inc.
1001 Boulders Parkway, Suite 300
Richmond, Virginia 23225

Prepared By
Apogee Environmental & Archaeological, Inc.
6425 Living Place, Suite 200
Pittsburgh, PA 15206
info@apogee-environmental.com
Apogee Project No. 22-1135.00

Garrett Silliman, RPA
Principal Investigator

Amanda Commins, MA
Architectural Historian

David S. Hanley, RPA
Field Director

Lead Agency
Virginia Department of Environmental Quality
DHR File No. 2023-4075

June 2023 (Finalized August 2023)

Abstract

On behalf of Timmons Group, Apogee Environmental & Archaeological, Inc. conducted a Phase I architectural survey and effects assessment for the proposed Moonlight Solar Facility in Isle of Wight County, Virginia. Phase I survey serves as the secondary step in meeting compliance requirements for The Virginia Department of Environmental Equality (DEQ). All activities were conducted in accordance with the Virginia Department of Historic Resources (DHR), as published in *Guidelines for Conducting Historic Resources Survey in Virginia* (2017).

The project consists of the development of a solar energy facility located approximately 5.2 miles northwest of Smithfield, Virginia, situated west and south of the intersection between Moonlight Road and Burwells Bay Road. The archaeological area of potential effects (APE) contains parcels of mixed-use rural land totaling 516.9 acres (209.2 hectares). The architectural APE encompasses the archaeological APE, as well as a .5-mile buffer extending outward. A desktop analysis cultural resources assessment was conducted in March 2023. The Phase IA cultural resources assessment was conducted in March 2023, with a site visit from March 27th to 29th, 2023.

As a result of the architectural survey, Apogee identified 21 historic resources. 11 previously recorded resources were identified within the 0.5-mile buffer. Of the 11 resources, 9 had been surveyed within the past 5 years. The remaining 2 previously recorded resources and 19 newly identified resources were surveyed within the architectural APE. No historic properties potentially eligible for listing in the National Register of Historic Places (NRHP) were identified within the architectural APE. Effects were assessed to gauge the potential direct and indirect effects on historic properties located within the architectural APE.

Overall, it is Apogee's finding that the proposed Project will have **no adverse effects** on the 21 properties surveyed within the architectural APE.

APOGEE

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1.0 INTRODUCTION TO THE PROJECT

On behalf of Timmons Group, Inc. (Timmons), Apogee Environmental & Archaeological, Inc. (Apogee) conducted a Phase I architectural survey and effects assessment for the proposed Moonlight Solar Facility in Isle of Wight County, Virginia. Phase I survey serves as the secondary step in meeting compliance requirements for The Virginia Department of Environmental Equality (DEQ). All activities were conducted in accordance with the Virginia Department of Historic Resources (DHR), as published in *Guidelines for Conducting Historic Resources Survey in Virginia* (2017).

The project consists of the development of a solar energy facility located approximately 5.2 miles northwest of Smithfield, Virginia, situated west and south of the intersection between Moonlight Road and Burwells Bay Road. The archaeological area of potential effects (APE) contains parcels of mixed-use rural land totaling 516.9 acres (209.2 hectares). The architectural APE encompasses the archaeological APE, as well as a .5-mile buffer extending outward. A desktop analysis cultural resources assessment and Phase IA site visit were conducted in March 2023. The Phase I architectural survey was conducted in May 2023.

Amanda Commins, MA conducted the historic architectural survey on May 10th that involved surveying all structures 45 years and older within the project boundaries and within the 0.5-mile buffer. A total of 21 primary resources were identified as a result of the architectural history survey. 2 previously identified resources were revisited.

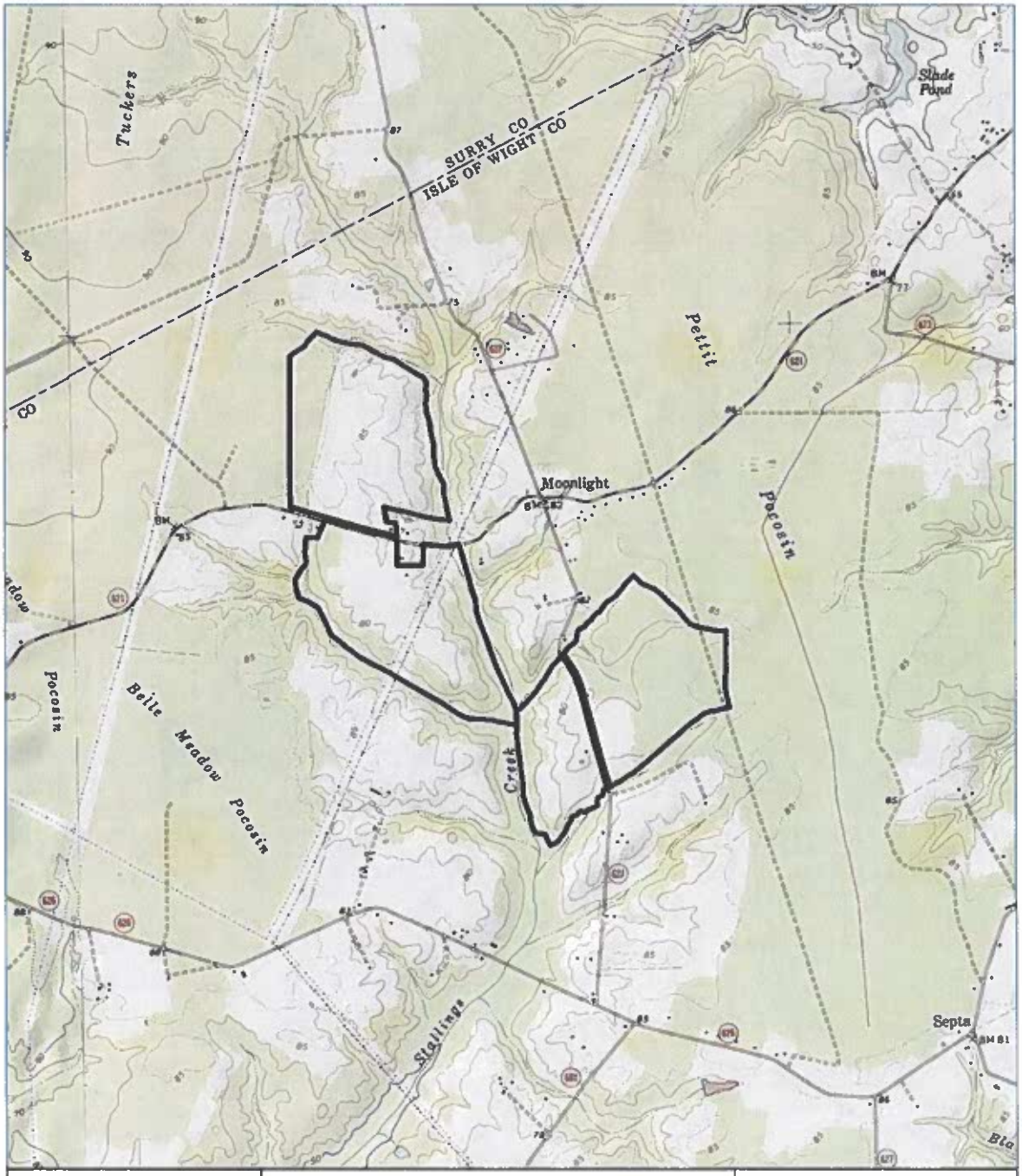

Figure 1: Project area depicted on modern topographic map.

Figure 2: Project area depicted on modern aerial imagery.

2.0 RESEARCH DESIGN

Apogee conducted an architectural survey and effects assessment for the proposed Project. The purpose of the architectural survey and effects assessment was to identify historic properties and to assess the effects of the proposed Project on those properties. All field investigations and technical reporting meet the qualifications specified in the Secretary of the Interior's (SOI) *Standards and Guidelines for Archeology and Historic Preservation* (Federal Register 48:190:44716–44742) and the *Guidelines for Conducting Historic Resources Survey in Virginia* (2017).

Prior to fieldwork, Apogee completed a review of the Virginia Cultural Resource Information System (V-CRIS) to identify previous architectural surveys and previously recorded architectural resources within a .5-mile buffer of the project area. Newly identified historic resources were identified through a combination of methods. Utilizing readily available Isle of Wight County tax maps and GIS files, all parcels were reviewed for pre-1977 build dates (45 years of age). Historic county maps, topographic maps and aerial imagery were also reviewed to identify potential historic-age resources and to verify the accuracy of build dates obtained via GIS-based tax data. Field survey will include exterior photographs of the primary resources and each secondary resource; a description of the property with information needed to properly evaluate NRHP eligibility; and an interview of the property owner if available. The location of each resource will be recorded on field maps and incorporated into a GIS dataset as part of the documentation record. Following fieldwork, all previously recorded (last evaluated over five years ago) and newly identified resources within the architectural APE will be documented in V-CRIS and evaluated for listing in the VLR/NRHP based on guidance provided in National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation (NPS 1990). Historic physical integrity will be determined from site observations, field data, and photographic documentation.

Fieldwork was conducted to verify build dates for all parcels containing historic-age buildings throughout the architectural APE. The field survey was conducted on foot from the public right-of-way. Field survey included exterior photographs of the primary resources and each secondary resource; and a description of the property with information needed to properly evaluate NRHP eligibility.

Following fieldwork, all previously recorded and newly identified resources within the architectural APE were evaluated for listing in the NRHP based on guidance provided in *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation* (NPS 1990), as well as *Guidelines for Conducting Historic Resources Survey in Virginia* (2017). Historic physical integrity was determined from site observations, field data, and photographic documentation. To be recommended eligible for inclusion in the NRHP, a resource must demonstrate quality of significance in American history, architecture, archeology, engineering, and culture in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and:

A. That are associated with events that have made a significant contribution to the broad patterns of our history; or

B. That are associated with the lives of significant persons in or past; or

C. That embody the distinctive characteristics of a type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D. That have yielded or may be likely to yield, information important in history or prehistory.

Per *National Register Bulletin 15: How to Apply the National Register Criteria for Evaluation*, a significant property's integrity is evaluated by applying the Seven Aspects of Integrity to determine the property's ability to convey its significance:

Location is the place where the historic property was constructed or the place where the historic event occurred.

Design is the combination of elements that create the form, plan, space, structure, and style of a property.

Setting is the physical environment of a historic property.

Materials are the physical elements that were combined or deposited during a particular period of time and in a particular pattern or configuration to form a historic property.

Workmanship is the physical evidence of the crafts of a particular culture or people during any given period in history or prehistory.

Feeling is a property's expression of the aesthetic or historic sense of a particular period of time.

Association is the direct link between an important historic event or person and a historic property.

Additionally, an effects assessment was completed. An undertaking is considered to have an adverse effect when the effect on a historic property may diminish the integrity of the property's location, design, setting, materials, workmanship, feeling or association. Examples include, but are not limited to:

- Physical destruction, damage, or alteration of all or part of the property;
- Isolation of the property from or alteration of the character of the property's setting when that character contributes to the property's significance;
- Introduction of a significant change to visual, audible, or atmospheric elements that are out of character with the property or alter its setting;
- Neglect of a property resulting in its deterioration or destruction; and
- Transfer, lease or sale of the property without protective restrictions.

A summary of all NRHP recommendations and the results of the effects assessment are included in this report. Photographs for each resource and representative secondary structures are included in this report. The locations of all previously recorded and newly identified resources are depicted on aerial imagery showing parcel boundaries and the architectural APE.

3.0 LITERATURE REVIEW

This section provides a literature review of the regional history, results of the Virginia Cultural Resource Information System (V-CRIS) file review, and historic map research.

3.1 Literature Review

The project area is located within the Southern Coastal Plain geographical and cultural region of Virginia as defined by VDHR's Regional Boundaries and Differences: Geography and Culture map (2017). This region is bound by the Atlantic Ocean/Chesapeake Bay to the east, the Virginia-North Carolina border to the south, the Fall Line to the west, and the Northern Coastal Plain to the north (VDHR 2017: 101-102). The Southern Coastal Plain features the earliest European settlement in Virginia: the colony at Jamestown founded in 1607. From here, European colonists would move westward throughout the 17th century using the region's many rivers. Due to the self-sufficient nature of the Southern Coastal Plain's plantations in the 17th century, there were very few central town centers until the mid-18th century.

Below is an outline of a partial account primarily based on archaeological data. After first arriving in Virginia in 1607, European colonists started moving along the many rivers in the Southern Coastal Plain into the western portions of the region (VDHR 2017: 101). Due to the self-sufficient nature of the Southern Coastal Plain's plantations in the 17th century, there were very few central town centers until the mid-18th century. This region was settled both for its agricultural potential, but also for its industrial potential and access to the Atlantic Ocean.

Isle of Wight County Historic Period

Settlement to Society (1607 to 1750)

Prior to its establishment, the area now known as Isle of Wight County was once home to many Native American tribes that settled along the James River. The Warraskoyak are the first documented Indigenous group to make contact with European settlers. European settlers at the Jamestown settlement first made contact with the Warraskoyak in 1607 after crossing the James River in search of food (Boddie 1973). In 1632, English colonists constructed a fort in order to defend their settlements from Native American and Spanish attackers (Isle of Wight County Museum 2014). This fort, first known as The Castle, was later expanded during the Revolutionary War and was renamed Fort Boykin.

In 1634, Isle of Wight County was officially established under the name Warraskoyak Shire as one of the eight shires first established by the English. The initial population was approximately 522 people (Boddie 1973; Morrison 2001). In 1637, Warraskoyak Shire was renamed Isle of Wight County after the English island (Isle of Wight County 2023). In 1674, Isle of Wight County gained a porti on of the now extinct Nansemond County (Boddie 1973; Morrison 2001). However, the current boundary of the county was not set until 1732 when a considerable portion was added to neighboring Brunswick County, which was subsequently turned into Southampton County in 1748 (Morrison 2001)

Since its founding, Isle of Wight County largely exhibits rural character and encompasses approximately 350 square miles (Morrison 2001). Many streams and roads intersect the county with an east/west connecting road playing a significant role in the area's history as it controlled access to Richmond via the James River. The county's location along the James River also demonstrates why the first English plantations were constructed within the county and mainly grew tobacco.

Figure 3: A map of Isle of Wight County showing the general location of the project area (Selection from Campbell et al 1864).

Colony to Nation (1750 to 1789)

The Isle of Wight County courts were established in 1751 in Smithfield through the appointment of eight justices (Morrison 2001). Four of these judges could make up a court and were required to meet monthly. This would continue until the county courts were abolished in the 1902 constitution when the judicial power of counties was given to circuit courts. The following year, Smithfield officially became an incorporated town and is still the largest town in the county. The original courthouse and its associated tavern, The Smithfield Inn, are still standing today.

While there were no official Revolutionary War battles fought within Isle of Wight County, its residents served in the Continental Army and the county's location allowed it to serve as an important place for commerce and agriculture (Morrison 2001). During the Revolutionary War, British troops raided Smithfield in an effort to destroy country records (Morrison 2001). The wife of Mr. Francis Young, an officer in the Continental Army, was able to remove the records prior to the raid. The records were hidden until the British forces surrendered at Yorktown. In March of 1782, the county court made an order describing the county's location and how its inhabitants have been strongly impacted by the invading British forces (Morrison 2001). The proximity to British landing caused a great strain on the county's militia as they were forced to be on constant duty due to threat of attack. However, no significant battles were fought within the county.

Early National Period (1789 to 1830)

At the beginning of the 19th century, Isle of Wight County saw its economic impact shift away from tobacco farming towards other crops such as cotton, wheat, and corn (Morrison 2001). Its location along the James River also allowed the county to begin building ships, though not at the scale of nearby coastal cities such as Norfolk. The economic focus on agriculture required the use of plantations which heavily utilized slave labor.

While Isle of Wight County is situated close to the coastline of Virginia, it played a minor role during the War of 1812 (Morrison 2001). During the war, the county mainly served as a defensive position to protect access to Richmond via the James River with Fort Boykin, which was refortified during the war (Isle of Wight County Museum 2014). While the county is located along the James River with access to Richmond, no battles were fought within the county's borders. The county helped finance the United States forces to fend off British invaders as well as supplied troops.

Antebellum Period (1830 to 1860)

Leading up to the Civil War, Isle of Wight County's wealthy plantation owners and politicians heavily supported the continuation of slavery in the United States (Morrison 2001). However, the county's Quaker population supported the abolitionist movement. Leading up to Virginia seceding from the Union and joining the Confederate States of America, a vote was held in Isle of Wight County to determine if the county wanted to secede or remain with the Union. Among the 861 registered voters in the county, every vote went in favor of secession (Morrison 2001).

The county's population during this time period rose from 9,028 in 1790 up to 9,977 in 1860 with the highest population being 10,517 in 1830 (USCB). This rise in population led the county

to move the courthouse to a more central location within Smithfield (Morrison 2001). The new courthouse, constructed in 1800, along with its associated tavern (Boykin's Tavern) are still standing.

Civil War (1860 to 1865)

During the Civil War, the James River served as the backbone for supplies to get from the Atlantic coast to the Confederate capital of Richmond. Isle of Wight County's location between Norfolk and Richmond required Confederate forces to construct earthwork fortifications in order to defend against Union naval attacks on supply runners (Morrison 2001). Part of these new fortifications were centered around Fort Boykin and also led to the construction of Fort Huger, named after the commander of the Confederate States Army's Department of Norfolk Major General Benjamin Huger (Morrison 2001).

Unlike previous wars, Isle of Wight County was home to many skirmishes and battles. On May 8, 1862, a Union flotilla bombarded Fort Boykin and forced Confederate troops to abandon the structure. The Union boats continued up the James River and bombarded Fort Huger to the point where the Confederate soldiers needed to abandon the structure as well. After the Union discovered Fort Boykin was empty, Confederate forces took Fort Boykin back as a signaling station and served as a key piece in the communication line to Richmond from the coast (Isle of Wight County Museum 2014).

The most significant Civil War battle to take place in Isle of Wight County is the Battle of Smithfield. On January 31, 1864, Union forces sailed up the Pagan River to investigate Confederate activity (Isle of Wight County Museum 2014). After engaging in a small skirmish, Union forces went back to Smithfield to leave the area. However, the Union gunboat departed without the shore party, leaving the Union troops to camp on shore for the night. This led to a three-hour-long skirmish to break out along Main Street on February 1 that resulted in Confederate forces destroying the Union gunboat *Smith-Briggs* and capturing the Union forces before they could retreat.

A noteworthy regiment of the Virginia Infantry is the 61st regiment. While the regiment formed in Petersburg under the command of Lieutenant Colonel Samuel H. Wilson, F Company was known as the "Isle of Wight Avengers" (Isle of Wight County Museum 2014).

Reconstruction and Growth (1865 to 1917)

After the Civil War defeat, the former Confederate states underwent a period of Reconstruction. Since Virginia's postwar government enacted laws restricting the rights of former slaves, Congress took control of the state via military rule until a new state constitution was adopted in 1870 (VMHC 2023). The Underwood Constitution as it's known reformed local government on the more democratic model of the New England township, required the General Assembly to create a statewide system of free public schools for all children, allowed the governor to veto bills that the assembly had passed, and granted the vote to all 21-year-old men regardless of race except some supporters of the Confederacy (Library of Virginia 2023). The citizens of Isle of Wight County voted in favor of levying a 50-cent tax to fund the new public school in the county (Morrison 2001). While the county's people voted to approve

this tax, the white residents of Isle of Wight County were not initially in favor of funding schools for black citizens (Morrison 2001).

With the defeat during the Civil War, agriculture in Virginia and specifically Isle of Wight County faced forced change. One of the changes that occurred within Isle of Wight County was a shift to include peanut farming (Morrison 2001). This growth in peanut farming percentage coincides with the change in the labor force away from slaves to paid workers as well as improved methods in cultivating peanuts. While there was a change in agricultural practices, the lack of slave labor to exploit led to much of Virginia shifting to a more industrial source of economic development (Morrison 2001). During this time period, the population of the county grew from 8,320 in 1870 up to 14,929 in 1910 (USCB).

World War I to World War II (1917-1945)

The economic impact of a shift from agriculture to industry continued in Isle of Wight County. This shift was helped with the completion of the James River Bridge (US-17) in 1928, which connected Isle of Wight County to Newport News (Kozel 2004). The construction of this bridge allowed people and goods to gain easier access to Isle of Wight County via a road instead of the most direct route being via boat up the James River.

Economic growth also came when Joseph W. Luter Sr. and Jr. founded Smithfield Packing Company in Smithfield, Virginia in 1936 (now known as Smithfield Foods, Inc.) (Smithfield Foods 2023). The founding of Smithfield Packing Company led to an influx of job opportunities for the county's residents and is still the county's main job supplier today. The still present agricultural industry paired with the growing Smithfield Packing Company allowed Isle of Wight County to provide the United States military with supplies during World War I and especially World War II.

New Dominion (1945-Present)

From 1975 to 1982, the James River Bridge was replaced with a wider four lane bridge in order to accommodate the traffic going between Smithfield and Newport News (Kozel 2004). In 1982, the Nansemond River Bridge opened, which allowed for residents of Isle of Wight County to have easier access to the independent city of Suffolk. This bridge crosses over the Nansemond River and is a part of US-17, the same US highway as the James River Bridge.

As of the 2020 United States Census, there were 38,606 people living in the county, up from 14,906 people back in 1950 (USCB). The growth of Smithfield Foods and the easier access to cities like Newport News, Norfolk, and Suffolk are likely key contributors to the large population growth in Isle of Wight County. It is estimated that of this population, 69.5% were White, 23% were Black or African American, 4.2% were Hispanic or Latino, 1.1% were Asian, 0.5% were Native American or Native Alaskan, and 2.8% were of two or more races (USCB).

3.2 Previous Investigations

Apogee conducted a file review via the Virginia Cultural Resource Information System (V-CRIS) website in March 2023. According to the V-CRIS record search there are 11 previously recorded architectural resources (Table 1) within a .5-mile radius of the project area (Figure 4). Of the 11 resources, 2 were revisited (046-0063, 046-5144).

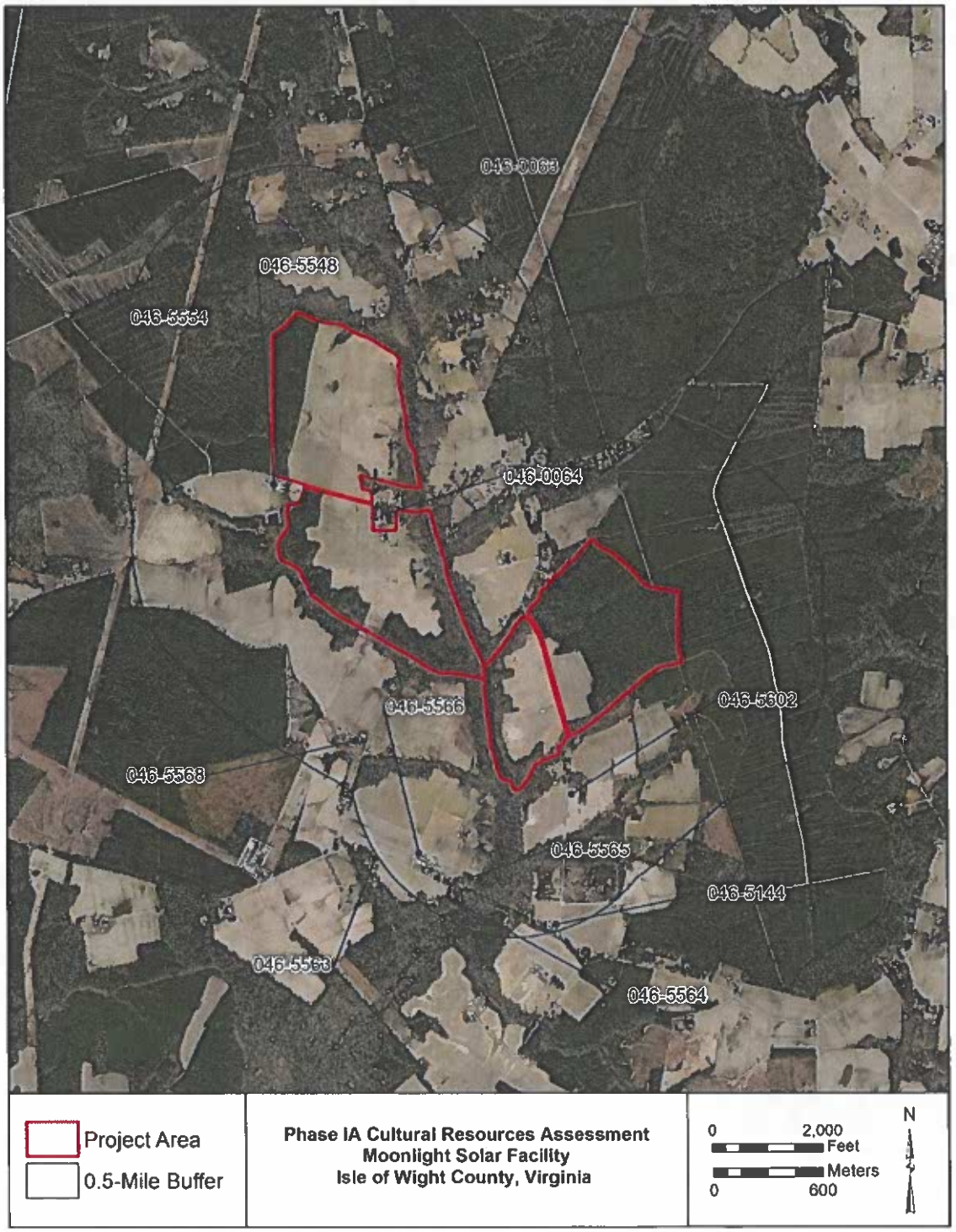

Figure 4: Results from V-CRIS records search of the APE.

Table 1: Previously Recorded Architectural Resources within 0.5 miles of Current Project.

DHR ID	Property Name	NRHP Evaluation	Location Relative to Project Area
046-0063	House, Route 627	DHR Staff: Not Evaluated	outside
046-0064	Carroll Plantation (Current/Historic)/Gary Carroll House (Historic)	DHR Staff: Eligible	outside
046-5144	Dwelling, 9346 Moonlight Road Former Store, 11489 Mill Swamp Road	DHR Staff: Not Evaluated	outside
046-5548	Dwelling, 10522 Burwells Bay Road	DHR Staff: Not Eligible	outside
046-5554	Dwelling, 10338 Burwells Bay Road	DHR Staff: Not Eligible	outside
046-5563	Dwelling, 11128 Mill Swamp Road	DHR Staff: Not Eligible	outside
046-5564	Dwelling, 11292 Mill Swamp Road	DHR Staff: Not Eligible	outside
046-5565	Dwelling, 11301 Mill Swamp Road	DHR Staff: Not Eligible	outside
046-5566	Dwelling, 11231 Mill Swamp Road	DHR Staff: Potentially Eligible	outside
046-5668	Dwelling, 11073 Mill Swamp Road	DHR Staff: Not Eligible	outside
046-5602	Jordan Cemetery	DHR Staff: Recommended for Further Survey (2020)	outside

3.3 Historic Map Review

A review of historic USGS topographic quadrangle maps was conducted to identify any potential historic resources within or adjacent to the project area. The earliest available topographic quadrangle depicting the project area is the Yorktown, VA (1907) USGS 1:62,500 scale quadrangle, on which three historic properties are depicted within the project area. These structures are present on both the 1907 and 1943 Yorktown, VA 1:62,500 scale quadrangle maps. Only one structure is present within the project area on the most recent historic topographic map: Bacons Castle, VA (1983) 1:24,000 quadrangle map.

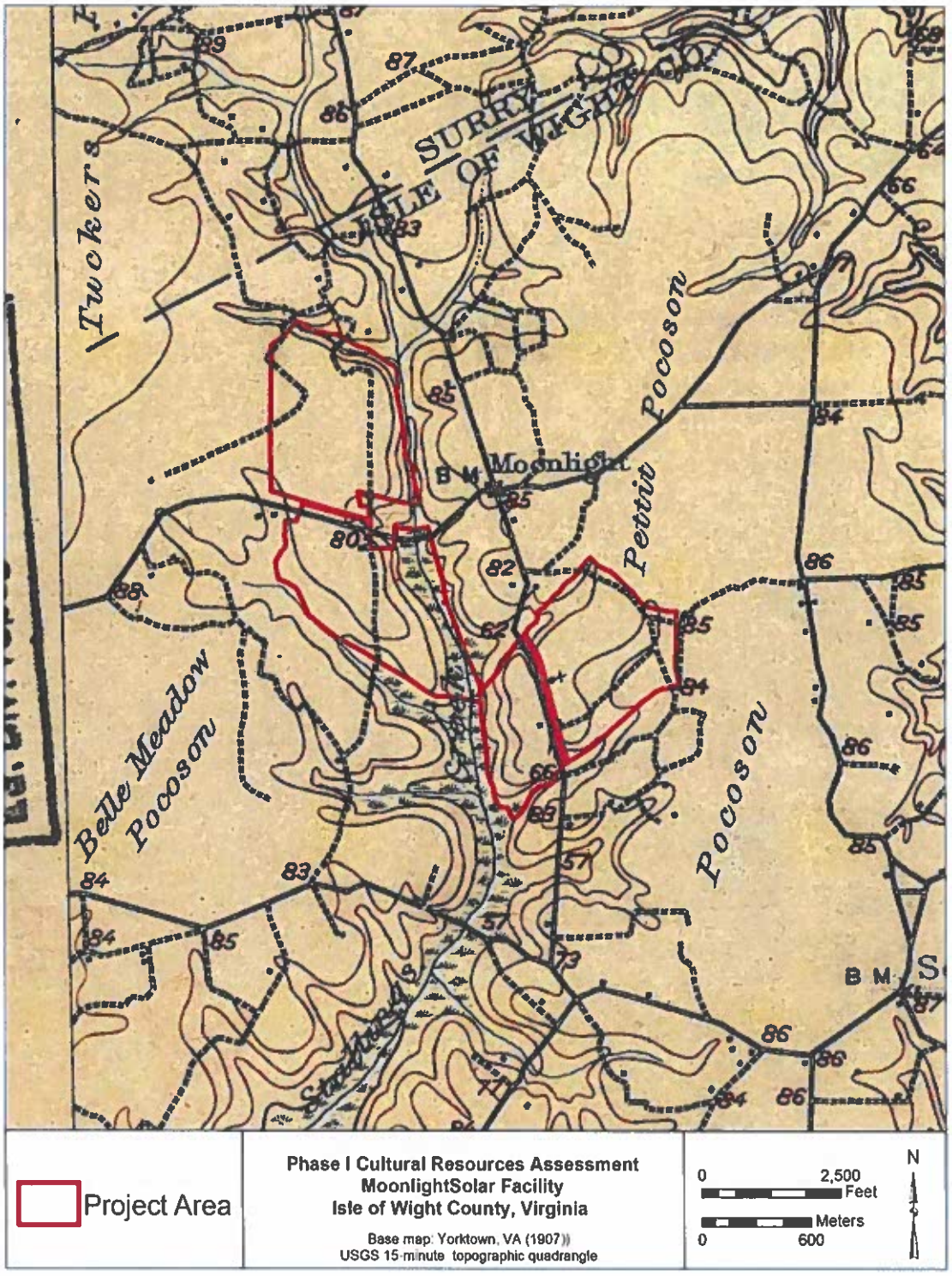

Figure 5: Structures present on the Yorktown, VA (1907) USGA 1:62,500 scale quadrangle.

4.0 RESULTS OF THE ARCHITECTURAL SURVEY

Apogee conducted an architectural survey and effects assessment for the proposed Project located in Isle of Wight County, Virginia. The purpose of the survey was to identify historic properties, those listed in or eligible for listing in the NRHP, and to assess the effects of the proposed Project on those properties. The architectural APE encompasses the project parcels of the proposed undertaking, as well as areas within 0.5-miles of the project area.

A total of 21 historic resources (2 previously recorded and 19 newly identified) were surveyed within the architectural APE. Table 2 provides relevant information for each of the resources identified, including VDHR ID, name/address, property description, location relative to APE, and Apogee's recommendations for NRHP listing.

The 21 resources are recommended not eligible for listing in the NRHP. They include residential and agricultural resources ranging in date from the late 1700s to the 1970s. Many of the resources are Minimal Traditional or Ranch-type single dwellings of a common design and lacking significant associations to notable events or people. There are also a couple larger Colonial and Georgian farmhouses with minimal ornamentation and replacement exterior fabric. Overall, these resources generally lack architectural distinction, no longer retain sufficient integrity of materials to convey significance, or do not have significant associations with events or people.

Table 2: Architectural Resources Documented during the Field Investigation.

VDHR ID	Site Name/ Address	Property Description	Location Relative to Direct APE	NRHP Recommendation
046-0063	House, Route 627	1770 Georgian brick dwelling	outside	Not Eligible
046-5144	House, 9346 Moonlight Road	1930 Minimal Traditional dwelling	outside	Not Eligible
046-5721	House, 7296 Moonlight Road	1976 Ranch-style dwelling	outside	Not Eligible
046-5722	House, 7286 Moonlight Road	1976 Ranch-style dwelling	outside	Not Eligible
046-5723	House, 8190 Moonlight Road	1902 Colonial-style Farmhouse	outside	Not Eligible
046-5724	House, 8179 Moonlight Road	1975 Ranch-style dwelling	outside	Not Eligible
046-5725	House, 7364 Moonlight Road	1898 Vernacular-style dwelling	outside	Not Eligible
046-5726	House, 7283 Moonlight Road	1975 Vernacular-style dwelling	outside	Not Eligible
046-5727	House, 8063 Moonlight Road	1973 Ranch-style dwelling	outside	Not Eligible
046-5728	House, 11482 Burwells Bay Road	1969 Ranch-style dwelling	outside	Not Eligible
046-5729	House, 11504 Burwells Bay Road	1973 Ranch-style dwelling	outside	Not Eligible
046-5780	House, 11522 Burwells Bay Road	1972 Ranch-style dwelling	outside	Not Eligible
046-5781	House, 12002 Burwells Bay Road	1973 Ranch-style dwelling	outside	Not Eligible
046-5782	House, 12024 Burwells Bay Road	1973 Ranch-style dwelling	outside	Not Eligible
046-5783	House, 12046 Burwells Bay Road	1970 Ranch-style dwelling	outside	Not Eligible
046-5784	House, 12064 Burwells Bay Road	1963 Ranch-style dwelling	outside	Not Eligible
046-5785	House, 12078 Burwells Bay Road	1971 Minimal Traditional dwelling	outside	Not Eligible
046-5786	House, 9076 Moonlight Road	1954 Ranch-style dwelling	outside	Not Eligible

VDHR ID	Site Name/ Address	Property Description	Location Relative to Direct APE	NRHP Recommendation
046-5787	House, 9211 Moonlight Road	1921 Minimal Traditional dwelling	outside	Not Eligible
046-5788	House, 9290 Moonlight Road	1880 Gabled-ell Farmhouse	outside	Not Eligible
046-5789	Barn, 8462 Moonlight Road	Ca. 1950 Barn	inside	Not Eligible

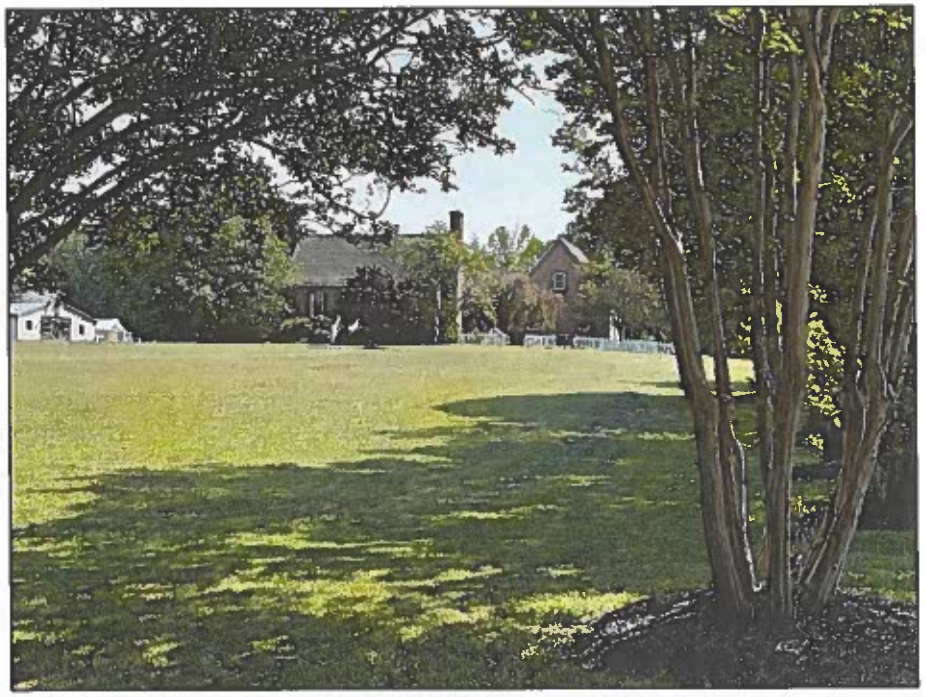

Photo 1: House, Route 627 (046-0063), view to east.

Photo 2: 11489 Mill Swamp Road (046-5144), view to north.

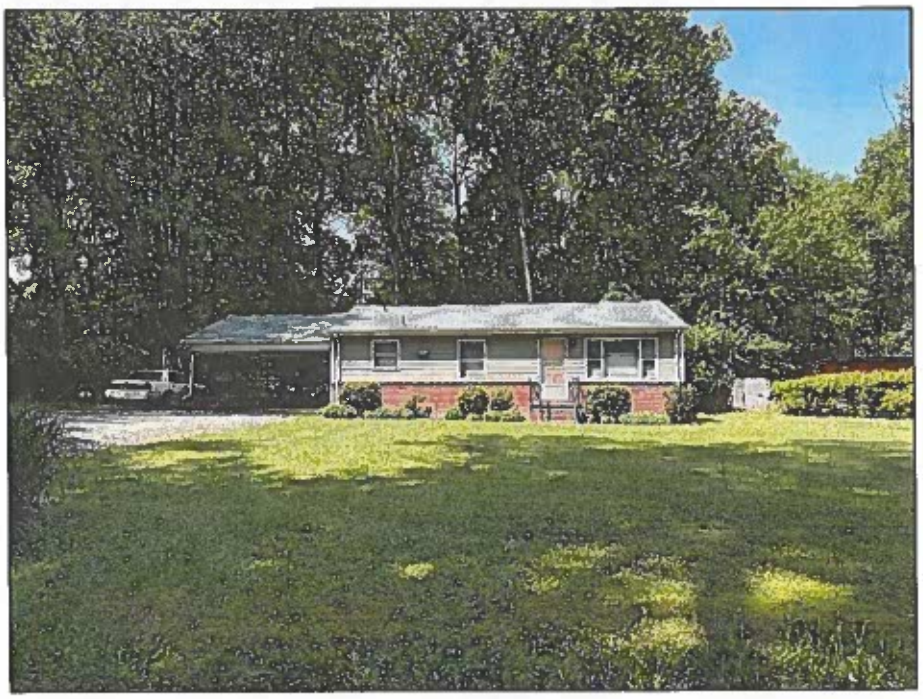

Photo 3: 7296 Moonlight Road (046-5721), view to southwest.

Photo 4: 7286 Moonlight Road (046-5722), view to southwest.

Photo 5: 8190 Moonlight Road (046-5723), view to southwest.

Photo 6: 8179 Moonlight Road (046-5724), view to northeast.

Photo 7: 7364 Moonlight Road (046-5725), view to southwest.

Photo 8: 7283 Moonlight Road (046-5726), view to northeast.

Photo 9: 8063 Moonlight Road (046-5727), view to southeast.

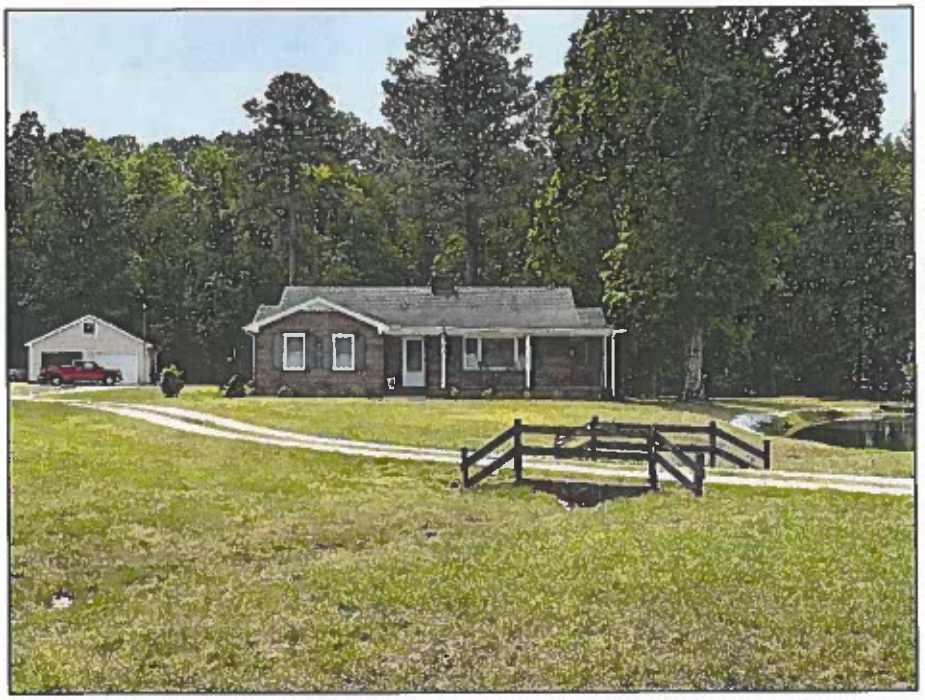

Photo 10: 11482 Burwells Bay Road (046-5728), view to south.

Photo 11: 11504 Burwells Bay Road (046-5729), view to south.

Photo 12: 11522 Burwells Bay Road (046-5780), view to south.

Photo 13: 12002 Burwells Bay Road (046-5781), view to south.

Photo 14: 12024 Burwells Bay Road (046-5782), view to south.

Photo 15: 12046 Burwells Bay Road (046-5783), view to south.

Photo 16: 12064 Burwells Bay Road (046-5784), view to southeast.

Photo 17: 12078 Burwells Bay Road (046-5785), view to southeast.

Photo 18: 9076 Moonlight Road (046-5786), view to west.

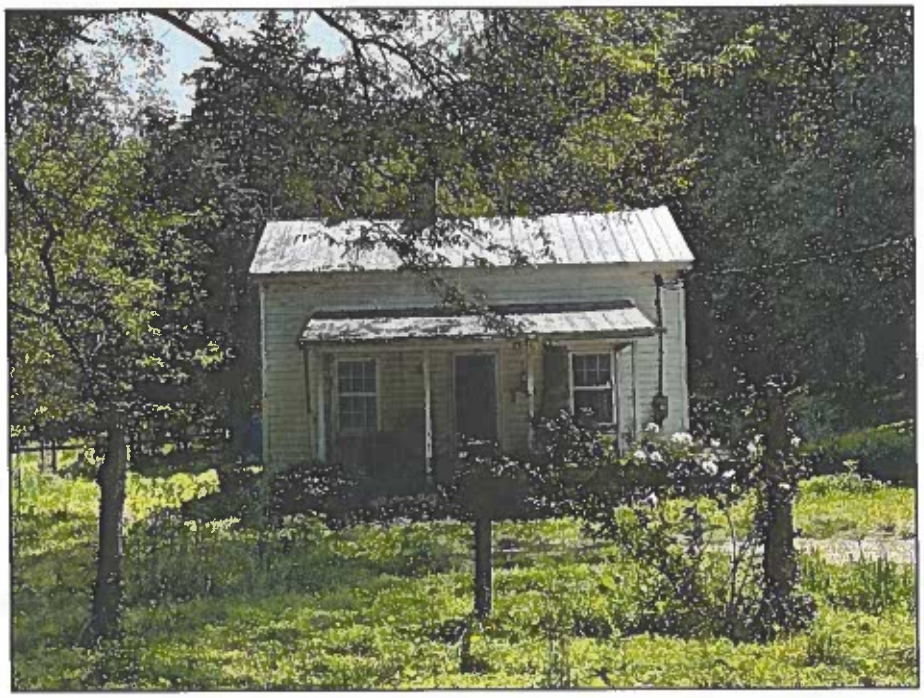

Photo 19: 9211 Moonlight Road (046-5787), view to east.

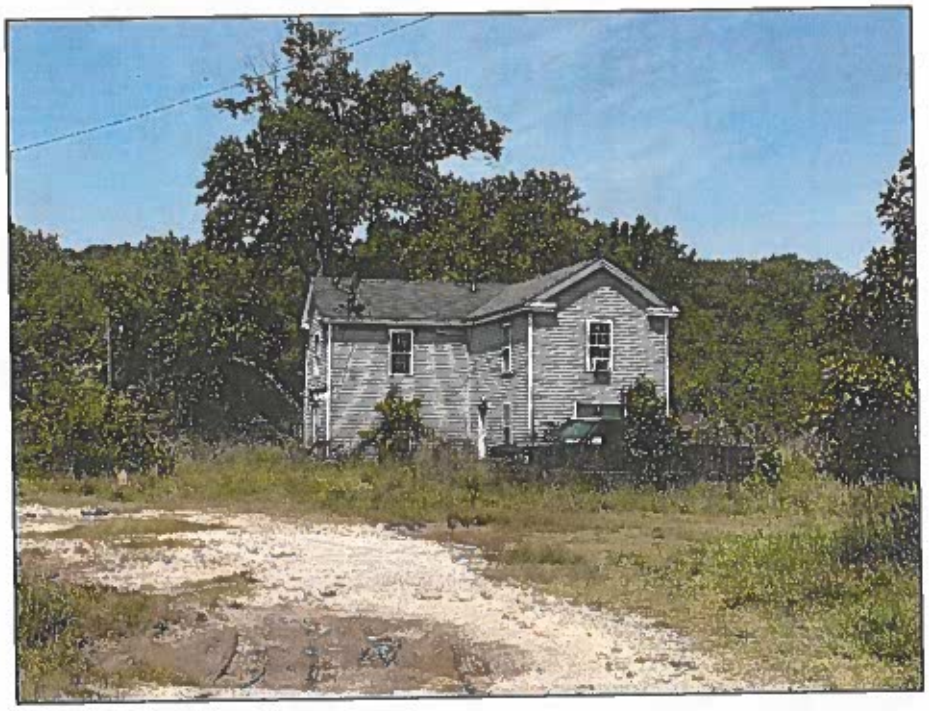

Photo 20: 9290 Moonlight Road (046-5788), view to west.

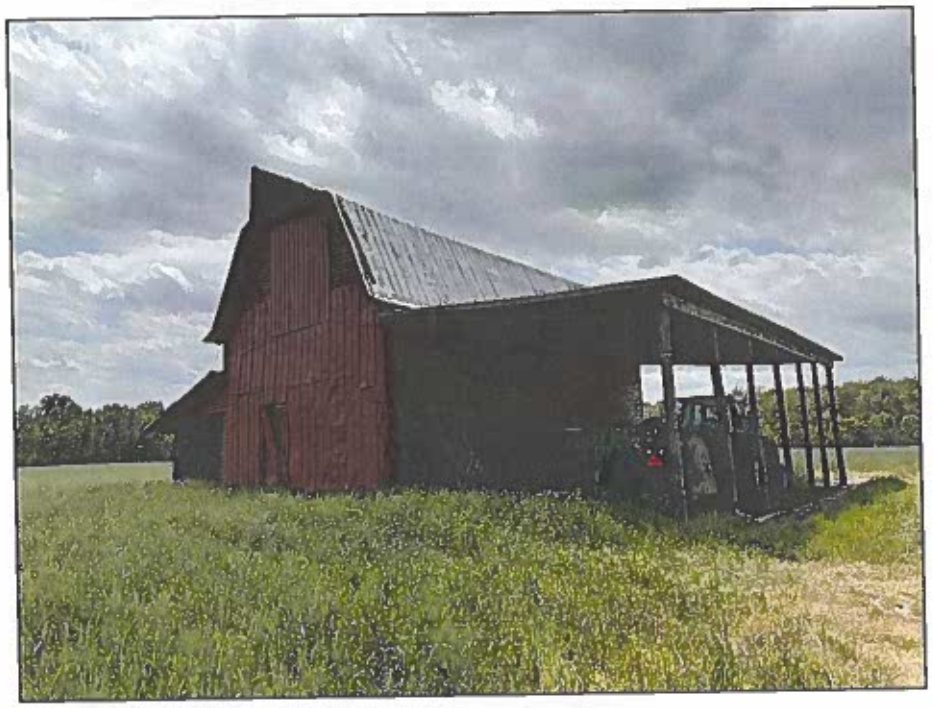

Photo 21: 8462 Moonlight Road (046-5789), view to southwest.

5.0 SUMMARY AND CONCLUSIONS

On behalf of Timmons, Apogee conducted an architectural survey and effects assessment for the proposed Moonlight Solar Facility in Isle of Wight County, Virginia. The purpose of the architectural survey and effects assessment was to identify historic properties, those listed in or eligible for listing in the NRHP, and to assess the effects of the proposed Project on those properties. A total of 21 historic resources were surveyed within the architectural APE (2 previously recorded and 19 newly identified). Effects were assessed to gauge the potential direct and indirect effects on historic properties located within the architectural APE.

Overall, it is Apogee's finding that the proposed Project will have an **no adverse effect** on the 21 properties surveyed within the architectural APE.

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Appendix A: DHR VCRIS Inventory Forms

Property Information

Property Names

Name Explanation	Name
Function/Location	House, Route 627

Property Evaluation Status

Property Addresses

Current - 7141 Moonlight Road Route 627

County/Independent City(s): Isle of Wight (County)
Incorporated Town(s): *No Data*
Zip Code(s): *No Data*
Magisterial District(s): *No Data*
Tax Parcel(s): *No Data*
USGS Quad(s): BACONS CASTLE

Additional Property Information

Architecture Setting: Rural
Acreage: 9.35
Site Description:

May 2023: This house is located in a rural area on the east side of Moonlight Road. The buildings in the immediate vicinity of the house are residential and agricultural, and downtown Smithfield is located 8.5-miles southeast of the property. The roughly 9-acre property is comprised of grass and pastures that spans the majority of the property with a long gravel driveway that leads to the rear south of the main house from Moonlight Road. Mature trees are located throughout the parcel, primarily along the southern edge of the parcel's boundary and along Moonlight Road.

Surveyor Assessment:

1973: The house on Route 627 is typical of an early 19th century center hall story and a half one room deep plan found in Surry (Warren Crossroads House) Nansemond Pulley House, W. Holliday House) and Isle of Wight (original block of the Nurney Farm), per intensive survey.

May 2023: Overall, this property retains a moderate level of integrity. The exterior alterations, including multiple additions have diminished this house's integrity of materials. Furthermore, the building has no significant association or linkage to events or persons of demonstrable significance in the past and does not appear to have the ability to yield important and unique information for research based on physical evidence. This architectural resource is recommended as not eligible for the NRHP under Criteria A, B, C, or D.

Surveyor Recommendation: Recommended Not Eligible

Ownership

Ownership Category	Ownership Entity
Private	*No Data*

Primary Resource Information

Resource Category: Domestic
Resource Type: Single Dwelling
NR Resource Type: Building
Date of Construction: ca 1770
Date Source: Local Records
Historic Time Period: Early National Period (1790 - 1829)
Historic Context(s): Domestic
Other ID Number: *No Data*
Architectural Style: Georgian
Form: *No Data*
Number of Stories: 1.5
Condition: Good
Interior Plan: Central Passage, Single Pile
Threats to Resource: Vacant

Cultural Affiliations: Indeterminate

Cultural Affiliation Details: *No Data*

Architectural Description:

Architecture Summary, October 1973: Frame with some early beaded weatherboard surviving at the end gables, the House on Route 627 has an exterior chimney at each end laid in three course American bond with stepped double weatherings., intensive survey.

May 2023: The 1.5-story, side-gabled Georgian Revival farmhouse has an irregular plan with many additions added over the years. The west elevation has a side-gabled roof and is covered with composite shingles with two brick chimneys on the roof edges. The front door is centered on the south elevation and is accessed a full-width wood porch. The windows are all double-hung sash and vary between six-over-six and nine-over-nine.

Exterior Components

Component	Component Type	Material	Material Treatment
Chimneys	Exterior End	Brick	Other
Roof	Gable	Asphalt	Shingle
Windows	Sash, Double-Hung	Wood	4/4
Foundation	Solid/Continuous	Brick	*No Data*
Structural System and Exterior Treatment	Frame	Wood	Weatherboard
Windows	Sash, Double-Hung	Wood	9/6
Structural System and Exterior Treatment	Masonry	*No Data*	*No Data*
Porch	1-Story Full-Width	Wood	Posts

Secondary Resource Information

Secondary Resource #1

Resource Category: Domestic

Resource Type: Kitchen

NR Resource Type: Building

Not Observed: This resource was not observed during the last survey.

Date of Construction: *No Data*

Date Source: *No Data*

Historic Time Period: *No Data*

Historic Context(s): Domestic

Other ID Number: *No Data*

Architectural Style: *No Data*

Form: *No Data*

Number of Stories: 1.0

Condition: *No Data*

Threats to Resource: *No Data*

Cultural Affiliations: *No Data*

Cultural Affiliation Details: *No Data*

Architectural Description:

October 1973: No additional information

May 2023: Located immediately surrounding the primary dwelling are multiple agricultural outbuildings. From the public ROW, there are no discernable details.

Secondary Resource #2

Resource Category: Agriculture/Subsistence

Resource Type: Smoke/Meat House

NR Resource Type: Building

Not Observed: This resource was not observed during the last survey.

Date of Construction: *No Data*

Date Source: *No Data*

Historic Time Period: *No Data*

Historic Context(s): Domestic

Other ID Number:	*No Data*
Architectural Style:	*No Data*
Form:	*No Data*
Number of Stories:	1.0
Condition:	*No Data*
Threats to Resource:	*No Data*
Cultural Affiliations:	*No Data*
Cultural Affiliation Details:	*No Data*

Architectural Description:

October 1973: No additional information.

May 2023: Located immediately surrounding the primary dwelling are multiple agricultural outbuildings. From the public ROW, there are no discernable details.

Secondary Resource #3

Resource Category:	Agriculture/Subsistence
Resource Type:	Granary
NR Resource Type:	Building
Not Observed:	This resource was not observed during the last survey.
Date of Construction:	*No Data*
Date Source:	*No Data*
Historic Time Period:	*No Data*
Historic Context(s):	Domestic
Other ID Number:	*No Data*
Architectural Style:	*No Data*
Form:	*No Data*
Number of Stories:	1.0
Condition:	*No Data*
Threats to Resource:	*No Data*
Cultural Affiliations:	*No Data*
Cultural Affiliation Details:	*No Data*

Architectural Description:

Architecture Summary, October 1973: 2 granaries

May 2023: Located immediately surrounding the primary dwelling are multiple agricultural outbuildings. From the public ROW, there are no discernable details.

Secondary Resource #4

Resource Category:	Agriculture/Subsistence
Resource Type:	Granary
NR Resource Type:	Building
Not Observed:	This resource was not observed during the last survey.
Date of Construction:	*No Data*
Date Source:	*No Data*
Historic Time Period:	*No Data*
Historic Context(s):	Domestic
Other ID Number:	*No Data*
Architectural Style:	*No Data*
Form:	*No Data*
Number of Stories:	*No Data*
Condition:	*No Data*
Threats to Resource:	*No Data*
Cultural Affiliations:	*No Data*
Cultural Affiliation Details:	*No Data*

Architectural Description:

Architecture Summary, October 1973: 2 granaries

May 2023: Located immediately surrounding the primary dwelling are multiple agricultural outbuildings. From the public ROW, there are no discernable details.

Historic District Information

Historic District Name: *No Data*
Local Historic District Name: *No Data*
Historic District Significance: *No Data*

CRM Events

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: *No Data*
Investigator: Chris Swisher
Organization/Company: Apogee Environmental & Archaeological, Inc.
Photographic Media: Digital
Survey Date: 5/10/2023
Dhr Library Report Number: *No Data*
Project Staff/Notes:
Amanda Commins, Architectural Historian
Project Bibliographic Information:
Historic Architectural Reconnaissance Survey for the Proposed Moonlight Solar Facility in Isle of Wight County, Virginia

Event Type: Survey:Phase II/Intensive

Project Review File Number: *No Data*
Investigator: Herman, Bernard L.
Organization/Company: Unknown (DSS)
Photographic Media: *No Data*
Survey Date: 10/1/1973
Dhr Library Report Number: *No Data*
Project Staff/Notes:
No Data

Bibliographic Information

Bibliography:
No Data
Property Notes:
No Data

Property Information

Property Names

Name Explanation	Name
Function/Location	Dwelling, 9346 Moonlight Road
Function/Location	Store, 11489 Mill Swamp Road
Function/Location	Store, intersection of Mill Swamp Road and Moonlight Road

Property Evaluation Status

Property Addresses

Current - 9346 Moonlight Road
Alternate - 11489 Mill Swamp Road Route 626

County/Independent City(s): Isle of Wight (County)
Incorporated Town(s): *No Data*
Zip Code(s): 23430
Magisterial District(s): *No Data*
Tax Parcel(s): 11-01-025
USGS Quad(s): BACONS CASTLE

Additional Property Information

Architecture Setting: Rural
Acreage: 1
Site Description:

2005: This commercial building is situated on the northwest corner of the intersection of Mill Swamp Road (626) and Moonlight Road (627). The building faces southeast to the intersection. The area is characterized by open agricultural fields. There are no visible outbuildings associated with this property.

May 2023: The dwelling is the primary resource on the property located on the west side of Moonlight Road. The former store sits at the corner of Moonlight Road and Mill Swamp Road, and multiple sheds are dotted throughout the parcel.

Surveyor Assessment:

2005: Rural commercial buildings deviated in appearance from their urban counterparts of the turn of the 20th century. While most urban or town commercial buildings exhibited a parapeted front and were constructed of brick, the rural stores dominated rural intersections and waterfront transportation points, and appeared like vernacular dwellings of the period. The gabled-fronted store is the most common with a gable roof surmounting a wood frame building. These buildings were mostly two-story, though more modest commercial buildings could be one-story. The commercial buildings served as general stores, hardware stores, groceries or feed stores. The ease and affordability of erecting such a building allowed small business owners to see the addition of a store to, in many cases, their own property as a viable financial venture. The addition of post offices in the late 19th and early 20th century as well the addition of gasoline services in the 1920s and 1930s guaranteed prosperity of the commercial building during these periods. The commercial building served as a social meeting place for area residents and was a hub of the community.

The characteristics of the building are recognizable on the rural landscape. They are usually sited near the roadway and most often sited near an intersection of roadways. They have a dominant storefront on the first story with a central entrance flanked by oversized fixed storefront windows or grouped double-hung sash windows that are oversized. The second stories feature double-hung sash windows and contained additional commercial space or living space for an owner or operator, if the store was operated by someone other than the person who owned the store. The roof was articulated with brackets in many cases or features decorative cornices. With the addition of gas station services in the 1920s and 1930s, the area in front of the building featured gas pumps with light fixtures set upon a poured concrete foundation. An important feature of the commercial building, which has been lost among numerous buildings, is the signage advertising the gasoline brand or good brands available in the store.

May 2023: Overall, the dwelling retains a moderate level of integrity. The exterior alterations, including a wood deck addition and replacement roof, have diminished this house's integrity of materials. Furthermore, the building has no significant association or linkage to events or persons of demonstrable significance in the past and does not appear to have the ability to yield important and unique information for research based on physical evidence. This architectural resource is recommended as not eligible for the NRHP under Criteria A, B, C, or D.

Surveyor Recommendation: Recommended Not Eligible

Ownership

Ownership Category	Ownership Entity
Private	*No Data*

Primary Resource Information

Resource Category:	Domestic
Resource Type:	Single Dwelling
NR Resource Type:	Building
Date of Construction:	1930
Date Source:	Local Records
Historic Time Period:	World War I to World War II (1917 - 1945)
Historic Context(s):	Domestic
Other ID Number:	*No Data*
Architectural Style:	Minimal Traditional
Form:	*No Data*
Number of Stories:	1.0
Condition:	Good
Threats to Resource:	None Known
Cultural Affiliations:	Indeterminate
Cultural Affiliation Details:	*No Data*

Architectural Description:

May 2023: The one-story, front-gabled Minimal Traditional house has a rectangular plan and measures four bays wide and three bays deep. It rests on a raised brick foundation and is clad with horizontal vinyl siding. The front-gabled roof is standing seam metal and features three brick chimneys on the roof slope. The front door is centered and is accessed by a wooden front entry porch. The windows are single-hung sash and vary between six-over-six and two-over-two with decorative shutters. The dwelling has experience some alterations over the years, including two shed-roof additions on the north and south elevations.

Exterior Components

Component	Component Type	Material	Material Treatment
Windows	Single-hung	*No Data*	*No Data*
Structural System and Exterior Treatment	Wood Frame	Vinyl	Siding
Roof	Front Gable	Metal	*No Data*
Porch	Portico/Entry Porch	*No Data*	*No Data*
Foundation	English/Raised	Brick	*No Data*
Chimneys	Interior Slope	Brick	*No Data*

Secondary Resource Information

Secondary Resource #1

Resource Category:	Commerce/Trade
Resource Type:	Commercial Building
NR Resource Type:	Building
Date of Construction:	1930
Date Source:	Local Records
Historic Time Period:	World War I to World War II (1917 - 1945)
Historic Context(s):	Architecture/Community Planning, Commerce/Trade
Other ID Number:	*No Data*
Architectural Style:	Vernacular
Form:	*No Data*
Number of Stories:	1.0
Condition:	Good
Threats to Resource:	Vacant
Cultural Affiliations:	Indeterminate
Cultural Affiliation Details:	*No Data*

Architectural Description:

2005: This commercial building is one-story and has a brick pier foundation and wood frame structural system clad in weatherboard. The roof is gable clad in standing-seam metal with exposed rafters under the eaves. The façade is dominated by a central entrance flanked by oversized windows. The windows are covered by wood vertical board shutters. The double door on the southeast façade is board and batten. Sheltering the southeast facade is a five-bay porch with plain wood posts and a hipped roof clad in standing-seam metal roof. There is a central interior brick chimney that is parged. The foundation for gas pumps is situated southeast of the façade. It once had a wood gabled shelter that has been removed.

May 2023: No changes since previous survey.

Exterior Components

Component	Component Type	Material	Material Treatment
Roof	Gable	Metal	Standing Seam
Chimneys	Central interior	Brick	Bond, American
Structural System and Exterior Treatment	Frame	Wood	Weatherboard
Foundation	Piers	Brick	Bond, American
Porch	1-story, 3-bay	Wood	Posts

Historic District Information

Historic District Name: *No Data*
Local Historic District Name: *No Data*
Historic District Significance: *No Data*

CRM Events

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: *No Data*
Investigator: Chris Swisher
Organization/Company: Apogee Environmental & Archaeological, Inc
Photographic Media: Digital
Survey Date: 5/10/2023
Dhr Library Report Number: *No Data*
Project Staff/Notes:
Amanda Commins, Architectural Historian
Project Bibliographic Information:
Historic Architectural Reconnaissance Survey for the Proposed Moonlight Solar Facility in Isle of Wight County, Virginia

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: *No Data*
Investigator: David, Kimble
Organization/Company: Unknown (DSS)
Photographic Media: *No Data*
Survey Date: 3/1/2005
Dhr Library Report Number: *No Data*
Project Staff/Notes:
2004-2005-0001
Project Bibliographic Information:
Historic Architectural Reconnaissance Survey for the Proposed Moonlight Solar Facility in Isle of Wight County, Virginia

Bibliographic Information

Bibliography:
No Data

Property Notes:
Name: Jesse & Janet Appel
Address 1: 9346 Moonlight Road
City: Smithfield
State: Virginia
ZIP: 23430
Owner Relationship: Owner of property

Property Information

Property Names

Name Explanation	Name
Function/Location	Dwelling, 7296 Moonlight Road

Property Evaluation Status

Property Addresses

Current - 7296 Moonlight Road

County/Independent City(s): Isle Of Wight (County)
Incorporated Town(s): *No Data*
Zip Code(s): 23430
Magisterial District(s): *No Data*
Tax Parcel(s): *No Data*
USGS Quad(s): BACONS CASTLE

Additional Property Information

Architecture Setting: Rural
Acreage: .73
Site Description:

May 2023: This house is located in a rural area on the west side of Moonlight Road. The buildings in the immediate vicinity of the house are residential and agricultural, and downtown Alberta is located 8-miles southeast of the property. The nearly 1-acre property is comprised of grass that spans the majority of the property with a concrete driveway that leads to an attached carport from Moonlight Road. Mature trees are dotted throughout the parcel and primarily located along the north, west, and south boundaries of the parcel.

Surveyor Assessment:

May 2023: Overall, this property retains a moderate level of integrity. However, his property is an undistinguished example of a mid-to-late-twentieth century dwelling. It does not embody distinctive characteristics or possess significant or unique architectural or design features. Furthermore, the building has no significant association or linkage to events or persons of demonstrable significance in the past and does not appear to have the ability to yield important and unique information for research based on physical evidence. This architectural resource is recommended as not eligible for the NRHP under Criteria A, B, C, or D.

Surveyor Recommendation: Recommended Not Eligible

Ownership

Ownership Category	Ownership Entity
Private	*No Data*

Primary Resource Information

Resource Category: Domestic
Resource Type: Single Dwelling
NR Resource Type: Building
Date of Construction: 1976
Date Source: Local Records
Historic Time Period: The New Dominion (1946 - 1991)
Historic Context(s): Domestic
Other ID Number: *No Data*
Architectural Style: Ranch
Form: *No Data*
Number of Stories: 1.0
Condition: Good
Threats to Resource: None Known
Cultural Affiliations: Indeterminate
Cultural Affiliation Details: *No Data*
Architectural Description:

May 2023. The one-story, side-gabled Ranch-style house has a rectangular plan and measures four bays wide and two bays deep. The foundation is concrete and the dwelling is clad in vinyl siding and stretcher bond brick. The roof is composite shingles. The front door is off-centered and accessed four brick steps and metal railings. The windows are all one-over-one single hung sash. An attached side-gabled carport is located on south elevation.

Exterior Components

Component	Component Type	Material	Material Treatment
Foundation	Slab	Concrete	*No Data*
Roof	Side Gable	Composite	*No Data*
Structural System and Exterior Treatment	Not Visible	Vinyl	Siding
Structural System and Exterior Treatment	Not Visible	Brick	Stretcher Bond
Windows	Single-hung	*No Data*	*No Data*

Secondary Resource Information

Historic District Information

Historic District Name: *No Data*
Local Historic District Name: *No Data*
Historic District Significance: *No Data*

CRM Events

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: *No Data*
Investigator: Chris Swisher
Organization/Company: Apogee Environmental & Archaeological, Inc.
Photographic Media: Digital
Survey Date: 5/10/2023
Dhr Library Report Number: *No Data*
Project Staff/Notes:
Amanda Commins, Architectural Historian
Project Bibliographic Information:
Historic Architectural Reconnaissance Survey for the Proposed Moonlight Solar Facility in Isle of Wight County, Virginia

Bibliographic Information

Bibliography:
No Data
Property Notes:
No Data

Property Information

Property Names

Name Explanation	Name
Function/Location	Dwelling, 7286 Moonlight Road

Property Evaluation Status

Property Addresses

Current - 7286 Moonlight Road

County/Independent City(s): Isle Of Wight (County)
Incorporated Town(s): *No Data*
Zip Code(s): 23430
Magisterial District(s): *No Data*
Tax Parcel(s): *No Data*
USGS Quad(s): BACONS CASTLE

Additional Property Information

Architecture Setting: Rural
Acreage: 1.33
Site Description:

May 2023: This house is located in a rural area on the west side of Moonlight Road. The buildings in the immediate vicinity of the house are residential and agricultural, and downtown Alberta is located 8-miles southeast of the property. The roughly 1-acre property is comprised of grass that spans the majority of the property with a concrete driveway that leads to an attached garage from Moonlight Road. Mature trees are dotted throughout the parcel and primarily located along the west and south boundaries of the parcel.

Surveyor Assessment:

May 2023: Overall, this property retains a moderate level of integrity. However, his property is an undistinguished example of a mid-to-late-twentieth century dwelling. It does not embody distinctive characteristics or possess significant or unique architectural or design features. Furthermore, the building has no significant association or linkage to events or persons of demonstrable significance in the past and does not appear to have the ability to yield important and unique information for research based on physical evidence. This architectural resource is recommended as not eligible for the NRHP under Criteria A, B, C, or D.

Surveyor Recommendation: Recommended Not Eligible

Ownership

Ownership Category	Ownership Entity
Private	*No Data*

Primary Resource Information

Resource Category: Domestic
Resource Type: Single Dwelling
NR Resource Type: Building
Date of Construction: 1976
Date Source: Local Records
Historic Time Period: The New Dominion (1946 - 1991)
Historic Context(s): Domestic
Other ID Number: *No Data*
Architectural Style: Ranch
Form: *No Data*
Number of Stories: 1.0
Condition: Good
Threats to Resource: None Known
Cultural Affiliations: Indeterminate
Cultural Affiliation Details: *No Data*
Architectural Description:

May 2023: The one-story, side-gabled Ranch-style house has a rectangular plan and measures five bays wide and two bays deep. The foundation is not visible and the dwelling is clad in vertical aluminum siding. The roof is composite shingles. The front door is centered under the roof slope porch and accessed from a wood deck. The windows are all one-over-one single-hung sash.

Exterior Components

Component	Component Type	Material	Material Treatment
Foundation	Not Visible	*No Data*	*No Data*
Porch	Stoop/Deck	*No Data*	*No Data*
Roof	Side Gable	Composite	*No Data*
Structural System and Exterior Treatment	Wood Frame	*No Data*	*No Data*
Windows	Single-hung	*No Data*	*No Data*

Secondary Resource Information

Historic District Information

Historic District Name: *No Data*
Local Historic District Name: *No Data*
Historic District Significance: *No Data*

CRM Events

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: *No Data*
Investigator: Chris Swisher
Organization/Company: Apogee Environmental & Archaeological, Inc
Photographic Media: Digital
Survey Date: 5/10/2023
Dhr Library Report Number: *No Data*
Project Staff/Notes:
Amanda Commins, Architectural Historian
Project Bibliographic Information:
Historic Architectural Reconnaissance Survey for the Proposed Moonlight Solar Facility in Isle of Wight County, Virginia

Bibliographic Information

Bibliography:
No Data
Property Notes:
No Data

Property Information

Property Names

Name Explanation	Name
Function/Location	Dwelling, 8190 Moonlight Road

Property Evaluation Status

Property Addresses

Current - 8190 Moonlight Road

County/Independent City(s): Isle Of Wight (County)
Incorporated Town(s): *No Data*
Zip Code(s): 23430
Magisterial District(s): *No Data*
Tax Parcel(s): *No Data*
USGS Quad(s): BACONS CASTLE

Additional Property Information

Architecture Setting: Rural
Acreage: 2.61
Site Description:

May 2023: This house is located in a rural area on the west side of Moonlight Road. The buildings in the immediate vicinity of the house are residential and agricultural, and downtown Alberta is located 7-miles southeast of the property. The nearly 3-acre property is comprised of farmland that spans the majority of the property with a gravel driveway that leads to the main house from Moonlight Road. Mature trees are dotted around the main dwelling and span the north, west, and south boundaries.

Surveyor Assessment:

May 2023: Overall, this property retains a high level of integrity. However, his property is an undistinguished example of a early-twentieth century Colonial Farmhouse. It does not embody distinctive characteristics or possess significant or unique architectural or design features. Furthermore, the building has no significant association or linkage to events or persons of demonstrable significance in the past and does not appear to have the ability to yield important and unique information for research based on physical evidence. This architectural resource is recommended as not eligible for the NRHP under Criteria A, B, C, or D.

Surveyor Recommendation: Recommended Not Eligible

Ownership

Ownership Category	Ownership Entity
Private	*No Data*

Primary Resource Information

Resource Category: Domestic
Resource Type: Single Dwelling
NR Resource Type: Building
Date of Construction: 1902
Date Source: Local Records
Historic Time Period: Reconstruction and Growth (1866 - 1916)
Historic Context(s): Domestic, Subsistence/Agriculture
Other ID Number: *No Data*
Architectural Style: Colonial Revival
Form: *No Data*
Number of Stories: 2.0
Condition: Good
Threats to Resource: None Known
Cultural Affiliations: Indeterminate
Cultural Affiliation Details: *No Data*
Architectural Description:

May 2023: The two-story, side-gabled Colonial farmhouse has a rectangular plan. Public ROW assessment indicates a wood frame dwelling with an exterior brick chimney. A lean-to addition is located on the east elevation.

Exterior Components

Component	Component Type	Material	Material Treatment
Chimneys	Exterior End	Brick	No Data
Structural System and Exterior Treatment	Wood Frame	No Data	No Data
Roof	Side Gable	No Data	No Data

Secondary Resource Information

Secondary Resource #1

Resource Category: Agriculture/Subsistence
Resource Type: Agricultural Outbuildings
NR Resource Type: Building
Not Observed: This resource was not observed during the last survey.
Date of Construction: No Data
Date Source: No Data
Historic Time Period: No Data
Historic Context(s): No Data
Other ID Number: No Data
Architectural Style: No Data
Form: No Data
Number of Stories: No Data
Condition: No Data
Threats to Resource: No Data
Cultural Affiliations: No Data
Cultural Affiliation Details: No Data
Architectural Description:

May 2023: Located immediately surrounding the primary dwelling are multiple agricultural outbuildings. From the public ROW, there are not discernable details.

Historic District Information

Historic District Name: No Data
Local Historic District Name: No Data
Historic District Significance: No Data

CRM Events

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: No Data
Investigator: Chris Swisher
Organization/Company: Apogee Environmental & Archaeological, Inc.
Photographic Media: Digital
Survey Date: 5/10/2023
Dhr Library Report Number: No Data
Project Staff/Notes:

Amanda Commins, Architectural Historian

Project Bibliographic Information:
Historic Architectural Reconnaissance Survey for the Proposed Moonlight Solar Facility in Isle of Wight County, Virginia

Bibliographic Information

Bibliography:
No Data

Property Notes:
No Data

Property Information

Property Names

Name Explanation	Name
Function/Location	Dwelling, 8179 Moonlight Road

Property Evaluation Status

Property Addresses

Current - 8179 Moonlight Road

County/Independent City(s): Isle Of Wight (County)
Incorporated Town(s): *No Data*
Zip Code(s): 23430
Magisterial District(s): *No Data*
Tax Parcel(s): *No Data*
USGS Quad(s): BACONS CASTLE

Additional Property Information

Architecture Setting: Rural
Acreage: 1.07
Site Description:

May 2023: This house is located in a rural area on the east side of Moonlight Road. The buildings in the immediate vicinity of the house are residential and agricultural, and downtown Alberta is located 7-miles southeast of the property. The roughly 1-acre property is comprised of grass that spans the majority of the property with a gravel driveway that leads to the rear of the main house from Moonlight Road. Mature trees are dotted throughout the parcel.

Surveyor Assessment:

May 2023: Overall, this property retains a moderate level of integrity. However, his property is an undistinguished example of a mid-twentieth century dwelling. It does not embody distinctive characteristics or possess significant or unique architectural or design features. Furthermore, the building has no significant association or linkage to events or persons of demonstrable significance in the past and does not appear to have the ability to yield important and unique information for research based on physical evidence. This architectural resource is recommended as not eligible for the NRHP under Criteria A, B, C, or D.

Surveyor Recommendation: Recommended Not Eligible

Ownership

Ownership Category	Ownership Entity
Private	*No Data*

Primary Resource Information

Resource Category: Domestic
Resource Type: Single Dwelling
NR Resource Type: Building
Date of Construction: 1975
Date Source: Local Records
Historic Time Period: The New Dominion (1946 - 1991)
Historic Context(s): Domestic
Other ID Number: *No Data*
Architectural Style: Ranch
Form: *No Data*
Number of Stories: 1.0
Condition: Good
Threats to Resource: None Known
Cultural Affiliations: Indeterminate
Cultural Affiliation Details: *No Data*
Architectural Description:

May 2023: The one-story, side-gabled Ranch-style house has a rectangular plan and measures four bays wide and two bays deep. The foundatio n is concrete and the dwelling is clad vinyl siding. The roof is composite shingles with a lean-to wood entry porch accessed by four wood steps. The windows are all one-over-one single-hung sash with decorative shutters.

Exterior Components

Component	Component Type	Material	Material Treatment
Foundation	English/Raised	Concrete	*No Data*
Porch	Portico/Entry Porch	Wood	Posts
Roof	Side Gable	Composite	*No Data*
Structural System and Exterior Treatment	Unknown	Vinyl	Siding
Windows	Single-hung	*No Data*	*No Data*

Secondary Resource Information

Historic District Information

Historic District Name: *No Data*
Local Historic District Name: *No Data*
Historic District Significance: *No Data*

CRM Events

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: *No Data*
Investigator: Chris Swisher
Organization/Company: Apogee Environmental & Archaeological, Inc.
Photographic Media: Digital
Survey Date: 5/10/2023
Dhr Library Report Number: *No Data*
Project Staff/Notes:
Amanda Commins, Architectural Historian
Project Bibliographic Information:
Historic Architectural Reconnaissance Survey for the Proposed Moonlight Solar Facility in Isle of Wight County, Virginia

Bibliographic Information

Bibliography:
No Data
Property Notes:
No Data

Property Information

Property Names

Name Explanation	Name
Function/Location	Dwelling, 7364 Moonlight Road

Property Evaluation Status

Property Addresses

Current - 7364 Moonlight Road

County/Independent City(s): Isle Of Wight (County)
Incorporated Town(s): *No Data*
Zip Code(s): 23430
Magisterial District(s): *No Data*
Tax Parcel(s): *No Data*
USGS Quad(s): BACONS CASTLE

Additional Property Information

Architecture Setting: Rural
Acreage: 29.38
Site Description:

May 2023: This house is located in a rural area on the west side of Moonlight Road. The buildings in the immediate vicinity of the house are residential and agricultural, and downtown Alberta is located 7-miles southeast of the property. The nearly 30-acre property is comprised of farmland that spans the majority of the property with a gravel driveway that leads from Moonlight Road and circles to the rear of the property. Mature trees are dotted around the main dwelling and span the north, west, and south boundaries.

Surveyor Assessment:

May 2023: Overall, this property retains a moderate level of integrity. However, this property is an undistinguished example of a Vernacular late-nineteenth century dwelling. It does not embody distinctive characteristics or possess significant or unique architectural or design features. Furthermore, the building has no significant association or linkage to events or persons of demonstrable significance in the past and does not appear to have the ability to yield important and unique information for research based on physical evidence. This architectural resource is recommended as not eligible for the NRHP under Criteria A, B, C, or D.

Surveyor Recommendation: Recommended Not Eligible

Ownership

Ownership Category	Ownership Entity
Private	*No Data*

Primary Resource Information

Resource Category: Domestic
Resource Type: Single Dwelling
NR Resource Type: Building
Date of Construction: 1898
Date Source: Local Records
Historic Time Period: Reconstruction and Growth (1866 - 1916)
Historic Context(s): Domestic
Other ID Number: *No Data*
Architectural Style: Vernacular
Form: *No Data*
Number of Stories: 1.0
Condition: Fair
Threats to Resource: None Known
Cultural Affiliations: Indeterminate
Cultural Affiliation Details: *No Data*
Architectural Description:

May 2023: The one-story, side-gabled Vernacular house has a square rectangular plan and measures three bays wide and five bays deep. It rests on a raised stone foundation and is clad with wood siding. The side-gabled roof is covered with composite shingles and features one brick chimney on the rear addition. The front door is centered and is accessed by three steps. The windows are all one-over-one replacement single-hung sash. A gable addition is located at the rear of the property on the west elevation.

Exterior Components

Component	Component Type	Material	Material Treatment
Chimneys	Interior Slope	Brick	*No Data*
Foundation	English/Raised	*No Data*	*No Data*
Roof	Side Gable	Composite	*No Data*
Structural System and Exterior Treatment	Wood Frame	*No Data*	*No Data*
Windows	Single-hung	*No Data*	*No Data*

Secondary Resource Information

Secondary Resource #1

Resource Category: Agriculture/Subsistence
Resource Type: Agricultural Outbuildings
NR Resource Type: Building
Not Observed: This resource was not observed during the last survey.
Date of Construction: *No Data*
Date Source: *No Data*
Historic Time Period: *No Data*
Historic Context(s): *No Data*
Other ID Number: *No Data*
Architectural Style: *No Data*
Form: *No Data*
Number of Stories: *No Data*
Condition: *No Data*
Threats to Resource: *No Data*
Cultural Affiliations: *No Data*
Cultural Affiliation Details: *No Data*
Architectural Description:

May 2023: Located in the rear of the main dwelling are a few agricultural outbuildings not observed from the public ROW. According to maps, they appear to be in fair condition.

Historic District Information

Historic District Name: *No Data*
Local Historic District Name: *No Data*
Historic District Significance: *No Data*

CRM Events

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: *No Data*
Investigator: Chris Swisher
Organization/Company: Apogee Environmental & Archaeological, Inc
Photographic Media: Digital
Survey Date: 5/10/2023

Dhr Library Report Number: *No Data*

Project Staff/Notes:

Amanda Commins, Architectural Historian

Project Bibliographic Information:

Historic Architectural Reconnaissance Survey for the Proposed Moonlight Solar Facility in Isle of Wight County, Virginia

Bibliographic Information

Bibliography:

No Data

Property Notes:

No Data

Property Information

Property Names

Name Explanation	Name
Function/Location	Dwelling, 7283 Moonlight Road

Property Evaluation Status

Property Addresses

Current - 7283 Moonlight Road

County/Independent City(s): Isle Of Wight (County)
Incorporated Town(s): *No Data*
Zip Code(s): 23430
Magisterial District(s): *No Data*
Tax Parcel(s): *No Data*
USGS Quad(s): BACONS CASTLE

Additional Property Information

Architecture Setting: Rural
Acreage: 1
Site Description:

May 2023: This house is located in a rural area on the east side of Moonlight Road. The buildings in the immediate vicinity of the house are residential and agricultural, and downtown Alberta is located 8-miles southeast of the property. The 1-acre property is comprised of grass and mature trees that spans the majority of the property with a metal entry gate just off of Moonlight Road.

Surveyor Assessment:

May 2023: Overall, this property retains a moderate level of integrity. However, his property is an undistinguished example of a mid-to-late-twentieth century dwelling. It does not embody distinctive characteristics or possess significant or unique architectural or design features. Furthermore, the building has no significant association or linkage to events or persons of demonstrable significance in the past and does not appear to have the ability to yield important and unique information for research based on physical evidence. This architectural resource is recommended as not eligible for the NRHP under Criteria A, B, C, or D.

Surveyor Recommendation: Recommended Not Eligible

Ownership

Ownership Category	Ownership Entity
Private	*No Data*

Primary Resource Information

Resource Category: Domestic
Resource Type: Single Dwelling
NR Resource Type: Building
Date of Construction: 1975
Date Source: Local Records
Historic Time Period: The New Dominion (1946 - 1991)
Historic Context(s): Domestic
Other ID Number: *No Data*
Architectural Style: Vernacular
Form: *No Data*
Number of Stories: 2.0
Condition: Good
Threats to Resource: None Known
Cultural Affiliations: Indeterminate
Cultural Affiliation Details: *No Data*
Architectural Description:

May 2023: The two-story, side-gabled Vernacular dwelling has a rectangular plan. Public ROW assessment indicates a wood frame dwelling

clad in plaster and wood siding with a standing seam metal roof. A full-width wood porch is located on the second story.

Exterior Components

Component	Component Type	Material	Material Treatment
Porch	1-Story Full-Width	Wood	Posts
Roof	Side Gable	Metal	*No Data*
Structural System and Exterior Treatment	Wood Frame	Wood	Siding
Structural System and Exterior Treatment	Wood Frame	*No Data*	Stuccoed

Secondary Resource Information

Secondary Resource #1

Resource Category: Domestic
Resource Type: Secondary Dwelling
NR Resource Type: Building
Not Observed: This resource was not observed during the last survey.
Date of Construction: *No Data*
Date Source: *No Data*
Historic Time Period: *No Data*
Historic Context(s): *No Data*
Other ID Number: *No Data*
Architectural Style: *No Data*
Form: *No Data*
Number of Stories: *No Data*
Condition: *No Data*
Threats to Resource: *No Data*
Cultural Affiliations: *No Data*
Cultural Affiliation Details: *No Data*
Architectural Description:

May 2023: Located adjacent to the primary dwelling is a secondary dwelling with little visibility from the public ROW due to increased foliage.

Secondary Resource #2

Resource Category: Domestic
Resource Type: Garage
NR Resource Type: Building
Date of Construction: 1975
Date Source: Local Records
Historic Time Period: The New Dominion (1946 - 1991)
Historic Context(s): Domestic
Other ID Number: *No Data*
Architectural Style: No discernible style
Form: *No Data*
Number of Stories: 1.0
Condition: Fair
Threats to Resource: None Known
Cultural Affiliations: Indeterminate
Cultural Affiliation Details: *No Data*
Architectural Description:

May 2023: Located adjacent to the primary dwelling is a two-story wood frame garage. The roof is standing seam metal front gable and the primary facade features fixed windows.

Historic District Information

Historic District Name: *No Data*
Local Historic District Name: *No Data*
Historic District Significance: *No Data*

CRM Events

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: *No Data*
Investigator: Chris Swisher
Organization/Company: Apogee Environmental & Archaeological, Inc.
Photographic Media: Digital
Survey Date: 5/10/2023
Dhr Library Report Number: *No Data*
Project Staff/Notes:
Amanda Commins, Architectural Historian
Project Bibliographic Information:
Historic Architectural Reconnaissance Survey for the Proposed Moonlight Solar Facility in Isle of Wight County, Virginia

Bibliographic Information

Bibliography:
No Data
Property Notes:
No Data

Property Information

Property Names

Name Explanation	Name
Function/Location	Dwelling, 8063 Moonlight Road

Property Evaluation Status

Property Addresses

Current - 8063 Moonlight Road

County/Independent City(s): Isle Of Wight (County)
Incorporated Town(s): *No Data*
Zip Code(s): 23430
Magisterial District(s): *No Data*
Tax Parcel(s): *No Data*
USGS Quad(s): BACONS CASTLE

Additional Property Information

Architecture Setting: Rural
Acreage: 1.39
Site Description:

May 2023: This house is located in a rural area on the east side of Moonlight Road. The buildings in the immediate vicinity of the house are residential and agricultural, and downtown Alberta is located 7.5-miles southeast of the property. The nearly 1.5-acre property is comprised of grass that spans the majority of the property with a gravel driveway that leads to the rear of the main house from Moonlight Road. Mature trees are dotted throughout the parcel.

Surveyor Assessment:

May 2023: Overall, this property retains a moderate level of integrity. However, his property is an undistinguished example of a mid-twentieth century dwelling. It does not embody distinctive characteristics or possess significant or unique architectural or design features. Furthermore, the building has no significant association or linkage to events or persons of demonstrable significance in the past and does not appear to have the ability to yield important and unique information for research based on physical evidence. This architectural resource is recommended as not eligible for the NRHP under Criteria A, B, C, or D.

Surveyor Recommendation: Recommended Not Eligible

Ownership

Ownership Category	Ownership Entity
Private	*No Data*

Primary Resource Information

Resource Category: Domestic
Resource Type: Single Dwelling
NR Resource Type: Building
Date of Construction: 1973
Date Source: Local Records
Historic Time Period: The New Dominion (1946 - 1991)
Historic Context(s): Domestic
Other ID Number: *No Data*
Architectural Style: Ranch
Form: *No Data*
Number of Stories: 1.0
Condition: Fair
Threats to Resource: None Known
Cultural Affiliations: Indeterminate
Cultural Affiliation Details: *No Data*
Architectural Description:

May 2023: The one-story, cross-gabled Ranch-style house has a rectangular plan and measures five bays wide and two bays deep. The foundation is concrete block and the dwelling is vinyl siding. The roof is composite shingles and has one chimney on the center. The front door is off-centered under a lean-to wood entry porch accessed four wood steps. The windows are all single-hung sash and vary between six-over-six and one-over-one.

Exterior Components

Component	Component Type	Material	Material Treatment
Chimneys	Interior Central	*No Data*	*No Data*
Foundation	English/Raised	Concrete	Block
Porch	Portico/Entry Porch	Wood	Posts
Roof	Cross Gable	Composite	*No Data*
Structural System and Exterior Treatment	Wood Frame	Vinyl	Siding
Windows	Single-hung	*No Data*	*No Data*

Secondary Resource Information

Historic District Information

Historic District Name: *No Data*
Local Historic District Name: *No Data*
Historic District Significance: *No Data*

CRM Events

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: *No Data*
Investigator: Chris Swisher
Organization/Company: Apogee Environmental & Archaeological, Inc.
Photographic Media: Digital
Survey Date: 5/10/2023
Dhr Library Report Number: *No Data*
Project Staff/Notes:
Amanda Commins, Architectural Historian
Project Bibliographic Information:
Historic Architectural Reconnaissance Survey for the Proposed Moonlight Solar Facility in Isle of Wight County, Virginia

Bibliographic Information

Bibliography:
No Data
Property Notes:
No Data

Property Information

Property Names

Name Explanation	Name
Function/Location	Dwelling, 11482 Burwells Bay Road

Property Evaluation Status

Property Addresses

Current - 11482 Burwells Bay Road

County/Independent City(s): Isle Of Wight (County)
Incorporated Town(s): *No Data*
Zip Code(s): 23430
Magisterial District(s): *No Data*
Tax Parcel(s): *No Data*
USGS Quad(s): BACONS CASTLE

Additional Property Information

Architecture Setting: Rural
Acreage: 1.5
Site Description:

May 2023: This house is located in a rural area on the south side of Burwells Bay Road. The buildings in the immediate vicinity of the house are residential and agricultural, and downtown Alberta is located 8-miles southeast of the property. The 1.5-acre property is comprised of grass that spans the majority of the property with a gravel driveway that leads to the rear detached garage and carport from Burwells Bay Road. Mature trees are dotted throughout the parcel.

Surveyor Assessment:

May 2023: Overall, this property retains a moderate level of integrity. However, his property is an undistinguished example of a mid-to-late-twentieth century Ranch. It does not embody distinctive characteristics or possess significant or unique architectural or design features. Furthermore, the building has no significant association or linkage to events or persons of demonstrable significance in the past and does not appear to have the ability to yield important and unique information for research based on physical evidence. This architectural resource is recommended as not eligible for the NRHP under Criteria A, B, C, or D.

Surveyor Recommendation: Recommended Not Eligible

Ownership

Ownership Category	Ownership Entity
Private	*No Data*

Primary Resource Information

Resource Category: Domestic
Resource Type: Single Dwelling
NR Resource Type: Building
Date of Construction: 1969
Date Source: Local Records
Historic Time Period: The New Dominion (1946 - 1991)
Historic Context(s): Domestic
Other ID Number: *No Data*
Architectural Style: Ranch
Form: *No Data*
Number of Stories: 1.0
Condition: Good
Threats to Resource: None Known
Cultural Affiliations: Indeterminate
Cultural Affiliation Details: *No Data*
Architectural Description:

May 2023. The one-story, cross-gabled Ranch-style house has a rectangular plan and measures four bays wide and two bays deep. It rests on a brick foundation and clad in stretcher bond brick. The side-gabled roof is covered with composite shingles and features a brick chimney on the central slope. The front door is off-centered under a partial width posted porch and accessed by two brick steps. The windows are one-over-one single-hung sash with decorative shutters.

Exterior Components

Component	Component Type	Material	Material Treatment
Chimneys	Interior Central	Brick	*No Data*
Foundation	Solid/Continuous	*No Data*	*No Data*
Porch	1-Story Partial Width	*No Data*	Posts
Roof	Cross Gable	Composite	*No Data*
Structural System and Exterior Treatment	Not Visible	Brick	Stretcher Bond
Windows	Single-hung	*No Data*	*No Data*

Secondary Resource Information

Secondary Resource #1

Resource Category: Domestic
Resource Type: Garage
NR Resource Type: Building
Date of Construction: 1969
Date Source: Local Records
Historic Time Period: The New Dominion (1946 - 1991)
Historic Context(s): Domestic
Other ID Number: *No Data*
Architectural Style: No discernible style
Form: *No Data*
Number of Stories: 1.0
Condition: Good
Threats to Resource: None Known
Cultural Affiliations: Indeterminate
Cultural Affiliation Details: *No Data*
Architectural Description:

May 2023: Located in the rear of the property is a two-car garage. The structure has a front-gable composite roof and is clad in vinyl siding. A fixed window with 12 panes is located on the primary facade.

Historic District Information

Historic District Name: *No Data*
Local Historic District Name: *No Data*
Historic District Significance: *No Data*

CRM Events

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: *No Data*
Investigator: Chris Swisher
Organization/Company: Apogee Environmental & Archaeological, Inc.
Photographic Media: Digital
Survey Date: 5/10/2023

Dhr Library Report Number: *No Data*

Project Staff/Notes:

Amanda Commins, Architectural Historian

Project Bibliographic Information:

Historic Architectural Reconnaissance Survey for the Proposed Moonlight Solar Facility in Isle of Wight County, Virginia

Bibliographic Information

Bibliography:

No Data

Property Notes:

No Data

Property Information

Property Names

Name Explanation	Name
Function/Location	Dwelling, 11504 Burwells Bay Road

Property Evaluation Status

Property Addresses

Current - 11504 Burwells Bay Road

County/Independent City(s): Isle Of Wight (County)
Incorporated Town(s): *No Data*
Zip Code(s): 23430
Magisterial District(s): *No Data*
Tax Parcel(s): *No Data*
USGS Quad(s): BACONS CASTLE

Additional Property Information

Architecture Setting: Rural
Acreage: 1
Site Description:

May 2023: This house is located in a rural area on the south side of Burwells Bay Road. The buildings in the immediate vicinity of the house are residential and agricultural, and downtown Alberta is located 8 miles southeast of the property. The 1-acre property is comprised of grass that spans the majority of the property with a gravel driveway that leads to the attached carport and to the rear detached garage from Burwells Bay Road. Mature trees are dotted throughout the parcel.

Surveyor Assessment:

May 2023: Overall, this property retains a moderate level of integrity. However, his property is an undistinguished example of a mid-to-late-twentieth century Ranch. It does not embody distinctive characteristics or possess significant or unique architectural or design features. Furthermore, the building has no significant association or linkage to events or persons of demonstrable significance in the past and does not appear to have the ability to yield important and unique information for research based on physical evidence. This architectural resource is recommended as not eligible for the NRHP under Criteria A, B, C, or D.

Surveyor Recommendation: Recommended Not Eligible

Ownership

Ownership Category	Ownership Entity
Private	*No Data*

Primary Resource Information

Resource Category: Domestic
Resource Type: Single Dwelling
NR Resource Type: Building
Date of Construction: 1973
Date Source: Local Records
Historic Time Period: The New Dominion (1946 - 1991)
Historic Context(s): Domestic
Other ID Number: *No Data*
Architectural Style: Ranch
Form: *No Data*
Number of Stories: 1.0
Condition: Good
Threats to Resource: None Known
Cultural Affiliations: Indeterminate
Cultural Affiliation Details: *No Data*
Architectural Description:

May 2023: The one-story, side-gabled Ranch-style house has a rectangular plan and measures five bays wide and three bays deep. It rests on a brick foundation and clad in vinyl siding. The cross-gabled roof is covered with composite shingles. The front door is off-centered and accessed by three brick steps. The windows are one-over-one single-hung sash with decorative shutters. An attached carport is located off the west elevation.

Exterior Components

Component	Component Type	Material	Material Treatment
Foundation	English/Raised	Brick	*No Data*
Roof	Cross Gable	Composite	*No Data*
Structural System and Exterior Treatment	Not Visible	Brick	Stretcher Bond
Structural System and Exterior Treatment	Not Visible	Vinyl	Siding
Windows	Single-hung	*No Data*	*No Data*

Secondary Resource Information

Secondary Resource #1

Resource Category: Domestic
Resource Type: Garage
NR Resource Type: Building
Date of Construction: 1973
Date Source: Local Records
Historic Time Period: The New Dominion (1946 - 1991)
Historic Context(s): Domestic
Other ID Number: *No Data*
Architectural Style: No discernible style
Form: *No Data*
Number of Stories: 1.0
Condition: Good
Threats to Resource: None Known
Cultural Affiliations: Indeterminate
Cultural Affiliation Details: *No Data*
Architectural Description:

May 2023: Located in the rear of the property is a vinyl sided single garage with attached carport. The roof is front-gable and the carport has a shed roof.

Historic District Information

Historic District Name: *No Data*
Local Historic District Name: *No Data*
Historic District Significance: *No Data*

CRM Events

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: *No Data*
Investigator: Chris Swisher
Organization/Company: Apogee Environmental & Archaeological, Inc.
Photographic Media: Digital
Survey Date: 5/10/2023

Dhr Library Report Number: *No Data*

Project Staff/Notes:

Amanda Commins, Architectural Historian

Project Bibliographic Information:

Historic Architectural Reconnaissance Survey for the Proposed Moonlight Solar Facility in Isle of Wight County, Virginia

Bibliographic Information

Bibliography:

No Data

Property Notes:

No Data

Property Information

Property Names

Name Explanation	Name
Function/Location	Dwelling, 11522 Burwells Bay Road

Property Evaluation Status

Property Addresses

Current - 11522 Burwells Bay Road

County/Independent City(s): Isle Of Wight (County)
Incorporated Town(s): *No Data*
Zip Code(s): 23430
Magisterial District(s): *No Data*
Tax Parcel(s): *No Data*
USGS Quad(s): BACONS CASTLE

Additional Property Information

Architecture Setting: Rural
Acreage: 1
Site Description:

May 2023: This house is located in a rural area on the south side of Burwells Bay Road. The buildings in the immediate vicinity of the house are residential and agricultural, and downtown Alberta is located 8-miles southeast of the property. The 1-acre property is comprised of grass that spans the majority of the property with a gravel driveway that leads to the rear of the main house from Burwells Bay Road. Mature trees are dotted throughout the parcel.

Surveyor Assessment:

May 2023: Overall, this property retains a moderate level of integrity. However, his property is an undistinguished example of a mid-to-late-twentieth century Ranch. It does not embody distinctive characteristics or possess significant or unique architectural or design features. Furthermore, the building has no significant association or linkage to events or persons of demonstrable significance in the past and does not appear to have the ability to yield important and unique information for research based on physical evidence. This architectural resource is recommended as not eligible for the NRHP under Criteria A, B, C, or D.

Surveyor Recommendation: Recommended Not Eligible

Ownership

Ownership Category	Ownership Entity
Private	*No Data*

Primary Resource Information

Resource Category: Domestic
Resource Type: Single Dwelling
NR Resource Type: Building
Date of Construction: 1972
Date Source: Local Records
Historic Time Period: The New Dominion (1946 - 1991)
Historic Context(s): Domestic
Other ID Number: *No Data*
Architectural Style: Ranch
Form: *No Data*
Number of Stories: 1.0
Condition: Good
Threats to Resource: None Known
Cultural Affiliations: Indeterminate
Cultural Affiliation Details: *No Data*
Architectural Description:

May 2023: The one-story, cross-gabled Ranch-style house has a rectangular plan and measures six bays wide and two bays deep. The dwelling i s clad in stretcher bond brick and the roof is covered with composite shingles. The front door is off-centered under the roof slope and accessed by four brick steps. The windows are six-over-six single-hung sash with decorative shutters. The main facade features a single garage.

Exterior Components

Component	Component Type	Material	Material Treatment
Foundation	Not Visible	*No Data*	*No Data*
Roof	Cross Gable	Brick	*No Data*
Structural System and Exterior Treatment	Not Visible	Brick	Stretcher Bond
Windows	Single-hung	*No Data*	*No Data*

Secondary Resource Information

Historic District Information

Historic District Name: *No Data*
Local Historic District Name: *No Data*
Historic District Significance: *No Data*

CRM Events

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: *No Data*
Investigator: Chris Swisher
Organization/Company: Apogee Environmental & Archaeological, Inc.
Photographic Media: Digital
Survey Date: 5/10/2023
Dhr Library Report Number: *No Data*
Project Staff/Notes:
Amanda Commins, Architectural Historian
Project Bibliographic Information:
Historic Architectural Reconnaissance Survey for the Proposed Moonlight Solar Facility in Isle of Wight County, Virginia

Bibliographic Information

Bibliography:
No Data
Property Notes:
No Data

Property Information

Property Names

Name Explanation	**Name**
Function/Location	Dwelling, 12002 Burwells Bay Road

Property Evaluation Status

Property Addresses

Current - 12002 Burwells Bay Road

County/Independent City(s):	Isle Of Wight (County)
Incorporated Town(s):	*No Data*
Zip Code(s):	23430
Magisterial District(s):	*No Data*
Tax Parcel(s):	*No Data*
USGS Quad(s):	BACONS CASTLE

Additional Property Information

Architecture Setting:	Rural
Acreage:	1

Site Description:

May 2023: This house is located in a rural area on the south side of Burwells Bay Road. The buildings in the immediate vicinity of the house are residential and agricultural, and downtown Alberta is located 8-miles southeast of the property. The 1-acre property is comprised of grass that spans the majority of the property with a gravel driveway that leads to the rear of the main house from Burwells Bay Road. Mature trees are dotted throughout the parcel.

Surveyor Assessment:

May 2023: Overall, this property retains a moderate level of integrity. However, his property is an undistinguished example of a mid-to-late-twentieth century Ranch. It does not embody distinctive characteristics or possess significant or unique architectural or design features. Furthermore, the building has no significant association or linkage to events or persons of demonstrable significance in the past and does not appear to have the ability to yield important and unique information for research based on physical evidence. This architectural resource is recommended as not eligible for the NRHP under Criteria A, B, C, or D.

Surveyor Recommendation: Recommended Not Eligible

Ownership

Ownership Category	**Ownership Entity**
Private	*No Data*

Primary Resource Information

Resource Category:	Domestic
Resource Type:	Single Dwelling
NR Resource Type:	Building
Date of Construction:	1973
Date Source:	Local Records
Historic Time Period:	The New Dominion (1946 - 1991)
Historic Context(s):	Domestic
Other ID Number:	*No Data*
Architectural Style:	Ranch
Form:	*No Data*
Number of Stories:	1.0
Condition:	Good
Threats to Resource:	None Known
Cultural Affiliations:	Indeterminate
Cultural Affiliation Details:	*No Data*
Architectural Description:	

May 2023: The one-story, cross-gabled Ranch-style house has a rectangular plan and measures seven bays wide and two bays deep. The dwelling is clad in stretcher bond brick and the roof is covered with composite shingles and features two brick chimneys. The front door is off-centered under the roof slope. The windows are one-over-one single-hung sash with decorative shutters.

Exterior Components

Component	Component Type	Material	Material Treatment
Chimneys	Exterior End	Brick	*No Data*
Foundation	Not Visible	*No Data*	*No Data*
Roof	Cross Gable	Composite	*No Data*
Structural System and Exterior Treatment	Not Visible	Brick	Stretcher Bond
Windows	Single-hung	*No Data*	*No Data*

Secondary Resource Information

Historic District Information

Historic District Name: *No Data*
Local Historic District Name: *No Data*
Historic District Significance: *No Data*

CRM Events

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: *No Data*
Investigator: Chris Swisher
Organization/Company: Apogee Environmental & Archaeological, Inc.
Photographic Media: Digital
Survey Date: 5/10/2023
Dhr Library Report Number: *No Data*
Project Staff/Notes:
Amanda Commins, Architectural Historian
Project Bibliographic Information:
Historic Architectural Reconnaissance Survey for the Proposed Moonlight Solar Facility in Isle of Wight County, Virginia

Bibliographic Information

Bibliography:
No Data
Property Notes:
No Data

Property Information

Property Names

Name Explanation	Name
Function/Location	Dwelling, 12024 Burwells Bay Road

Property Evaluation Status

Property Addresses

Current - 12024 Burwells Bay Road

County/Independent City(s): Isle Of Wight (County)
Incorporated Town(s): *No Data*
Zip Code(s): 23430
Magisterial District(s): *No Data*
Tax Parcel(s): *No Data*
USGS Quad(s): BACONS CASTLE

Additional Property Information

Architecture Setting: Rural
Acreage: 1
Site Description:

May 2023: This house is located in a rural area on the south side of Burwells Bay Road. The buildings in the immediate vicinity of the house are residential and agricultural, and downtown Alberta is located 8-miles southeast of the property. The 1-acre property is comprised of grass that spans the majority of the property with a asphalt driveway that leads to the rear of the main house and curves in front of the property from Burwells Bay Road. Mature trees are dotted throughout the parcel.

Surveyor Assessment:

May 2023: Overall, this property retains a moderate level of integrity. However, his property is an undistinguished example of a mid-to-late-twentieth century Ranch. It does not embody distinctive characteristics or possess significant or unique architectural or design features. Furthermore, the building has no significant association or linkage to events or persons of demonstrable significance in the past and does not appear to have the ability to yield important and unique information for research based on physical evidence. This architectural resource is recommended as not eligible for the NRHP under Criteria A, B, C, or D.

Surveyor Recommendation: Recommended Not Eligible

Ownership

Ownership Category	Ownership Entity
Private	*No Data*

Primary Resource Information

Resource Category: Domestic
Resource Type: Single Dwelling
NR Resource Type: Building
Date of Construction: 1973
Date Source: Local Records
Historic Time Period: The New Dominion (1946 - 1991)
Historic Context(s): Domestic
Other ID Number: *No Data*
Architectural Style: Ranch
Form: *No Data*
Number of Stories: 1.0
Condition: Fair
Threats to Resource: None Known
Cultural Affiliations: Indeterminate
Cultural Affiliation Details: *No Data*
Architectural Description:

May 2023: The one-story, side-gabled Ranch-style house has a rectangular plan and measures seven bays wide and two bays deep. It rests on a concrete foundation and composed of stretcher bond brick. The side-gabled roof is covered with composite shingles. The front door is off-centered and accessed by three brick steps with wood railing. The windows are all two-over-single single-hung sash with decorative shutters.

Exterior Components

Component	Component Type	Material	Material Treatment
Foundation	Slab	Concrete	*No Data*
Roof	Side Gable	Composite	*No Data*
Structural System and Exterior Treatment	Masonry	Brick	*No Data*
Windows	Single-hung	*No Data*	*No Data*

Secondary Resource Information

Secondary Resource #1

Resource Category: Domestic
Resource Type: Garage
NR Resource Type: Building
Date of Construction: 1973
Date Source: Local Records
Historic Time Period: The New Dominion (1946 - 1991)
Historic Context(s): Domestic
Other ID Number: *No Data*
Architectural Style: No discernible style
Form: *No Data*
Number of Stories: 1.0
Condition: Good
Threats to Resource: None Known
Cultural Affiliations: Indeterminate
Cultural Affiliation Details: *No Data*
Architectural Description:

May 2023: Located in the rear of the dwelling is a steep composite shingle front-gabled two-car garage clad in vinyl siding.

Historic District Information

Historic District Name: *No Data*
Local Historic District Name: *No Data*
Historic District Significance: *No Data*

CRM Events

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: *No Data*
Investigator: Chris Swisher
Organization/Company: Apogee Environmental & Archaeological, Inc.
Photographic Media: Digital
Survey Date: 5/10/2023
Dhr Library Report Number: *No Data*
Project Staff/Notes:

Amanda Commins, Architectural Historian

Project Bibliographic Information:
Historic Architectural Reconnaissance Survey for the Proposed Moonlight Solar Facility in Isle of Wight County, Virginia

Bibliographic Information

Bibliography:
No Data

Property Notes:
No Data

Property Information

Property Names

Name Explanation	Name
Function/Location	Dwelling, 12046 Burwells Bay Road

Property Evaluation Status

Property Addresses

Current - 12046 Burwells Bay Road

County/Independent City(s): Isle Of Wight (County)
Incorporated Town(s): *No Data*
Zip Code(s): 23430
Magisterial District(s): *No Data*
Tax Parcel(s): *No Data*
USGS Quad(s): BACONS CASTLE

Additional Property Information

Architecture Setting: Rural
Acreage: 1
Site Description:

May 2023: This house is located in a rural area on the south side of Burwells Bay Road. The buildings in the immediate vicinity of the house are residential and agricultural, and downtown Alberta is located 8-miles southeast of the property. The 1-acre property is comprised of grass that spans the majority of the property with a concrete driveway that leads to the attached garage and rear of the main house from Burwells Bay Road. Mature trees are dotted throughout the parcel.

Surveyor Assessment:

May 2023: Overall, this property retains a moderate level of integrity. However, his property is an undistinguished example of a mid-to-late-twentieth century Ranch. It does not embody distinctive characteristics or possess significant or unique architectural or design features. Furthermore, the building has no significant association or linkage to events or persons of demonstrable significance in the past and does not appear to have the ability to yield important and unique information for research based on physical evidence. This architectural resource is recommended as not eligible for the NRHP under Criteria A, B, C, or D.

Surveyor Recommendation: Recommended Not Eligible

Ownership

Ownership Category	Ownership Entity
Private	*No Data*

Primary Resource Information

Resource Category: Domestic
Resource Type: Single Dwelling
NR Resource Type: Building
Date of Construction: 1970
Date Source: Local Records
Historic Time Period: The New Dominion (1946 - 1991)
Historic Context(s): Domestic
Other ID Number: *No Data*
Architectural Style: Ranch
Form: *No Data*
Number of Stories: 1.0
Condition: Good
Threats to Resource: None Known
Cultural Affiliations: Indeterminate
Cultural Affiliation Details: *No Data*
Architectural Description:

May 2023: The one-story, side-gabled Ranch-style house has a rectangular plan and measures seven bays wide and two bays deep. The dwelling is clad in stretcher bond brick and the side-gabled roof is covered with composite shingles. The front door is centered on the original structure and accessed by four brick brick steps. The windows are single-hung sash and fixed with decorative shutters and vary between eight-over-over and six-over-six. An addition is located on the west elevation and is clad with vinyl siding.

Exterior Components

Component	Component Type	Material	Material Treatment
Chimneys	Interior Slope	Brick	*No Data*
Roof	Side Gable	Composite	*No Data*
Structural System and Exterior Treatment	Not Visible	Brick	Stretcher Bond
Windows	Single-hung	*No Data*	*No Data*
Windows	Fixed	*No Data*	*No Data*

Secondary Resource Information

Historic District Information

Historic District Name: *No Data*
Local Historic District Name: *No Data*
Historic District Significance: *No Data*

CRM Events

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: *No Data*
Investigator: Chris Swisher
Organization/Company: Apogee Environmental & Archaeological, Inc.
Photographic Media: Digital
Survey Date: 5/10/2023
Dhr Library Report Number: *No Data*
Project Staff/Notes:
Amanda Commins, Architectural Historian
Project Bibliographic Information:
Historic Architectural Reconnaissance Survey for the Proposed Moonlight Solar Facility in Isle of Wight County, Virginia

Bibliographic Information

Bibliography:
No Data
Property Notes:
No Data

Property Information

Property Names

Name Explanation	Name
Function/Location	Dwelling, 12064 Burwells Bay Road

Property Evaluation Status

Property Addresses

Current - 12064 Burwells Bay Road

County/Independent City(s): Isle Of Wight (County)
Incorporated Town(s): *No Data*
Zip Code(s): 23430
Magisterial District(s): *No Data*
Tax Parcel(s): *No Data*
USGS Quad(s): BACONS CASTLE

Additional Property Information

Architecture Setting: Rural
Acreage: 1
Site Description:

May 2023: This house is located in a rural area on the south side of Burwells Bay Road. The buildings in the immediate vicinity of the house are residential and agricultural, and downtown Alberta is located 8-miles southeast of the property. The 1-acre property is comprised of grass that spans the majority of the property with a gravel driveway that leads to the rear of the main house from Burwells Bay Road. Mature trees are dotted throughout the parcel.

Surveyor Assessment:

May 2023: Overall, this property retains a moderate level of integrity. However, his property is an undistinguished example of a mid-to-late-twentieth century Ranch. It does not embody distinctive characteristics or possess significant or unique architectural or design features. Furthermore, the building has no significant association or linkage to events or persons of demonstrable significance in the past and does not appear to have the ability to yield important and unique information for research based on physical evidence. This architectural resource is recommended as not eligible for the NRHP under Criteria A, B, C, or D.

Surveyor Recommendation: Recommended Not Eligible

Ownership

Ownership Category	Ownership Entity
Private	*No Data*

Primary Resource Information

Resource Category: Domestic
Resource Type: Single Dwelling
NR Resource Type: Building
Date of Construction: 1963
Date Source: Local Records
Historic Time Period: The New Dominion (1946 - 1991)
Historic Context(s): Domestic
Other ID Number: *No Data*
Architectural Style: Ranch
Form: *No Data*
Number of Stories: 1.0
Condition: Good
Threats to Resource: None Known
Cultural Affiliations: Indeterminate
Cultural Affiliation Details: *No Data*
Architectural Description:

May 2023: The one-story, side-gabled Ranch-style house has a rectangular plan and measures four bays wide and three bays deep. It rests on a brick foundation and clad in stretcher bond brick. The side-gabled roof is covered with composite shingles. The front door is off-centered under a front gabled wood pediment front posted porch and accessed by two brick steps. The windows are six-over-six single-hung sash with decorative shutters. A secondary entry is accessible from the west elevation via a set of wood steps.

Exterior Components

Component	Component Type	Material	Material Treatment
Foundation	Solid/Continuous	*No Data*	*No Data*
Porch	Portico/Entry Porch	*No Data*	Posts
Roof	Side Gable	Composite	*No Data*
Structural System and Exterior Treatment	Masonry	Brick	Stretcher Bond
Windows	Single-hung	*No Data*	*No Data*

Secondary Resource Information

Secondary Resource #1

Resource Category: Domestic
Resource Type: Garage
NR Resource Type: Building
Date of Construction: pre 1994
Date Source: Map
Historic Time Period: Post Cold War (1992 - Present)
Historic Context(s): Domestic
Other ID Number: *No Data*
Architectural Style: No discernible style
Form: *No Data*
Number of Stories: 1.0
Condition: Good
Threats to Resource: None Known
Cultural Affiliations: Indeterminate
Cultural Affiliation Details: *No Data*
Architectural Description:

May 2023: Located in the rear of the dwelling is a two-car garage with a gambrel roof. The structure has vinyl siding and a fixed window on the north elevation.

Historic District Information

Historic District Name: *No Data*
Local Historic District Name: *No Data*
Historic District Significance: *No Data*

CRM Events

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: *No Data*
Investigator: Chris Swisher
Organization/Company: Apogee Environmental & Archaeological, Inc.
Photographic Media: Digital
Survey Date: 5/10/2023
Dhr Library Report Number: *No Data*

Project Staff/Notes:

Amanda Commins, Architectural Historian

Project Bibliographic Information:

Historic Architectural Reconnaissance Survey for the Proposed Moonlight Solar Facility in Isle of Wight County, Virginia

Bibliographic Information

Bibliography:

No Data

Property Notes:

No Data

Property Information

Property Names

Name Explanation	Name
Function/Location	Dwelling, 12078 Burwells Bay Road

Property Evaluation Status

Property Addresses

Current - 12078 Burwells Bay Road

County/Independent City(s): Isle Of Wight (County)
Incorporated Town(s): *No Data*
Zip Code(s): 23430
Magisterial District(s): *No Data*
Tax Parcel(s): *No Data*
USGS Quad(s): BACONS CASTLE

Additional Property Information

Architecture Setting: Rural
Acreage: .95
Site Description:

May 2023: This house is located in a rural area on the far north side of Flat Rock Road. The buildings in the immediate vicinity of the house are residential and agricultural, and downtown Alberta is located 5-miles southeast of the property. The 1.5-acre property is comprised of grass that spans the majority of the property with a long gravel driveway that leads to the carport east of the main house from Flat Rock Road. Mature trees are located throughout the parcel, primarily along the western edge of the parcel's boundary.

Surveyor Assessment:

May 2023: Overall, this property retains a moderate level of integrity. However, his property is an undistinguished example of a mid-twentieth century dwelling. It does not embody distinctive characteristics or possess significant or unique architectural or design features. Furthermore, the building has no significant association or linkage to events or persons of demonstrable significance in the past and does not appear to have the ability to yield important and unique information for research based on physical evidence. This architectural resource is recommended as not eligible for the NRHP under Criteria A, B, C, or D.

Surveyor Recommendation: Recommended Not Eligible

Ownership

Ownership Category	Ownership Entity
Private	*No Data*

Primary Resource Information

Resource Category: Domestic
Resource Type: Single Dwelling
NR Resource Type: Building
Date of Construction: 1971
Date Source: Local Records
Historic Time Period: The New Dominion (1946 - 1991)
Historic Context(s): Domestic
Other ID Number: *No Data*
Architectural Style: Minimal Traditional
Form: *No Data*
Number of Stories: 1.0
Condition: Good
Threats to Resource: None Known
Cultural Affiliations: Indeterminate
Cultural Affiliation Details: *No Data*
Architectural Description:

May 2023. The one-story, side-gabled Minimal Traditional house has a rectangular plan and measures four bays wide and two bays deep. It rests on a concrete block foundation and is clad with horizontal vinyl siding. The side-gabled roof is covered with composite shingles and features one brick chimney on exterior end. The front door is off-centered under a front gabled pediment front posted porch and accessed by four wood steps. The windows are one-over-one double-hung sash and fixed.

Exterior Components

Component	Component Type	Material	Material Treatment
Chimneys	Exterior End	Concrete	*No Data*
Foundation	English/Raised	Concrete	*No Data*
Porch	Portico/Entry Porch	*No Data*	*No Data*
Roof	Side Gable	Composite	*No Data*
Structural System and Exterior Treatment	Masonry	*No Data*	*No Data*
Windows	Double-hung	*No Data*	*No Data*

Secondary Resource Information

Historic District Information

Historic District Name: *No Data*
Local Historic District Name: *No Data*
Historic District Significance: *No Data*

CRM Events

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: *No Data*
Investigator: Chris Swisher
Organization/Company: Apogee Environmental & Archaeological, Inc.
Photographic Media: Digital
Survey Date: 5/10/2023
Dhr Library Report Number: *No Data*
Project Staff/Notes:
Amanda Commins, Architectural Historian
Project Bibliographic Information:
Historic Architectural Reconnaissance Survey for the Proposed Moonlight Solar Facility in Isle of Wight County, Virginia

Bibliographic Information

Bibliography:
No Data
Property Notes:
No Data

Property Information

Property Names

Name Explanation	Name
Function/Location	Dwelling, 9076 Moonlight Road

Property Evaluation Status

Property Addresses

Current - 9076 Moonlight Road

County/Independent City(s): Isle Of Wight (County)
Incorporated Town(s): *No Data*
Zip Code(s): 23430
Magisterial District(s): *No Data*
Tax Parcel(s): *No Data*
USGS Quad(s): BACONS CASTLE

Additional Property Information

Architecture Setting: Rural
Acreage: 34.08

Site Description:

May 2023: This dwelling is located in a rural area on the west side of Moonlight Road. The buildings in the immediate vicinity of the house are residential and agricultural, and downtown Alberta is located 6-miles southeast of the property. The roughly 34-acre property is comprised of farmland and grass that spans the majority of the property. Mature trees border the parcel along the north, south, and west boundaries.

Surveyor Assessment:

May 2023: Overall, this property retains a moderate level of integrity. The exterior alterations, including replacement siding, have diminished this house's integrity of materials. Furthermore, the building has no significant association or linkage to events or persons of demonstrable significance in the past and does not appear to have the ability to yield important and unique information for research based on physical evidence. This architectural resource is recommended as not eligible for the NRHP under Criteria A, B, C, or D.

Surveyor Recommendation: Recommended Not Eligible

Ownership

Ownership Category	Ownership Entity
Private	*No Data*

Primary Resource Information

Resource Category: Domestic
Resource Type: Single Dwelling
NR Resource Type: Building
Date of Construction: 1954
Date Source: Local Records
Historic Time Period: The New Dominion (1946 - 1991)
Historic Context(s): Domestic, Subsistence/Agriculture
Other ID Number: *No Data*
Architectural Style: Ranch
Form: *No Data*
Number of Stories: 1.0
Condition: Good
Threats to Resource: None Known
Cultural Affiliations: Indeterminate
Cultural Affiliation Details: *No Data*

Architectural Description:

May 2023: The one-story, side-gabled Ranch-style house has a square rectangular plan and measures five bays wide and two bays deep. It rests

on a brick foundation and is clad with horizontal vinyl siding. The cross-gabled roof is covered with composite shingles and features one brick chimney on the roof slope. The front door is off-centered and is accessed by two brick and concrete steps under a small gabled awning. The windows are all six-over-six single-hung sash. A wooden deck addition is located at the rear of the property and an attached carport is located on the south elevation.

Exterior Components

Component	Component Type	Material	Material Treatment
Chimneys	Interior Slope	Brick	*No Data*
Foundation	English/Raised	Brick	*No Data*
Porch	Portico/Entry Porch	*No Data*	*No Data*
Roof	Cross Gable	Composite	*No Data*
Structural System and Exterior Treatment	Unknown	Vinyl	*No Data*
Windows	Single-hung	*No Data*	*No Data*

Secondary Resource Information

Secondary Resource #1

Resource Category: Domestic
Resource Type: Garage
NR Resource Type: Building
Date of Construction: pre 1966
Date Source: Map
Historic Time Period: The New Dominion (1946 - 1991)
Historic Context(s): Domestic, Subsistence/Agriculture
Other ID Number: *No Data*
Architectural Style: No discernible style
Form: *No Data*
Number of Stories: 1.0
Condition: Good
Threats to Resource: None Known
Cultural Affiliations: Indeterminate
Cultural Affiliation Details: *No Data*
Architectural Description:

May 2023: Located in the rear of the dwelling is a front-gabled garage with a lean-to addition and flat roof covered porch. The roof is clad in composite shingle and the walls are vinyl siding.

Secondary Resource #2

Resource Category: Domestic
Resource Type: Garage
NR Resource Type: Building
Date of Construction: pre 1989
Date Source: Map
Historic Time Period: The New Dominion (1946 - 1991)
Historic Context(s): Domestic, Subsistence/Agriculture
Other ID Number: *No Data*
Architectural Style: No discernible style
Form: *No Data*
Number of Stories: 1.0
Condition: Fair
Threats to Resource: None Known
Cultural Affiliations: Indeterminate
Cultural Affiliation Details: *No Data*
Architectural Description:

May 2023: Located in the rear of the dwelling is a flat roof garage with a square shape. The roof and siding is standing seam metal and one garage door is located on the west east elevation.

Secondary Resource #3

Resource Category:	Domestic
Resource Type:	Mobile Home/Trailer
NR Resource Type:	Building
Date of Construction:	ca 2008
Date Source:	Map
Historic Time Period:	Post Cold War (1992 - Present)
Historic Context(s):	Domestic
Other ID Number:	*No Data*
Architectural Style:	No discernible style
Form:	*No Data*
Number of Stories:	1.0
Condition:	Fair
Threats to Resource:	None Known
Cultural Affiliations:	Indeterminate
Cultural Affiliation Details:	*No Data*

Architectural Description:

May 2023: Located northwest of the primary dwelling is a secondary mobile home. The rectangular plan is constructed of concrete and aluminum siding with four-over-four single-hung sash windows.

Historic District Information

Historic District Name:	*No Data*
Local Historic District Name:	*No Data*
Historic District Significance:	*No Data*

CRM Events

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number:	*No Data*
Investigator:	Chris Swisher
Organization/Company:	Apogee Environmental & Archaeological, Inc.
Photographic Media:	Digital
Survey Date:	5/10/2023
Dhr Library Report Number:	*No Data*

Project Staff/Notes:

Amanda Commins, Architectural Historian

Project Bibliographic Information:

Historic Architectural Reconnaissance Survey for the Proposed Moonlight Solar Facility in Isle of Wight County, Virginia

Bibliographic Information

Bibliography:

No Data

Property Notes:

No Data

Property Information

Property Names

Name Explanation	Name
Function/Location	Dwelling, 9211 Moonlight Road

Property Evaluation Status

Property Addresses

Current - 9211 Moonlight Road

County/Independent City(s): Isle Of Wight (County)
Incorporated Town(s): *No Data*
Zip Code(s): 23430
Magisterial District(s): *No Data*
Tax Parcel(s): *No Data*
USGS Quad(s): BACONS CASTLE

Additional Property Information

Architecture Setting: Rural
Acreage: 2

Site Description:

May 2023: This dwelling is located in a rural area on the east side of Moonlight Road. The buildings in the immediate vicinity of the house are residential and agricultural, and downtown Alberta is located 6.5-miles southeast of the property. The 2-acre property is comprised of grasses and mature trees that border the entire parcel. A gravel driveway circles the driveway.

Surveyor Assessment:

May 2023: Overall, this property retains a moderate level of integrity. However, his property is an undistinguished example of a early-twentieth century dwelling. It does not embody distinctive characteristics or possess significant or unique architectural or design features. Furthermore, the building has no significant association or linkage to events or persons of demonstrable significance in the past and does not appear to have the ability to yield important and unique information for research based on physical evidence. This architectural resource is recommended as not eligible for the NRHP under Criteria A, B, C, or D.

Surveyor Recommendation: Recommended Not Eligible

Ownership

Ownership Category	Ownership Entity
Private	*No Data*

Primary Resource Information

Resource Category: Domestic
Resource Type: Single Dwelling
NR Resource Type: Building
Date of Construction: 1921
Date Source: Local Records
Historic Time Period: World War I to World War II (1917 - 1945)
Historic Context(s): Domestic
Other ID Number: *No Data*
Architectural Style: Minimal Traditional
Form: *No Data*
Number of Stories: 1.0
Condition: Fair
Threats to Resource: Neglect
Cultural Affiliations: Indeterminate
Cultural Affiliation Details: *No Data*
Architectural Description:

May 2023: The one-story, side-gabled vernacular house has a square plan and measures three bays wide and two bays deep. It rests on a concrete block foundation and is clad with horizontal wood siding. The side-gabled roof is clad in standing seam metal and features two brick chimneys centered on the roof slope and rear shed roof addition. The front door is centered and is accessed by two concrete steps. The windows are all double-hung sash and vary between six-over-six and one-over-one. A shed-roofed extension is located at the rear of the property on the east elevation.

Exterior Components

Component	Component Type	Material	Material Treatment
Chimneys	Interior Slope	Brick	*No Data*
Foundation	English/Raised	Concrete	Block
Porch	Portico/Entry Porch	*No Data*	Posts
Roof	Side Gable	Metal	*No Data*
Structural System and Exterior Treatment	Wood Frame	*No Data*	*No Data*
Windows	Double-hung	*No Data*	*No Data*

Secondary Resource Information

Secondary Resource #1

Resource Category: Agriculture/Subsistence
Resource Type: Barn
NR Resource Type: Building
Not Observed: This resource was not observed during the last survey.
Date of Construction: *No Data*
Date Source: *No Data*
Historic Time Period: *No Data*
Historic Context(s): *No Data*
Other ID Number: *No Data*
Architectural Style: *No Data*
Form: *No Data*
Number of Stories: *No Data*
Condition: *No Data*
Threats to Resource: *No Data*
Cultural Affiliations: *No Data*
Cultural Affiliation Details: *No Data*
Architectural Description:

May 2023: Located in the rear of the main dwelling is a barn not observed from the public ROW. According to maps, it appears to be in fair condition.

Historic District Information

Historic District Name: *No Data*
Local Historic District Name: *No Data*
Historic District Significance: *No Data*

CRM Events

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: *No Data*
Investigator: Chris Swisher
Organization/Company: Apogee Environmental & Archaeological, Inc.
Photographic Media: Digital

Survey Date: 5/10/2023
Dhr Library Report Number: *No Data*
Project Staff/Notes:
Amanda Commins, Architectural Historian
Project Bibliographic Information:
Historic Architectural Reconnaissance Survey for the Proposed Moonlight Solar Facility in Isle of Wight County, Virginia

Bibliographic Information

Bibliography:
No Data
Property Notes:
No Data

Property Information

Property Names

Name Explanation	Name
Function/Location	Dwelling, 9290 Moonlight Road

Property Evaluation Status

Property Addresses

Current - 9290 Moonlight Road

County/Independent City(s): Isle Of Wight (County)
Incorporated Town(s): *No Data*
Zip Code(s): 23430
Magisterial District(s): *No Data*
Tax Parcel(s): *No Data*
USGS Quad(s): BACONS CASTLE

Additional Property Information

Architecture Setting: Rural
Acreage: 9.76
Site Description:

May 2023: This dwelling is located in a rural area on the west side of Moonlight Road. The buildings in the immediate vicinity of the house are residential and agricultural, and downtown Alberta is located 6-miles southeast of the property. The nearly 10-acre property is comprised of grass immediately surrounding the dwelling with mature trees making up the majority of the parcel along the north and west boundaries.

Surveyor Assessment:

May 2023: Overall, this property retains a moderate level of integrity. The exterior alterations, including replacement siding and windows, have diminished this house's integrity of materials. Furthermore, the building has no significant association or linkage to events or persons of demonstrable significance in the past and does not appear to have the ability to yield important and unique information for research based on physical evidence. This architectural resource is recommended as not eligible for the NRHP under Criteria A, B, C, or D.

Surveyor Recommendation: Recommended Not Eligible

Ownership

Ownership Category	Ownership Entity
Private	*No Data*

Primary Resource Information

Resource Category: Domestic
Resource Type: Single Dwelling
NR Resource Type: Building
Date of Construction: 1880
Date Source: Local Records
Historic Time Period: Reconstruction and Growth (1866 - 1916)
Historic Context(s): Domestic, Subsistence/Agriculture
Other ID Number: *No Data*
Architectural Style: Vernacular
Form: *No Data*
Number of Stories: 2.0
Condition: Good
Threats to Resource: None Known
Cultural Affiliations: Indeterminate
Cultural Affiliation Details: *No Data*
Architectural Description:

May 2023: The two-story, cross-gabled ell-style house has a rectangular plan and measures two bays wide and five bays deep. It rests on a raise d foundation and is clad with horizontal vinyl siding. The cross-gabled roof is covered with asphalt shingles and features cornice returns. The front door is located in the ell on the south elevation. The windows are all six-over-six single-hung sash A one-story gabled addition is located in the rear of the property.

Exterior Components

Component	Component Type	Material	Material Treatment
Windows	Single-hung	*No Data*	*No Data*
Structural System and Exterior Treatment	Wood Frame	Vinyl	Siding
Roof	Cross Gable	Asphalt	*No Data*

Secondary Resource Information

Secondary Resource #1

Resource Category: Agriculture/Subsistence
Resource Type: Shed
NR Resource Type: Building
Date of Construction: pre 1966
Date Source: Map
Historic Time Period: Reconstruction and Growth (1866 - 1916)
Historic Context(s): Domestic, Subsistence/Agriculture
Other ID Number: *No Data*
Architectural Style: No discernible style
Form: *No Data*
Number of Stories: 1.0
Condition: Fair
Threats to Resource: Structural Failure
Cultural Affiliations: Indeterminate
Cultural Affiliation Details: *No Data*
Architectural Description:

May 2023: Located adjacent to the main dwelling is a small stone structure used as a storage shed. The gabled roof is standing seam metal.

Secondary Resource #2

Resource Category: Agriculture/Subsistence
Resource Type: Agricultural Outbuildings
NR Resource Type: Building
Not Observed: This resource was not observed during the last survey.
Date of Construction: *No Data*
Date Source: *No Data*
Historic Time Period: *No Data*
Historic Context(s): *No Data*
Other ID Number: *No Data*
Architectural Style: *No Data*
Form: *No Data*
Number of Stories: *No Data*
Condition: *No Data*
Threats to Resource: *No Data*
Cultural Affiliations: *No Data*
Cultural Affiliation Details: *No Data*
Architectural Description:

May 2023: Located in the rear of the main dwelling are a few agricultural outbuildings not observed from the public ROW. According to maps, they appear to be in poor condition and not currently in use.

Historic District Information

Historic District Name: *No Data*
Local Historic District Name: *No Data*
Historic District Significance: *No Data*

CRM Events

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: *No Data*
Investigator: Chris Swisher
Organization/Company: Apogee Environmental & Archaeological, Inc
Photographic Media: Digital
Survey Date: 5/10/2023
Dhr Library Report Number: *No Data*
Project Staff/Notes:
Amanda Commins, Architectural Historian
Project Bibliographic Information:
Historic Architectural Reconnaissance Survey for the Proposed Moonlight Solar Facility in Isle of Wight County, Virginia

Bibliographic Information

Bibliography:
No Data
Property Notes:
No Data

Property Information

Property Names

Name Explanation	Name
Function/Location	Barn, 8462 Moonlight Road

Property Evaluation Status

Property Addresses

Current - 8462 Moonlight Road

County/Independent City(s): Isle Of Wight (County)
Incorporated Town(s): *No Data*
Zip Code(s): 23430
Magisterial District(s): *No Data*
Tax Parcel(s): *No Data*
USGS Quad(s): BACONS CASTLE

Additional Property Information

Architecture Setting: Rural
Acreage: 77

Site Description:

May 2023: This barn is located in a rural area on the far west side of Moonlight Road. The buildings in the immediate vicinity of the house are residential and agricultural, and downtown Alberta is located 6.5-miles southeast of the property. The 77-acre property is comprised of farmland that spans the majority of the property. Mature trees border the parcel along the north, south, and west boundaries.

Surveyor Assessment:

May 2023: Overall, this property retains a high level of integrity. However, his property is an undistinguished example of a mid-twentieth century barn. It does not embody distinctive characteristics or possess significant or unique architectural or design features. Furthermore, the building has no significant association or linkage to events or persons of demonstrable significance in the past and does not appear to have the ability to yield important and unique information for research based on physical evidence. This architectural resource is recommended as not eligible for the NRHP under Criteria A, B, C, or D.

Surveyor Recommendation: Recommended Not Eligible

Ownership

Ownership Category	Ownership Entity
Private	*No Data*

Primary Resource Information

Resource Category: Agriculture/Subsistence
Resource Type: Barn
NR Resource Type: Building
Date of Construction: ca 1950
Date Source: Map
Historic Time Period: The New Dominion (1946 - 1991)
Historic Context(s): Subsistence/Agriculture
Other ID Number: *No Data*
Architectural Style: Vernacular
Form: *No Data*
Number of Stories: 1.0
Condition: Fair
Threats to Resource: Neglect
Cultural Affiliations: Indeterminate
Cultural Affiliation Details: *No Data*
Architectural Description:

May 2023: The one-story, barn has a standing seam metal gambrel roof. The structure is wood-frame and partially clad in painted metal board. A shed roof open porch is located on the north elevation and an enclosed shed roof addition is located on the south elevation.

Exterior Components

Component	Component Type	Material	Material Treatment
Roof	Gambrel	Metal	*No Data*
Roof	Shed	Metal	*No Data*
Structural System and Exterior Treatment	Wood Frame	*No Data*	*No Data*

Secondary Resource Information

Historic District Information

Historic District Name: *No Data*
Local Historic District Name: *No Data*
Historic District Significance: *No Data*

CRM Events

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: *No Data*
Investigator: Chris Swisher
Organization/Company: Apogee Environmental & Archaeological, Inc
Photographic Media: Digital
Survey Date: 5/10/2023
Dhr Library Report Number: *No Data*
Project Staff/Notes:
Amanda Commins, Architectural Historian
Project Bibliographic Information:
Historic Architectural Reconnaissance Survey for the Proposed Moonlight Solar Facility in Isle of Wight County, Virginia

Bibliographic Information

Bibliography:
No Data
Property Notes:
No Data

Appendix B: Principal Author Resume

Amanda Commins
amanda@apogee-environmental.com

Architectural Historian
Mobile: (909) 762-3145

Education

University of California, San Diego, CA (2022)
- Extended Studies, Introduction to NEPA Certification

Savannah College of Art and Design, Savannah, GA (2020)
- Master of Arts, Preservation Design

University of California, Berkeley, CA (2017)
- Bachelor of Arts, Urban Studies
- Minor in Sustainable Design

Professional Affiliations

Amanda Commins specializes in Middle Atlantic architectural history, historic preservation design, and transportation planning. Ms. Commins completed her Master of Arts in Preservation Design at Savannah College of Art and Design in 2020. Her course work included examining global preservation practices, performing historic building surveys, documenting and analyzing the form, material, and condition of building features, and designing adaptive reuse solutions. She has completed 2 Historic American Building Surveys in Washington, DC that provided detailed descriptions of the structures, summaries of their architectural significance, and hand-measured and digital drawings of key architectural features. These surveys were conducted at the former Gate House at Gallaudet University and the former Carriage House at the Old Naval Hospital on Pennsylvania Avenue. She has conducted a historic district survey in the Capitol Hill neighborhood in Washington, DC through an in-depth assessment of 22 contiguous rowhouses. She has completed a National Register of Historic Places nomination form for the Rutherford B. Hayes School in Washington, DC for both its contribution to history as well as significance in architectural design. Ms. Commins has over 2 years of experience in architectural history and exceeds the Professional Qualifications Standards in Architectural History (36 CFR Part 61).

Project Experience

Architectural Historian – Apogee, Inc. – Alexandria, VA
September 2021 – present
- Reconnaissance Architectural Phase IB Survey for Bellflower Solar 3 Project, Brunswick County, VA
- Cultural Resources Assessment for the proposed Stone43 Apartments Multifamily Construction Project, Seattle, WA
- State Level Historic Documentation for Haymond Highway over Elk Creek Bridge Replacement Project, Harrison County, WV
- Reconnaissance Architectural Phase IA Survey for Bellflower Solar Project, Brunswick and Lunenburg Counties, VA
- Architectural Survey and Effects Assessment for Manchester Redevelopment Project, Pittsburgh, PA
- Reconnaissance Architectural Phase IA Survey for Beldale Solar Project, Powhatan County, VA
- Reconnaissance Architectural Phase IA Historic Property Inventory Forms for Wild Hill Solar Project, Jefferson County, WV

Architectural Historian – Commonwealth Heritage Group – Alexandria, VA
May 2021 – September 2021

- Reconnaissance Architectural Survey for Kensington Solar Project, Franklin Township, Columbiana County, OH
- Cultural Resources Survey for American Beech 1 & 2 Solar Addendum, Mineral, VA
- Cultural Resources Survey for the Braddock Road Multimodal Improvements, Fairfax County, VA
- Reconnaissance Architectural Survey, Route 20 & 33 Barboursville Roundabout, Orange County, VA

Distinctive Destinations Marketing Intern – National Trust for Historic Preservation – Washington, DC
January 2020 – May 2020

- Expanded Distinctive Destinations program through outreach to eligible historic sites. Developed marketing campaigns to drive additional visibility for the program. Surpassed goal of 300 participants.

Program Assistant – Union Station Redevelopment Corporation – Washington, DC
January 2019 – May 2019

- Marble Condition Report for Union Station in Washington, DC. Surveyed individual tiles in Main Hall, created a floor plan to indicate areas in need of restoration or replacing, and assisted preservation architect in determining level of repair needed.
- 2nd Century Plan for Union Station in Washington DC. Created comprehensive timeline of station expansion project and compiled key information for environmental review and planning studies.

Transportation Associate – Metro – Los Angeles, CA
January 2018 – August 2018

I-605 Corridor Hot Spots Program in Los Angeles County, California. Developed environmental review documents under the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA).

SR-710 North Project in Los Angeles County, California. Produced list of potential road projects along corridor for increased safety and mobility in the region.

Volunteer Experience

Volunteer – Heurich House Museum – Washington, DC

- Answered questions pertaining to the history of the house and monitored historic art and interior furniture during major events (2 months)

Educational Course Work

Undergraduate Course Work

University of California, Berkeley, CA

Urban Studies (Major)	Sustainable Design (Minor)
Planning for Sustainability	People and the Environment
Global Cities	Environmental Science
Design and Activism	Food and the Environment
History of Architecture	Environmental Philosophy & Ethics
Intro to Transportation Planning	Cultural Resource Management
Urban Design	Sustainable Landscapes

APOGEE

Graduate Course Work

Savannah College of Art and Design, Savannah, GA

Preservation Design (Core)
Digital Foundations
Practicing Preservation in a Global Context
Style and Elegance in the Classical Tradition
Defining Place: Research and Survey
Preservation Through Public Policy
Construction Technology and Assessment
Conserving the Built Environment
Entrepreneurship for Community Revitalization
Adapting Existing Buildings

University of California, San Diego, CA

Introduction to NEPA

Appendix C: DHR Project Communications

COMMONWEALTH of VIRGINIA

Travis A. Voyles
Secretary of Natural and Historic Resources

Department of Historic Resources
2801 Kensington Avenue, Richmond, Virginia 23221

Julie V. Langan
Director
Tel: (804) 367-2323
Fax: (804) 367-2391
www.dhr.virginia.gov

August 16, 2023

Garrett Silliman
Apogee
1493 Butler Plank Road, Suite 6
Glenshaw, Pennsylvania 15116

RE- Moonlight Solar Facility
Isle of Wight County, VA
DHR File No. 2023-4075

Dear. Mr. Silliman

We have received for review two reports, *Phase IB Archaeological Survey for the Proposed Moonlight Facility, Isle of Wight County, Virginia,* and *Phase I Historic Architecture Survey and Effects Assessment for the Proposed Moonlight Solar Facility, Isle of Wight County, Virginia* prepared by Apogee Environmental & Archaeological, Inc. (Apogee) on behalf of Timmons Group Inc in support of an application to the Department of Environmental Quality for a Permit-by-Rule application to construct and operate a small solar project in Isle of Wight County. Our comments are provided as technical assistance to DEQ. We have not been notified by any Federal agency of their involvement in this project; however, we reserve the right to provide additional comment pursuant to the National Historic Preservation Act, if applicable.

Archaeology

The report documents an archaeological survey of 516.9 acres for Moonlight Solar Facility. During the course of the survey, Apogee identified five archaeological sites (44IW0390, 44IW0391, 44IW0392, 44IW0393, and 44IW0394). Site 44IW0390 is a mid-19th to early-20th century domestic trash scatter. site 44IW0391 is a low-density artifact scatter dating to the mid- to late-19th century. Site 44IW0392 and 44IW0393 are a low-density artifact scatters dating to the mid-19th to mid-20th century potentially associated with the agricultural structure across Moonlight Road. Site 44IW0394 is a late-19th to early-20th century domestic artifact scatter. Apogee recommends that all five sites (**44IW0390, 44IW0391, 44IW0392, 44IW0393,** and **44IW0394)** are *not eligible* for listing the National Register of Historic Places (NRHP). No additional work is recommended for the project area. DHR agrees with these recommendations.

Please revise the VCRIS forms to remove the temporary site names (e.g. Apogee 1). Please submit comb-bound hard copies of the report.

Historic Architecture

Apogee identified a total of twenty-one (21) historic architectural resources. Eleven (11) previously recorded resources were identified within the 0.5-mile buffer. Of the eleven (11) resources, nine (9) had been surveyed within the past 5 years. The remaining two (2) previously recorded resources and nineteen (19) newly identified resources were surveyed. Apogee recommends none of the surveyed resources as eligible for listing in the National Register of Historic Places (NRHP) and Virginia Landmarks Register (VLR) and DHR concurs. See the attached table for details.

If you have any questions regarding these comments, please contact me at 804-482-8091 or via email, jennifer.bellville-marrion@dhr.virginia.gov.

Sincerely,

Jenny Bellville-Marrion
Project Review Archaeologist
Review and Compliance Division

Cc: Chris Egghart, DEQ
Amber Foster, DEQ

DHR ID #	Resource Name	Apogee Eligibility	DHR Eligibility	Apogee Impact	DHR Impact
046-0063	House	Not Eligible	Not Eligible	N/A	N/A
046-5144	House	Not Eligible	Not Eligible	N/A	N/A
046-5721	House	Not Eligible	Not Eligible	N/A	N/A
046-5722	House	Not Eligible	Not Eligible	N/A	N/A
046-5723	House	Not Eligible	Not Eligible	N/A	N/A
046-5724	House	Not Eligible	Not Eligible	N/A	N/A
046-5725	House	Not Eligible	Not Eligible	N/A	N/A
046-5726	House	Not Eligible	Not Eligible	N/A	N/A
046-5727	House	Not Eligible	Not Eligible	N/A	N/A
046-5728	House	Not Eligible	Not Eligible	N/A	N/A
046-5729	House	Not Eligible	Not Eligible	N/A	N/A
046-5780	House	Not Eligible	Not Eligible	N/A	N/A
046-5781	House	Not Eligible	Not Eligible	N/A	N/A
046-5783	House	Not Eligible	Not Eligible	N/A	N/A
046-5784	House	Not Eligible	Not Eligible	N/A	N/A
046-5785	House	Not Eligible	Not Eligible	N/A	N/A
046-5786	House	Not Eligible	Not Eligible	N/A	N/A

TABLE KEY:	Warrants Mitigation	Needs Attention	DHR does not concur

Western Region Office
962 Kime Lane
Salem, VA 24153
Tel: (540) 387-5443
Fax: (540) 387-5446

Northern Region Office
5357 Main Street
PO Box 519
Stephens City, VA 22655
Tel: (540) 868-7029
Fax: (540) 868-7033

Eastern Region Office
2801 Kensington Avenue
Richmond, VA 23221
Tel: (804) 367-2323
Fax: (804) 367-2391

APOGEE
Environmental & Archaeological, Inc.

PHASE IB ARCHAEOLOGICAL SURVEY FOR THE PROPOSED MOONLIGHT SOLAR FACILITY ISLE OF WIGHT COUNTY, VIRGINIA

Prepared For
Timmons Group, Inc.
1001 Boulders Parkway, Suite 300
Richmond, VA 23225

Prepared By
Apogee Environmental & Archaeological, Inc.
6425 Living Place, Suite 200
Pittsburgh, PA 15206
Apogee Project No. 23-1188.01

Garrett Silliman, RPA
Principal Investigator

David S. Hanley, MA, RPA
Field Director

Lead Agency
Virginia Department of Environmental Quality
DHR File No. 2023-4075

June 2023 (Finalized August 2023)

Abstract

On behalf of Timmons Group, Inc. (Timmons), Apogee Environmental & Archaeological, Inc. (Apogee) conducted a Phase IB archaeological survey for the proposed Moonlight Solar Facility in Isle of Wight County, Virginia. The Phase IB survey serves as a secondary step in meeting compliance requirements for the Virginia Department of Environmental Quality (DEQ). All activities were conducted in accordance with the Virginia Department of Historic Resources (DHR), as published in *Guidelines for Conducting Historic Resources Survey in Virginia* (2017).

The project consists of the development of a solar energy facility located approximately 5.2 miles northwest of Smithfield, Virginia, situated west and south of the intersection between Moonlight Road and Burwells Bay Road. The archaeological area of potential effects (APE) contains parcels of mixed-use rural land totaling 516.9 acres (209.2 hectares). A desktop analysis cultural resources assessment was conducted in March 2023. The Phase I cultural resources survey was conducted between April 17th and May 5th, 2023.

As a result of the archaeological survey, Apogee identified five archaeological sites (44IW0390, 44IW0391, 44IW0392, 44IW0393, and 44IW0394) and 22 isolated artifacts. All archaeological resources identified during the survey have been recommended as not eligible for the National Register of Historic Places. Therefore, no further work is recommended.

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1.0 INTRODUCTION TO THE PROJECT

On behalf of Timmons Group, Inc. (Timmons), Apogee Environmental & Archaeological, Inc. (Apogee) conducted a Phase IB archaeological survey for the proposed Moonlight Solar Facility in Isle of Wight County, Virginia. The cultural resources survey serves as a secondary step in meeting compliance requirements for the Virginia Department of Environmental Quality (DEQ). All activities were conducted in accordance with the Virginia Department of Historic Resources (DHR), as published in *Guidelines for Conducting Historic Resources Survey in Virginia* (2017).

The project consists of the development of a solar energy facility located approximately 5.2 miles northwest of Smithfield, Virginia. Figure 1 depicts the project area on the Bacons Castle, VA and Runnymede, VA USGS 7.5-minute topographic quadrangles. The archaeological area of potential effects (APE) contains parcels of mixed-use rural land totaling 516.9 acres (209.2 hectares). Timmons will only be utilizing 323.6 acres (130.9 hectares) of the property (Figure 1). A Phase IA reconnaissance survey was conducted in March 2023 to develop appropriate methodology for the Phase I survey. The Phase IB survey was conducted starting in April 2023 and concluded in May 2023.

From April 17th to May 5th, 2023, Apogee personnel, under the direction of David Hanley, Registered Professional Archaeologist (RPA), conducted a Phase IB archaeological investigation including systematic shovel testing, judgmental shovel testing, and systematic pedestrian survey within the combined 516.9-acre area of investigation. A total of 999 shovel tests were excavated across the different sections of the APE. As a result of the archaeological survey, Apogee identified five archaeological sites (44IW0390, 44IW0391, 44IW0392, 44IW0393, and 44IW0394) and 22 isolated artifacts.

Garrett Silliman, RPA, served as Principal Investigator and was responsible for project management, report writing, and research design. David Hanley, RPA, was responsible for leading fieldwork, artifact analysis, and was report co-author. Resumes for key project staff are provided in Appendix B.

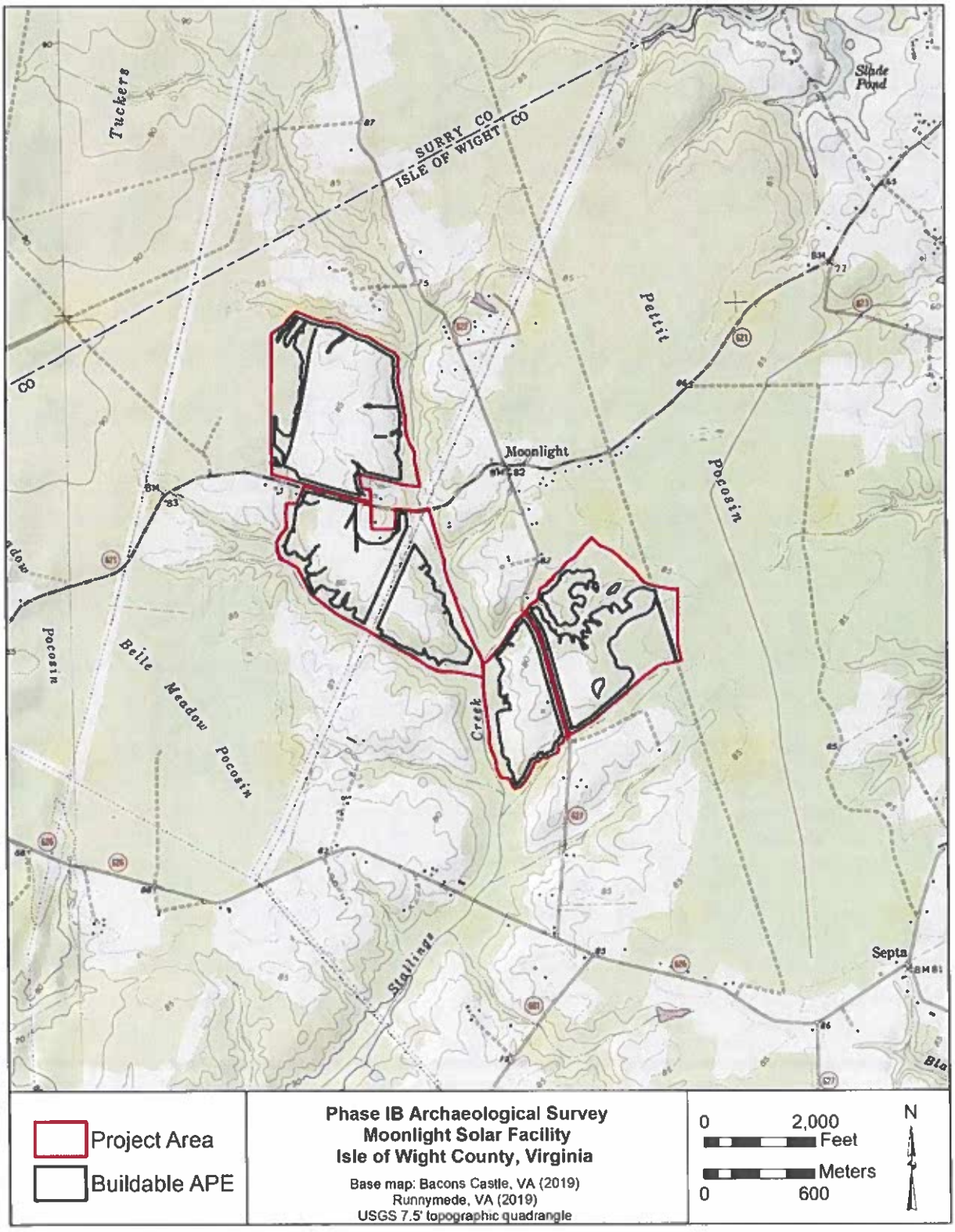

Figure 1: Project area depicted on USGS 7.5-minute topographic quadrangle.

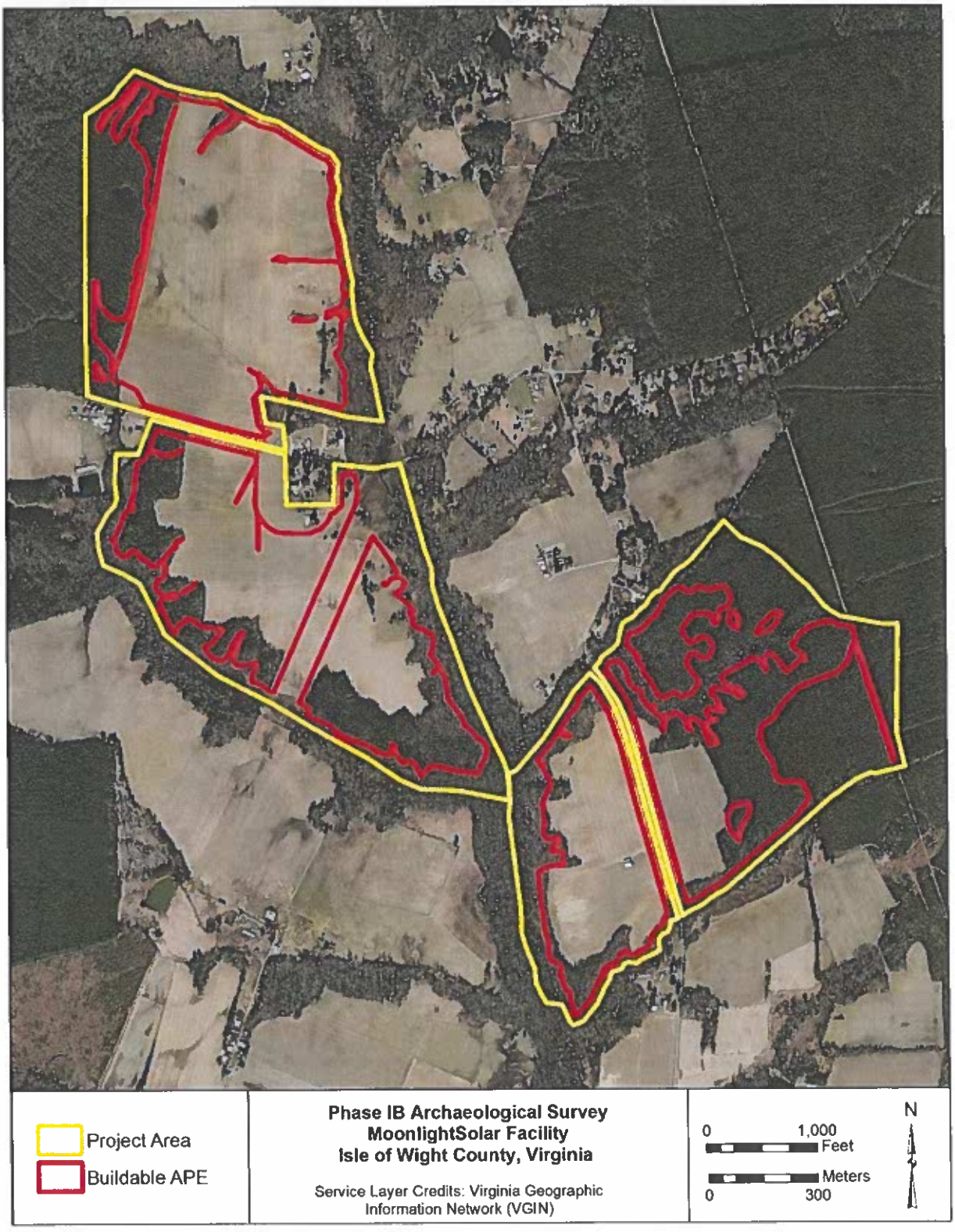

Figure 2: Project area depicted on modern aerial imagery.

2.0 RESEARCH DESIGN

2.1 Archaeology

Apogee utilized a staged approach to develop an archaeological probability model for the project area according to DHR guidance. First, the environmental setting of the project area was reviewed to identify areas with contributing factors to archaeological site probability (e.g., well-drained alluvial soils, stream confluences, etc.) and those that reduce the potential for encountering archaeological sites (e.g., slope, poor soil drainage, observable ground disturbances, etc.). Following the review of the environmental setting, investigators conducted a literature review including an overview of regional history/prehistory, and the identification of previously recorded cultural resources within or immediately adjacent to the project area.

A site visit was then conducted to observe the present conditions at key locales selected during background research. Areas within the project area selected for a site visit consisted of those with a high potential to contain archaeological resources, previously recorded cultural resources, historic buildings and structures identified on historic maps, and past ground disturbance. Photographs were taken at each locale and throughout the project area to document the landscape. Limited shovel testing was also conducted to observe and record soil profiles within the project area. Cylindrical shovel test pits (STPs) 38 cm (15 in) in diameter were excavated by natural stratigraphic sequence 10 cm (4 in) into sterile subsoil. All soils were screened through 1/4-in hardware cloth. Notes on all STPs were recorded and included information on survey/site/transect identification and location, either a profile drawing or detailed description of strata, soil types, Munsell descriptions, depth measurement, and a list of artifacts (both those kept and discarded). The environmental conditions under which any testing strategy was employed were also noted (for example, adverse weather, condition of ground surface, etc.).

Results from the site visit were then considered with the results of the desktop assessment to develop an archaeological probability model. A four-tiered archaeological probability scheme was used categorize all areas within the project area based on similar projects completed in the past. The following four probability tiers will be used: 1) *High Probability*; 2) *Medium Probability*; 3) *Low Probability*; and 4) *Visual Inspection Only* (DEQ 2018).

> ***High Probability*** designation is typically assigned to locations that exhibit multiple, independent site predictive attributes, or locations where map or other historic documents suggest the presence of archaeological resources.
>
> ***Medium Probability*** can be assigned to areas that do not exhibit specific site predictive attributes but also do not contain site limiting environmental conditions. Examples could include broad, undifferentiated upland terraces well removed from water and/or historic transportation corridors.
>
> ***Low Probability*** can be assigned to areas that have site potential limiting characteristics such as slope or slow soil drainage but with these conditions not so pronounced or widespread as to preclude the possibility of intact archaeological resources being present.

Visual Inspection Only (or similar terminology) areas exhibit characteristics such as slope, poor soil drainage or disturbance as to reasonably preclude the possibility intact archaeological resources being present.

Once the probability assessment was completed for the project area, recommendations for Phase IB archaeological survey methodology were developed based on the four probability tiers above. Full shovel test coverage at 50-foot intervals is required for *High Probability* areas (DEQ 2018). *Medium probability* areas require a shovel test sampling strategy at a rate of approximately 25 percent, with *Low Probability* areas at approximately 10 percent sampling coverage. Areas designated as *Visual Inspection Only* need not be shovel tested but should be subject to a walkover visual inspection.

As a result of the Phase IA survey (Silliman et al. 2023), Moonlight consists of 176.92 acres of high probability areas, 135.23 acres of medium probability areas, 60.77 acres of low probability areas, and 143.98 acres of visual inspection only (Figure 3).

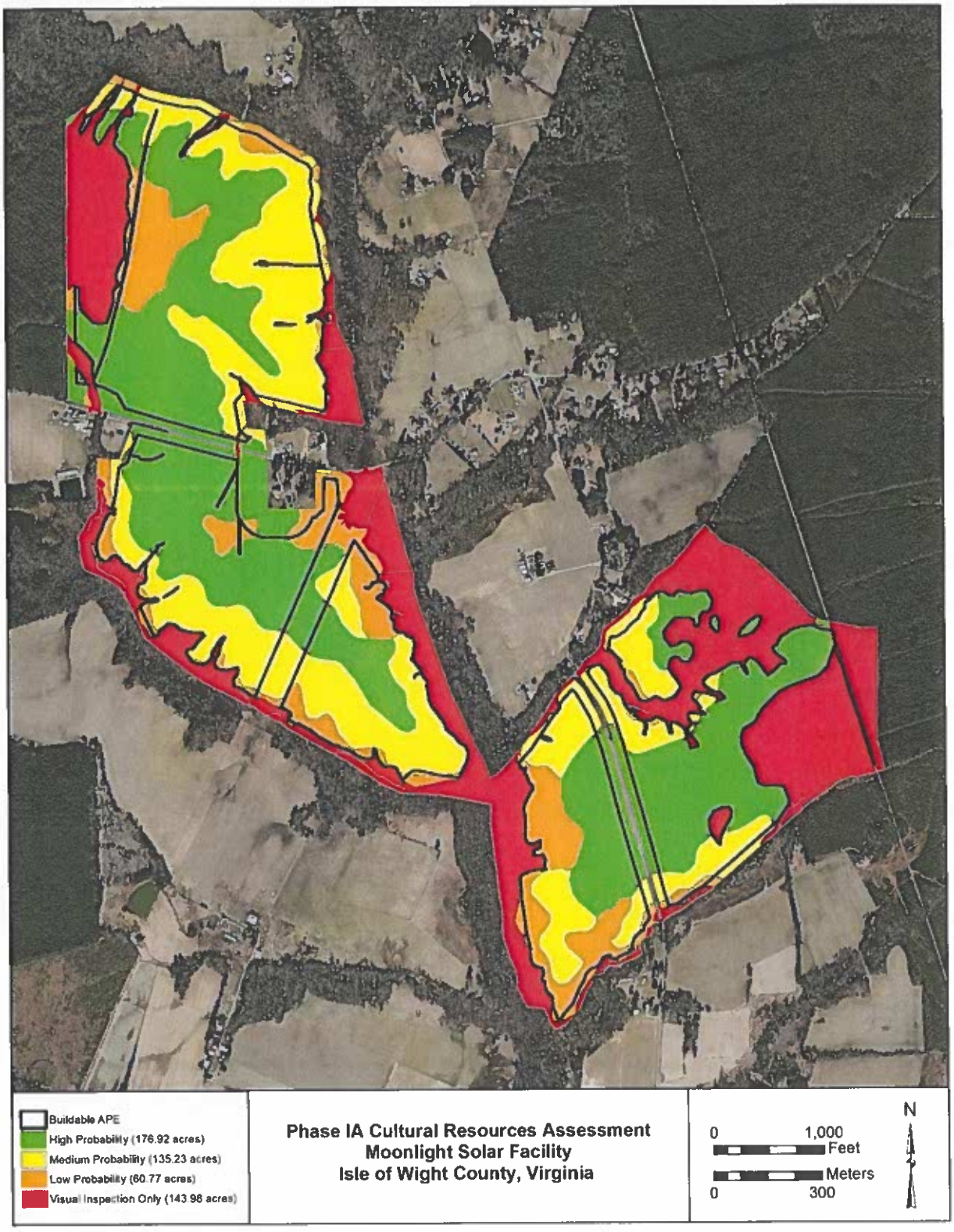

Figure 3: Results of Phase IA Archaeological Probability Assessment for Moonlight.

3.0 ENVIRONMENTAL CONTEXT

This section of the report describes the present environment of the project area as well as the major environmental factors influencing the selection of appropriate archaeological survey methods utilized.

3.1 Physiography and Geology

The project area is situated in southeastern Virginia within the Coastal Plain physiographic province, also known as the Coastal Lowland subregion. The Coastal Plain is bound by the Fall Zone and Piedmont to the west, and by the Atlantic coastline to the east. The Coastal Lowland subregion topography is characterized as a terrace landscape that descends eastward towards the coast and the major rivers, with a sedimentary wedge that thickens as you get closer to the coastline (CMW 2021). The project area lies atop portions of rock formations running west to east. Much of the project area lies atop the Windsor Formation, a Tertiary-Quaternary-aged formation composed of gravel and sand. (DGMR 2021). Vein quartz, composed of silica dioxide deposits commonly found as transparent vitreous veins within igneous rock outcrops (i.e., granite) on the ground surface, is the most common lithic material found in the region which was utilized by precontact peoples in the Coastal Plain and beyond (DHR 2018).

3.2 Hydrology

The project area is located within the Blackwater (Albemarle-Chowan) River Basin. The Blackwater basin drains 741.64 square miles of southeastern Virginia. Within and immediately adjacent to the project area are a series of streams mapped in the National Hydrography Dataset (NHD), including Stallings Creek. These waterways meet Blackwater River approximately 8.7 miles to the southwest.

3.3 Soils

According to the USDA Web Soil Survey, there were eight soil types identified within the project area (Figure 3, Table 1) (USDA 2023). Two soil types have a greater potential to contain archaeologically sensitive stratigraphy due to its location on flat floodplains and stream terraces: Slagle fine sandy loam (18A) and Yemassee fine sandy loam (23). Slagle fine sandy loam, 0 to 2 percent slopes, is formed in loamy marine deposits and located on marine terraces and uplands. The Slagle fine sandy loam soil series makes up about 27.9% of the soils within project area. A typical soil profile for 18A consists of a H1 with 0 to 13 inches of fine sandy loam, a H2 with 13 to 25 inches of sandy clay loam, and a H3 with 25 to 60 inches of sandy clay loam, with a depth to water table at 18 to 36 inches. Yemassee fine sandy loam, 0 to 2 percent slopes, is also formed in loamy marine deposits and located marine terraces and uplands. The Yemassee fine sandy loam soil series makes up about 16.3% of the soils within the project area. A typical soil profile for 23 consists of a H1 with 0 to 10 inches of fine sandy loam, a H2 with 10 to 52 inches of sandy clay loam, and a H3 with 52 to 60 inches of fine sandy loam, with a depth to water table at 12 to 18 inches.

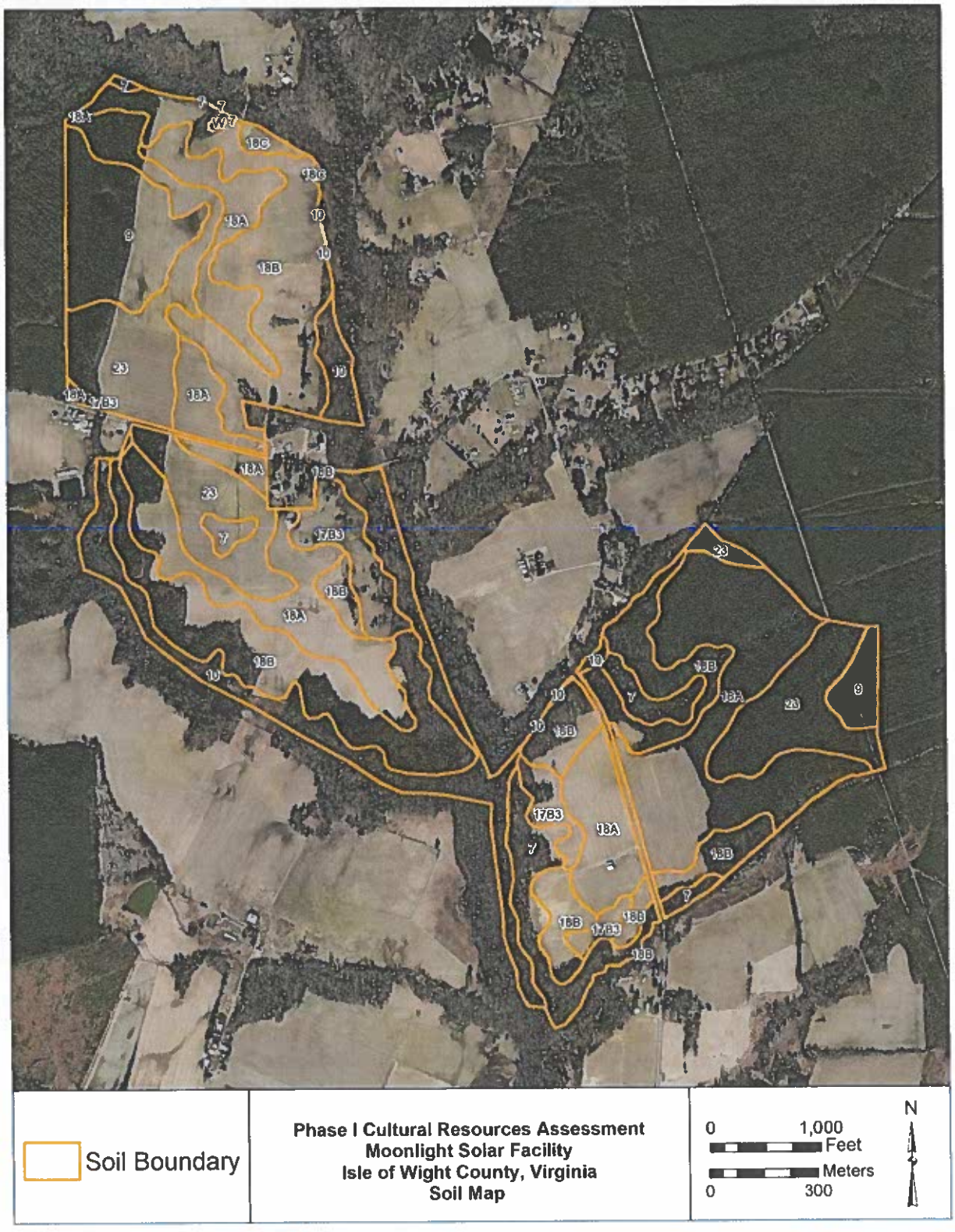

Figure 4: Soil types identified within the project area.

Table 1: Soil Types Identified within Project Area.

Map Unit Symbol	Map Unit Name	Acres in Project Area	Percent of Project Area
7	Kinston loam	28.7	5.6%
9	Myatt fine sandy loam	36.4	7.0%
10	Nawney loam	50.2	9.7%
17B3	Slagle sandy loam, 2 to 6 percent slopes, severely eroded	22.9	4.4%
18A	Slagle fine sandy loam, 0 to 2 percent slopes	144.2	27.9%
18B	Slagle fine sandy loam, 2 to 6 percent slopes	147.5	28.5%
18C	Slagle fine sandy loam, 6 to 10 percent slopes	2.5	0.5%
23	Yemassee fine sandy loam	84.2	16.3%
W	Water	0.4	0.1%
	Totals for Area of Interest	516.9	100.0%

3.1 Prehistoric Environment

Since the last glacial maximum episode of the Pleistocene Epoch and the arrival of humans in North America, there have been significant oscillations in regional climate that have affected the occupation and settlement patterns of prehistoric peoples. During the last glacial maximum, mixed conifer/northern hardwood forest was prevalent throughout much of the continent. This forest type contained hemlocks, pines, spruces, firs, oaks, birches, elms, ashes, ironwood, maples and beeches (Grayson and Meltzer 2003). However, as temperatures warmed and glaciers retreated during the Late Pleistocene, there was a general change from boreal forest towards mixed conifer/northern hardwood forest (Anderson 2001). During the Terminal Pleistocene around 10,900 B.C., a rapid shift towards glacial conditions occurred throughout the northern hemisphere. This abrupt cooling event, called the Younger Dryas Cold Episode, quickly heralded the extinction of mega-fauna in the Americas (Anderson 2001). The Early Holocene Climatic Episode, starting at approximately 9,300 B.C., began a period of rapid warming with the proliferation of mesic deciduous woodlands in North America (Anderson 2001). The mid-Holocene interval, also referred to as the Hypsithermal Climatic Episode, began around 7,000 B.C. This period brought about conditions that were generally dryer and warmer than the present day. This drier weather resulted in more prairie vegetation and greater local climatic variability (Anderson 2001). During the Hypsithermal Climatic Episode, prairie grasses and vegetation including xeric oak and hickory species typified the local floral assemblage (Grayson and Meltzer 2003). The Late Holocene Climatic Episode, beginning at approximately 3,000 B.C., heralded a climate like our present-day condition with modern deciduous forests (Anderson 2001).

3.2 Current Land Use

The project area is located within the Rolling Coastal Plain ecoregion (65m) (Woods et al. 1998). The topography of the ecoregion is a dissected portion of the Inner Coastal Plain featuring rolling hills made up of sedimentary rock. Natural soils for the ecoregion support forests filled with oak, hickory, and pine. It is believed these forests are the original forest cover as well. Dominant land use within the region is split between forestry and agriculture. Within the project area, most forested areas have been logged and replanted cyclically as tree farms. Much of the project area is agricultural fields with some pine tree farms along the edges of the project areas. The agricultural fields had a cover crop present during the field visit. Some intermittent less densely

forested areas are also present near waterways. An overhead electric line cuts through one of the project parcels and Stallings Creek are present in the northern edge and center of the project area. These conditions were observed during Apogee's background research and field visit.

As part of Apogee's investigation of current land use and terrain, LiDAR data was studied. These data were accessed via the Isle of Wight County's online mapping resources and downloaded for comparison with the proposed project's boundaries. LiDAR data were imported as hillshade modeling based on elevation to capture potential subtleties of landform variation or potential manmade features (Figure 5). These data indicate a series of level/leveled landforms flanked by creeks and intermittent streams, which represent the agricultural fields (and former agricultural fields) and the stream or wetland boundaries that align with the project/survey limits. Roads, consistent with those observed in the field, are present as are the outlines of buildings located outside of the parcel boundaries.

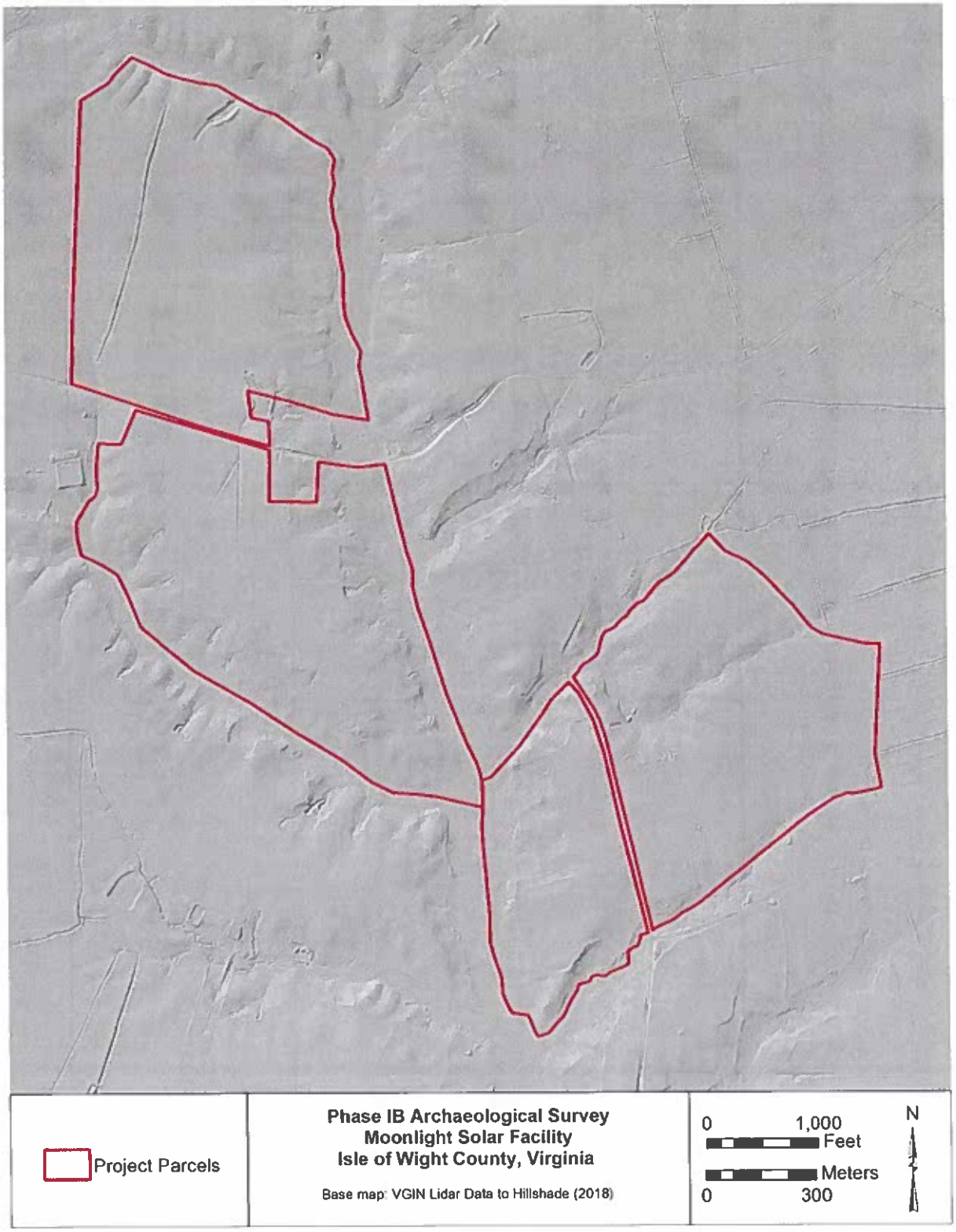

Figure 5: LiDAR data as hillshade, showing project area.

4.0 LITERATURE REVIEW

This section provides a literature review of the regional prehistory and history, results of the Virginia Cultural Resource Information System (V-CRIS) file review, and historic map research.

4.1 Literature Review

This literature review summarizes the prehistory and history of Virginia. It provides details on the six major time periods documented by the Virginia Department of Historic Resources (DHR): Early Hunters and Dispersed Foragers, Sedentary Foragers, Farmers, European Contact and Historic Period.

The project area is located within the Southern Coastal Plain geographical and cultural region of Virginia as defined by VDHR's Regional Boundaries and Differences: Geography and Culture map (2017). This region is bound by the Atlantic Ocean/Chesapeake Bay to the east, the Virginia-North Carolina border to the south, the Fall Line to the west, and the Northern Coastal Plain to the north (VDHR 2017: 101-102). The Southern Coastal Plain features the earliest European settlement in Virginia: the colony at Jamestown founded in 1607. From here, European colonists would move westward throughout the 17th century using the region's many rivers. Due to the self-sufficient nature of the Southern Coastal Plain's plantations in the 17th century, there were very few central town centers until the mid-18th century.

Below is an outline of a partial account primarily based on archaeological data. After first arriving in Virginia in 1607, European colonists started moving along the many rivers in the Southern Coastal Plain into the western portions of the region (VDHR 2017: 101). Due to the self-sufficient nature of the Southern Coastal Plain's plantations in the 17th century, there were very few central town centers until the mid-18th century. This region was settled both for its agricultural potential, but also for its industrial potential and access to the Atlantic Ocean.

Early Hunters and Dispersed Foragers

Paleoindian Period (ca. 15000 to 8000 B.C.)

This period marks the end of the last glacial episode in the late Pleistocene Period and the transition into the Holocene Period in Virginia (Custer 1990). Due to the cool temperatures, the Paleoindian Period is marked by a mobile, hunting and gathering adaptation, known primarily as big game hunters of now-extinct megafauna. The Paleoindian tool kit is heavily defined by chipped stone fluted points of local material known as Clovis points, which focused on procurement and processing of megafauna (Custer 1990). During this almost six thousand years long period, there is a consistent settlement practice of small familial bands following alongside game movements. A very small number of Paleoindian sites have been encountered in modern day Virginia (VDHR 2017: 107). One consideration for the area is the use of overhangs as shelter as well as temporary camps (Custer 1990). The small number of Paleoindian sites is likely attributed to the age of the sites as well as low population density (VDHR 2017: 107).

Despite the scarcity of Paleoindian sites in Virginia, there are three significant site complexes in Virginia: Flint Run in Warren County, Williamson in Dinwiddie County, and Cactus Hill in Sussex County (VDHR 2017: 107; Gardner 1983; Peck 2010; Hranicky 2010). The Williamson and Cactus

Hill sites are both located within the Southern Coastal Plain. Within the Flint Run site complex, the Thunderbird and Fifty sites provide the complex with its chronological order (Gardner 1983:49). By using these three sites, archaeologists were able to create the "Flint Run Lithic Deterministic Model," a model that helps understand settlement strategies of Paleoindian groups (Anderson and Sassaman 1996:23). According to the model, high-quality lithic material was the main factor in the settlement patterns of Paleoindian and Early Archaic Indigenous groups. Another factor that contributed to Paleoindian and Early Archaic settlement patterns was food collection. These two factors help explain why many Paleoindian sites are located in floodplains or adjacent alluvial fans (Turner 1989).

Fluted point concentrations have been recorded in the Southern Coastal Plain region of Virginia, which has been attributed to local outcrops of chert, jasper, and chalcedony (Turner 1989). The end of the Paleoindian period and the transition to the Early Archaic period is traditionally seen through the change from fluted points to unfluted, triangular points.

Early Archaic and Middle Archaic Period (8000 to 2500 B.C.)

The Early Archaic period marks a shift in the types of lithic points that were produced as well as a drastic shift in environment. The once cool temperatures receded and were replaced by a warm and dry climate. The hunting lifestyle shifted to include gathering of fruit and nuts, and the extinction of megafauna led to the hunting of smaller game, for which a smaller toolkit became necessary (Custer 1990). While there are drastic environmental changes during the Early Archaic period, the tool kits, settlement patterns, and subsistence patterns of the Indigenous groups is very similar to those used during the Paleoindian Period. This is consistent with the fact that many of the Paleoindian sites in Virginia also have an Early Archaic component (Gardner 1983; Peck 2010; Hranicky 2010).

As populations responded to the dramatic changes to the plant and animal communities of the early Holocene, small mobile groups developed a more diversified subsistence strategy. As a result, the Archaic tool kit also diversifies. More plant processing tools are encountered, including grinding stones, and mortars and pestles. Another shift includes an increase in group size, but the locational pattern stays relatively the same.

There are a limited number of Archaic sites located in Virginia (Custer 1990, Egloff and Woodward 2006). This could be a result of many sites being inundated by changing sea levels over time, but it could also be a symptom of the low population density during the period (Turner 1989; Gardner 1989). It could also be symptomatic of poor survey coverage as Custer (1990) suggests. The currently available data suggest Archaic settlements were usually associated with freshwater wetlands, bogs, and swamps (Custer 1990). Custer (1990) also proposes that the rapid rise in sea level during the Early and Middle Archaic may have not allowed coastal resources to have been as rich with shellfish beds as they were at later times.

Sedentary Foragers

Late Archaic, Early and Middle Woodland Period (2500 B.C to 900 A.D.)

The Late Archaic Period, while marked by distinctive projectile point types, does not differ much to the adaptations of the Middle Archaic period. The primary attributes of the Late Archaic period are small groups, non-sedentary settlement patterns, infrequent aggregation phases, and minimal regional integration or interaction (Mouer 1991:10). Sites during the Late Archaic period seem to

differ greatly depending upon their location in either upland of near river settings (Mouer 1991). The Woodland Period correlates to a pronounced warm and dry period in the region, where this climatic alteration with increasing sea levels creates extensive brackish marshes along the coast. In addition to the dramatic climatic changes, Woodland settlements become larger and start to congregate along major river floodplains and estuaries, and the construction of homes correlates with a sedentary lifestyle (Klein and Klatka 1991). With an overall tendency of increases in population densities, there is an increased efficient utilization of horticulture. The Woodland tool kit continues to utilize chipped stone tools and plant processing tools like in the Archaic, but now starts to incorporate non-local lithic raw materials that indicate larger interaction spheres.

Due to increased success in food production and incorporation of storage containers, such as ceramics, there is corresponding proliferation in social development and the beginnings of ranked societies around 1200 B.C. From the Late Archaic through the Middle Woodland Periods, the archaeological record in Virginia also corroborates the appearance and general incorporation of agricultural practices with a general trend towards larger village sizes and population growth. This corresponding increase in population size was similarly witnessed in the overall larger sizes of coeval base camps and seasonal camps compared to previous periods. These larger overall trend in sites' sizes could be the result of an initial fissioning of these bourgeoning large populations into smaller, more manageable groups versus the proliferation of social complexity to compensate for unsustainable densities and the additional energy to maintain it. This period may also be characterized by rock shelter and small camp sites (Egloff and Woodward 2006, VP 2015).

Ceramics found from the Early Woodland Period in the Coastal Plain province include Bushnell Ware, Croaker Landing Ware, Ware Plain, and Waterlily Ware (Egloff and Potter 1982). Bushnell Ware is one of the earliest pottery types in Virginia, dating to between 1200 and 1000 BCE (DHR 2020). This ware type has a schist temper with smooth surfaces. Croaker Landing Ware usually has a clay or grog temper with smoothed surfaces that features some cord markings on its surface. Ware Plain is a crushed-quartz temper that typically does not have any exterior decoration. Waterlily Ware is a shell-tempered ware that usually has a bumpy exterior surface.

Wares that were found in the Coastal Plain include Accokeek Ware, Chesterfield Ware, Mockley Ware, Prince George Ware, Stony Creek Ware, and Varina Ware (Egloff and Potter 1982). Accokeek Ware is a sand-tempered or crushed-quartz tempered ware with cord-marked exterior surfaces (DHR 2020). Chesterfield Ware is sand-tempered that is usually knotted-net or cord-marked. Mockley Ware is shell-tempered with net-impressed and cord-marked surfaces that have a clayey texture. Prince George Ware is characterized by either a pebble-tempered or sand-and-pebble-tempered paste and is infrequently decorated. When decorated, there are usually cord marks, net marks, or fabric impressions. Stony Creek Ware is a sand-tempered ware that sometimes features a cord-marked surface. Varina Ware is made of a very coarse sand-temper and is usually knotted-net marked.

Farmers

Late Woodland (A.D. 900 to 1600)

The Late Woodland period is characterized by large villages with incredibly organized social, economic, and political structures, as such, the material culture expanded immensely to include a wide variety of pottery, lithic and bone tools, and jewelry made from shell and copper (Turner 1992). This period is also characterized by an increased dependence upon agricultural practices. However, the reliance on agriculture led to greater population growth, larger villages, and an

increase in social complexity. Burial practices became more elaborate, and different areas began developing distinct identities. Farming became a main source of food, with the three main crops being beans, corn, and squash. Site types for this period include large settlements, burial mounds, and camps (Egloff and Woodward 2006).

Ceramics in Virginia during this period become more localized, which is consistent with the increased evidence of territorial behaviors (Turner 1992). Ceramics commonly found in this province during the Late Woodland Period are Branchville Ware, Hercules Ware, Potomac Creek Ware, and Townsend Ware (DHR 2020). Branchville Ware is tempered with small quartzite granules and can be fabric-impressed, cord-marked, simple-stamped, or plain. Hercules Ware, commonly seen as a late Middle Woodland or early Late Woodland pottery, is tempered with quartz, granite, and gneiss and has a wicker-fabric-impressed surface. Potomac Creek Ware is tempered with either crushed quartz or fine to medium grain sand that can be elaborately cord-decorated beneath their rims. Townsend Ware is a shell-tempered ware with a silty paste and a fabric impressed exterior surface.

European Contact

Contact Period (A.D. 1600 to 1800)

After A.D. 1600, the native cultural groups and their lifeways become heavily influenced by European economies, diseases, and technology. The Contact Period is poorly understood as there are very few archaeological sites dating to that period in the region. The settlement distribution and pattern would have been like the Woodland Period, with a general decrease in population sizes. The period ended with the almost extinction of the native population by early European explorers and illnesses. Some examples of site types may include battlefields and mass graves (Egloff and Woodward 2006).

Brunswick County Historic Period

Settlement to Society (1607 to 1750)

Prior to its establishment, the area now known as Isle of Wight County was once home to many Native American tribes that settled along the James River. The Warraskoyak are the first documented Indigenous group to make contact with European settlers. European settlers at the Jamestown settlement first made contact with the Warraskoyak in 1607 after crossing the James River in search of food (Boddie 1973). In 1632, English colonists constructed a fort in order to defend their settlements from Native American and Spanish attackers (Isle of Wight County Museum 2014). This fort, first known as The Castle, was later expanded during the Revolutionary War and was renamed Fort Boykin.

In 1634, Isle of Wight County was officially established under the name Warraskoyak Shire as one of the eight shires first established by the English. The initial population was approximately 522 people (Boddie 1973; Morrison 2001). In 1637, Warraskoyak Shire was renamed Isle of Wight County after the English island (Isle of Wight County 2023) (Figure 6). In 1674, Isle of Wight County gained a portion of the now extinct Nansemond County (Boddie 1973; Morrison 2001). However, the current boundary of the county was not set until 1732 when a considerable portion was added to neighboring Brunswick County, which was subsequently turned into Southampton County in 1748 (Morrison 2001)

Since its founding, Isle of Wight County largely exhibits rural character and encompasses approximately 350 square miles (Morrison 2001). Many streams and roads intersect the county with an east/west connecting road playing a significant role in the area's history as it controlled access to Richmond via the James River. The county's location along the James River also demonstrates why the first English plantations were constructed within the county and mainly grew tobacco.

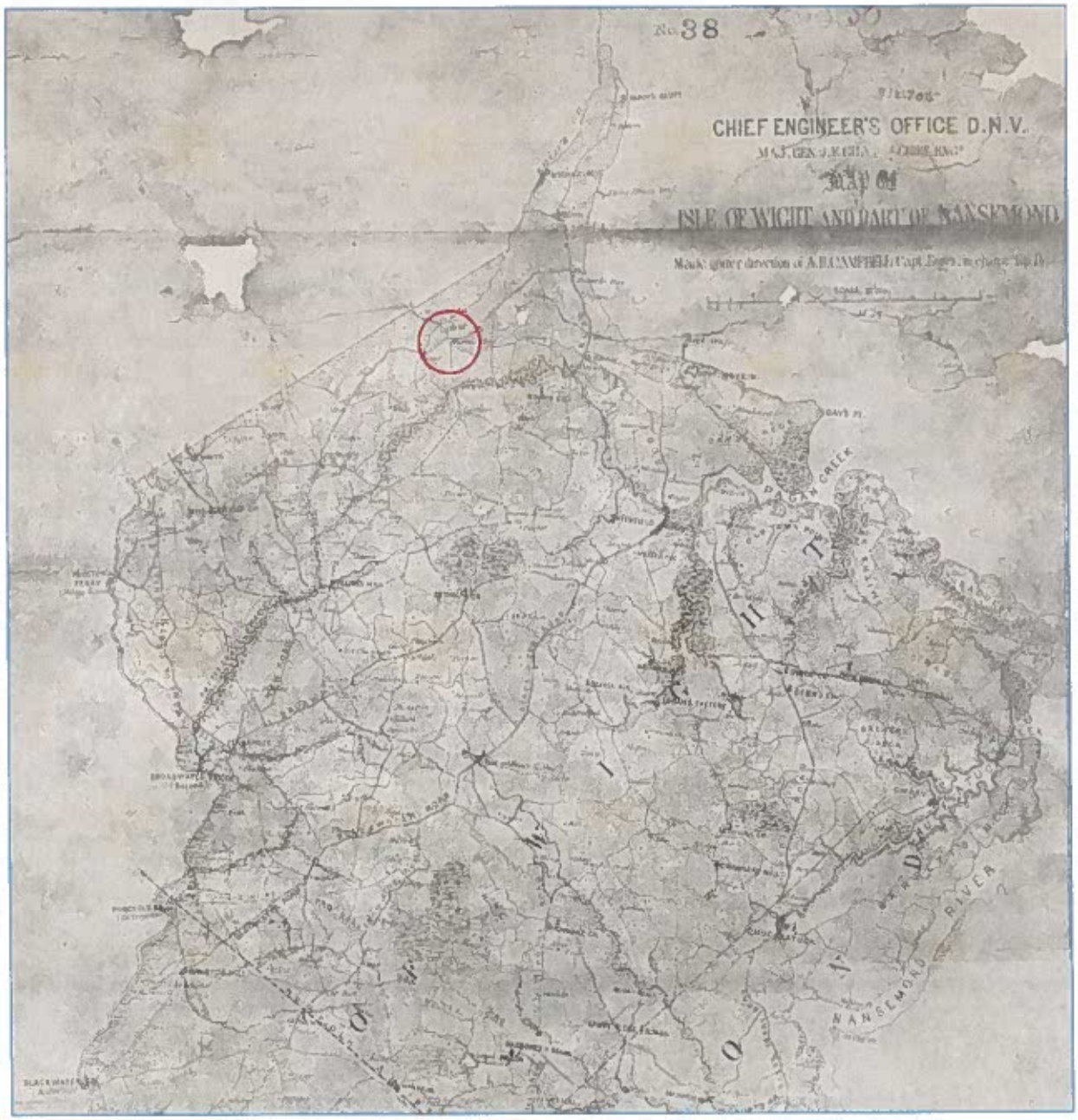

Figure 6: A map of Isle of Wight County showing the general location of the project area (Selection from Campbell et al 1864).

Colony to Nation (1750 to 1789)

The Isle of Wight County courts were established in 1751 in Smithfield through the appointment of eight justices (Morrison 2001). Four of these judges could make up a court and were required to meet monthly. This would continue until the county courts were abolished in the 1902 constitution when the judicial power of counties was given to circuit courts. The following year, Smithfield officially became an incorporated town and is still the largest town in the county. The original courthouse and its associated tavern, The Smithfield Inn, are still standing today.

While there were no official Revolutionary War battles fought within Isle of Wight County, its residents served in the Continental Army and the county's location allowed it to serve as an important place for commerce and agriculture (Morrison 2001). During the Revolutionary War, British troops raided Smithfield in an effort to destroy country records (Morrison 2001). The wife of Mr. Francis Young, an officer in the Continental Army, was able to remove the records prior to the raid. The records were hidden until the British forces surrendered at Yorktown. In March of 1782, the county court made an order describing the county's location and how its inhabitants have been strongly impacted by the invading British forces (Morrison 2001). The proximity to British landing caused a great strain on the county's militia as they were forced to be on constant duty due to threat of attack. However, no significant battles were fought within the county.

Antebellum Period (1789 to 1860)

At the beginning of the 19th century, Isle of Wight County saw its economic impact shift away from tobacco farming towards other crops such as cotton, wheat, and corn (Morrison 2001). Its location along the James River also allowed the county to begin building ships, though not at the scale of nearby coastal cities such as Norfolk. The economic focus on agriculture required the use of plantations which heavily utilized slave labor.

While Isle of Wight County is situated close to the coastline of Virginia, it played a minor role during the War of 1812 (Morrison 2001). During the war, the county mainly served as a defensive position to protect access to Richmond via the James River with Fort Boykin, which was refortified during the war (Isle of Wight County Museum 2014). While the county is located along the James River with access to Richmond, no battles were fought within the county's borders. The county helped finance the United States forces to fend off British invaders as well as supplied troops.

Leading up to the Civil War, Isle of Wight County's wealthy plantation owners and politicians heavily supported the continuation of slavery in the United States (Morrison 2001). However, the county's Quaker population supported the abolitionist movement. Leading up to Virginia seceding from the Union and joining the Confederate States of America, a vote was held in Isle of Wight County to determine if the county wanted to secede or remain with the Union. Among the 861 registered voters in the county, every vote went in favor of secession (Morrison 2001).

The county's population during this time period rose from 9,028 in 1790 up to 9,977 in 1860 with the highest population being 10,517 in 1830 (USCB). This rise in population led the county to move the courthouse to a more central location within Smithfield (Morrison 2001). The new courthouse, constructed in 1800, along with its associated tavern (Boykin's Tavern) are still standing.

Civil War (1860 to 1865)

During the Civil War, the James River served as the backbone for supplies to get from the Atlantic coast to the Confederate capital of Richmond. Isle of Wight County's Location between Norfolk and Richmond required Confederate forces to construct earthwork fortifications in order to efend against Union naval attacks on supply runners (Morrison 2001). Part of these new fortifications were centered around Fort Boykin and also led to the construction of Fort Huger, named after the commander of the Confederate States' Army's Department of Norfolk Major General Benjamin Huger (Morrison 2001).

Unlike previous wars, Isle of Wight County was home to many skirmishes and battles. On May 8th, 1862, a Union flotilla bombarded Fort Boykin and forced Confederate troops to abandon the structure. The Union boats continued up the James River and bombarded Fort Huger to the point where Confederate soldiers needed to abandon the structure as well. After the Union discovered Fort Boykin was empty, Confederate forces took Fort Boykin back as a signaling station and served as a key piece in the communication line between Richmond and the Atlantic coast (Isle of Wight County Museum 2014).

The most significant Civil War battle to take place in Isle of Wight County is the Battle of Smithfield. On January 31, 1864, Union forces sailed up the Pagan River to investigate Confederate activity (Isle of Wight County Museum 2014). After engaging in a small skirmish, Union forces went back to Smithfield to leave the area. However, the Union gunboat departed without the shore party, leaving the Union troops to camp on shore for the night. This led to a three-hour-long skirmish to break out along Main Street on February 1 that resulted in Confederate forces destroying the Union gunboat *Smith-Briggs* and capturing the Union forces before they could retreat.

A noteworthy regiment of the Virginia Infantry is the 61st regiment. While the regiment formed in Petersburg under the command of Lieutenant Colonel Samuel H. Wilson, F Company was known as the "Isle of Wight Avengers" (Isle of Wight County Museum 2014).

Reconstruction and Growth (1866 to 1917)

The economic impact of a shift from agriculture to industry continued in Isle of Wight County. This shift was helped with the completion of the James River Bridge (US-17) in 1928, which connected Isle of Wight County to Newport News (Kozel 2004). The construction of this bridge allowed people and goods to gain easier access to Isle of Wight County via a road instead of the most direct route being via boat up the James River.

Economic growth also came when Joseph W. Luter Sr. and Jr. founded Smithfield Packing Company in Smithfield, Virginia in 1936 (now known as Smithfield Foods, Inc.) (Smithfield Foods 2023). The founding of Smithfield Packing Company led to an influx of job opportunities for the county's residents and is still the county's main job supplier today. The still present agricultural industry paired with the growing Smithfield Packing Company allowed Isle of Wight County to provide the United States military with supplies during World War I and especially World War II.

World War I to World War II (1917-1945)

In 1920, nearly five million pounds of tobacco were produced in the area. In addition to tobacco, the raising of chickens and dairy products represented a major sector of the agrarian based economy. Brunswick thrived prior to the Great Depression, continuing as a major market center for the rich agricultural areas evidenced by the tobacco warehouses, cotton gins, and creameries

(Brunswick County 2018). However, the population of the county steadily declined over the next forty years with the number of farms also declining.

New Dominion (1945-Present)

From 1975 to 1982, the James River Bridge was replaced with a wider four lane bridge in order to accommodate the traffic going between Smithfield and Newport News (Kozel 2004). In 1982, the Nansemond River Bridge opened, which allowed for residents of Isle of Wight County to have easier access to the independent city of Suffolk. This bridge crosses over the Nansemond River and is a part of US-17, the same US highway as the James River Bridge.

As of the 2020 United States Census, there were 38,606 people living in the county, up from 14,906 people back in 1950 (USCB). The growth of Smithfield Foods and the easier access to cities like Newport News, Norfolk, and Suffolk are likely key contributors to the large population growth in Isle of Wight County. It is estimated that of this population, 69.5% were White, 23% were Black or African American, 4.2% were Hispanic or Latino, 1.1% were Asian, 0.5% were Native American or Native Alaskan, and 2.8% were of two or more races (USCB).

4.2 Previous Investigations

Apogee conducted a file review via the Virginia Cultural Resource Information System (V-CRIS) website in January 2022 (Figure 7). According to the V-CRIS record search, there are no previously recorded archaeological sites, one previous Phase I archaeological survey (Table 2), and 11 previously recorded architectural resources (Table 3) within a half-mile radius of the project area.

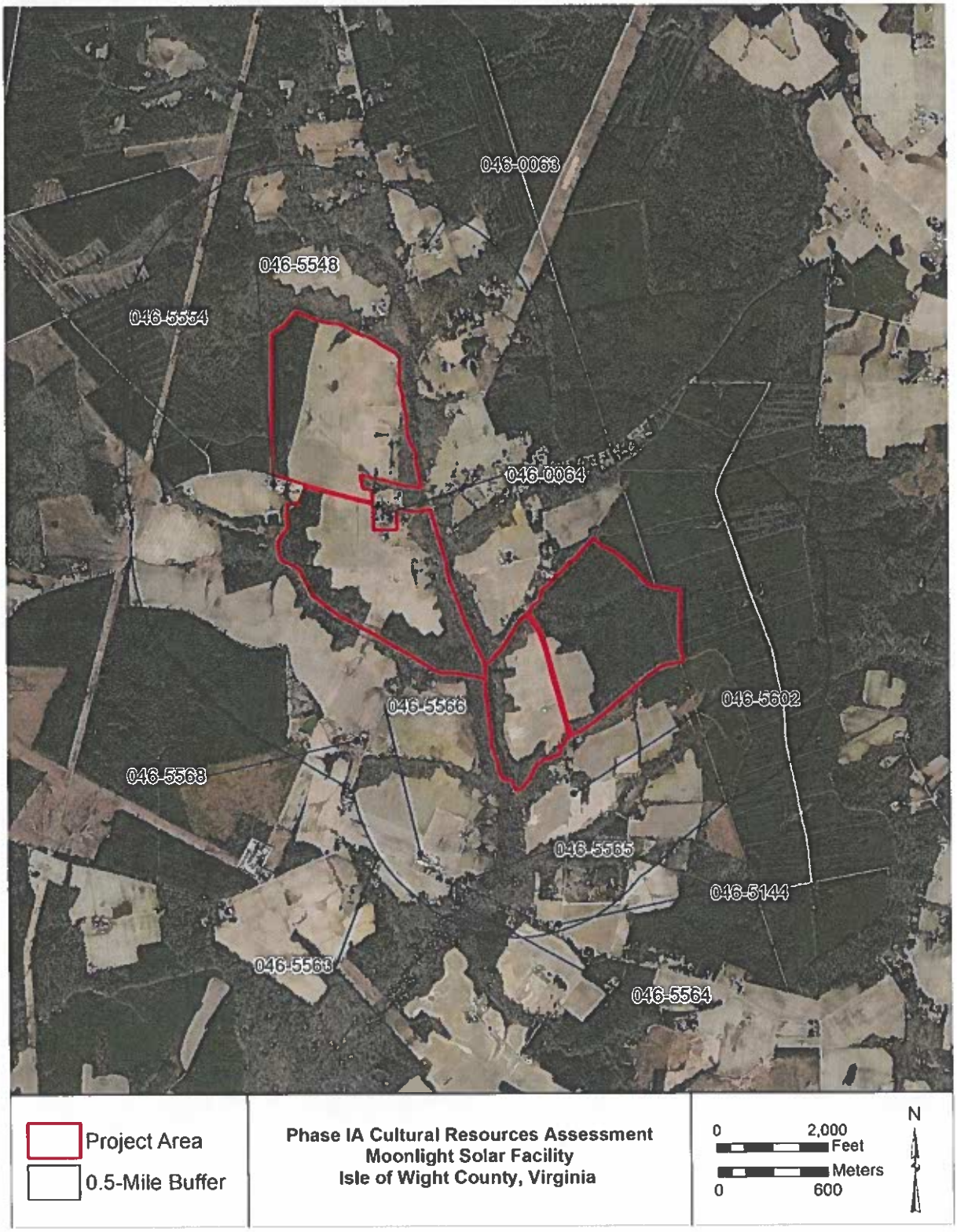

Figure 7: V-CRIS resources map within 0.5-mile buffer of Project Area.

Table 2: Previously Phase I Archaeological Surveys within 0.5-mile Buffer of Current Project.

Survey Year	Report Title	Author(s)	Company	Location Relative to APE
2020	Phase I Cultural Resource Survey of the +/- 2,106.02-Hectare (+/-5.204.1-Acre) Cavalier Solar Study Area, Isle of Wight and Surry Counties, Virginia	Hope Smith and Dara Friedberg	Dutton and Associates	outside

Table 3: Previously Recorded Architectural Resources within 0.5 miles of Project Area.

DHR ID	Site Name	NRHP Evaluation	Location Relative to APE
046-0063	House, Route 627	DHR Staff: Not Evaluated	outside
046-0064	Carroll Plantation (Current/Historic)/Gary Carroll House (Historic)	DHR Staff: Eligible	outside
046-5144	Dwelling, 9346 Moonlight Road	DHR Staff: Not Evaluated	outside
046-5548	Dwelling, 10522 Burwells Bay Road	DHR Staff: Not Eligible	outside
046-5554	Dwelling, 10338 Burwells Bay Road	DHR Staff: Not Eligible	outside
046-5563	Dwelling, 11128 Mill Swamp Road	DHR Staff: Not Eligible	outside
046-5564	Dwelling, 11292 Mill Swamp Road	DHR Staff: Not Eligible	outside
046-5565	Dwelling, 11301 Mill Swamp Road	DHR Staff: Not Eligible	outside
046-5566	Dwelling, 11231 Mill Swamp Road	DHR Staff: Potentially Eligible	outside
046-5568	Dwelling, 11128 Mill Swamp Road	DHR Staff: Not Eligible	outside
046-5602	Jordan Cemetery	DHR Staff: Not Evaluated	outside

4.3 Historic Map Review

A review of historic USGS topographic quadrangle maps was conducted to identify any potential historic resources within or adjacent to the project area. The earliest available topographic quadrangle depicting the project area is the Yorktown, VA (1907) USGS 1:62,500 scale quadrangle, on which three historic properties are depicted within the project area (Figure 8). These structures are present on both the 1907 and 1943 Yorktown, VA 1:62,500 scale quadrangle maps. Only one structure is present within the project area on the most recent historic topographic map: Bacons Castle, VA (1969) 1:24,000 quadrangle map (Figure 9).

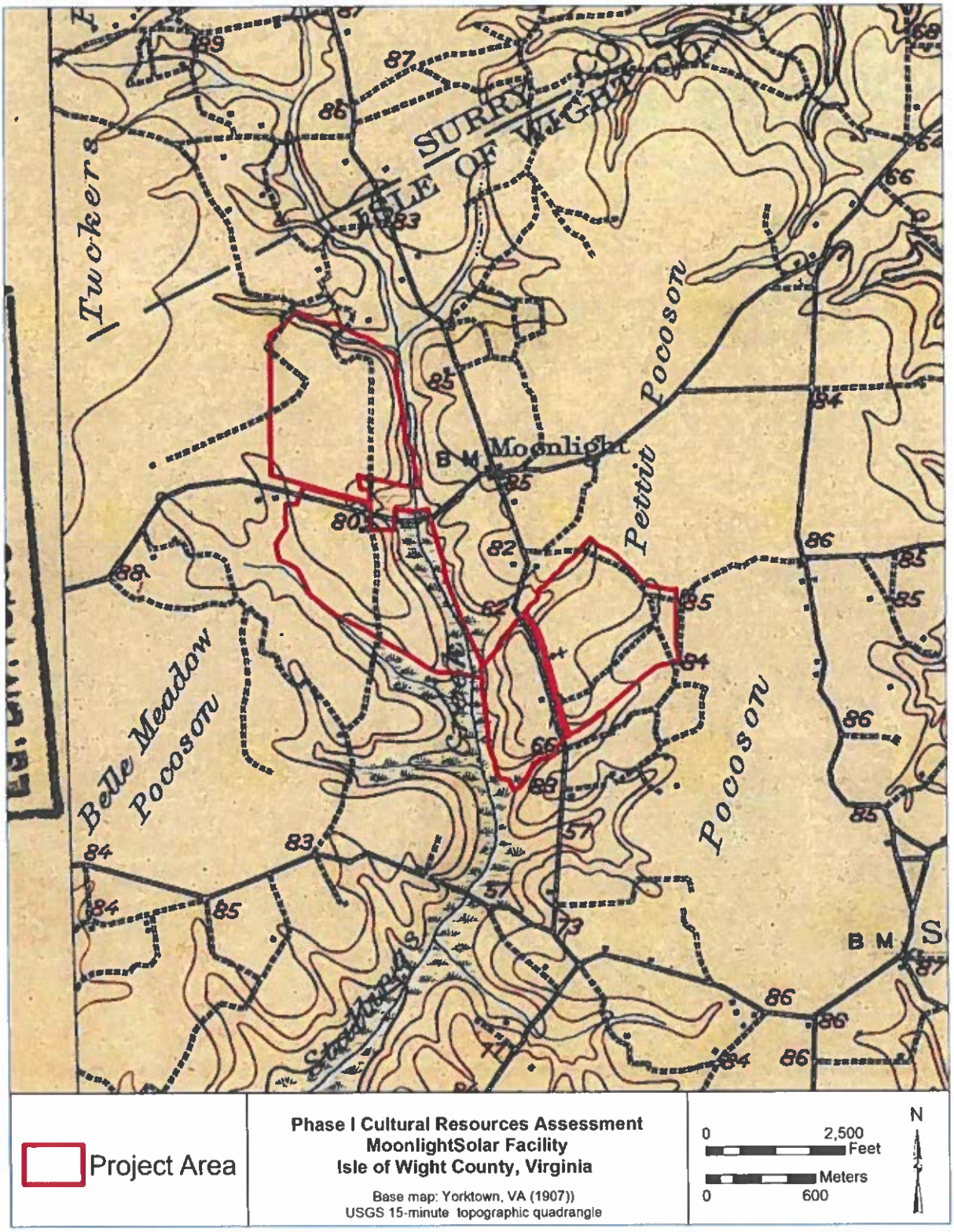

Figure 8: Project area depicted on the Yorktown, VA (1907) USGA 1:62,500 scale quadrangle.

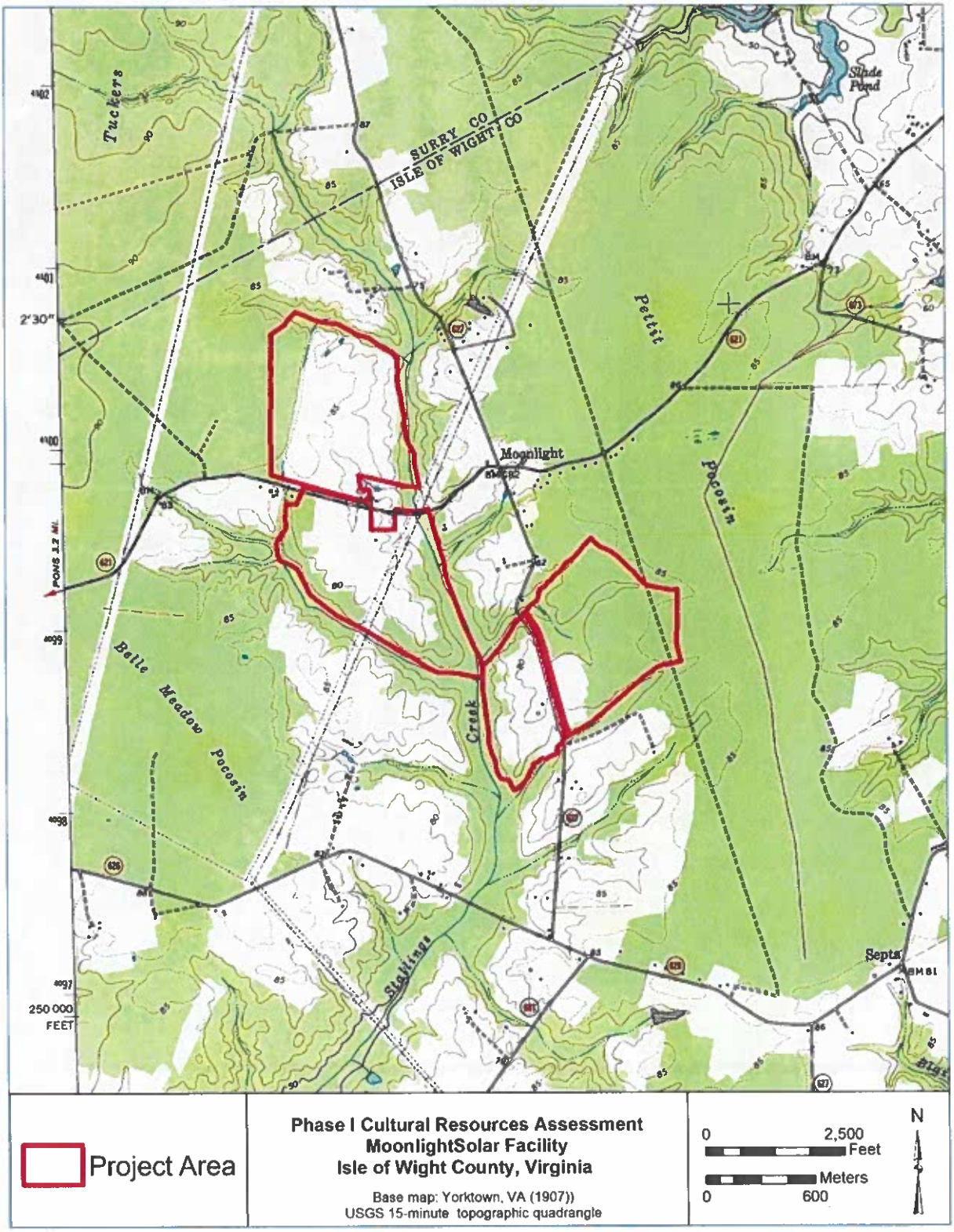

Figure 9: Project area depicted on the Bacons Castle, VA (1969) 1:24,000 scale quadrangle.

5.0 PHASE I ARCHAEOLOGICAL SURVEY RESULTS

5.1 Results Overview

From April 17th to May 5th, 2023, Apogee personnel, under the direction of David Hanley, MA, RPA, conducted a Phase I archaeological investigation including systematic shovel testing at a 15-m interval, judgmental shovel testing, and systematic pedestrian survey at a 10-m interval within the combined 516.9-acre areas of investigation (Figures 10-13). In areas that could not be tested via pedestrian survey, systematic shovel testing was conducted. Shovel testing was focused in the high probability areas where Timmons noted there would be building activities occurring. A total of 999 shovel tests were excavated across the four different portions of the APE (Appendices D and E). As a result of the cultural resources survey, Apogee identified five archaeological sites (44IW0390, 44IW0391, 44IW0392, 44IW0393, and 44IW0394) and 22 isolated artifacts across high, medium, and low probability areas.

High probability areas for this project included soils with flat topography surrounding waterways that were located outside of delineated wetlands. Medium probability areas within the project area consist of landforms with relatively flat topography removed from water sources.

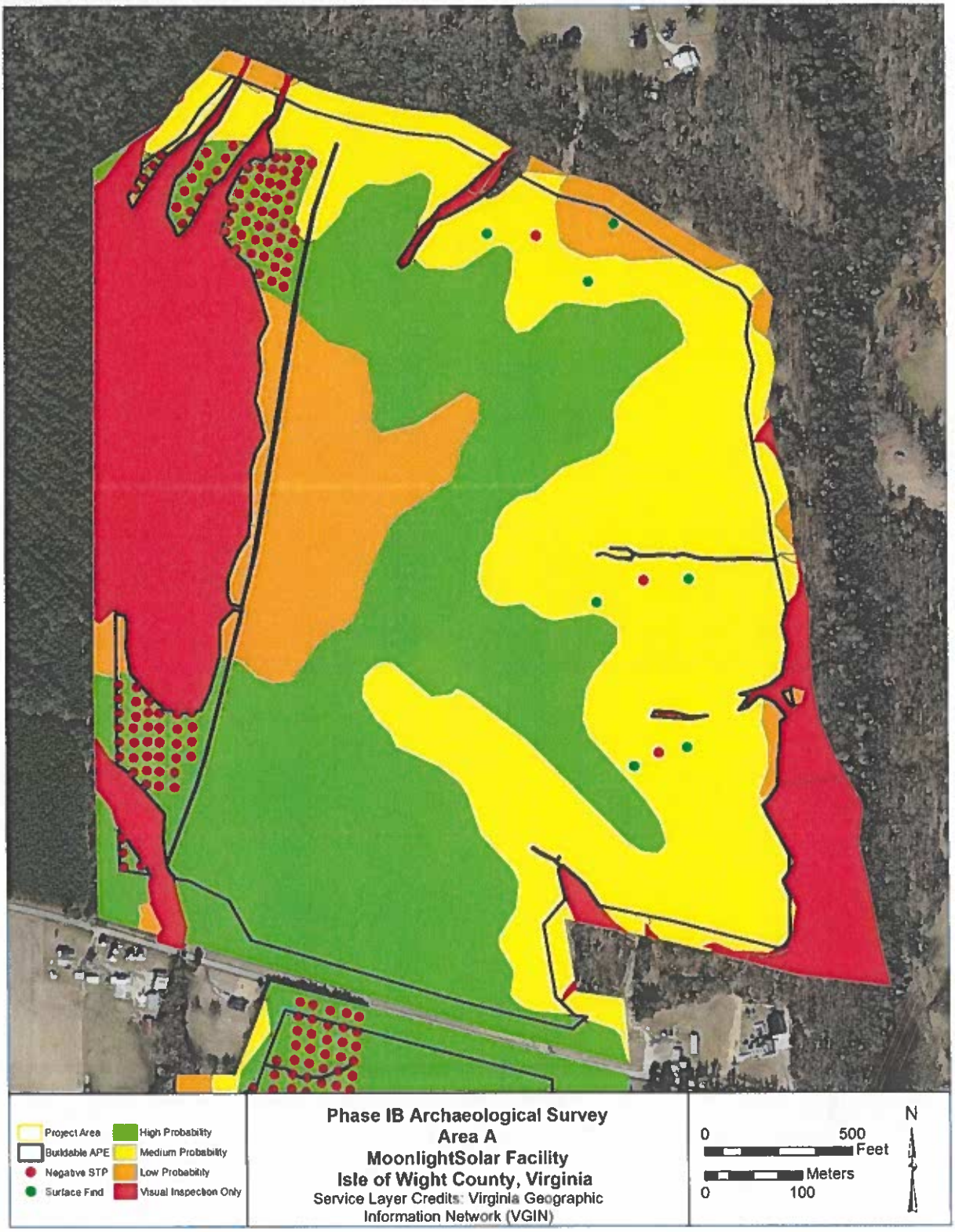

Figure 10: Results map for Area A.

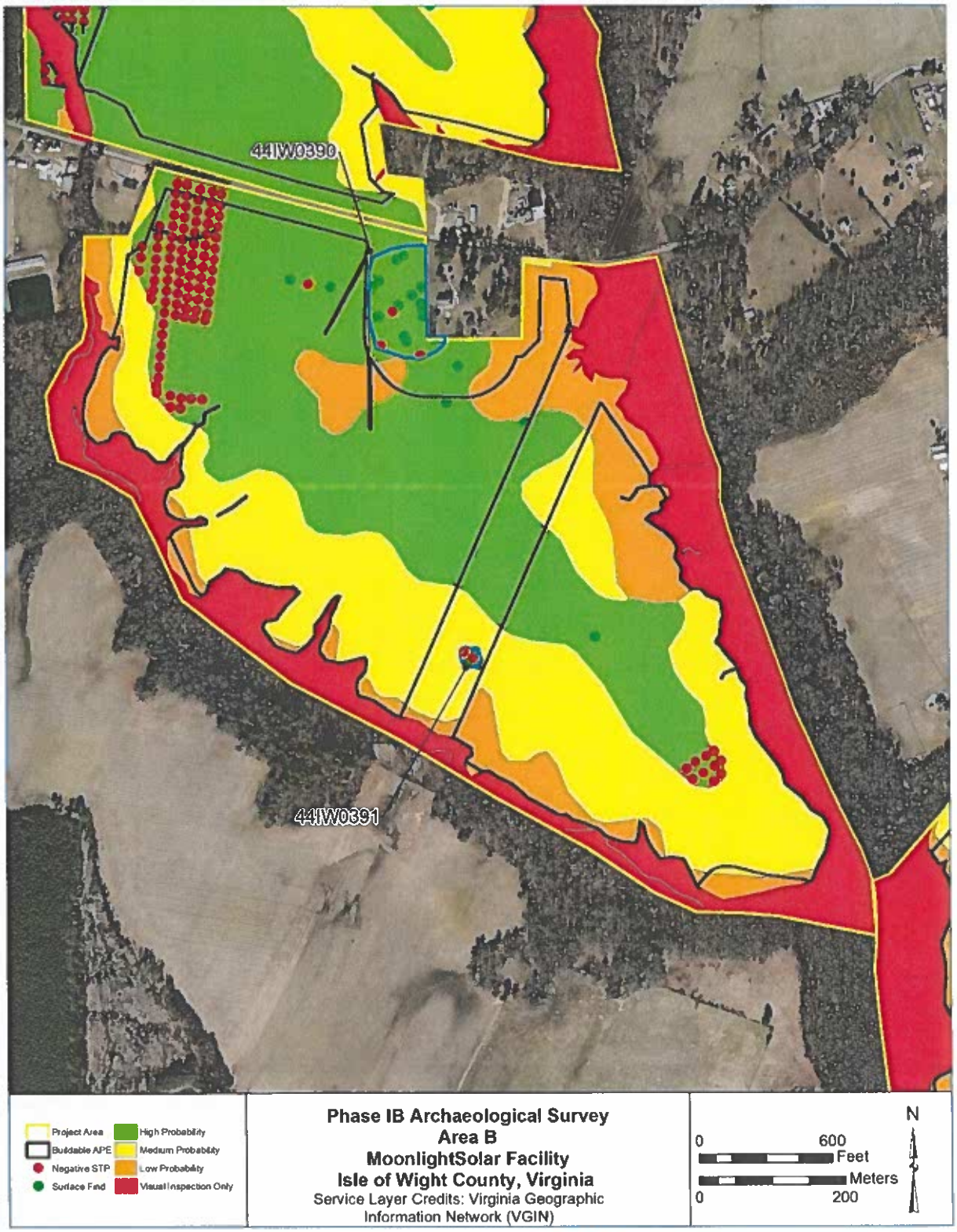

Figure 11: Results map for Area B.

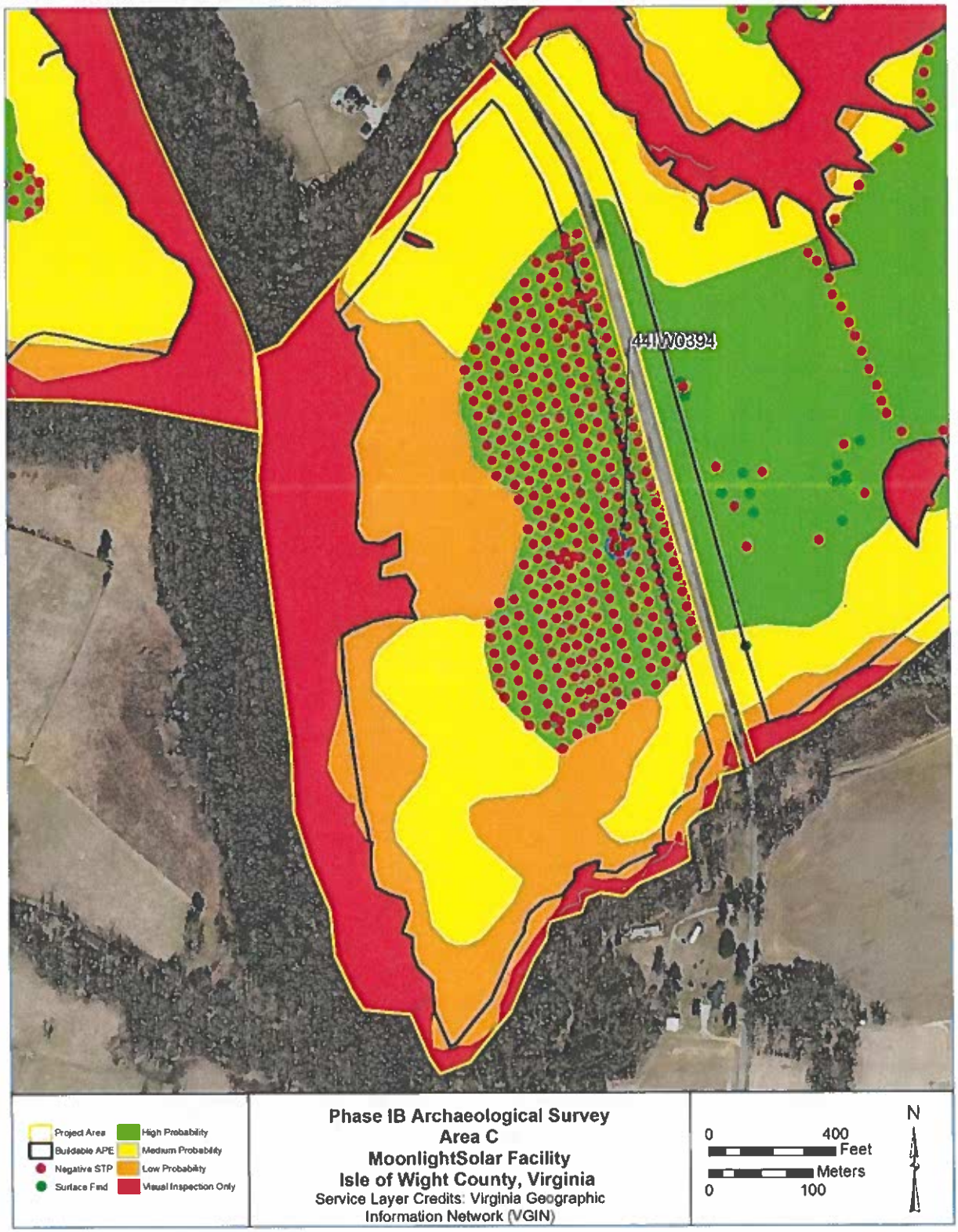

Figure 12: Results map for Area C.

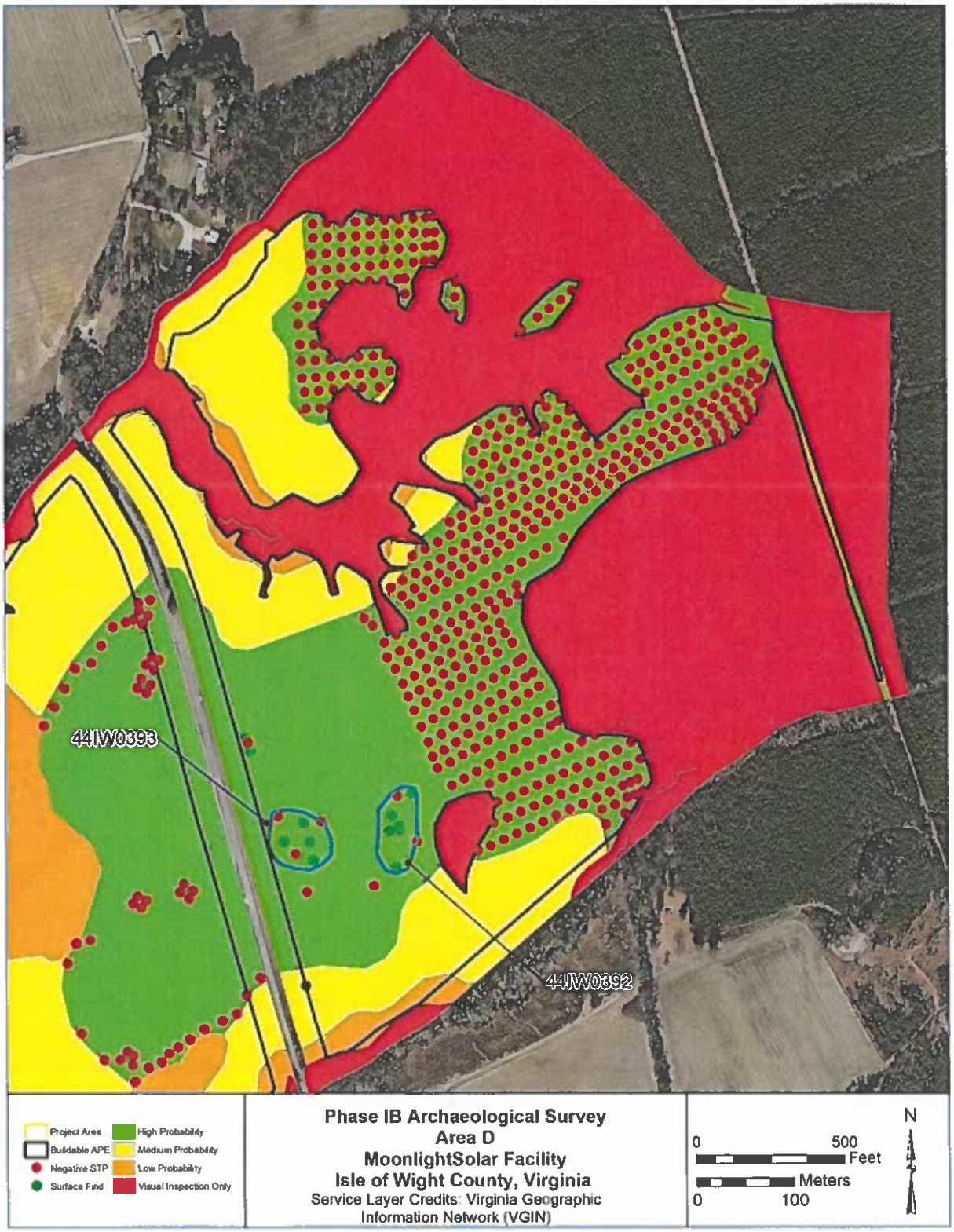

Figure 13: Results map for Area D.

5.1 Area A

Apogee archaeologists surveyed an approximate total of 157 acres of mixed probability areas within Area A (Figures 14-16). Current land use within Area A consists of active agricultural fields, planted pine, deciduous forest, and delineated wetland (Photos 1-4). Surveying included the use of both systematic pedestrian survey and systematic shovel testing. A total of 105 shovel tests were excavated within Area A: three judgmental shovel tests in between isolated finds encountered during the pedestrian survey and 102 in high probability wooded areas. A typical soil profile for the active agricultural fields portion of Area A consisted of a brown (10YR 5/3) sandy loam Ap horizon that clearly transitions to a strong brown (7.5YR 5/6) clay loam subsoil (Photo 5). A typical soil profile for the forested portion of Area A consisted of a dark grayish brown (10YR 4/2) sandy loam that clearly transitioned to a pale brown (2.5Y 7/3) clay loam subsoil (Photo 6). In some instances, an E horizon was present in the forested areas that consisted of a light brownish gray (10YR 6/2) sandy loam. All shovel tests were negative for cultural material. No archaeological sites and seven isolated finds were encountered within Area A.

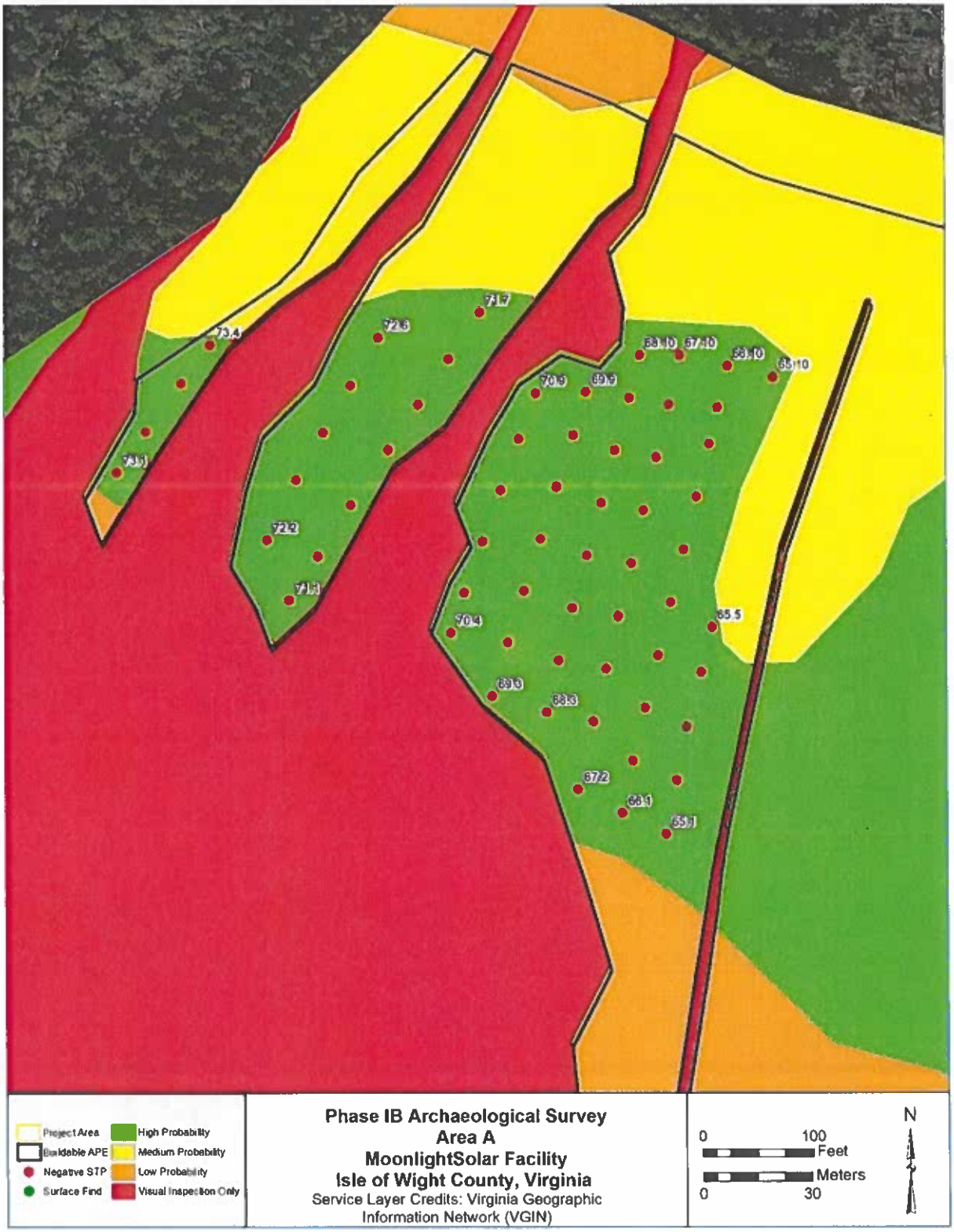

Figure 14: Results map for Area A with labeled ST transects (Northwest Section).

Figure 15: Results map for Area A with labeled ST transects (Southwest Section).

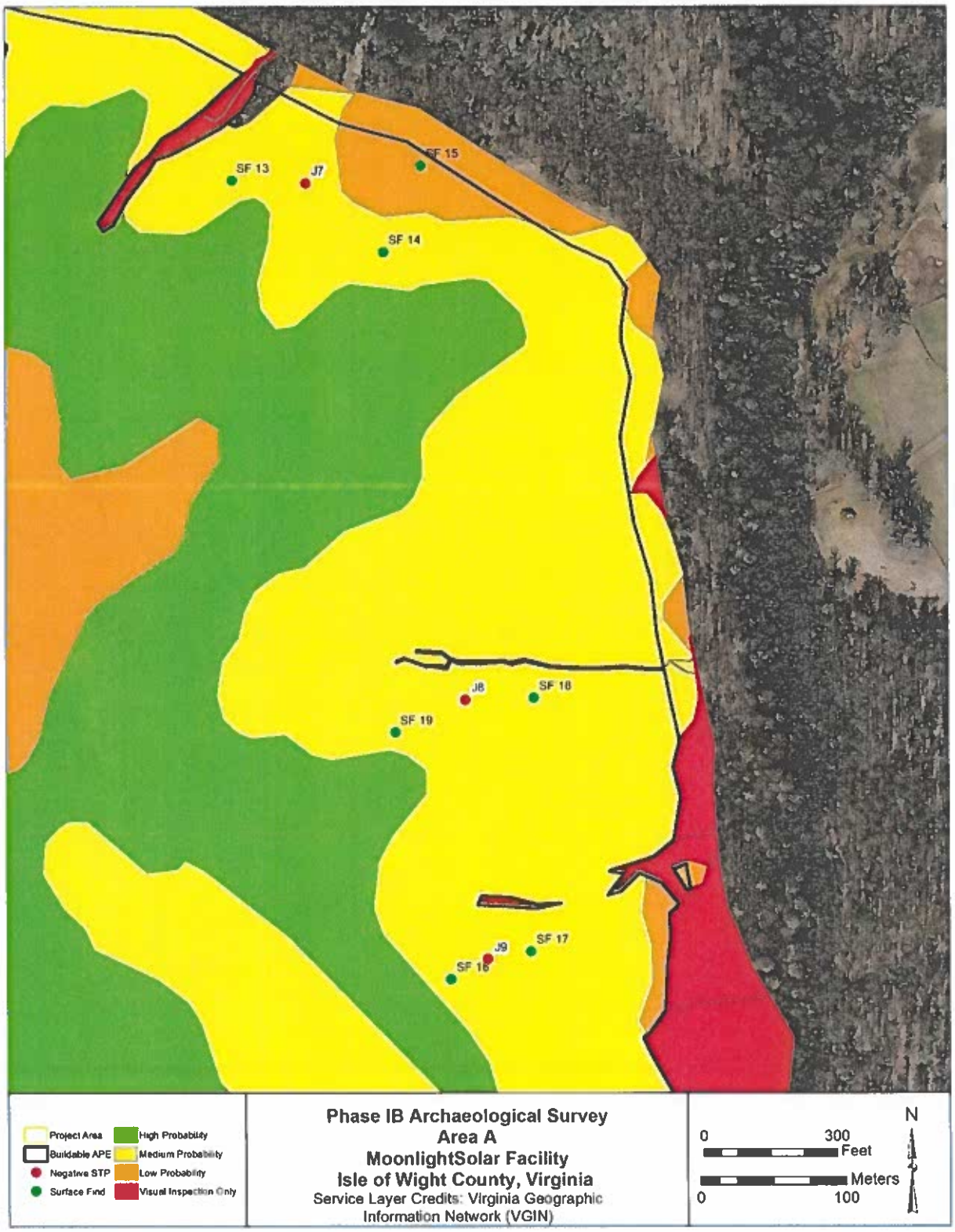

Figure 16: Results map for Area A with labeled surface finds and judgmental STs.

Photo 1: Overview of agricultural fields in Area A, facing north.

Photo 2: View of wooded areas in Area A, facing west.

Photo 3: View of ditch and berm in Area A wooded area, facing northwest.

Photo 4: View of wetland delineated area in Area A, facing southeast.

Photo 5: Fully excavated shovel test profile in agricultural field portion of Area A.

Photo 6: Fully excavated shovel test profile in wooded portion of Area A.

A total of seven isolated artifacts were recovered from the pedestrian survey of Area A: five historic in nature and two potentially precontact artifacts (Photo 7) (Appendix). The five recovered historic artifacts include two milk glass canning lid liner fragments, one blue transfer printed whiteware sherd, one undecorated soft paste porcelain sherd, and one light green bottle glass fragment. The two recovered precontact artifacts include one quartzite biface/preform fragment and one possible quartz core fragment.

Photo 7: Isolated surface finds recovered from Area A.

5.2 Area B

Apogee archaeologists surveyed approximately 159 acres of mixed probability areas within Area B (Figures 17-19). Current land use for Area B consists of pasture, active agricultural fields, planted pine, forested areas, and delineated wetland (Photos 8-11). A total of 106 shovel tests were excavated within Area B: six judgmental shovel tests to delineate surface find sites and determine if isolated finds were sites as well as 100 shovel tests within high probability areas. A typical soil profile within the agricultural field portion of Area B consisted of a brown (10YR 4/3) sandy loam Ap horizon that clearly transitions to a strong brown (7.5YR 5/6) clay loam subsoil (Photo 12). A typical soil profile within the wooded portions of Area B consisted of a very dark grayish brown (10YR 3/2) sandy loam Ap horizon that clearly transitions to a very pale brown (10YR 7/3) sandy loam E horizon. After a clear transition from the E horizon is a brownish gray (10YR 6/6) sandy clay subsoil (Photo 13). In some instances, the E horizon was not present. All shovel tests were negative for cultural material. A total of two archaeological sites (44IW0390 and 44IW0391) and six isolated finds were identified within medium probability areas.

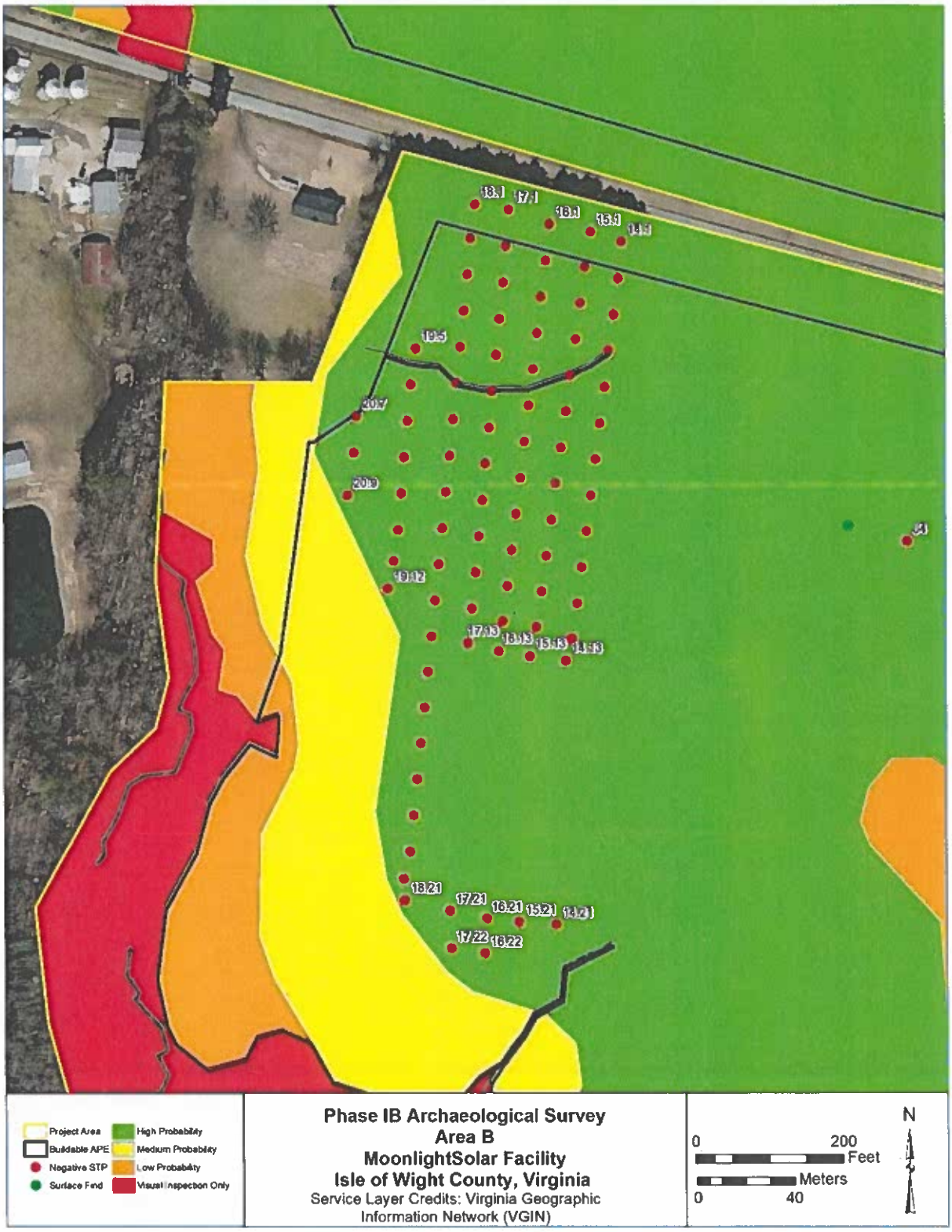

Figure 17: Results map for Area B with labeled STs (Northwest Section).

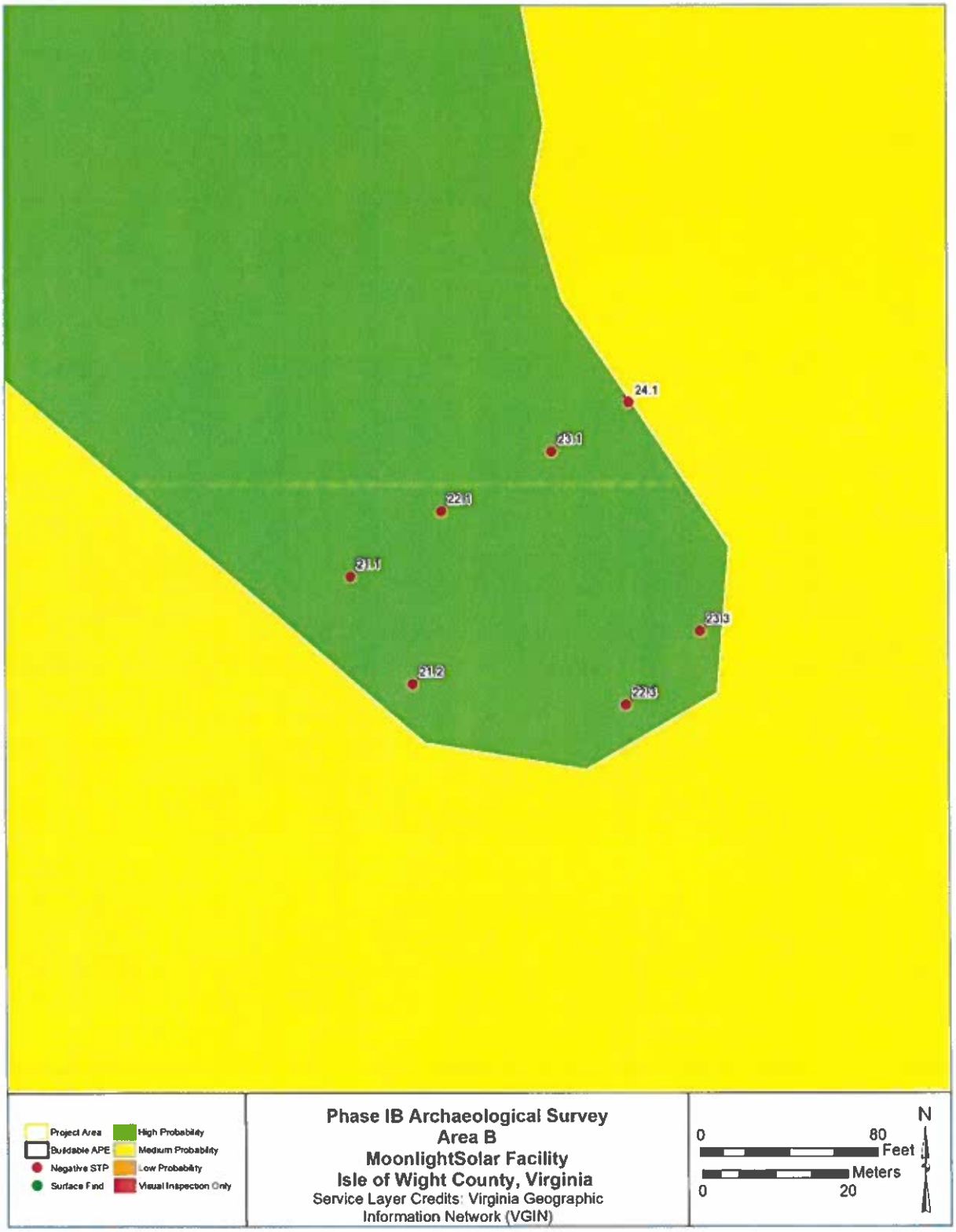

Figure 18: Results map for Area B with labeled STs (Southeast Section).

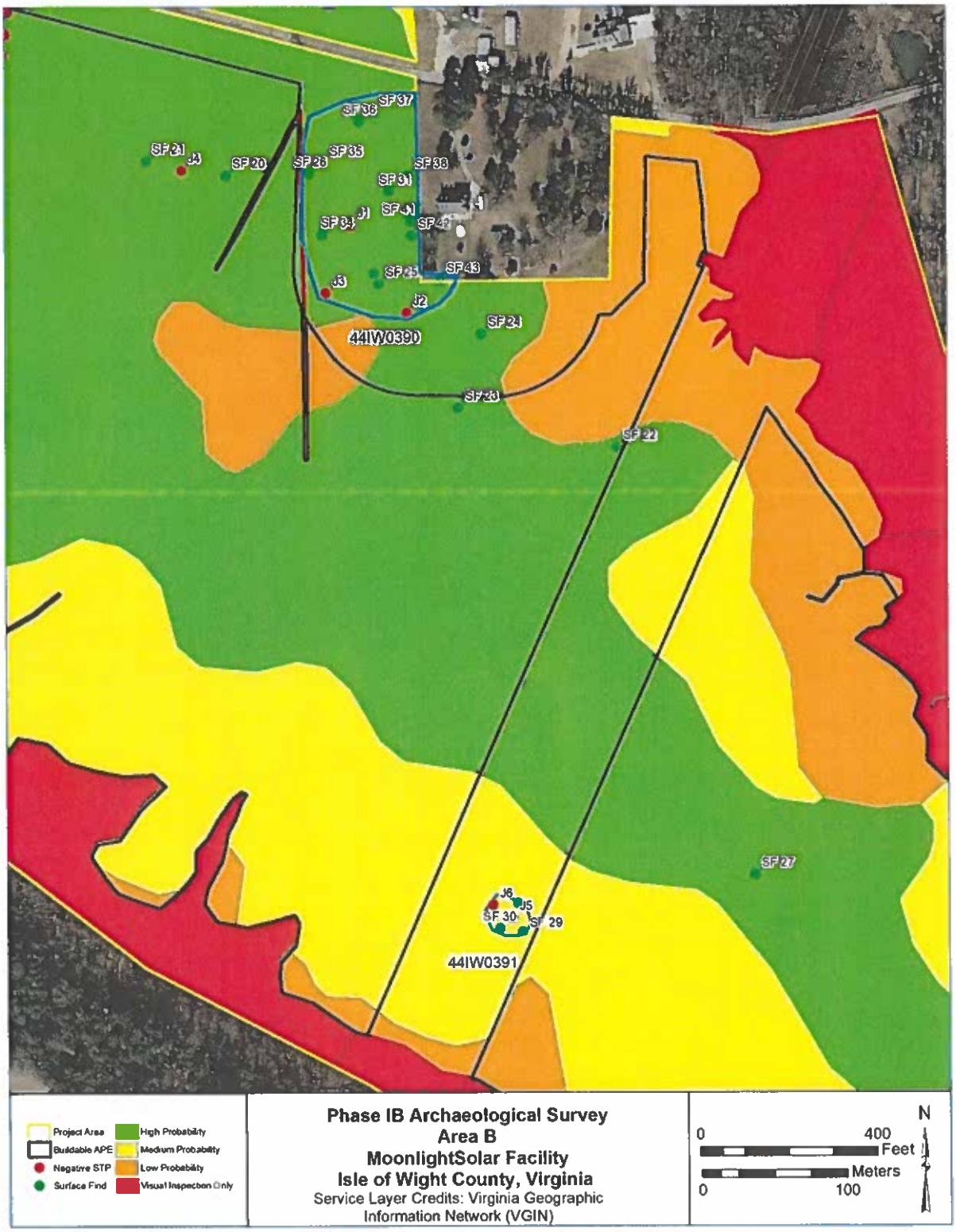

Figure 19: Results map for Area B with labeled site boundaries, surface finds, and judgmental STs.

Photo 8: Overview of agricultural fields in Area B, facing south.

Photo 9: Overview of wooded areas in Area B, facing southeast.

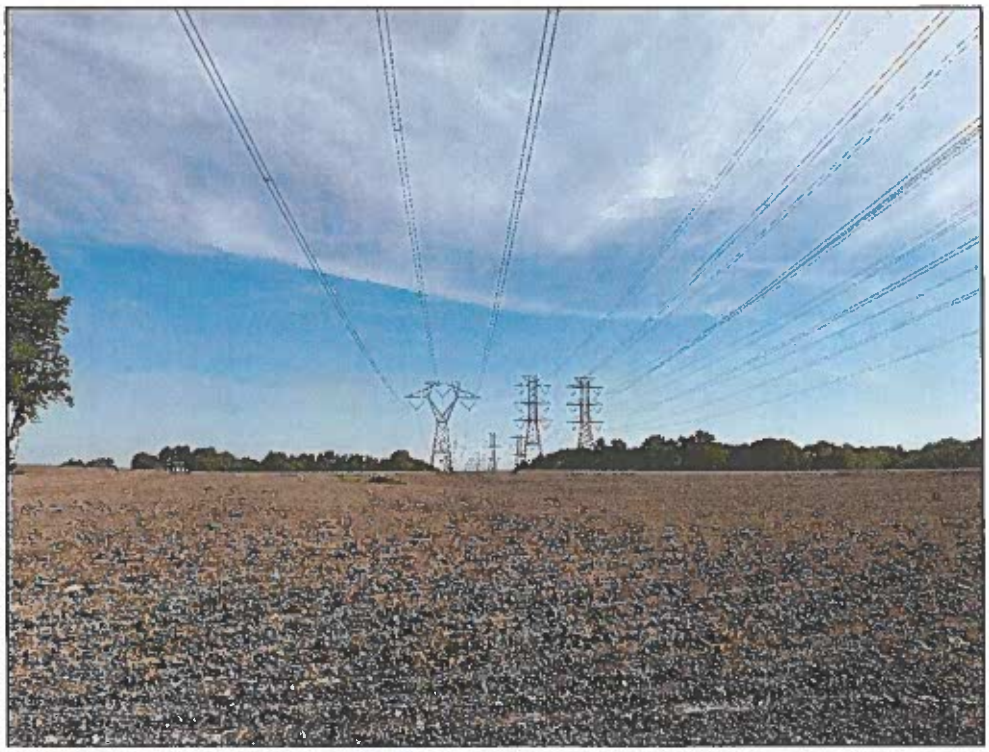

Photo 10: Overview of powerline corridor within Area B, facing northeast.

Photo 11: Overview of drainage culvert in delineated wetland within Area B, facing east.

Photo 12: Fully excavated shovel test profile in agricultural field portion of Area B (44IW0390).

Photo 13: Fully excavated shovel test profile in wooded portion of Area B.

44IW0390

Site 44IW0390 was identified during pedestrian survey of an agricultural field within a high probability portion of Area B (Photo 14). Site 44IW0390 is located south of the Burwells Bay Road directly west of architectural recourse 046-0064 (Figure 20). A total of four shovel test pits (STPs) were excavated to determine the boundary for site 44IW0390. All excavated STPs were negative. A typical STP profile for site 44IW0390 consisted of a brown (10YR 5/3) sandy loam Ap horizon that clearly transitions to a strong brown (7.5YR 5/6) clay loam subsoil (See Photo 12).

A total of 35 artifacts were recovered from the pedestrian survey of site 44IW0390. While most of the artifacts recovered did not have a discernable date range, eight artifacts allowed for a better understanding of when the site was potentially used. These artifacts with discernable date ranges include: three flow blue whiteware sherds, two blue shell edge decorated whiteware sherd, one blue dipped whiteware sherd, one blue transfer print whiteware sherd, and one black transfer print whiteware sherd (Photo 15) (APPENDIX). Flow blue printed whiteware became common around 1844 and stopped being commonly produced at the turn of the 20th century (Miller 1991). Among the two blue shell edge sherds, one sherd is impressed and scalloped and the other features a molded motif. The impressed and scalloped shell edge sherd typically dates between the 1830s and the 1890s while the molded motif sherd has a more exact date range of between the 1820s and 1830s (Hunter and Miller 1994). The sherd of blue dipped whiteware likely features the design of a cat's eye or cabling. These decorations are both multi-chambered slip decorations, which were produced between 1830 and 1900 (Sussman 1997; Rickard 2006). Finally, the two transfer printed sherds (one blue and one black) both date to the mid-19th century with the date range for blue transfer print ending around 1867 and black around 1864 (Miller 1980; Majewski and O'Brien 1986). Based on these recovered artifacts, site 44IW0390 is likely a mid-19th to early-20th century domestic trash scatter. Due to its proximity to architectural resource No. 046-0064, it is likely that 44IW0390 is the refuse from the structure's occupants that has been incidentally distributed in the agricultural field over the years.

All artifacts were recovered from the surface of the Ap horizon with no buried or sealed historic deposits encountered. The site lacks integrity and research potential as the absence of stratified deposits and features limits the potential for research questions addressing lives of rural populations in the mid-19th to early-20th century. No further work is recommended at this site.

Figure 20: 44IW0390 Site Map.

Photo 14: Overview of 44IW0390, facing northeast.

Photo 15: Recovered artifact sample from 44IW0390.

44IW0391

Site 44IW0391 was identified during pedestrian survey of an agricultural field within a medium probability portion of Area B (Photo 16). Site 44IW0391 is located south of Burwells Bay Road and south of 44IW0390 within a powerline corridor (Figure 21). A total of two STPs were excavated to determine the boundary of site 44IW0391, both of which were negative for cultural material. A typical STP profile for site 44IW0391 consisted of a brown (10YR 4/3) sandy loam Ap horizon that clearly transitions to a yellowish brown (10YR 5/6) clay loam subsoil (Photo 17).

A total of three artifacts were recovered from within the site 44IW0391 boundary, all of which were historic in nature: two flow blue transfer printed whiteware sherds and one undecorated whiteware sherd (Photo 18) (APPENDIX). While whiteware has been produced since 1820 and is still seen today (Miller 1980; Majewski and O'Brien 1986), flow blue printed whiteware became common around 1844 and stopped being commonly produced at the turn of the 20th century (Miller 1991). Based on these three recovered artifacts, it is likely that site 44IW0391 is a low-density artifact scatter dating to the mid- to late-19th century.

All artifacts were recovered from the Ap horizon with no buried or sealed historic deposits encountered. The site lacks integrity and research potential as the absence of stratified deposits and features limits the potential for research questions addressing lives of rural populations in the mid- to late-19th century. No further work is recommended at this site.

Figure 21: 44IW0391 Site Map.

Photo 16: Overview of 44IW0391, facing west.

Photo 17: Example soil profile for 44IW0391.

Photo 18: Artifact assemblage from 44IW0391.

A total of six isolated artifacts were recovered from the pedestrian survey of Area B: five historic in nature and one potentially precontact artifact (Photo 19) (Appendix). The five recovered historic artifacts include three undecorated whiteware sherds and two brick fragments. The one recovered precontact artifact is a possible biface/preform manufactured from Mitchell Chert.

Photo 19: Isolated surface finds recovered from Area B.

5.3 Area C

Apogee archaeologists surveyed approximately 17.7 acres of high probability area within Area C (Figure 22). Current land use for Area C consists of active agricultural fields, forested areas, and delineated wetland (Photos 20-21). An active barn/farming structure sits towards the southern end of Area C (Photo 22). Shovel testing was focused on the high probability portion of Area C, which consisted exclusively of active agricultural fields. A total of 307 shovel tests were excavated within Area C, all of which were surveying high probability areas. No pedestrian survey was able to be conducted within Area C due to low ground visibility. Of the 307 shovel tests, six were positive for cultural materials. A typical soil profile within the high probability portion of Area C consisted of a brownish yellow (10YR 6/6) sandy loam Ap horizon that clearly transitions to a strong brown (7.5YR 5/6) clay loam subsoil (Photo 23). In some instances, an E horizon was present between the Ap horizon and subsoil. The E horizon, when present, consisted of a very pale brown (10YR 7/3) sandy loam. All shovel tests were negative for cultural material. One archaeological site (44IW0394) and six isolated finds were identified via shovel testing.

Figure 22: Results map for Area C with labeled STs.

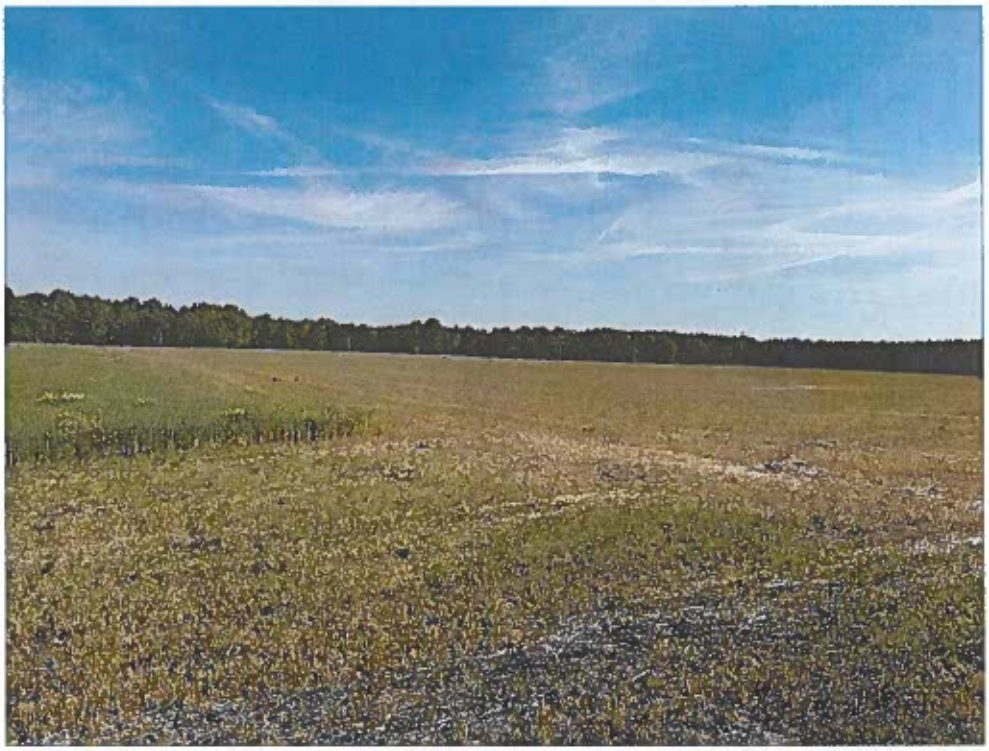

Photo 20: Overview of agricultural field in Area C, facing northeast.

Photo 21: Overview of wooded areas/wetlands in Area C, facing west.

Photo 22: Active barn/farming structure in Area C, facing northeast.

Photo 23: Fully excavated shovel test profile in Area C.

44IW0394

Site 44IW0394 was identified during systematic shovel testing of an agricultural field within a high probability portion of Area C (Photo 24). 44IW0394 is located west of Moonlight Road directly north of a barn present on the property (Figure 23). A total of five STPs were excavated to determine the boundary for site 44IW0394, with only the original STP being positive for historic materials. A typical soil profile for 44IW0394 consisted of a brownish yellow (10YR 6/6) sandy loam that clearly transitions to a strong brown (7.5YR 5/6) clay loam subsoil (Photo 25).

A total of seven historic artifacts were recovered from one STP, most of which do not possess a definitive date range: two aqua bottle glass fragments, two colorless bottle glass fragments, one oyster shell fragment, one brick fragment, and one undecorated whiteware sherd (Photo 26). The only artifact recovered with a date range is the whiteware sherd, which started to be produced in 1820 and is still produced today (Miller 1980; Majewski and O'Brien 1986). Due to the site's proximity to a barn to the south, site 44IW0394 is likely a late-19th to early-20th century domestic artifact scatter.

All artifacts were recovered from the Ap horizon with no buried or sealed historic deposits encountered. The site lacks integrity and research potential as the absence of stratified deposits and features limits the potential for research questions addressing lives of rural populations in the late-19th to early-20th century. No further work is recommended at this site.

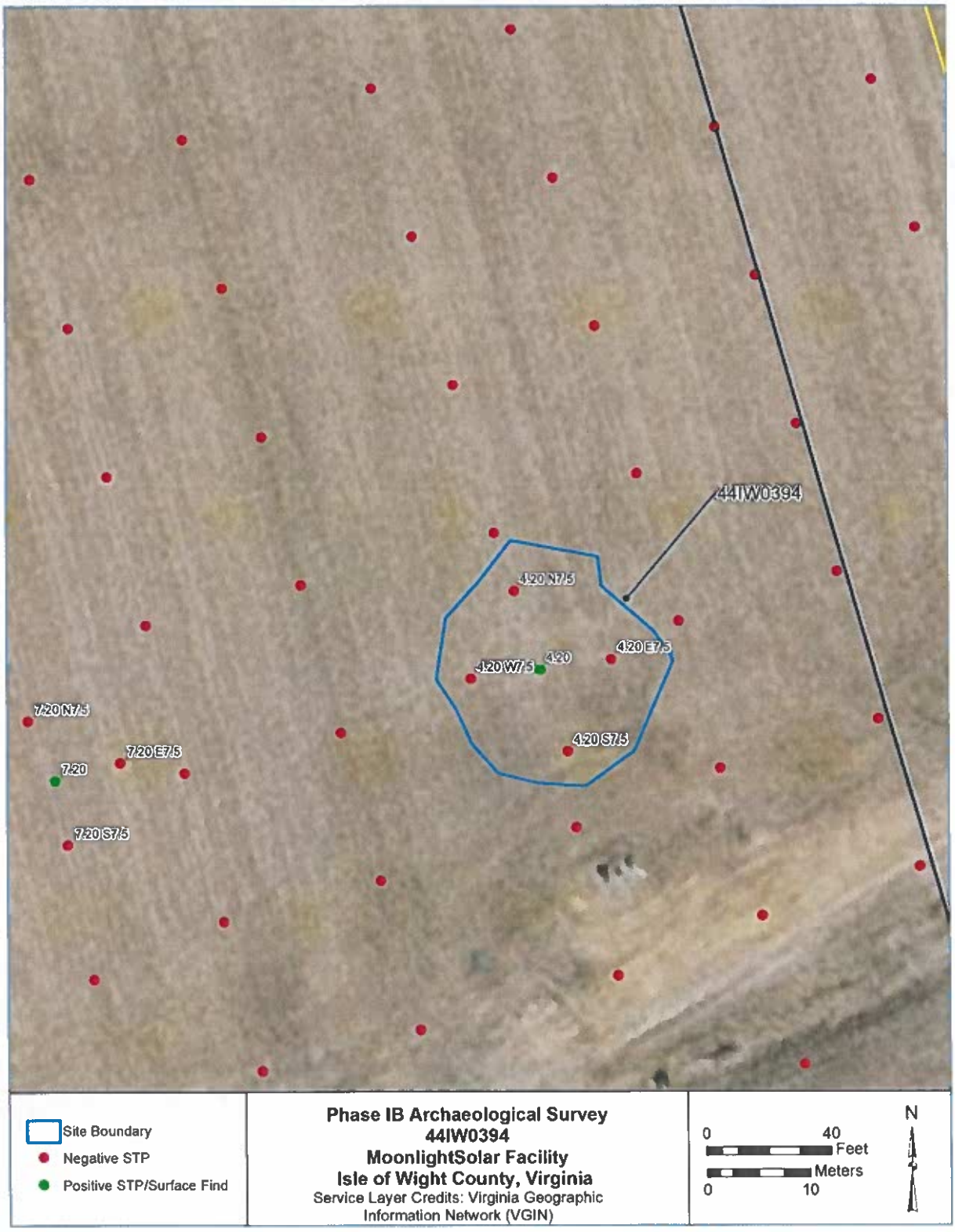

Figure 23: Site map for 44IW0394.

Photo 24: Overview of 44IW0394, facing east.

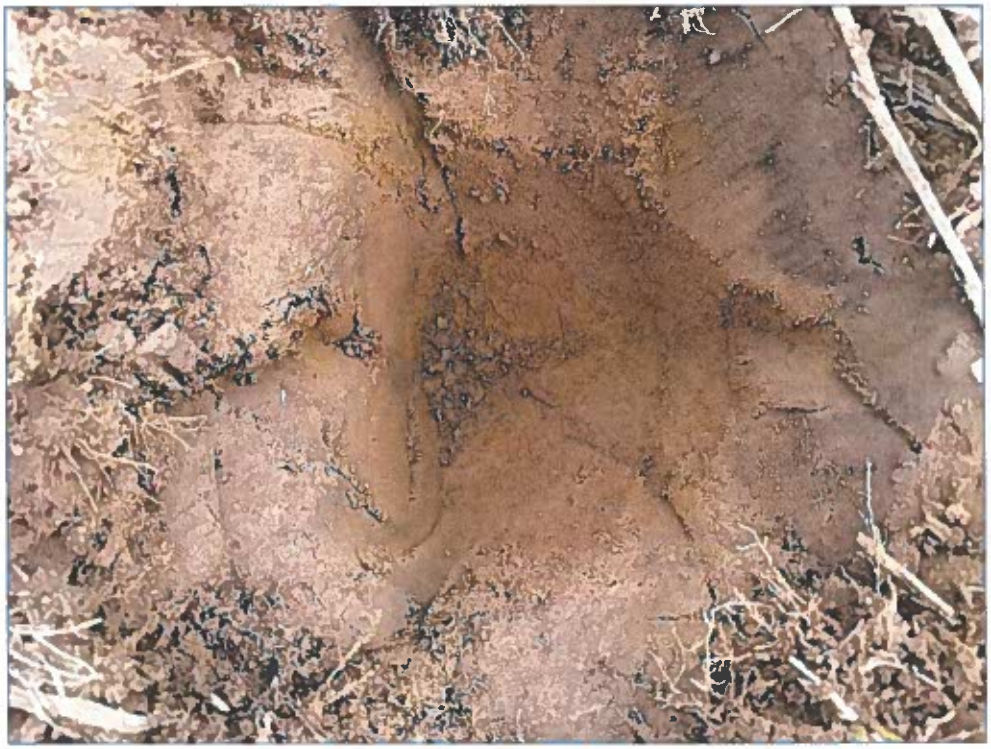

Photo 25: Soil profile for 44IW0394, facing northeast.

Photo 26: Artifact assemblage from 44IW0394.

A total of six isolated artifacts were recovered from the pedestrian survey of Area C: four historic in nature and two precontact artifacts (Photo 27) (Appendix). The four recovered historic artifacts include one blue edge decorated whiteware sherd, one salt glaze American gray stoneware sherd, one hand wrought nail, and one "black" glass bottle fragment. The two recovered precontact artifacts are one tertiary flake manufactured from quartz and one tertiary flake with retouch manufactured from rhyolite.

Photo 27: Isolated surface finds recovered from Area C.

The hand wrought nail and the "black" bottle glass fragment were recovered within 30 meters of each other, and given the lack of additional material, led Apogee archaeologists to further investigate due to their age. Apogee archaeologists returned to the area to metal detect in the

vicinity of the positive shovel test (ST 11.29), which contained the hand wrought nail. A series of cruciform survey lines, using the shovel test as a datum, were investigated. Investigations extended as far as the original glass surface find in each cardinal direction. One operator, using a Teknetics G7 metal detector, swept the area for one half day. No additional artifacts, or viable metal targets, were recovered as a result of metal detection.

5.4 Area D

Apogee archaeologists surveyed approximately 137.75 acres of mixed probability areas within Area D (Figures 24-26). Current land use for Area D consists of active agricultural fields, forested areas, and delineated wetland (Photos 28-30). Significant disturbance from previous logging activities were encountered in the wooded portions of Area D (Photo 31). Systematic shovel testing was focused on the high probability portions of Area D that were wooded. A total of 481 shovel tests were excavated within Area D: eight judgmental shovel tests used to determine site boundaries and 463 shovel tests in high probability areas that could not be pedestrian surveyed. All excavated shovel tests within Area D were negative for cultural material. A typical soil profile within an agricultural field consisted of a brownish yellow (10YR 6/6) sandy loam Ap horizon that clearly transitions to a strong brown (7.5YR 5/6) clay loam subsoil (Photo 32). A typical shovel test within the wooded portion of Area D consisted of a dark grayish brown (10YR 4/2) sandy loam Ap horizon that clearly transitions to a brownish yellow (10YR 6/8) sandy clay subsoil (Photo 33). In some instances, an E horizon was present between the Ap horizon and the subsoil. When the E horizon was present, it consisted of a very pale brown (10YR 7/3) sandy loam. All shovel tests were negative for cultural material. Two archaeological sites (44IW0392 and 44IW0393) and six isolated finds were identified via pedestrian survey.

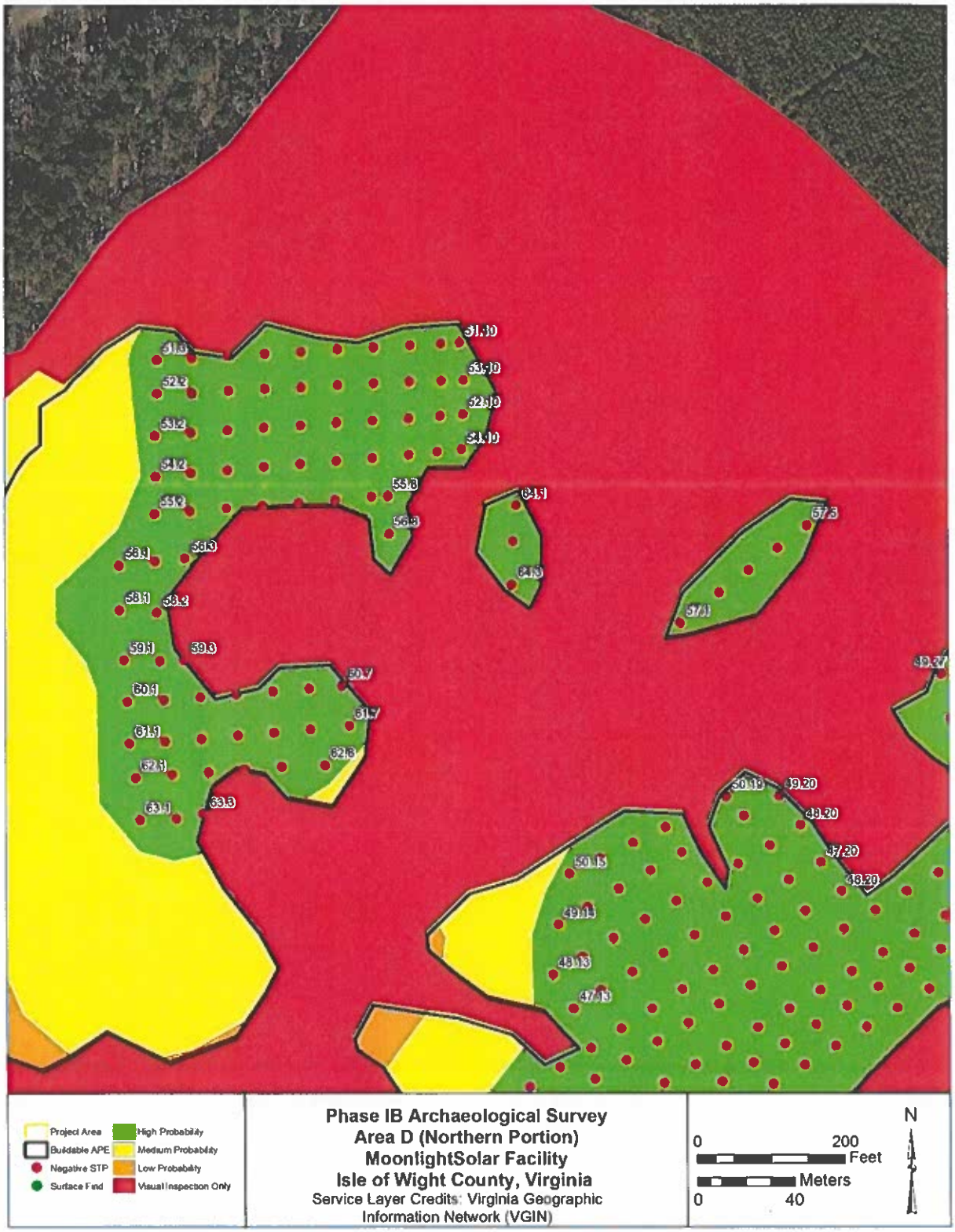

Figure 24: Results map for Area D with labeled STs (Northern Section).

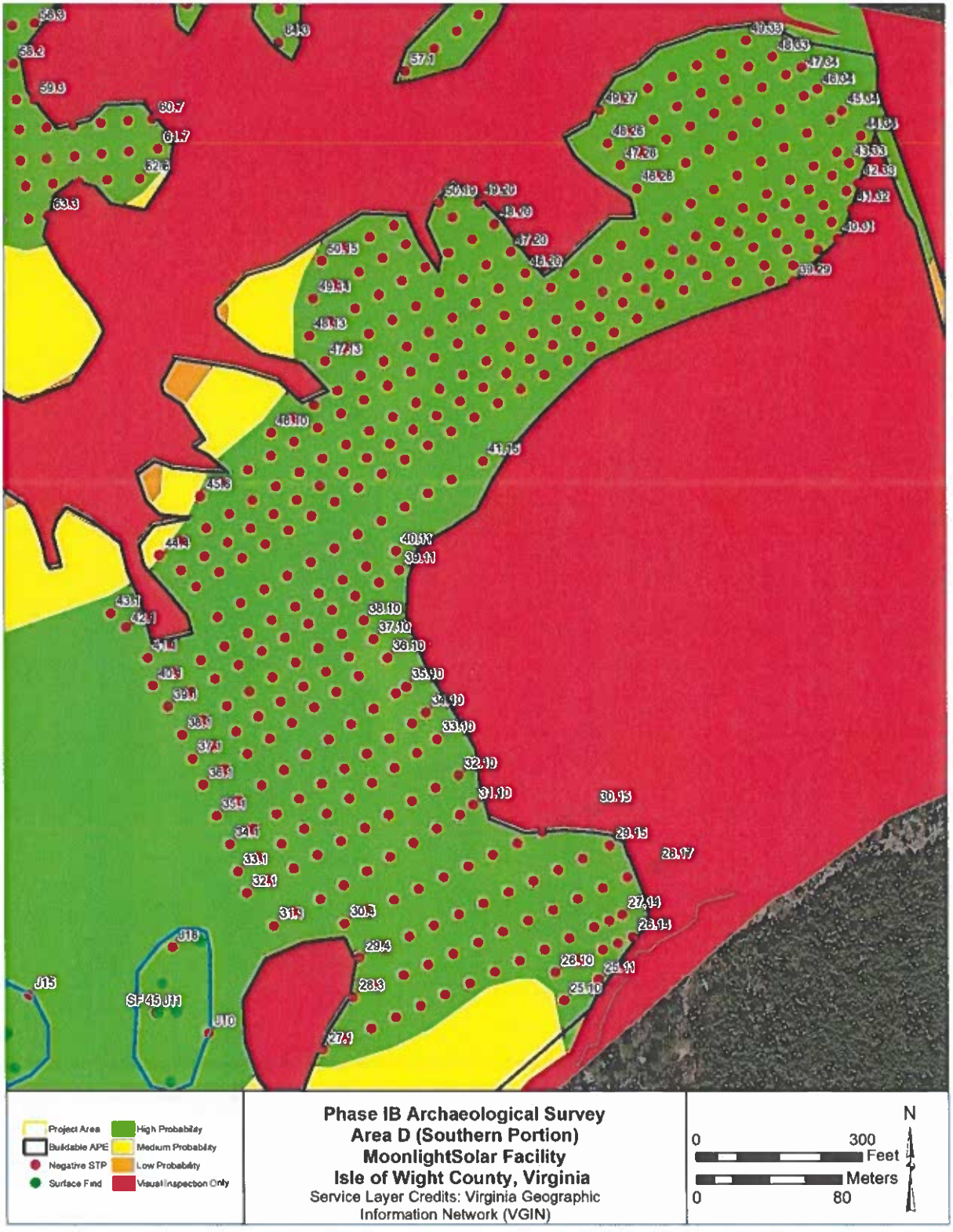

Figure 25: Results map for Area D with labeled STs (Southern Section).

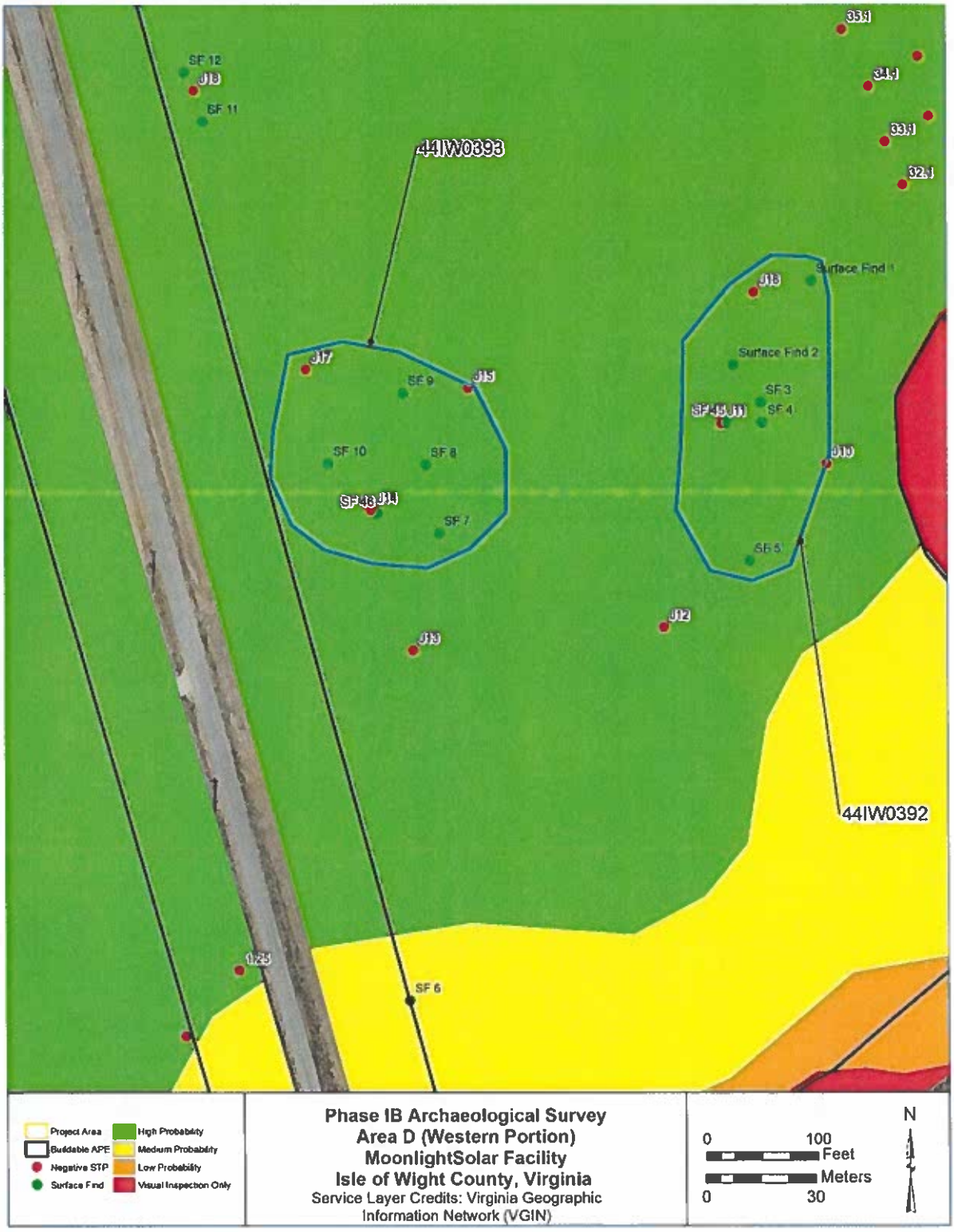

Figure 26: Results map for Area D with labeled site boundaries, surface finds, and judgmental STs.

Photo 28: Overview of agricultural field in Area D, facing northwest.

Photo 29: Overview of wooded portion in Area D, facing east.

Photo 30: Delineated wetland in Area D, facing north.

Photo 31: Example of logging disturbance in Area D, facing south.

Photo 32: Fully excavated shovel test soil profile within an agricultural field of Area D.

Photo 33: Fully excavated shovel test soil profile within the wooded portion of Area D.

44IW0392

Site 44IW0392 was identified during pedestrian survey of a plowed field within a high probability portion of Area D (Photo 34). 44IW0393 is located east along Moonlight Road northeast of site 44IW0393 (Figure 27). A total of four STPs were excavated to determine the boundary of site 44IW0392, all of which were negative. A typical STP profile for 44IW0392 consisted of a brown (10YR 5/3) sandy loam Ap horizon that clearly transitions to a strong brown (7.5YR 5/6) clay loam subsoil (Photo 35).

A total of seven artifacts were recovered from the pedestrian survey of site 44IW0392, all of which were historic in nature. Recovered artifacts include: two cobalt blue glass bottle fragments, two undecorated whiteware sherds, one milk glass canning jar lid liner fragment, one undecorated hard-paste porcelain sherd, and one "black" bottle glass fragment (Photo 36) (APPENDIX). These artifacts provide a large date range for potential use of the site. For instance, cobalt blue glass was commonly used for glass bottle production during the late-19th to the early-20th century (SHA 2023a), milk glass started to be used for canning jar lid liners during the 1930s (Toulouse 1969), and "black" glass (otherwise known as a dark olive green) was most commonly used in bottle production between the 1840s and the 1880s (SHA 2023b). Therefore, it is likely that site 44IW0392 is a low-density artifact scatter dating to the mid-19th to mid-20th century potentially associated with the agricultural structure across Moonlight Road in Area C.

All artifacts were recovered from the surface of the Ap horizon with no buried or sealed historic deposits encountered. The site lacks integrity and research potential as the absence of stratified deposits and features limits the potential for research questions addressing lives of rural populations in the mid-19th to mid-20th century. No further work is recommended at this site.

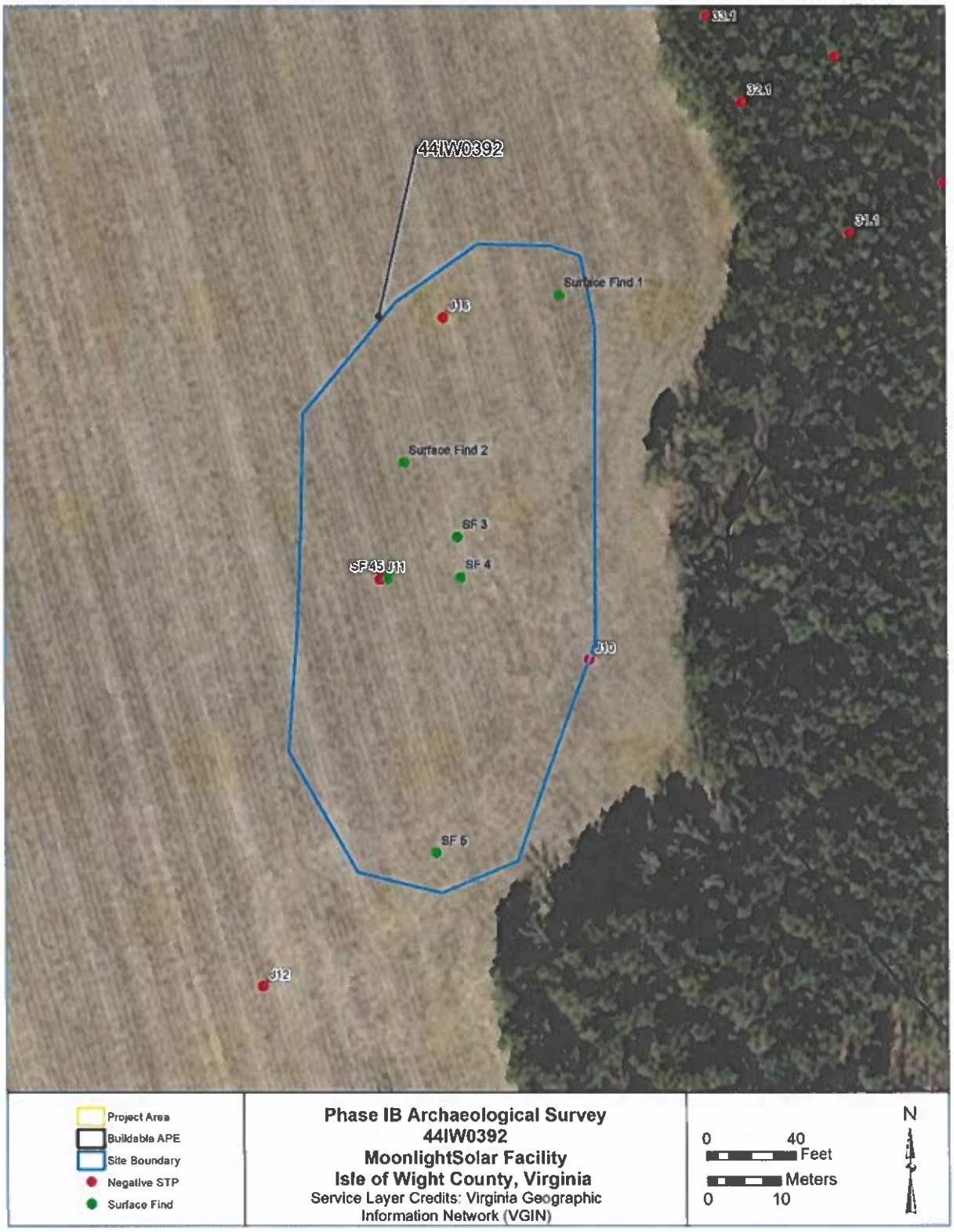

Figure 27: Site map for 44IW0392.

Photo 34: Overview of 44IW0392, facing southwest.

Photo 35: Fully excavated shovel test soil profile for 44IW0392.

Photo 36: Artifact assemblage from 44IW0392.

44IW0393

Site 44IW0393 was identified during pedestrian survey of an agricultural field within a high probability portion of Area D (Photo 37). Site 44IW0393 is located east of Moonlight Road southwest of site 44IW0392 (Figure 28). A total of four STPs were excavated to determine the boundary of site 44IW0393, none of which were positive for cultural material. A typical STP profile for site 44IW0393 consisted of a brown (10YR 5/3) sandy loam Ap horizon that clearly transitions to a strong brown (7.5YR 5/6) clay loam subsoil (Photo 38).

A total of 12 artifacts were recovered from the surface of site 44IW0393, all of which were historic in nature. Among the 12 recovered artifacts are five aqua bottle glass fragments, one color glazed whiteware sherd, one oyster shell fragment, two amethyst glass bottle fragments, one light green bottle glass fragment, one brick fragment, and one black transfer printed whiteware sherd (Photo 39) (APPENDIX). Two artifacts out of these 12 have a discernable date range that can assist in dating the site: the black transfer print whiteware sherd, and the light green glass fragment. As seen in site 44IW0390, black transfer printed wares were at the height of their production between 1820 and 1864 (Miller 1980; Majewski and O'Brien 1986). However, light green bottle glass started to be produced around 1940 and is still in use today (Toulouse 1971). Based on the recovered artifacts, Apogee determined that site 44IW0393 is likely a low-density artifact scatter dating to the mid-19th to mid-20th century potentially associated with the agricultural structure across Moonlight Road in Area C.

All artifacts were recovered from the Ap horizon with no buried or sealed historic deposits encountered. No diagnostic precontact artifacts were recovered. The site lacks integrity and research potential as the absence of stratified deposits and features limits the potential for research questions addressing lives of precontact Native American populations. No further work is recommended at this site.

Figure 28: Site map for 44IW0393.

Photo 37: Overview of 44IW0393, facing south.

Photo 38: Soil profile for 44IW0393, facing northeast.

Photo 39: Artifact assemblage from 44IW0393.

A total of three isolated artifacts were recovered from the pedestrian survey of Area D, all of which are historic in nature (Photo 40) (Appendix). The three recovered historic artifacts include one undecorated whiteware sherd, one plain salt glaze American gray stoneware sherd, and one cobalt blue bottle glass fragment.

Photo 40: Isolated surface finds recovered from Area D.

6.0 SUMMARY AND CONCLUSIONS

On behalf of Timmons, Apogee conducted a Phase IB archaeological survey for the proposed Moonlight Solar Facility in Isle of Wight County, Virginia. This survey was conducted based on guidance by the Virginia Department of Historic Resources and the Virginia State Corporation Commission, with an emphasis on flat landforms near water sources and the locations of buildings identified in historic map research. As a result of the cultural resources survey, Apogee identified five archaeological sites (44IW0390, 44IW0391, 44IW0392, 44IW0393, and 44IW0394), and 22 isolated artifacts.

All archaeological sites identified and revisited during the survey did not possess qualities to be potentially eligible for listing on the National Register of Historic Places. Therefore, no further work is recommended within the APE.

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Appendix A: DHR VCRIS Inventory Forms

Snapshot

Date Generated: May 18, 2023

Site Name:	No Data
Site Classification:	Terrestrial, open air
Year(s):	1830 - 1860, 1861 - 1865, 1866 - 1916, 1917 - 1945, 1946 - 1991
Site Type(s):	Artifact scatter
Other DHR ID:	No Data
Temporary Designation:	No Data

Site Evaluation Status

Locational Information

USGS Quad:	BACONS CASTLE
County/Independent City:	Isle Of Wight (County)
Physiographic Province:	No Data
Elevation:	No Data
Aspect:	No Data
Drainage:	Albemarle-Chowan
Slope:	0-2%
Acreage:	2.900
Landform:	Other
Ownership Status:	Private
Government Entity Name:	No Data

Site Components

Component 1

Category:	Domestic
Site Type:	Artifact scatter
Cultural Affiliation:	Euro-American
Cultural Affiliation Detail:	No Data
DHR Time Period:	Antebellum Period (1830 - 1860), Civil War (1861 - 1865), Reconstruction and Growth (1866 - 1916), World War I to World War II (1917 - 1945), The New Dominion (1946 - 1991)
Start Year:	No Data
End Year:	No Data
Comments:	44IW0390 was identified during pedestrian survey of a planted field within a high probability portion of Area B. Apogee 1 is located south of the Burwells Bay Road directly west of architectural recourse 046-0064. A total of four shovel test pits (STPs) were excavated to determine the boundary for 44IW0390. All excavated STPs were negative. A typical STP profile for Apogee 1 consisted of a brown (10YR 5/3) sandy loam Ap horizon that clearly transitions to a strong brown (7.5YR 5/6) clay loam subsoil.

Bibliographic Information

Bibliography:

No Data

Informant Data:

No Data

CRM Events

Event Type: Survey:Phase I

Project Staff/Notes:

Garrett Silliman - Principal Investigator
David Hanley - Archaeological Field Director
Amanda Commins - Architectural Historian
Matthew Donathan - Archaeological Field Technician
Robert Kotlarek - Archaeological Field Technician
Dallon Olive - Archaeological Field Technician

Project Review File Number: No Data

Sponsoring Organization: No Data

Organization/Company: Apogee Environmental & Archaeological, Inc.

Investigator: David Hanley

Survey Date: 5/5/2023

Survey Description:

On behalf of Timmons Group, Inc. (Timmons), Apogee Environmental & Archaeological, Inc. (Apogee) conducted a Phase IB archaeological survey for the proposed Moonlight Solar Facility in Isle of Wight County, Virginia. The Phase IB survey serves as secondary step in meeting compliance requirements for The Virginia Department of Environmental Quality (DEQ). All activities were conducted in accordance with the Virginia Department of Historic Resources (DHR), as published in Guidelines for Conducting Historic Resources Survey in Virginia (2017). The project consists of the development of a solar energy facility located approximately 5.2 miles northwest of Smithfield, Virginia, situated west and south of the intersection between Moonlight Road and Burwells Bay Road. The archaeological area of potential effects (APE) contains parcels of mixed-use rural land totaling 516.9 acres (209.2 hectares). A desktop analysis cultural resources assessment was conducted in March 2023. The Phase I cultural resources survey was conducted between April 17th and May 5th, 2023.

Current Land Use	Date of Use	Comments
Agricultural field	5/5/2023	No Data

Threats to Resource: Development, Erosion

Site Conditions: Unknown Portion of Site Destroyed

Survey Strategies: Subsurface Testing, Surface Testing

Specimens Collected: Yes

Specimens Observed, Not Collected: No

Artifacts Summary and Diagnostics:

A total of 35 artifacts were recovered from the pedestrian survey of the site. While most of the artifacts recovered did not have a discernable date range, eight artifacts allowed for a better understanding of when the site was potentially used. These artifacts with discernable date ranges include: three flow blue whiteware sherds, two blue shell edge decorated whiteware sherd, one blue dipped whiteware sherd, one blue transfer print whiteware sherd, and one black transfer print whiteware sherd. Flow blue printed whiteware became common around 1844 and stopped being commonly produced at the turn of the 20th century. Among the two blue shell edge sherds, one sherd is impressed and scalloped and the other features a molded motif. The impressed and scalloped shell edge sherd typically dates between the 1830s and the 1890s while the molded motif sherd has a more exact date range of between the 1820s and 1830s. The sherd of blue dipped whiteware likely features the design of a cat's eye or cabling. These decorations are both multi-chambered slip decorations, which were produced between 1830 and 1900. Finally, the two transfer printed sherds (one blue and one black) both date to the mid-19th century with the date range for blue transfer print ending around 1867 and black around 1864. Based on these recovered artifacts, the site is likely a mid-19th to early-20th century domestic trash scatter. Due to its proximity to architectural resource No. 046-0064, it is likely that the site is the refuse from the structure's occupants thrown out in the agricultural field over the years.

Summary of Specimens Observed, Not Collected:

No Data

Current Curation Repository: Apogee

Permanent Curation Repository: VDHR

Field Notes: Yes

Field Notes Repository: VDHR

Photographic Media: Digital

Survey Reports: Yes

Survey Report Information:

Silliman, Garrett and David S. Hanley, 2023, Phase I Cultural Resources Survey for the Proposed Moonlight Solar Facility, Isle of Wight County, Virginia, Report Prepared for Timmons Group, Inc., Richmond, Virginia, from Apogee Environmental and Archaeological, Inc., Pittsburgh, Pennsylvania.

Survey Report Repository: VDEQ

DHR Library Reference Number: No Data

Significance Statement: All artifacts were recovered from the surface of the Ap horizon with no buried or sealed historic deposits encountered. The site lacks integrity and research potential as the absence of stratified deposits and features limits the potential for research questions addressing lives of rural populations in the mid-19th to early-20th century. No further work is recommended

	at this site.
Surveyor's Eligibility Recommendations:	Recommended Not Eligible
Surveyor's NR Criteria Recommendations:	No Data
Surveyor's NR Criteria Considerations:	No Data

Snapshot

Date Generated: May 18, 2023

Site Name:	No Data
Site Classification:	Terrestrial, open air
Year(s):	1866 - 1916
Site Type(s):	Artifact scatter
Other DHR ID:	No Data
Temporary Designation:	No Data

Site Evaluation Status

Locational Information

USGS Quad:	BACONS CASTLE
County/Independent City:	Isle Of Wight (County)
Physiographic Province:	Coastal Plain
Elevation:	No Data
Aspect:	No Data
Drainage:	Albemarle-Chowan
Slope:	2-6%
Acreage:	0.150
Landform:	Other
Ownership Status:	Private
Government Entity Name:	No Data

Site Components

Component 1

Category:	Indeterminate
Site Type:	Artifact scatter
Cultural Affiliation:	Euro-American
Cultural Affiliation Detail:	No Data
DHR Time Period:	Reconstruction and Growth (1866 - 1916)
Start Year:	No Data
End Year:	No Data
Comments:	44IW0391 was identified during pedestrian survey of a plowed field within a medium probability portion of Area B. 44IW0391 is located south of Burwells Bay Road and south of 44IW0390. A total of two shovel test pits (STPs) were excavated to determine the boundary of Apogee 2, both of which were negative for cultural material. A typical STP profile for Apogee 2 consisted of a brown (10YR 4/3) sandy loam Ap horizon that clearly transitions to a yellowish brown (10YR 5/6) clay loam subsoil.

Bibliographic Information

Bibliography:

No Data

Informant Data:

No Data

Archaeological site data is protected under the Archaeological Resource Protection Act (ARPA 1979).

CRM Events

Event Type: Survey:Phase I

Project Staff/Notes:

Garrett Silliman - Principal Investigator
David Hanley - Archaeological Field Director
Amanda Commins - Architectural Historian
Matthew Donathan - Archaeological Field Technician
Robert Kotlarek - Archaeological Field Technician
Dallon Olive - Archaeological Field Technician

Project Review File Number: No Data

Sponsoring Organization: No Data

Organization/Company: Apogee Environmental & Archaeological, Inc.

Investigator: David Hanley

Survey Date: 5/5/2023

Survey Description:

On behalf of Timmons Group, Inc. (Timmons), Apogee Environmental & Archaeological, Inc. (Apogee) conducted a Phase IB archaeological survey for the proposed Moonlight Solar Facility in Isle of Wight County, Virginia. The Phase IB survey serves as secondary step in meeting compliance requirements for The Virginia Department of Environmental Quality (DEQ). All activities were conducted in accordance with the Virginia Department of Historic Resources (DHR), as published in Guidelines for Conducting Historic Resources Survey in Virginia (2017). The project consists of the development of a solar energy facility located approximately 5.2 miles northwest of Smithfield, Virginia, situated west and south of the intersection between Moonlight Road and Burwells Bay Road. The archaeological area of potential effects (APE) contains parcels of mixed-use rural land totaling 516.9 acres (209.2 hectares). A desktop analysis cultural resources assessment was conducted in March 2023. The Phase I cultural resources survey was conducted between April 17th and May 5th, 2023.

Current Land Use	Date of Use	Comments
Agricultural field	5/5/2023	No Data

Threats to Resource: Development, Erosion

Site Conditions: Surface Deposits Present But With No Subsurface Integrity

Survey Strategies: Subsurface Testing, Surface Testing

Specimens Collected: Yes

Specimens Observed, Not Collected: No

Artifacts Summary and Diagnostics:

A total of three artifacts were recovered from within the site boundary, all of which were historic in nature: two flow blue transfer printed whiteware sherds and one undecorated whiteware sherd. While whiteware has been produced since 1820 and is still seen today, flow blue printed whiteware became common around 1844 and stopped being commonly produced at the turn of the 20th century. Based on these three recovered artifacts, it is likely that the site is a low-density artifact scatter dating to the mid- to late-19th century.

Summary of Specimens Observed, Not Collected:

No Data

Current Curation Repository: Apogee

Permanent Curation Repository: VDHR

Field Notes: Yes

Field Notes Repository: VDHR

Photographic Media: Digital

Survey Reports: Yes

Survey Report Information:

Silliman, Garrett and David S. Hanley, 2023, Phase I Cultural Resources Survey for the Proposed Moonlight Solar Facility, Isle of Wight County, Virginia, Report Prepared for Timmons Group, Inc., Richmond, Virginia, from Apogee Environmental and Archaeological, Inc., Pittsburgh, Pennsylvania.

Survey Report Repository: VDEQ

DHR Library Reference Number: No Data

Significance Statement: All artifacts were recovered from the Ap horizon with no buried or sealed historic deposits encountered. The site lacks integrity and research potential as the absence of stratified deposits and features limits the potential for research questions addressing lives of rural populations in the mid- to late-19th century. No further work is recommended at this site.

Surveyor's Eligibility Recommendations: Recommended Not Eligible

Surveyor's NR Criteria Recommendations: No Data

Surveyor's NR Criteria Considerations: No Data

Snapshot

Date Generated: May 18, 2023

Site Name:	No Data
Site Classification:	Terrestrial, open air
Year(s):	1866 - 1916, 1917 - 1945, 1946 - 1991
Site Type(s):	Artifact scatter
Other DHR ID:	No Data
Temporary Designation:	No Data

Site Evaluation Status

Locational Information

USGS Quad:	BACONS CASTLE
County/Independent City:	Isle Of Wight (County)
Physiographic Province:	Coastal Plain
Elevation:	No Data
Aspect:	No Data
Drainage:	Albemarle-Chowan
Slope:	0-2%
Acreage:	0.750
Landform:	Other
Ownership Status:	Private
Government Entity Name:	No Data

Site Components

Component 1

Category:	Domestic
Site Type:	Artifact scatter
Cultural Affiliation:	Euro-American
Cultural Affiliation Detail:	No Data
DHR Time Period:	Reconstruction and Growth (1866 - 1916), World War I to World War II (1917 - 1945), The New Dominion (1946 - 1991)
Start Year:	No Data
End Year:	No Data
Comments:	44IW0392 was identified during pedestrian survey of a plowed field within a high probability portion of Area D. 44IW0392 is located east along Moonlight Road northeast of 44IW0393. A total of four shovel test pits (STPs) were excavated to determine the boundary of 44IW0392, all of which were negative. A typical STP profile for 44IW0392 consisted of a brown (10YR 5/3) sandy loam that clearly transitions to a strong brown (7.5YR 5/6) clay loam subsoil.

Bibliographic Information

Bibliography:

No Data

Informant Data:

No Data

CRM Events

Event Type: Survey:Phase I

Project Staff/Notes:

Garrett Silliman - Principal Investigator
David Hanley - Archaeological Field Director
Amanda Commins - Architectural Historian
Matthew Donathan - Archaeological Field Technician
Robert Kotlarek - Archaeological Field Technician
Dallon Olive - Archaeological Field Technician

Project Review File Number: No Data

Sponsoring Organization: No Data

Organization/Company: Apogee Environmental & Archaeological, Inc

Investigator: David Hanley

Survey Date: 5/5/2023

Survey Description:

On behalf of Timmons Group, Inc. (Timmons), Apogee Environmental & Archaeological, Inc. (Apogee) conducted a Phase IB archaeological survey for the proposed Moonlight Solar Facility in Isle of Wight County, Virginia. The Phase IB survey serves as secondary step in meeting compliance requirements for The Virginia Department of Environmental Quality (DEQ). All activities were conducted in accordance with the Virginia Department of Historic Resources (DHR), as published in Guidelines for Conducting Historic Resources Survey in Virginia (2017). The project consists of the development of a solar energy facility located approximately 5.2 miles northwest of Smithfield, Virginia, situated west and south of the intersection between Moonlight Road and Burwells Bay Road. The archaeological area of potential effects (APE) contains parcels of mixed-use rural land totaling 516.9 acres (209.2 hectares). A desktop analysis cultural resources assessment was conducted in March 2023. The Phase I cultural resources survey was conducted between April 17th and May 5th, 2023.

Current Land Use	Date of Use	Comments
Agricultural field	5/5/2023	No Data

Threats to Resource: Development, Erosion

Site Conditions: Surface Deposits Present But With No Subsurface Integrity

Survey Strategies: Subsurface Testing, Surface Testing

Specimens Collected: Yes

Specimens Observed, Not Collected: No

Artifacts Summary and Diagnostics:

A total of seven artifacts were recovered from the pedestrian survey of this site, all of which were historic in nature. Recovered artifacts include: two cobalt blue glass bottle fragments, two undecorated whiteware sherds, one milk glass canning jar lid liner fragment, one undecorated hard-paste porcelain sherd, and one "black" bottle glass fragment. These artifacts provide a large date range for potential use of the site. For instance, cobalt blue glass was commonly used for glass bottle production during the late-19th to the early-20th century, milk glass started to be used for canning jar lid liners during the 1930s, and "black" glass (otherwise known as a dark olive green) was most commonly used in bottle production between the 1840s and the 1880s. Therefore, it is likely that this site is a low-density artifact scatter dating to the mid-19th to mid-20th century potentially associated with the agricultural structure across Moonlight Road in Area C.

Summary of Specimens Observed, Not Collected:

No Data

Current Curation Repository: Apogee

Permanent Curation Repository: VDHR

Field Notes: Yes

Field Notes Repository: VDHR

Photographic Media: Digital

Survey Reports: Yes

Survey Report Information:

Silliman, Garrett and David S. Hanley, 2023, Phase I Cultural Resources Survey for the Proposed Moonlight Solar Facility, Isle of Wight County, Virginia, Report Prepared for Timmons Group, Inc., Richmond, Virginia, from Apogee Environmental and Archaeological, Inc., Pittsburgh, Pennsylvania.

Survey Report Repository: VDEQ

DHR Library Reference Number: No Data

Significance Statement: All artifacts were recovered from the surface of the Ap horizon with no buried or sealed historic deposits encountered. The site lacks integrity and research potential as the absence of stratified deposits and features limits the potential for research questions addressing lives of rural populations in the mid-19th to mid-20th century. No further work is recommended at this site.

Surveyor's Eligibility Recommendations: Recommended Not Eligible

Surveyor's NR Criteria Recommendations: No Data

Surveyor's NR Criteria Considerations:	No Data

Snapshot

Date Generated: May 18, 2023

Site Name:	No Data
Site Classification:	Terrestrial, open air
Year(s):	1866 - 1916, 1917 - 1945, 1946 - 1991
Site Type(s):	Artifact scatter
Other DHR ID:	No Data
Temporary Designation:	No Data

Site Evaluation Status

Locational Information

USGS Quad:	BACONS CASTLE
County/Independent City:	Isle Of Wight (County)
Physiographic Province:	Coastal Plain
Elevation:	No Data
Aspect:	No Data
Drainage:	Albemarle-Chowan
Slope:	0-2%
Acreage:	0.790
Landform:	Other
Ownership Status:	Private
Government Entity Name:	No Data

Site Components

Component 1

Category:	Domestic
Site Type:	Artifact scatter
Cultural Affiliation:	Euro-American
Cultural Affiliation Detail:	No Data
DHR Time Period:	Reconstruction and Growth (1866 - 1916), World War I to World War II (1917 - 1945), The New Dominion (1946 - 1991)
Start Year:	No Data
End Year:	No Data
Comments:	44IW0393 was identified during pedestrian survey of a plowed field within a high probability portion of Area D. 44IW0393 is located east of Moonlight Road southwest of 44IW0392. A total of four shovel test pits (STPs) were excavated to determine the boundary of 44IW0393, none of which were positive for cultural material. A typical STP profile for 44IW0393 consisted of a light gray (10YR 7/1) silt loam that clearly transitions to either a brown (10YR 5/3) or strong brown (7.5YR 5/6) clay loam subsoil.

Bibliographic Information

Bibliography:

No Data

Informant Data:

No Data

CRM Events

Event Type: Survey:Phase I

Project Staff/Notes:

Garrett Silliman - Principal Investigator
David Hanley - Archaeological Field Director
Amanda Commins - Architectural Historian
Matthew Donathan - Archaeological Field Technician
Robert Kotlarek - Archaeological Field Technician
Dallon Olive - Archaeological Field Technician

Project Review File Number: No Data

Sponsoring Organization: No Data

Organization/Company: Apogee Environmental & Archaeological, Inc.

Investigator: David Hanley

Survey Date: 5/5/2023

Survey Description:

On behalf of Timmons Group, Inc. (Timmons), Apogee Environmental & Archaeological, Inc. (Apogee) conducted a Phase IB archaeological survey for the proposed Moonlight Solar Facility in Isle of Wight County, Virginia. The Phase IB survey serves as secondary step in meeting compliance requirements for The Virginia Department of Environmental Quality (DEQ). All activities were conducted in accordance with the Virginia Department of Historic Resources (DHR), as published in Guidelines for Conducting Historic Resources Survey in Virginia (2017). The project consists of the development of a solar energy facility located approximately 5.2 miles northwest of Smithfield, Virginia, situated west and south of the intersection between Moonlight Road and Burwells Bay Road. The archaeological area of potential effects (APE) contains parcels of mixed-use rural land totaling 516.9 acres (209.2 hectares). A desktop analysis cultural resources assessment was conducted in March 2023. The Phase I cultural resources survey was conducted between April 17th and May 5th, 2023.

Current Land Use	Date of Use	Comments
Agricultural field	5/5/2023	No Data

Threats to Resource: Development, Erosion

Site Conditions: Surface Deposits Present But With No Subsurface Integrity

Survey Strategies: Subsurface Testing, Surface Testing

Specimens Collected: Yes

Specimens Observed, Not Collected: No

Artifacts Summary and Diagnostics:

A total of 12 artifacts were recovered from the surface of the site, all of which were historic in nature. Among the 12 recovered artifacts are five aqua bottle glass fragments, one color glazed whiteware sherd, one oyster shell fragment, two amethyst glass bottle fragments, one light green bottle glass fragment, one brick fragment, and one black transfer printed whiteware sherd. Two artifacts out of these 12 have a discernable date range that can assist in dating the site: the black transfer print whiteware sherd, and the light green glass fragment. As seen in another site, black transfer printed wares were at the height of their production between 1820 and 1864. However, light green bottle glass started to be produced around 1940 and is still in use today. Based on the recovered artifacts, Apogee determined that the site is likely a low-density artifact scatter dating to the mid-19th to mid-20th century potentially associated with the agricultural structure across Moonlight Road in Area C.

Summary of Specimens Observed, Not Collected:

No Data

Current Curation Repository: Apogee

Permanent Curation Repository: VDHR

Field Notes: Yes

Field Notes Repository: VDHR

Photographic Media: Digital

Survey Reports: Yes

Survey Report Information:

Silliman, Garrett and David S. Hanley, 2023, Phase I Cultural Resources Survey for the Proposed Moonlight Solar Facility, Isle of Wight County, Virginia, Report Prepared for Timmons Group, Inc., Richmond, Virginia, from Apogee Environmental and Archaeological, Inc., Pittsburgh, Pennsylvania

Survey Report Repository: VDEQ

DHR Library Reference Number: No Data

Significance Statement: All artifacts were recovered from the Ap horizon with no buried or sealed historic deposits encountered. No diagnostic precontact artifacts were recovered. The site lacks integrity and research potential as the absence of stratified deposits and features limits the potential for research questions addressing lives of precontact Native American populations. No further work is recommended at this site.

Surveyor's Eligibility Recommendations: Recommended Not Eligible

Surveyor's NR Criteria Recommendations: No Data

Surveyor's NR Criteria Considerations:	No Data

Snapshot

Date Generated: May 18, 2023

Site Name:	No Data
Site Classification:	Terrestrial, open air
Year(s):	1866 - 1916, 1917 - 1945, 1946 - 1991
Site Type(s):	Artifact scatter
Other DHR ID:	No Data
Temporary Designation:	No Data

Site Evaluation Status

Locational Information

USGS Quad:	BACONS CASTLE
County/Independent City:	Isle Of Wight (County)
Physiographic Province:	Coastal Plain
Elevation:	No Data
Aspect:	No Data
Drainage:	Albemarle-Chowan
Slope:	0-2%
Acreage:	0.090
Landform:	Other
Ownership Status:	Private
Government Entity Name:	No Data

Site Components

Component 1

Category:	Domestic
Site Type:	Artifact scatter
Cultural Affiliation:	Euro-American
Cultural Affiliation Detail:	No Data
DHR Time Period:	Reconstruction and Growth (1866 - 1916), World War I to World War II (1917 - 1945), The New Dominion (1946 - 1991)
Start Year:	No Data
End Year:	No Data
Comments:	44IW0394 was identified during systematic shovel testing of an agricultural field within a high probability portion of Area C. 44IW0394 is located west of Moonlight Road directly north of a barn present on the property. A total of five shovel test pits (STPs) were excavated to determine the boundary for 44IW0394, with only the original STP being positive for historic materials. A typical soil profile for 44IW0394 consisted of a brownish yellow (10YR 6/6) sandy loam that clearly transitions to a strong brown (7.5YR 5/6) clay loam subsoil.

Bibliographic Information

Bibliography:

No Data

Informant Data:

No Data

Archaeological site data is protected under the Archaeological Resource Protection Act (ARPA 1979).

CRM Events

Event Type: Survey:Phase I

Project Staff/Notes:

Garrett Silliman - Principal Investigator
David Hanley - Archaeological Field Director
Amanda Commins - Architectural Historian
Matthew Donathan - Archaeological Field Technician
Robert Kotlarek - Archaeological Field Technician
Dallon Olive - Archaeological Field Technician

Project Review File Number: No Data

Sponsoring Organization: No Data

Organization/Company: Apogee Environmental & Archaeological, Inc.

Investigator: David Hanley

Survey Date: 5/5/2023

Survey Description:

On behalf of Timmons Group, Inc. (Timmons), Apogee Environmental & Archaeological, Inc. (Apogee) conducted a Phase IB archaeological survey for the proposed Moonlight Solar Facility in Isle of Wight County, Virginia. The Phase IB survey serves as secondary step in meeting compliance requirements for The Virginia Department of Environmental Quality (DEQ). All activities were conducted in accordance with the Virginia Department of Historic Resources (DHR), as published in Guidelines for Conducting Historic Resources Survey in Virginia (2017). The project consists of the development of a solar energy facility located approximately 5.2 miles northwest of Smithfield, Virginia, situated west and south of the intersection between Moonlight Road and Burwells Bay Road. The archaeological area of potential effects (APE) contains parcels of mixed-use rural land totaling 516.9 acres (209.2 hectares). A desktop analysis cultural resources assessment was conducted in March 2023. The Phase I cultural resources survey was conducted between April 17th and May 5th, 2023.

Current Land Use	Date of Use	Comments
Agricultural field	5/5/2023	No Data

Threats to Resource: Development, Erosion

Site Conditions: Unknown Portion of Site Destroyed

Survey Strategies: Subsurface Testing

Specimens Collected: Yes

Specimens Observed, Not Collected: No

Artifacts Summary and Diagnostics:

A total of seven historic artifacts were recovered from one STP, most of which do not possess a definitive date range: two aqua bottle glass fragments, two colorless bottle glass fragments, one oyster shell fragment, one brick fragment, and one undecorated whiteware sherd. The only artifact recovered with a date range is the whiteware sherd, which started to be produced in 1820 and is still produced today. Due to the site's proximity to a barn to the south, the site is likely a late-19th to early-20th century domestic artifact scatter.

Summary of Specimens Observed, Not Collected:

No Data

Current Curation Repository: Apogee

Permanent Curation Repository: VDHR

Field Notes: Yes

Field Notes Repository: VDHR

Photographic Media: Digital

Survey Reports: Yes

Survey Report Information:

Silliman, Garrett and David S. Hanley, 2023, Phase I Cultural Resources Survey for the Proposed Moonlight Solar Facility, Isle of Wight County, Virginia, Report Prepared for Timmons Group, Inc., Richmond, Virginia, from Apogee Environmental and Archaeological, Inc., Pittsburgh, Pennsylvania.

Survey Report Repository: VDEQ

DHR Library Reference Number: No Data

Significance Statement: All artifacts were recovered from the Ap horizon with no buried or sealed historic deposits encountered. The site lacks integrity and research potential as the absence of stratified deposits and features limits the potential for research questions addressing lives of rural populations in the late-19th to early-20th century. No further work is recommended at this site.

Surveyor's Eligibility Recommendations: Recommended Not Eligible

Surveyor's NR Criteria Recommendations: No Data

Surveyor's NR Criteria Considerations: No Data

Archaeological site data is protected under the Archaeological Resource Protection Act (ARPA 1979).

Appendix B: Key Staff Curriculum Vitae

Garrett W. Silliman, RPA

Apogee Environmental and Archaeological, Inc.

garrett@apogee-environmental.com 919-748-7712

Education

BA/Archaeology, The College of Wooster, 1996

MHP/Master of Heritage Preservation (Public History /Archaeology), Georgia State University, 2008

Registration

Registered Professional Archaeologist, No. 28577953

Years of Experience

26

Mr. Silliman has over 25 years of experience in archaeology, history, and cultural resource management, with a research focus on the archaeology of American battlefields, sites associated with the African American and Indigenous experience, and historic landscapes throughout the United States and Central America. He has extensive experience in all phases of archaeological investigations (Phase I, II, and III), teaching and public archaeology, remote sensing, artifact analysis and curation, archaeological site and historic structure assessment and mitigation, and site management. Through his background in cultural resource management archaeology, he has experience with and has received formal training in Native American consultation, Section 106 and 110 of the National Historic Preservation Act (1966), and the Archaeological Resources Protection Act (1979). From 2019 through 2020, he was Lecturer and Senior Archaeologist in the Department of Sociology and Anthropology at North Carolina State University. He is currently Senior Archaeologist and Principal Investigator for Apogee Environmental & Archaeological, Inc.

Career History

Principal Investigator
Apogee Environmental & Archaeological, Inc.
Chapel Hill, NC
June 2021 – Present

Senior Archaeologist/Principal Investigator
Johnson, Mirmiran & Thompson (JMT)
Chapel Hill, NC
September 2015 – June 2021

Senior Archaeologist/Lecturer
North Carolina State University
Raleigh, NC
December 2019 – October 2020

Senior Staff Archaeologist
Cardno
Raleigh, NC
March 2014 – September 2015

Founder/Archaeologist
Terminus Archaeological Research
Atlanta, GA
September 2011 – September 2015

Adjunct Faculty, History and Anthropology Departments
Georgia State University
Atlanta, GA
January 2013 – August 2014

Adjunct, History Department
Shorter University
Rome, GA
July 2011 – January 2012

Principal Investigator
Edwards-Pitman Environmental, Inc.
Atlanta, GA
July 2004 – September 2011

Archaeologist
Prentice Thomas and Associates, Inc.
Savannah, GA
September 2003 – July 2004

Archaeological Field Director
TRC Companies, Inc.
El Paso, TX
February 2003 – September 2003

Archaeological Field Director
Mesa Field Services
New Mexico
December 2001 – February 2003

Garrett W. Silliman, RPA

Apogee Environmental and Archaeological, Inc.

garrett@apogee-environmental.com 919-748-7712

Archaeology and Cultural Resource Management Experience (selected)

Archaeological Investigation Jockey Hollow Unit, Morristown National Historic Site, Morristown, New Jersey. PEPC Number: 109295; ARPA 2022.MORR.01. *Principal Investigator.* Directed archaeological research and field efforts for Phase I investigations at site of the Continental Army's 1778-1779 winter cantonment at Jockey Hollow. Successfully conducted shovel testing and metal detection within 40 discrete loci prior to the NPS construction of new signage, trail maintenance and drainage bars. 2022

Archaeological Survey and Assessment for the Goonies Solar Project in Lycoming County, Pennsylvania. *Principal Investigator and Project Manager.* Directed and managed all aspects of the archaeological survey and assessment for the proposed +/- 1,200 acres solar facility. Field team conducted pedestrian survey, systematic shovel testing, and limited metal detection around structures during the Phase Ib of the Goonies Solar Project in Lycoming County. Bolstered with the geophysical and geoarchaeological data, test units measuring 1x1, 1x2, and 2x2 meter were employed in the tested areas to determine the presence of deeply buried precontact sites along the floodplain. These collective data were successfully used to avoid significant encountered deposits while allowing for the completion of the project in non-sensitive areas. 2021-2022

Fort Bragg Archaeological Project and Sandhills Archaeological Context Study.
Senior Archaeologist. Directed archaeological research and field efforts for North Carolina State University (NCSU). NCSU was awarded a four-year federal research grant to conduct Section 110 work at Fort Bragg Military Reservation. As part of this award, a region-wide archaeological context is being developed to provide future research directions in North Carolina. 2019-2020

Phase I Archaeological Survey and Phase II Archaeological Testing, Assessment and NRHP Evaluation, Currituck National Wildlife Refuge, Currituck County, North Carolina. *Principal Investigator and Project Manager.* US Fish and Wildlife Service. Phase I archaeological survey for 10 land tracts within the Currituck National Wildlife Refuge. Additionally, JMT conducted the Phase II archaeological testing and NRHP evaluation of four previously recorded archaeological sites located within the survey tracts. 2017-2018

Phase I Archaeological Investigations of Hawtree Solar Farm, Warren County, North Carolina. *Project Manager and Principal Investigator.* Mr. Silliman conducted this project at the request of the OSA on behalf of Carolina Solar II, LLC (Carolina Solar) in advance of their intention to install a solar farm. Approximately 520 acres were surveyed, which identified eighteen archaeological sites, ranging from single prehistoric artifacts to the remains of a historic farmstead. Due to their significant nature, the avoidance of two resources, the remains of a nineteenth century farmstead and abandoned African American cemetery, were recommended. Mr. Silliman worked in coordination with Carolina Solar and the OSA to ensure the successful documentation, evaluation, and avoidance of these resources. 2018.

Phase II Archaeological Testing, Assessment, and NRHP Evaluation, Savannah Harbor Expansion, Chatham County Georgia. *Senior Consultant.* Archaeological assessment and NRHP evaluation of 9CH1312, a historic rice trunk, Chatham County, Georgia. The purpose of this investigation was to document and evaluate site 9CH1312 for NRHP eligibility prior to the proposed Savannah Harbor Expansion Project. The site is located in the Savannah National Wildlife Refuge and was historically associated with the early nineteenth-century Red Knoll Plantation. JMT was sub-contracted for services as senior consultant to assist in the evaluation, historic research, and reporting. 2017

Phase II and III Archaeological Testing, Assessment/NRHP Evaluation, and Data Recovery/Mitigation, US 301 over the Potomac River, King George County, Virginia and Charles County, Maryland. *Principal Investigator.* Mr. Silliman has overseen all archaeological work associated with the project since September 2015, including the NRHP evaluation of two archaeological sites (one in MD and one in VA) associated with the replacement of the Harry Nice Bridge/US 301 over the Potomac by the Maryland Transportation Administration. This includes all background research, client and agency coordination, supervision of fieldwork, reporting, artifact analysis and curation. Geophysical work conducted in evaluating the Civil War component of the Barnesfield Plantation (44KG0171)/Battle of Mathias Point (June 1861). 2015-Present.

Archaeological and Historic Architecture Limited Services Contracts, North Carolina Department of Transportation. *North Carolina Cultural Resource Lead.* JMT was selected by the North Carolina Department of Transportation to provide all phases of architectural history and historic preservation work, particularly as it relates to Section 106 compliance. JMT anticipates projects

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ranging from small scale projects requiring documentation of a single resource (buildings, structures [including bridges], historic districts and linear resources) to large scale projects requiring the documentation of more than one hundred resources. In 2017, JMT was selected for the 3-year open-end Archaeological Services contract. Between January 2016 and the present, JMT has successfully completed 13 tasks for the department. 2015-Present.

Phase I Archaeological Survey Fredericksburg and Spotsylvania National Military Park, Chancellorsville, VA, Contract No. GS-00F-194-CA. *Principal Investigator.* This survey was conducted at the request of the NPS, which provided for cultural resource compliance services prior to the proposed installation of a security fence around an existing water tower north of the Chancellorsville Battlefield Visitor Center. A key element in the evaluation of the area was the employment of systematic metal detection sampling. Enough data was collected from the project area to identify what is tentatively interpreted as a small portion of a May 3, 1863 Confederate firing line with associated artifacts. 2016-2017

Archeological Monitoring for the Rehabilitation of Cemetery Ridge, Gettysburg National Military Park, Gettysburg, PA, Contract No. NPS.GETT 220829. *Principal Investigator.* JMT provided archeological monitoring services to identify and document any archeological deposits or features that may be revealed during vegetation removal and grading in Zeigler's Grove and Cemetery Ridge at the Gettysburg National Military Park. JMT provided on-site archeological monitoring of those activities with the potential to cause subsurface disturbance to significant historic resources. 2016

Archaeological Monitoring/Delaware Water Gap National Recreation Area. *Principal Investigator, archaeology*. Responsible for monitoring on-site contractors conducting earth-disturbing activities within NPS boundaries, and recording/evaluating any potential archaeological material. The project was associated with mitigation for impacts from construction of the new Susquehanna to Roseland Electric Transmission Line constructed through the Delaware Water Gap. 2015

HTVA Floating House EIS, Tennessee Valley Authority, Virginia, North Carolina, Georgia, Kentucky, Tennessee, Mississippi, and Alabama: *Cultural Resources Lead.* Conducted background research, alternatives analysis, and authored cultural resources sections for the Tennessee Valley Authority's (TVA) Environmental Impact Statement (EIS) concerning the treatment of floating houses on 13 TVA reservoirs in a 7-state area. Data generated by the study will be utilized by the TVA concerning their policy towards the presence of floating houses on lands and reservoirs managed by the authority. Of particular concern are the impacts to potential cultural resources located in the littoral and benthic zones as well overall shoreline erosion. July 2015.

Dalton Expansion Project, Transco-Williams/FERC., Coweta, Carroll, Douglas, Paulding, Bartow, Gordon, Whitfield and Murray Counties, Georgia: *Project Manager and Field Lead.* Project Manager and Cultural Resources field lead for the Phase I archaeological investigations of the proposed Dalton Expansion project, a natural gas pipeline extending 110 miles through an eight-county area of north Georgia. Project required the coordination with the GA SHPO, tribal groups, FERC, local stakeholders/preservation groups, and Transco-Williams. Project resulted in the identification and documentation of over 180 archaeological sites, of which 19 were recommended for evaluative testing as potentially eligible for listing to the NRHP. 2014-2015.

Archaeological and Historical Investigations in Talladega National Forest, USDA Forest Service, Alabama. *Principal Investigator.* Mr. Silliman served as Principal Investigator for cultural resources, project manager, and contract administrator for cultural resource survey of over 2200 acres in the Talladega National Forest near Heflin, Alabama. Project resulted in the identification and evaluation of 68 pre-Columbian and Historic period sites. Project conducted during 2014 contract year.

Archaeological and Historical Investigations in Chattahoochee and Oconee National Forests, USDA Forest Service, Georgia. As a sub consultant, directed archaeological field investigations for intensive survey of approximately 2500 acres for the Chattahoochee and Oconee National Forests in Georgia. Project resulted in the identification and evaluation of 112 pre-Columbian and Historic period sites. 2012-2013.

Appendix C: Artifact Catalogs

Provenience	Historic/Precontact	Functional Category	Material	Artifact Type	Count	Notes
Surface Find 25	Historic	Kitchen	Ceramic	Undecorated Whiteware Body Sherd	2	
Surface Find 26	Historic	Kitchen	Ceramic	Undecorated Soft Paste Porcelain Body Sherd	1	
Surface Find 26	Historic	Kitchen	Ceramic	Undecorated Redware Body Sherd	1	
Surface Find 31	Historic	Kitchen	Ceramic	Flow Blue Transfer Print Whiteware Rim Sherd	1	1840-1900
Surface Find 31	Historic	Kitchen	Shell	Oyster Shell Fragment	1	
Surface Find 32	Historic	Kitchen	Glass	Unidentified Aqua Bottle Glass Body Fragment	1	
Surface Find 33	Historic	Architectural	Glass	Colorless Window Glass Fragment	1	
Surface Find 33	Historic	Architectural	Brick	Unidentified Brick Fragment	1	
Surface Find 34	Historic	Kitchen	Ceramic	Undecorated Whiteware Body Sherd	1	
Surface Find 35	Historic	Kitchen	Ceramic	Undecorated Whiteware Body Sherd	1	
Surface Find 36	Historic	Architectural	Brick	Unidentified Brick Fragment	1	
Surface Find 36	Historic	Kitchen	Ceramic	Undecorated Whiteware Body Sherd	1	
Surface Find 37	Historic	Kitchen	Ceramic	Undecorated Whiteware Body Sherd	1	
Surface Find 38	Historic	Kitchen	Ceramic	Undecorated Whiteware Body Sherd	1	
Surface Find 39	Historic	Kitchen	Ceramic	Blue Shell Edge Decorated Whiteware Rim Sherd	1	incised and scalloped (1830s-1890s)
Surface Find 39	Historic	Kitchen	Ceramic	Blue Dipped Whiteware Body Sherd	1	cats eye or cabeled (1830-1900)
Surface Find 40	Historic	Kitchen	Ceramic	Undecorated Soft Paste Porcelain Body Sherd	1	
Surface Find 40	Historic	Kitchen	Ceramic	Undecorated Whiteware Body Sherd	1	
Surface Find 40	Historic	Kitchen	Ceramic	Blue Transfer Print Whiteware Rim Sherd	1	1820-1867
Surface Find 40	Historic	Kitchen	Ceramic	Blue Salt Glazed American Gray Stoneware Body Sherd	1	
Surface Find 40	Historic	Kitchen	Glass	Unidentified Colorless Glass Bottle Base Fragment	1	
Surface Find 41	Historic	Architectural	Brick	Unidentified Brick Fragment	2	
Surface Find 41	Historic	Kitchen	Ceramic	Undecorated Whiteware Body Sherd	1	
Surface Find 41	Historic	Kitchen	Ceramic	Molded Blue Shell Edge Whiteware Rim Sherd	1	incised (1820s-1830s)
Surface Find 42	Historic	Kitchen	Ceramic	Undecorated Ironstone Rim Sherd	1	1840-present
Surface Find 42	Historic	Architectural	Brick	Unidentified Brick Fragment	2	1 burnt
Surface Find 42	Historic	Kitchen	Shell	Oyster Shell Fragment	1	
Surface Find 42	Historic	Kitchen	Ceramic	Undecorated Whiteware Body Sherd	2	
Surface Find 42	Historic	Kitchen	Ceramic	Flow Blue Transfer Print Whiteware Rim Sherd	1	1840-1900
Surface Find 43	Historic	Kitchen	Ceramic	Black Transfer Print Whiteware Body Sherd	1	1820-1864
Surface Find 43	Historic	Kitchen	Ceramic	Flow Blue Transfer Print Whiteware Body Sherd	1	1840-1900
				Total	35	mid-19th to early-20th century

Provenience	Historic/Precontact	Functional Category	Material	Artifact Type	Count	Notes
Surface Find 28	Historic	Kitchen	Ceramic	Undecorated Whiteware Body Sherd	1	
Surface Find 29	Historic	Kitchen	Ceramic	Flow Blue Decorated Whiteware Rim Sherd	1	1840-1900
Surface Find 30	Historic	Kitchen	Ceramic	Flow Blue Decorated Whiteware Rim Sherd	1	scalloped edge (1840-1900)
				Total	3	mid- to late-19th century

Provenience	Historic/Precontact	Functional Category	Material	Artifact Type	Count	Notes
Surface Find 1	Historic	Kitchen	Glass	Cobalt Blue Bottle Glass Base Fragment	1	late-19th to early-20th century
Surface Find 2	Historic	Kitchen	Glass	Milk Glass Canning Lid Liner Fragment	1	1930s
Surface Find 3	Historic	Kitchen	Glass	Cobalt Blue Bottle Glass Fragment	1	late-19th to early-20th century
Surface Find 3	Historic	Kitchen	Ceramic	Undecorated Whiteware Body Sherd	1	
Surface Find 4	Historic	Kitchen	Ceramic	Undecorated Hard-Paste Porcelain Body Sherd	1	
Surface Find 5	Historic	Kitchen	Glass	"Black" Bottle Glass Body Fragment	1	1840s-1880s
Surface Find 5	Historic	Kitchen	Ceramic	Undecorated Whiteware Body Sherd	1	
				Total:	7	mid-19th to mid-20th century

Provenience	Historic/Precontact	Functional Caterogy (Historic)	Material	Artifact Type	Count	Notes
Surface Find 7	Historic	Kitchen	Glass	Aqua Bottle Glass Fragment	2	
Surface Find 7	Historic	Kitchen	Ceramic	Brown Glaze Interior Whiteware Body Sherd	1	
Surface Find 8	Historic	Kitchen	Glass	Aqua Bottle Glass Fragment	1	
Surface Find 8	Historic	Kitchen	Glass	Amethyst/Solarized Bottle Glass Fragment	1	
Surface Find 8	Historic	Kitchen	Shell	Oyster Shell Fragment	1	
Surface Find 9	Historic	Kitchen	Glass	Aqua Bottle Glass Fragment	1	
Surface Find 10	Historic	Kitchen	Glass	Amethyst/Solarized Bottle Glass Fragment	1	
Surface Find 10	Historic	Kitchen	Glass	Aqua Bottle Glass Fragment	1	
Surface Find 10	Historic	Kitchen	Glass	Light Green Bottle Glass Fragment	1	1940-present
Surface Find 10	Historic	Architectural	Brick	Unidentified Brick Fragment	1	
Surface Find 46	Historic	Kitchen	Ceramic	Black Transfer Printed Whiteware Body Sherd	1	1820-1864
				Total	12	mid-19th to mid-20th century

Provenience	Historic/Precontact	Functional Category	Material	Artifact Type	Count
ST 4.20 Strat 1 (0-28cm)	Historic	Kitchen	Shell	Oyster Shell Fragment	1
ST 4.20 Strat 1 (0-28cm)	Historic	Kitchen	Glass	Aqua Bottle Glass Fragment	2
ST 4.20 Strat 1 (0-28cm)	Historic	Kitchen	Glass	Colorless Bottle Glass Fragment	2
ST 4.20 Strat 1 (0-28cm)	Historic	Kitchen	Ceramic	Undecorated Whiteware Body Sherd	1
ST 4.20 Strat 1 (0-28cm)	Historic	Architectural	Brick	Unidentified Brick Fragment	1
				Total	7

Provenience	Historic/Precontact	Functional Category	Material	Artifact Type	Count
Surface Find 13	Historic	Kitchen	Glass	Milk Glass Canning Lid Liner Fragment	1
Surface Find 14	Historic	Kitchen	Ceramic	Blue Transfer-Printed Hard-Paste Porcelain Body Sherd	1
Surface Find 15	Historic	Kitchen	Glass	Milk Glass Canning Lid Liner Fragment	1
Surface Find 16	Historic	Kitchen	Ceramic	Undecorated Soft Paste Porcelain Handle Sherd	1
Surface Find 17	Historic	Kitchen	Glass	Unidentified Light Green Bottle Glass Base Fragment	1
Surface Find 18	Precontact	N/A	Quartzite (White)	Biface/Preform Fragment	1
Surface Find 19	Precontact	N/A	Quartz	Possible Core Fragment	1
				Total	7

Provenience	Historic/Precontact	Functional Category	Material	Artifact Type	Count
Surface Find 20	Historic	Kitchen	Ceramic	Undecorated Whiteware Body Sherd	1
Surface Find 21	Historic	Kitchen	Ceramic	Undecorated Whiteware Body Sherd	1
Surface Find 22	Historic	Kitchen	Ceramic	Undecorated Whiteware Body Sherd	1
Surface Find 23	Historic	Architectural	Brick	Unidentified Brick Fragment	1
Surface Find 24	Precontact	N/A	Mitchell Chert	Possible Biface/Preform	1
Surface Find 27	Historic	Architectural	Brick	Glazed Brick Edge Fragment	1
				Total	6

Provenience	Historic/Precontact	Functional Category	Material	Artifact Type	Count
ST 2.2 Strat 1 (0-30cm)	Historic	Kitchen	Ceramic	Blue Edge Decorated Whiteware Rim Sherd	1
ST 2.5 Strat 1 (0-29cm)	Precontact	N/A	Quartz	Tertiary Flake	1
ST 3.6 Strat 2 (14-27cm)	Precontact	N/A	Rhyolite	Tertiary Flake (Possible Scraper)	1
ST 7.20 Strat 1 (0-24cm)	Historic	Kitchen	Ceramic	Salt Glaze American Gray Stoneware Body Sherd	1
ST 11.29 Strat 1 (0-24cm)	Historic	Architectural	Iron	Hand Wrought Nail	1
Surface Find 44	Historic	Kitchen	Glass	Unidentified "Black" Glass Bottle Fragment	1
				Total	6

Provenience	Historic/Precontact	Functional Category	Material	Artifact Type	Count
Surface Find 6	Historic	Kitchen	Ceramic	Undecorated Whiteware Rim Sherd	1
Surface Find 11	Historic	Kitchen	Ceramic	Plain Salt Glaze American Gray Stoneware Base Sherd	1
Surface Find 12	Historic	Kitchen	Glass	Unidentified Cobalt Blue Bottle Glass Body Fragment	1
				Total	3

Appendix D: Representative Shovel Test Profiles

Area	Transect	ST Number	Strat 1: Depth (cm), Soil Color, and Texture	Strat 2: Depth (cm), Soil Color, and Texture	Strat 3: Depth (cm), Soil Color, and Texture	Positive or Negative
A	68	5	0-17 cm dark grayish brown (10YR 4/2) sandy loam	17-25 cm light brownish gray (10YR 6/2) sandy loam	25-35 cm pale brown (2.5Y 7/3) sandy clay	Negative
	72	3	0-14 cm very dark brown (10YR 2/2) sandy loam	14-30 cm light yellowish brown (10YR 6/4) sandy clay		Negative
	73	4	0-20 cm dark grayish brown (10YR 4/2) sandy loam	20-25 cm light brownish gray (10YR 6/2) sandy loam	25-35 cm pale brown (2.5Y 7/3) sandy clay	Negative
	77	6	0-19 cm dark grayish brown (10YR 4/2) sandy loam	19-30 cm pale brown (2.5Y 7/2) sandy clay		Negative
	81	3	0-21 cm dark grayish brown (10YR 4/2) sandy loam	21-31 cm light gray (10YR 7/2) sandy cly loam with yellowish red (5YR 5/6) and yellowish brown (10YR 5/6) mottling		Negative
	J8	N/A	0-24 cm brown (10YR 5/3) sandy loam	24-36 cm strong brown (7.5YR 5/6) clay loam		Negative
B	14	21	0-11 cm dark grayish brown (10YR 4/2) sandy loam	11-19 cm very pale brown (10YR 7/4) sandy loam	19-30 cm yellowish brown (10YR 5/8) clay loam	Negative
	17	4	0-17 cm very dark grayish brown (10YR 3/2) sandy loam	17-28 cm pale brown (2.5Y 8/3) loamy sand		Negative
	24	2	0-22 cm brown (10YR 5/3) sandy loam	22-28 cm very pale brown (10YR 7/4) sandy loam	28-40 cm strong brown (7.5YR 5/6) clay loam	Negative
	J4	N/A	0-29 cm brown (10YR 5/3) sandy loam	29-40 cm yellowish brown (10YR 5/6) clay loam		Negative
	J6	N/A	0-27 cm brown (10YR 4/3) sandy loam	27-39 cm yellowish brown (10YR 5/6) clay loam		Negative
C	4	20	0-28 cm brownish yellow (10YR 6/6) sandy loam	28-40 cm strong brown (7.5YR 5/6) clay loam		Positive
	5	27	0-26 cm brown (10YR 5/3) sandy loam	26-30 cm very pale brown (10YR 7/3) sandy loam	30-41 cm strong brown (7.5YR 5/6) clay loam	Negative
	12	28	0-20 cm dark yellowish brown (10YR 5/4) sandy loam	20-30 cm brownish yellow (10YR 6/8) sandy clay		Negative
D	26	11	0-15 cm dark grayish brown (10YR 4/2) sandy loam	15-22 cm very pale brown (10YR 7/3) sandy loam	22-32 cm brownish yellow (10YR 6/6) sandy clay	Negative
	45	34	0-17 cm dark grayish brown (10YR 4/2) sandy loam	17-29 cm pale brown (2.5Y 7/3) sandy clay		Negative
	52	9	0-15 cm dark grayish brown (10YR 4/2) sandy loam	15-17 cm brown (10YR 5/3) sandy loam	17-28 cm very pale brown (10YR 7/3) sandy clay	Negative
	64	2	0-17 cm dark grayish brown (10YR 4/2) sandy loam	17-27 cm pale brown (2.5Y 7/3) sandy clay		Negative
	J11	N/A	0-27 cm brown (10YR 5/3) sandy loam	27-37 cm strong brown (7.5YR 5/6) clay loam		Negative
	J15	N/A	0-27 cm brown (10YR 5/3) sandy loam	27-39 cm strong brown (7.5YR 5/6) clay loam		Negative

Appendix E: DHR Project Communications

COMMONWEALTH of VIRGINIA

Travis A. Voyles
Secretary of Natural and Historic Resources

Department of Historic Resources
2801 Kensington Avenue, Richmond, Virginia 23221

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Director
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www.dhr.virginia.gov

August 16, 2023

Garrett Silliman
Apogee
1493 Butler Plank Road, Suite 6
Glenshaw, Pennsylvania 15116

RE- Moonlight Solar Facility
Isle of Wight County, VA
DHR File No. 2023-4075

Dear. Mr. Silliman

We have received for review two reports, *Phase IB Archaeological Survey for the Proposed Moonlight Facility, Isle of Wight County, Virginia,* and *Phase I Historic Architecture Survey and Effects Assessment for the Proposed Moonlight Solar Facility, Isle of Wight County, Virginia* prepared by Apogee Environmental & Archaeological, Inc. (Apogee) on behalf of Timmons Group Inc in support of an application to the Department of Environmental Quality for a Permit-by-Rule application to construct and operate a small solar project in Isle of Wight County. Our comments are provided as technical assistance to DEQ. We have not been notified by any Federal agency of their involvement in this project; however, we reserve the right to provide additional comment pursuant to the National Historic Preservation Act, if applicable.

Archaeology

The report documents an archaeological survey of 516.9 acres for Moonlight Solar Facility. During the course of the survey, Apogee identified five archaeological sites (44IW0390, 44IW0391, 44IW0392, 44IW0393, and 44IW0394). Site 44IW0390 is a mid-19th to early-20th century domestic trash scatter. site 44IW0391 is a low-density artifact scatter dating to the mid- to late-19th century. Site 44IW0392 and 44IW0393 are a low-density artifact scatters dating to the mid-19th to mid-20th century potentially associated with the agricultural structure across Moonlight Road. Site 44IW0394 is a late-19th to early-20th century domestic artifact scatter. Apogee recommends that all five sites (**44IW0390, 44IW0391, 44IW0392, 44IW0393,** and **44IW0394)** are *not eligible* for listing the National Register of Historic Places (NRHP). No additional work is recommended for the project area. DHR agrees with these recommendations.

Please revise the VCRIS forms to remove the temporary site names (e.g. Apogee 1). Please submit comb-bound hard copies of the report.

Historic Architecture

Apogee identified a total of twenty-one (21) historic architectural resources. Eleven (11) previously recorded resources were identified within the 0.5-mile buffer. Of the eleven (11) resources, nine (9) had been surveyed within the past 5 years. The remaining two (2) previously recorded resources and nineteen (19) newly identified resources were surveyed. Apogee recommends none of the surveyed resources as eligible for listing in the National Register of Historic Places (NRHP) and Virginia Landmarks Register (VLR) and DHR concurs. See the attached table for details.

If you have any questions regarding these comments, please contact me at 804-482-8091 or via email, jennifer.bellville-marrion@dhr.virginia.gov.

Sincerely,

Jenny Bellville-Marrion
Project Review Archaeologist
Review and Compliance Division

Cc: Chris Egghart, DEQ
Amber Foster, DEQ

COMMONWEALTH of VIRGINIA

Travis A. Voyles
Secretary of Natural and Historic Resources

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Please revise the VCRIS forms to remove the temporary site names (e.g. Apogee 1). Please submit comb-bound hard copies of the report.

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Apogee identified a total of twenty-one (21) historic architectural resources. Eleven (11) previously recorded resources were identified within the 0.5-mile buffer. Of the eleven (11) resources, nine (9) had been surveyed within the past 5 years. The remaining two (2) previously recorded resources and nineteen (19) newly identified resources were surveyed. Apogee recommends none of the surveyed resources as eligible for listing in the National Register of Historic Places (NRHP) and Virginia Landmarks Register (VLR) and DHR concurs. See the attached table for details.

If you have any questions regarding these comments, please contact me at 804-482-8091 or via email, jennifer.bellville-marrion@dhr.virginia.gov.

Sincerely,

Jenny Bellville-Marrion
Project Review Archaeologist
Review and Compliance Division

Cc: Chris Egghart, DEQ
Amber Foster, DEQ

DHR ID #	Resource Name	Apogee Eligibility	DHR Eligibility	Apogee Impact	DHR Impact
046-0063	House	Not Eligible	Not Eligible	N/A	N/A
046-5144	House	Not Eligible	Not Eligible	N/A	N/A
046-5721	House	Not Eligible	Not Eligible	N/A	N/A
046-5722	House	Not Eligible	Not Eligible	N/A	N/A
046-5723	House	Not Eligible	Not Eligible	N/A	N/A
046-5724	House	Not Eligible	Not Eligible	N/A	N/A
046-5725	House	Not Eligible	Not Eligible	N/A	N/A
046-5726	House	Not Eligible	Not Eligible	N/A	N/A
046-5727	House	Not Eligible	Not Eligible	N/A	N/A
046-5728	House	Not Eligible	Not Eligible	N/A	N/A
046-5729	House	Not Eligible	Not Eligible	N/A	N/A
046-5780	House	Not Eligible	Not Eligible	N/A	N/A
046-5781	House	Not Eligible	Not Eligible	N/A	N/A
046-5783	House	Not Eligible	Not Eligible	N/A	N/A
046-5784	House	Not Eligible	Not Eligible	N/A	N/A
046-5785	House	Not Eligible	Not Eligible	N/A	N/A
046-5786	House	Not Eligible	Not Eligible	N/A	N/A

TABLE KEY:	Warrants Mitigation	Needs Attention	DHR does not concur

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YOUR VISION ACHIEVED THROUGH OURS.

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MEMORANDUM

TO: Palladium Energy

FROM: Timmons Group

DATE: May 4th, 2023

RE: Isle of Wight County Moonlight Solar Impacts (AG2-137)

Moonlight Solar Impact Study Background

An injection study was performed to detail the impact of the Moonlight Solar Project on the transmission system within Isle of Wight County, VA. Moonlight Solar is a 44 MWac solar project connecting to the Surry – Chuckatuck 230 kV Dominion-owned transmission line and is currently in the PJM queue as project number AG2-137.

The initial set up of the study model included the following steps:

- Adding all queued generation projects with an Interconnection Agreement (IA) within a two-county radius
- Confirming that PJM transmission projects in the local area are considered
- Confirming that PJM's planned decommissioned plants are turned off in the model
- Running a sensitivity with the two sets of offshore wind projects within the queue (AE2-122/123/124 and AF1-123/124/125)

PJM models queued projects as capacity and energy components to separately test different sets of contingencies. When considering single contingency outages, only the capacity of the project is considered since most of these outages can be planned ahead of the actual event. Bus, line, and tower contingencies will consider the full output of the project (capacity and energy). To account for this, two cases were created: the first being the capacity case and the second one including both capacity and energy.

Within the two-county radius there are nine solar projects with an Interconnection Agreement and two sets of offshore wind projects with an interim study performed (AE2-122/123/124 and AF1-123/124/125). The queued solar projects account for 630 MW of energy and 357.5 MW of capacity while the queued offshore wind projects account for 5040.3 MW of energy and 1273.2 MW of capacity. Since the offshore wind projects do not yet have an Interconnection Agreement but do have an interim study that was performed, a secondary sensitivity scenario was evaluated to include the wind projects within the model. Both sets of results are supplied.

There are additional projects within the queue in the vicinity of Moonlight Solar; however, they have not yet completed an Interconnection Agreement. It is unknown at this time which of these queued projects will move forward and were therefore excluded from the study herein.

Only one transmission upgrade was found in PJM's reports to be in the region of study. The upgrade consists of increasing the capacity of a 230 kV line near the City of Colonial Heights.

The listed in-service date of this line was 12/31/2022 and was included to be in the base model used.

As for plant retirements, there are two coal powered units (Chesterfield 5 and 6) and one oil powered unit (Yorktown 3) that are scheduled to be decommissioned in 2023. The two Chesterfield units account for 1014.9 MW capacity and were already turned off in the base model while the Yorktown unit which accounts for 767.1 MW capacity needed to be turned off.

Study and Results

Timmons Group ("Timmons"), on behalf of Palladium Energy, requested and received the 2024 AG1 SIS PJM model. Timmons then updated the model as described above.

Table 1 below shows the amount of power that can be injected at the Moonlight Solar site before overloading any section of the transmission system. Scenario 1 results exclude the offshore wind projects previously mentioned whereas Scenario 2 includes the added 5040.3 MW of energy between the two sets of projects.

Table 1. Limits of the transmission system within the vicinity of Isle of Wight County.

Scenario	Facility at risk of overloading if injection limit exceeded by Moonlight Solar	Injection Limit (MW)
1	Moonlight Solar Tap – Chuckatuck 230 kV Line	474.4
2	Battleboro – Rocky Mount 115 kV Line	-960.1
	Hopewell – Chesterfield A 230 kV Line	-822.6
	Chuckatuck – Ben's Church 230 kV Line	-511.6
	Hopewell – Chesterfield B 230 kV Line	-450.2
	Ben's Church – Copeland 230 kV Line	-193.6
	Prince George 230/115 kV Transformer	-156.1
	Copeland – Newport News 230 kV Line	230
	Moonlight Solar Tap – Chuckatuck 230 kV Line	532.7

Table 1 shows that after considering existing projects with an Interconnection Agreement, the Moonlight Solar Project does not have significant impact to the surrounding transmission system unless it were to exceed 474.4 MW. Since this project is only 44 MW, the 230 kV line from the project's point of interconnection to Chuckatuck would not be overloaded because of Moonlight Solar.

Once considering the more than 5 GW of offshore wind in the model, there are a couple facilities along the 230 kV system that are overloaded (negative injection limits); however, Moonlight Solar would just contribute to these upgrades, not cause them directly. If the offshore wind projects are not considered, then Moonlight Solar does not trigger these upgrades as shown in the Case 1 results as discussed. If the offshore wind projects are considered, then they are directly causing the overloads listed in Table 1 above, not Moonlight Solar.

Based on the results identified herein, there is adequate capacity on the system to accept the 44 MW generation from Moonlight Solar when considering previously queued projects with an interconnection agreement. As other projects are completed in the area, these results could fluctuate.

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April 28, 2023

Chance Zajicek
Palladium Energy
25 N. Market Street
Jacksonville, FL 32202

RE: Moonlight Solar, Burwells Bay Road, Smithfield, Isle of Wight County, VA

Mr. Zajicek

At your request, I have considered the impact of a 44 MW solar farm proposed to be constructed on a portion of approximately 523.75 acres of land off Burwells Bay Road, Smithfield, Isle of Wight County, Virginia. Specifically, I have been asked to give my professional opinion on whether the proposed solar farm will have any impact on adjoining property value and whether "the location and character of the use, if developed according to the plan as submitted and approved, will be in harmony with the area in which it is to be located."

To form an opinion on these issues, I have researched and visited existing and proposed solar farms in Virginia as well as other states, researched articles through the Appraisal Institute and other studies, and discussed the likely impact with other real estate professionals. I have not been asked to assign any value to any specific property.

This letter is a limited report of a real property appraisal consulting assignment and subject to the limiting conditions attached to this letter. My client is Palladium Energy, represented to me by Mr. Chance Zajicek. My findings support the Application. The effective date of this consultation is April 28, 2023.

Conclusion

The adjoining properties are well set back from the proposed solar panels and will use a combination of existing vegetation and planted vegetation to provide a screen from adjoining properties.

The matched pair analysis shows no impact on home values due to abutting or adjoining a solar farm as well as no impact to abutting or adjacent vacant residential or agricultural land where the solar farm is properly screened and buffered. The criteria that typically correlates with downward adjustments on property values such as noise, odor, and traffic all indicate that a solar farm is a compatible use for rural/residential transition areas and that it would function in a harmonious manner with this area.

Data from the university studies, broker commentary, and other appraisal studies support a finding of no impact on property value adjoining a solar farm with proper setbacks and landscaped buffers.

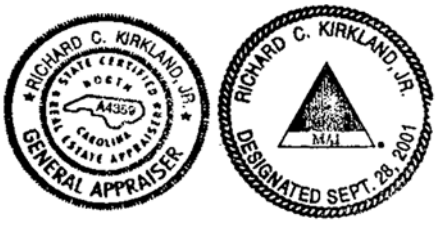
Very similar solar farms in very similar areas have been found by hundreds of towns and counties not to have a substantial negative effect to abutting or adjoining properties, and many of those

findings of no impact have been upheld by appellate courts. Similar solar farms have been approved with adjoining agricultural uses, schools, churches, and residential developments.

Based on the data and analysis in this report, it is my professional opinion that the solar farm proposed at the subject property will have no impact on the value of adjoining or abutting properties and that the proposed use is in harmony with the area in which it is located. I note that some of the positive implications of a solar farm that have been expressed by people living next to solar farms include protection from future development of residential developments or other more intrusive uses, reduced dust, odor and chemicals from former farming operations, protection from light pollution at night, it's quiet, and there is minimal traffic.

If you have any questions, please let me know.

Sincerely,



Richard C. Kirkland, Jr., MAI
NC Certified General Appraiser #A4359
VA Certified General Appraiser # 4001017291

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I. Proposed Project and Adjoining Uses

Proposed Use Description

This 44 MW solar farm is proposed to be constructed on a portion of approximately 523.75 acres of land off Burwells Bay Road, Smithfield, Isle of Wight County, Virginia.

Adjoining Properties

I have considered adjoining uses and included a map to identify each parcel's location. The closest adjoining home will be 165 feet from the closest solar panel and the average distance to adjoining homes will be 382 feet to the nearest solar panel.

Adjoining land is a mix of residential, agricultural and industrial uses. There is also a religious facility that will adjoin this project, which is common among the solar farms researched for this report.

The breakdown of those uses by acreage and number of parcels is summarized below.

Adjoining Use Breakdown

	Acreage	**Parcels**
Residential	4.85%	41.67%
Agricultural	92.41%	54.17%
Agri/Res	2.73%	4.17%
Total	**100.00%**	**100.00%**

On the following page, I have the GIS tax map shown with the parent tracts and numbered adjoining parcels. I also have the second image of the area proposed to be leased pulled from GoogleEarth.

1
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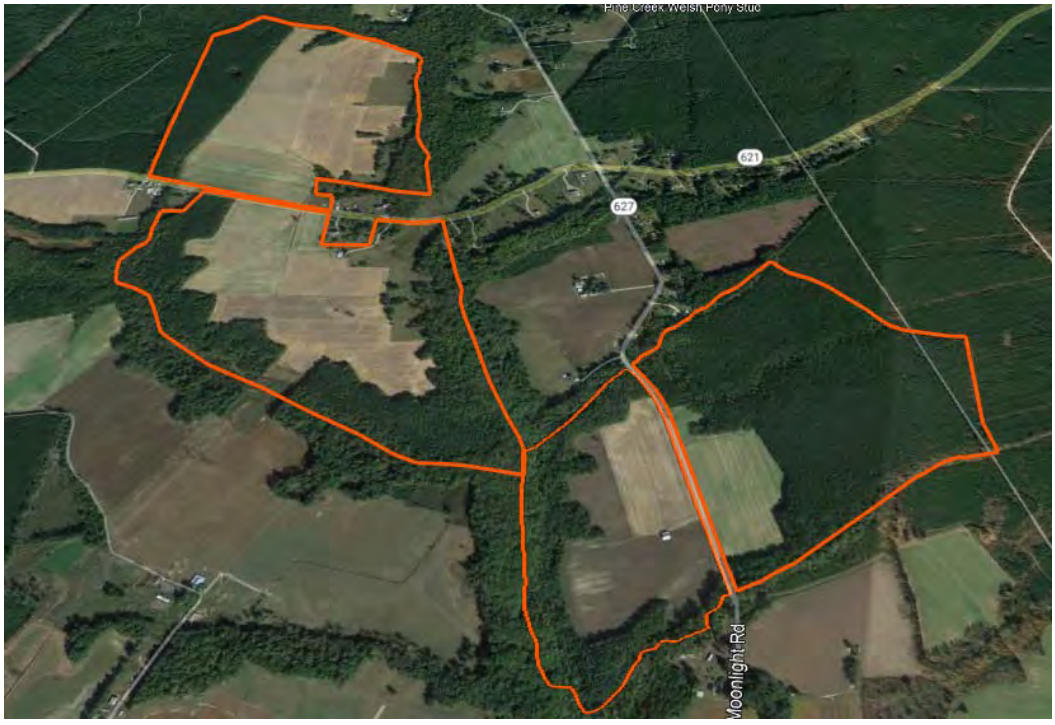
Pine Creek Welsh Pony Stud
621
627
Moonlight Rd

Surrounding Uses

#	MAP ID	Owner	GIS Data Acres	Present Use	Adjoin Acres	Adjoin Parcels	Distance (ft) Home/Panel
1	05-01-002	Doggett	27.00	Agricultural	1.89%	4.17%	N/A
2	05-01-002A	Walling	11.50	Residential	0.81%	4.17%	585
3	11-01-019	Goodrich	28.30	Residential	1.98%	4.17%	1,105
4	11-01-021Y	Edwards	15.00	Residential	1.05%	4.17%	N/A
5	11-01-018A	Edwards	1.00	Residential	0.07%	4.17%	270
6	11-01-017C	Lawton	2.00	Residential	0.14%	4.17%	N/A
7	11-01-017B	Villa	1.93	Residential	0.14%	4.17%	170
8	11-01-021P	Evans	3.27	Residential	0.23%	4.17%	180
9	11-01-022	Edwards	65.00	Agricultural	4.55%	4.17%	N/A
10	11-01-022	Edwards	1.86	Residential	0.13%	4.17%	280
11	11-01-022G	Upton	2.20	Residential	0.15%	4.17%	165
12	11-01-022	Edwards	25.50	Agricultural	1.79%	4.17%	N/A
13	11-01-042	Hofler	148.43	Agricultural	10.40%	4.17%	N/A
14	12-01-008	Hofler	121.47	Agricultural	8.51%	4.17%	N/A
15	11-01-041	Joyner	111.00	Agricultural	7.78%	4.17%	N/A
16	11-01-040	Gwaltney	51.60	Agricultural	3.62%	4.17%	N/A
17	11-01-024	Gwaltney	39.00	Agri/Res	2.73%	4.17%	510
18	11-01-015	Batten	95.00	Agricultural	6.66%	4.17%	N/A
19	11-01-016	Thacker	131.00	Agricultural	9.18%	4.17%	N/A
20	11-01-004	Thacker	55.00	Agricultural	3.85%	4.17%	N/A
21	11-01-003	Thacker	110.00	Agricultural	7.71%	4.17%	N/A
22	11-01-002	Edwards	38.00	Agricultural	2.66%	4.17%	N/A
23	11-01-017A	Edwards	2.20	Residential	0.15%	4.17%	175
24	11-01-001	Hancock	340.00	Agricultural	23.82%	4.17%	N/A
		Total	**1427.260**		**100.00%**	**100.00%**	382

Demographics Around Subject Property

I have pulled demographic data around a 1-mile, 3-mile and 5-mile radius from the middle of the project as shown on the following pages.

Housing Profile

9301-11399 Burwells Bay Rd, Smithfield, Virginia, 23430
Ring: 1 mile radius

Prepared by Esri
Latitude: 37.03196
Longitude: -76.72843

Population		Households	
2010 Total Population	74	2022 Median Household Income	$78,887
2020 Total Population	78	2027 Median Household Income	$97,279
2022 Total Population	79	2022-2027 Annual Rate	4.28%
2027 Total Population	81		
2022-2027 Annual Rate	0.50%		

	Census 2010		2022		2027	
Housing Units by Occupancy Status and Tenure	Number	Percent	Number	Percent	Number	Percent
Total Housing Units	39	100.0%	41	100.0%	42	100.0%
Occupied	32	82.1%	34	82.9%	35	83.3%
Owner	27	69.2%	26	63.4%	27	64.3%
Renter	5	12.8%	8	19.5%	8	19.0%
Vacant	7	17.9%	6	14.6%	7	16.7%

	2022		2027	
Owner Occupied Housing Units by Value	Number	Percent	Number	Percent
Total	27	100.0%	27	100.0%
<$50,000	2	7.4%	1	3.7%
$50,000-$99,999	1	3.7%	0	0.0%
$100,000-$149,999	1	3.7%	0	0.0%
$150,000-$199,999	4	14.8%	2	7.4%
$200,000-$249,999	2	7.4%	1	3.7%
$250,000-$299,999	3	11.1%	2	7.4%
$300,000-$399,999	7	25.9%	8	29.6%
$400,000-$499,999	2	7.4%	3	11.1%
$500,000-$749,999	2	7.4%	3	11.1%
$750,000-$999,999	3	11.1%	6	22.2%
$1,000,000-$1,499,999	0	0.0%	1	3.7%
$1,500,000-$1,999,999	0	0.0%	0	0.0%
$2,000,000+	0	0.0%	0	0.0%
Median Value	$307,143		$393,750	
Average Value	$350,000		$506,481	

Census 2010 Housing Units	Number	Percent
Total	39	100.0%
In Urbanized Areas	0	0.0%
In Urban Clusters	0	0.0%
Rural Housing Units	39	100.0%

Data Note: Persons of Hispanic Origin may be of any race.
Source: Esri forecasts for 2022 and 2027. U.S. Census Bureau 2010 decennial Census data converted by Esri into 2020 geography.

April 20, 2023

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Housing Profile

9301-11399 Burwells Bay Rd, Smithfield, Virginia, 23430
Ring: 3 mile radius

Prepared by Esri
Latitude: 37.03196
Longitude: -76.72843

Population		Households	
2010 Total Population	956	2022 Median Household Income	$80,159
2020 Total Population	947	2027 Median Household Income	$94,375
2022 Total Population	954	2022-2027 Annual Rate	3.32%
2027 Total Population	970		
2022-2027 Annual Rate	0.33%		

	Census 2010		2022		2027	
Housing Units by Occupancy Status and Tenure	Number	Percent	Number	Percent	Number	Percent
Total Housing Units	390	100.0%	406	100.0%	417	100.0%
Occupied	331	84.9%	344	84.7%	352	84.4%
Owner	278	71.3%	261	64.3%	270	64.7%
Renter	53	13.6%	83	20.4%	82	19.7%
Vacant	59	15.1%	62	15.3%	64	15.3%

	2022		2027	
Owner Occupied Housing Units by Value	Number	Percent	Number	Percent
Total	261	100.0%	270	100.0%
<$50,000	13	5.0%	8	3.0%
$50,000-$99,999	8	3.1%	3	1.1%
$100,000-$149,999	12	4.6%	6	2.2%
$150,000-$199,999	33	12.6%	20	7.4%
$200,000-$249,999	30	11.5%	23	8.5%
$250,000-$299,999	28	10.7%	22	8.1%
$300,000-$399,999	73	28.0%	75	27.8%
$400,000-$499,999	25	9.6%	35	13.0%
$500,000-$749,999	14	5.4%	25	9.3%
$750,000-$999,999	22	8.4%	46	17.0%
$1,000,000-$1,499,999	3	1.1%	6	2.2%
$1,500,000-$1,999,999	0	0.0%	1	0.4%
$2,000,000+	0	0.0%	0	0.0%
Median Value	$308,904		$370,667	
Average Value	$349,425		$455,648	

Census 2010 Housing Units	Number	Percent
Total	390	100.0%
In Urbanized Areas	0	0.0%
In Urban Clusters	23	5.9%
Rural Housing Units	368	94.4%

Data Note: Persons of Hispanic Origin may be of any race.
Source: Esri forecasts for 2022 and 2027. U.S. Census Bureau 2010 decennial Census data converted by Esri into 2020 geography.

April 20, 2023

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Housing Profile

9301-11399 Burwells Bay Rd, Smithfield, Virginia, 23430
Ring: 5 mile radius

Prepared by Esri
Latitude: 37.03196
Longitude: -76.72843

Population		Households	
2010 Total Population	4,139	2022 Median Household Income	$82,691
2020 Total Population	3,941	2027 Median Household Income	$96,892
2022 Total Population	3,999	2022-2027 Annual Rate	3.22%
2027 Total Population	4,101		
2022-2027 Annual Rate	0.51%		

	Census 2010		2022		2027	
Housing Units by Occupancy Status and Tenure	Number	Percent	Number	Percent	Number	Percent
Total Housing Units	1,830	100.0%	1,883	100.0%	1,949	100.0%
Occupied	1,618	88.4%	1,642	87.2%	1,694	86.9%
Owner	1,360	74.3%	1,282	68.1%	1,335	68.5%
Renter	258	14.1%	360	19.1%	359	18.4%
Vacant	212	11.6%	241	12.8%	256	13.1%

	2022		2027	
Owner Occupied Housing Units by Value	Number	Percent	Number	Percent
Total	1,283	100.0%	1,335	100.0%
<$50,000	68	5.3%	43	3.2%
$50,000-$99,999	40	3.1%	17	1.3%
$100,000-$149,999	55	4.3%	31	2.3%
$150,000-$199,999	132	10.3%	87	6.5%
$200,000-$249,999	162	12.6%	126	9.4%
$250,000-$299,999	148	11.5%	122	9.1%
$300,000-$399,999	370	28.8%	385	28.8%
$400,000-$499,999	148	11.5%	211	15.8%
$500,000-$749,999	65	5.1%	115	8.6%
$750,000-$999,999	80	6.2%	169	12.7%
$1,000,000-$1,499,999	13	1.0%	26	1.9%
$1,500,000-$1,999,999	2	0.2%	3	0.2%
$2,000,000+	0	0.0%	0	0.0%
Median Value	$309,865		$362,727	
Average Value	$341,621		$427,378	

Census 2010 Housing Units	Number	Percent
Total	1,830	100.0%
In Urbanized Areas	0	0.0%
In Urban Clusters	172	9.4%
Rural Housing Units	1,658	90.6%

Data Note: Persons of Hispanic Origin may be of any race.
Source: Esri forecasts for 2022 and 2027. U.S. Census Bureau 2010 decennial Census data converted by Esri into 2020 geography.

April 20, 2023

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II. Methodology and Discussion of Issues

Standards and Methodology

I conducted this analysis using the standards and practices established by the Appraisal Institute and that conform to the Uniform Standards of Professional Appraisal Practice. The analyses and methodologies contained in this report are accepted by all major lending institutions, and they are used in Virginia and across the country as the industry standard by certified appraisers conducting appraisals, market analyses, or impact studies and are considered adequate to form an opinion of the impact of a land use on neighboring properties. These standards and practices have also been accepted by the courts at the trial and appellate levels and by federal courts throughout the country as adequate to reach conclusions about the likely impact a use will have on adjoining or abutting properties.

The aforementioned standards compare property uses in the same market and generally within the same calendar year so that fluctuating markets do not alter study results. Although these standards do not require a linear study that examines adjoining property values before and after a new use (e.g. a solar farm) is developed, some of these studies do in fact employ this type of analysis. Comparative studies, as used in this report, are considered an industry standard.

The type of analysis employed is a Matched Pair Analysis or Paired Sales Analysis. This methodology is outlined in **The Appraisal of Real Estate**, Twelfth Edition by the Appraisal Institute pages 438-439. It is further detailed in **Real Estate Damages**, Third Edition, pages 33-36 by Randall Bell PhD, MAI. Paired sales analysis is used to support adjustments in appraisal work for factors ranging from the impact of having a garage, golf course view, or additional bedrooms. It is an appropriate methodology for addressing the question of impact of an adjoining solar farm. The paired sales analysis is based on the theory that when two properties are in all other respects equivalent, a single difference can be measured to indicate the difference in price between them. Dr. Bell describes it as comparing a test area to control areas. In the example provided by Dr. Bell he shows five paired sales in the test area compared to 1 to 3 sales in the control areas to determine a difference. I have used 3 sales in the control areas in my analysis for each sale developed into a matched pair.

Determining what is an External Obsolescence

An external obsolescence is a use of property that, because of its characteristics, might have a negative impact on the value of adjacent or nearby properties because of identifiable impacts. Determining whether a use would be considered an external obsolescence requires a study that isolates that use, eliminates any other causing factors, and then studies the sales of nearby versus distant comparable properties. The presence of one or a combination of key factors does not mean the use will be an external obsolescence, but a combination of these factors tends to be present when market data reflects that a use is an external obsolescence.

External obsolescence is evaluated by appraisers based on several factors. These factors include but are not limited to:

1) Traffic. Solar Farms are not traffic generators.

2) Odor. Solar farms do not produce odor.

3) Noise. Solar farms generate minimal noise and are even quieter at night typically with no noise above ambient sounds outside of the fenceline.

4) Environmental. Solar farms do not produce toxic or hazardous waste. Grass is maintained underneath the panels so there is minimal impervious surface area.

5) Appearance/Viewshed. This is the one area that potentially applies to solar farms. However, solar farms are generally required to provide significant setbacks and landscaping buffers to address that concern. Furthermore, any consideration of appearance of viewshed impacts has to be considered in comparison with currently allowed uses on that site. For example if a residential subdivision is already an allowed use, the question becomes in what way does the appearance impact adjoining property owners above and beyond the appearance of that allowed subdivision or other similar allowed uses.

6) Other factors. I have observed and studied many solar farms and have never observed any characteristic about such facilities that prevents or impedes neighbors from fully using their homes or farms or businesses for the use intended.

Relative Solar Farm Sizes

Solar farms have been increasing in size in recent years. Much of the data collected is from existing, older solar farms of smaller size, but there are numerous examples of sales adjoining 75 to 80 MW facilities that show a similar trend as the smaller solar farms. This is understandable given that the primary concern relative to a solar farm is the appearance or view of the solar farm, which is typically addressed through setbacks and landscaping buffers. The relevance of data from smaller solar farms to larger solar farms is due to the primary question being one of appearance. If the solar farm is properly screened, then little of the solar farm would be seen from adjoining property regardless of how many acres are involved.

Larger solar farms are often set up in sections where any adjoining owner would only be able to see a small section of the project even if there were no landscaping screen. Once a landscaping screen is in place, the primary view is effectively the same whether adjoining a 5 MW, 20 MW or 100 MW facility.

I have split out the data for the matched pairs adjoining larger solar farms only to illustrate the similarities later in this report.

Steps Involved in the Analysis

The paired sales analysis employed in this report follows the following process:

1. Identify sales of property adjoining existing solar farms.
2. Compare those sales to similar property that does not adjoin an existing solar farm.
3. Confirmation of sales are noted in the analysis write ups.
4. Distances from the homes to panels are included as a measure of the setbacks.
5. Topographic differences across the solar farms themselves are likewise noted along with demographic data for comparing similar areas.

There are a number of Sale/Resale comparables included in the write ups, but most of the data shown is for sales of homes after a solar farm has been announced (where noted) or after a solar farm has been constructed.

III. Research on Solar Farms

A. Appraisal Market Studies

I have also considered a number of impact studies completed by other appraisers as detailed below.

CohnReznick – Property Value Impact Study: Adjacent Property Values Solar Impact Study: A Study of Eight Existing Solar Facilities

Patricia McGarr, MAI, CRE, FRICS, CRA and Andrew R. Lines, MAI with CohnReznick completed an impact study for a proposed solar farm in Cheboygan County, Michigan completed on June 10, 2020. I am familiar with this study as well as a number of similar such studies completed by CohnReznick. I have not included all of these studies but I submit this one as representative of those studies.

This study addresses impacts on value from eight different solar farms in Michigan, Minnesota, Indiana, Illinois, Virginia and North Carolina. These solar farms are 19.6 MW, 100 MW, 11.9 MW, 23 MW, 71 MW, 61 MW, 40 MW, and 19 MW for a range from 11.9 MW to 100 MW with an average of 31 MW and a median of 31.5 MW. They analyzed a total of 24 adjoining property sales in the Test Area and 81 comparable sales in the Control Area over a five-year period.

The conclusion of this study is that there is no evidence of any negative impact on adjoining property values based on sales prices, conditions of sales, overall marketability, potential for new development or rate of appreciation.

Christian P. Kaila & Associates – Property Impact Analysis – Proposed Solar Power Plant Guthrie Road, Stuarts Draft, Augusta County, Virginia

Christian P. Kaila, MAI, SRA and George J. Finley, MAI developed an impact study as referenced above dated June 16, 2020. This was for a proposed 83 MW facility on 886 acres.

Mr. Kaila interviewed appraisers who had conducted studies and reviewed university studies and discussed the comparable impacts of other development that was allowed in the area for a comparative analysis of other impacts that could impact viewshed based on existing allowed uses for the site. He also discussed in detail the various other impacts that could cause a negative impact and how solar farms do not have such characteristics.

Mr. Kaila also interviewed county planners and real estate assessors in eight different Virginia counties with none of the assessor's identifying any negative impacts observed for existing solar projects.

Mr. Kaila concludes on a finding of no impact on property values adjoining the indicated solar farm.

Fred Beck, MAI, CCIM – Impact Analysis in Lincoln County 2013

Mr. Fred Beck, MAI, CCIM completed an impact analysis in 2013 for a proposed solar farm that concluded on a negative impact on value. That report relied on a single cancelled contract for an adjoining parcel where the contracted buyers indicated that the solar farm was the reason for the cancellation. It also relied on the activities of an assessment impact that was applied in a nearby county.

Mr. Beck was interviewed as part of the Christian Kalia study noted above. From that I quote "Mr. Beck concluded on no effect on moderate priced homes, and only a 5% change in his limited research of higher priced homes. His one sale that fell through is hardly a reliable sample. It also

was misleading on Mr. Beck's part to report the lower re-assessments since the primary cause of the re-assesments were based on the County Official, who lived adjacent to the solar farm, appeal to the assessor for reductions with his own home." In that Clay County Case study the noted lack of lot sales after announcement of the solar farm also coincided with the recession in 2008/2009 and lack of lot sales effectively defined that area during that time.

I further note, that I was present at the hearing where Mr. Beck presented these findings and the predominance of his argument before the Lincoln County Board of Commissioner's was based on the one cancelled sale as well as a matched pair analysis of high-end homes adjoining a four-story call center. He hypothesized that a similar impact from that example could be compared to being adjacent solar farm without explaining the significant difference in view, setbacks, landscaping, traffic, light, and noise. Furthermore, Mr. Beck did have matched pairs adjoining a solar farm in his study that he put in the back of his report and then ignored as they showed no impact on property value.

Also noted in the Christian Kalia interview notes is a response from Mr. Beck indicating that in his opinion "the homes were higher priced homes and had full view of the solar farm." Based on a description of screening so that "the solar farm would not be in full view to adjoining property owners. Mr. Beck said in that case, he would not see any drop in property value."

NorthStar Appraisal Company – Impact Analysis for Nichomus Run Solar, Pilesgrove, NJ, September 16, 2020

Mr. William J. Sapio, MAI with NorthStar Appraisal Company considered a matched pair analysis for the potential impact on adjoining property values to this proposed 150 MW solar farm. Mr. Sapio considered sales activity in a subdivision known as Point of Woods in South Brunswick Township and identified two recent new homes that were constructed and sold adjoining a 13 MW solar farm and compared them to similar homes in that subdivision that did not adjoin the solar farm. These homes sold in the $1,290,450 to $1,336,613 price range and these homes were roughly 200 feet from the closest solar panel.

Based on this analysis, he concluded that the adjoining solar farm had no impact on adjoining property value.

MR Valuation Consulting, LLC – The Kuhl Farm Solar Development and The Fischer Farm Solar Development – June 7, 2012

Mr. Mark Pomykacaz, MAI MRICS with MR Valuation Consulting, LLC considered a matched pair analysis for sales near these solar farms. The sales data presented supported a finding of no impact on property value for nearby and adjoining homes and concludes that there is no impact on marketing time and no additional risk involved with owning, building, or selling properties next to the solar farms.

Mary McClinton Clay, MAI – McCracken County Solar Project Value Impact Report, July 10, 2021

Ms. Mary Clay, MAI reviewed a report by Kirkland Appraisals in this case and also provided a differing opinion of impact. She cites a number of other appraisal studies and interestingly finds fault with heavily researched opinions, while praising the results of poorly researched studies that found the opposing view.

Her analysis includes details from solar farms that show no impact on value, but she dismisses those.

She cites the University of Texas study noted later in this report, but she cites only isolated portions of that study to conclude the opposite of what that study specifically concludes.

She cites the University of Rhode Island study noted alter in this report, but specifically excludes the conclusion of that study that in rural areas they found no impact on property value.

She cites lot sales near Spotsylvania Solar without confirming the purchase prices with brokers as indicative of market impact and has made no attempt to compare lot prices that are contemporaneous. In her 5 lot sales that she identifies, all of the lot prices decline with time from 2015 through 2019. This includes the 3 lot sales prior to the approval of the solar farm. The decrease in lot values shown in this chart are more indicative of the trend in the market, than of any impact related to the solar farm. Otherwise, how does she explain the drop in price from 2015 to 2017 prior to the solar farm approval.

She considers data at McBride Place Solar Farm and does a sale/resale analysis based on Zillow Home Value Index, which is not a reliable indication for appreciation in the market. She then adjusted her initial sales prior to the solar farm over 7 years to determine what she believes the home should have appreciated by and then compares that to an actual sale. She has run no tests or any analysis to show that the appreciation rates she is using are consistent with the market but more importantly she has not attempted to confirm any of these sales with market participants. I have spoken with brokers active in the sales that she cites and they have all indicated that the solar farm was not a negative factor in marketing or selling those homes.

She has considered lot sales at Sunshine Farms in Grandy, NC. She indicates that the lots next to the solar farm are selling for less than lots not near the solar farm, but she is actually using lot sales next to the solar farm prior to the solar farm being approved. She also ignores recent home sales adjoining this solar farm after it was built that show no impact on property value.

She also notes a couple of situations where solar developers have purchased adjoining homes and resold them or where a neighbor agreement was paid as proof of a negative impact on property value. Given that there are over 2,500 solar farms in the USA as of 2018 according to the U.S. Energy Information Administration and there are only a handful of such examples, this is clearly not an industry standard but a business decision. Furthermore, solar developers are not in the business of flipping homes and are in a position very similar to a bank that acquires a home as OREO (Other Real Estate Owned), where homes are frequently sold at discounted prices, not because of any drop in value, but because they are not a typically motivated seller. Market value requires an analysis of a typically motivated buyer and seller. So these are not good indicators of market value impacts.

The comments throughout this study are heavy in adjectives, avoids stating facts contrary to the conclusion and shows a strong selection bias.

Conclusion of Impact Studies

Of the five studies noted two included actual sales data to derive an opinion of no impact on value. The two studies to conclude on a negative impact includes the Fred Beck study based on no actual sales data, and he has since indicated that with landscaping screens he would not conclude on a negative impact. The other study by Mary Clay shows improper adjustments for time, a lack of confirmation of sales comparables, and exclusion of data that does not support her position.

I have relied on these studies as additional support for the findings in this impact analysis.

B. Articles

I have also considered a number of articles on this subject as well as conclusions and analysis as noted below.

Farm Journal Guest Editor, March 22, 2021 – Solar's Impact on Rural Property Values

Andy Ames, ASFMRA (American Society of Farm Managers and Rural Appraisers) published this article that includes a discussion of his survey of appraisers and studies on the question of property value related to solar farms. He discusses the university studies that I have cited as well as Patricia McGarr, MAI.

He also discusses the findings of Donald A. Fisher, ARA, who served six years at the Chair of the ASFMRA's National Appraisal Review Committee. He is also the Executive Vice President of the CNY Pomeroy Appraiser and has conducted several market studies on solar farms and property impact. He is quoted in the article as saying, "Most of the locations were in either suburban or rural areas, and all of those studies found either a neutral impact, or ironically, a positive impact, where values on properties after installation of solar farms went up higher than time trends."

Howard Halderman, AFM, President and CEO of Halderman Real Estate and Farm Management attended the ASFMRA solar talk hosted by the Indiana Chapter of the ASFMRA and he concludes that other rural properties would likely see no impact and farmers and landowners shown even consider possible benefits. "In some cases, farmers who rent land to a solar company will insure the viability of their farming operation for a longer time period. This makes them better long-term tenants or land buyers so one can argue that higher rents and land values will follow due to the positive impact the solar leases offer."

More recently in August 2022, Donald Fisher, ARA, MAI and myself led a webinar on this topic for the ASFMRA discussing the issues, the university studies and specific examples of solar farms having no impact on adjoining property values.

National Renewable Energy Laboratory – Top Five Large-Scale Solar Myths, February 3, 2016

Megan Day reports form NREL regarding a number of concerns neighbors often express. Myth #4 regarding property value impacts addresses specifically the numerous studies on wind farms that show no impact on property value and that solar farms have a significantly reduced visual impact from wind farms. She highlights that the appearance can be addressed through mitigation measures to reduce visual impacts of solar farms through vegetative screening. Such mitigations are not available to wind farms given the height of the windmills and again, those studies show no impact on value adjoining wind farms.

North Carolina State University: NC Clean Energy Technology Center White Paper: Balancing Agricultural Productivity with Ground-Based Solar Photovoltaic (PV) Development (Version 2), May 2019

Tommy Cleveland and David Sarkisian wrote a white paper for NCSU NC Clean Energy Technology Center regarding the potential impacts to agricultural productivity from a solar farm use. I have interviewed Tommy Cleveland on numerous occasions and I have also heard him speak on these issues at length as well. He addresses many of the common questions regarding how solar farms work and a detailed explanation of how solar farms do not cause significant impacts on the soils, erosion and other such concerns. This is a heavily researched paper with the references included.

North Carolina State University: NC Clean Energy Technology Center White Paper: Health and Safety Impacts of Solar Photovoltaics, May 2017

Tommy Cleveland wrote a white paper for NCSU NC Clean Energy Technology Center regarding the health and safety impacts to address common questions and concerns related to solar farms. This is a heavily researched white paper addressing questions ranging from EMFs, fire safety, as well as vegetation control and the breakdown of how a solar farm works.

C. Broker Commentary

In the process of working up the matched pairs used later in this report, I have collected comments from brokers who have actually sold homes adjoining solar farms indicating that the solar farm had no impact on the marketing, timing, or sales price for the adjoining homes. I have included comments from brokers within this report where they discussed specific solar projects including brokers from Kentucky, Virginia, Tennessee, and North Carolina.

I have additional commentary from other states including New Jersey and Michigan that provide the same conclusion.

IV. University Studies

I have also considered the following studies completed by four different universities related to solar farms and impacts on property values.

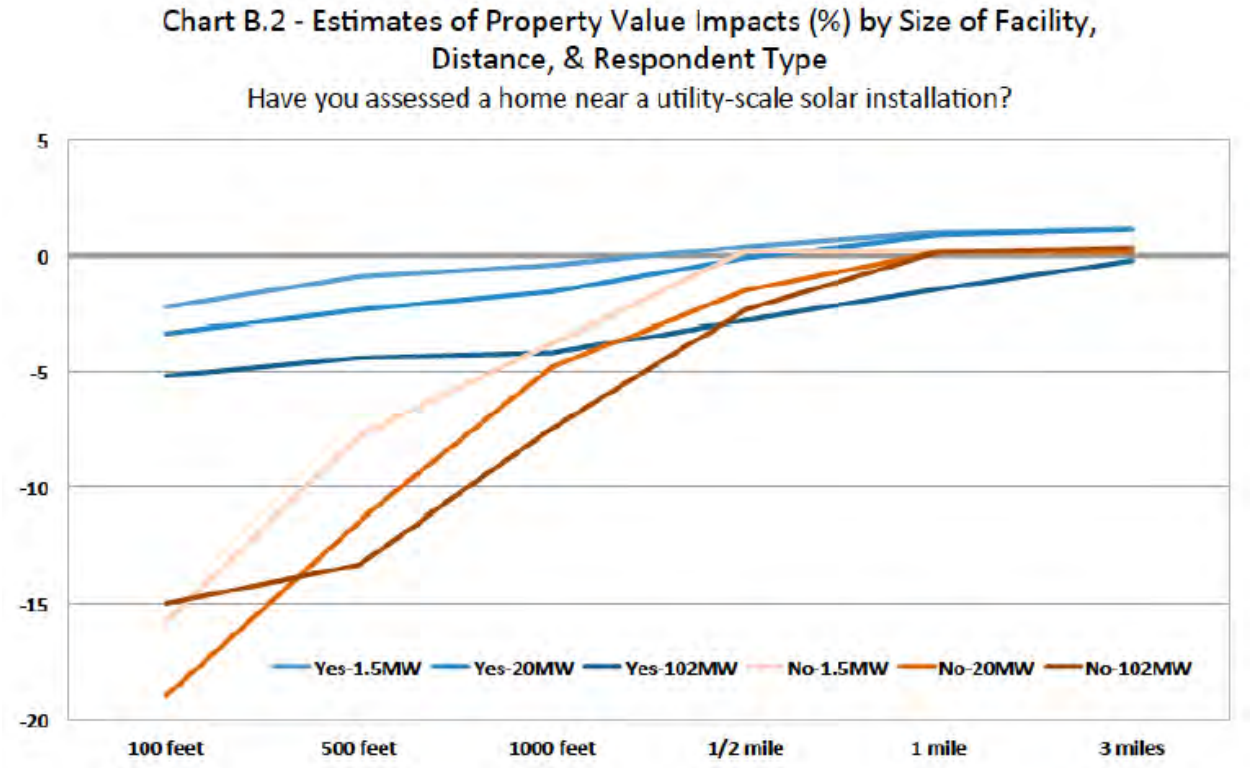
A. University of Texas at Austin, May 2018

An Exploration of Property-Value Impacts Near Utility-Scale Solar Installations

This study considers solar farms from two angles. First it looks at where solar farms are being located and concludes that they are being located primarily in low density residential areas where there are fewer homes than in urban or suburban areas.

The second part is more applicable in that they conducted a survey of appraisers/assessors on their opinions of the possible impacts of proximity to a solar farm. They consider the question in terms of size of the adjoining solar farm and how close the adjoining home is to the solar farm. I am very familiar with this part of the study as I was interviewed by the researchers multiple times as they were developing this. One very important question that they ask within the survey is very illustrative. They asked if the appraiser being surveyed had ever appraised a property next to a solar farm. There is a very noticeable divide in the answers provided by appraisers who have experience appraising property next to a solar farm versus appraisers who self-identify as having no experience or knowledge related to that use.

On Page 16 of that study they have a chart showing the responses from appraisers related to proximity to a facility and size of the facility, but they separate the answers as shown below with appraisers with experience in appraising properties next to a solar farm shown in blue and those inexperienced shown in brown. Even within 100 feet of a 102 MW facility the response from experienced appraisers were -5% at most on impact. While inexperienced appraisers came up with significantly higher impacts. This chart clearly shows that an uninformed response widely diverges from the sales data available on this subject.



Furthermore, the question cited above does not consider any mitigating factors such as landscaping buffers or screens which would presumably reduce the minor impacts noted by experienced appraisers on this subject.

The conclusion of the researchers is shown on Page 23 indicated that "Results from our survey of residential home assessors show that the majority of respondents believe that proximity to a solar installation has either no impact or a positive impact on home values."

This analysis supports the conclusion of this report that the data supports no impact on adjoining property values.

B. University of Rhode Island, September 2020

Property Value Impacts of Commercial-Scale Solar Energy in Massachusetts and Rhode Island

The University of Rhode Island published a study entitled **Property Value Impacts of Commercial-Scale Solar Energy in Massachusetts and Rhode Island** on September 29, 2020 with lead researchers being Vasundhara Gaur and Corey Lang. I have read that study and interviewed Mr. Corey Lang related to that study. This study is often cited by opponents of solar farms but the findings of that study have some very specific caveats according to the report itself as well as Mr. Lang from the interview.

While that study does state in the Abstract that they found depreciation of homes within 1-mile of a solar farm, that impact is limited to non-rural locations. On Pages 16-18 of that study under Section 5.3 Heterogeneity in treatment effect they indicate that the impact that they found was limited to non-rural locations with the impact in rural locations effectively being zero. For the study they defined "rural" as a municipality/township with less than 850 population per square mile.

They further tested the robustness of that finding and even in areas up to 2,000 population per square mile they found no statistically significant data to suggest a negative impact. They have not specifically defined a point at which they found negative impacts to begin, as the sensitivity study stopped checking at the 2,000-population dataset.

Where they did find negative impacts was in high population density areas that was largely a factor of running the study in Massachusetts and Rhode Island which the study specifically cites as being the 2nd and 3rd most population dense states in the USA. Mr. Lang in conversation as well as in recorded presentations has indicated that the impact in these heavily populated areas may reflect a loss in value due to the scarce greenery in those areas and not specifically related to the solar farm itself. In other words, any development of that site might have a similar impact on property value.

Based on this study I have checked the population for Carrsville District of Isle of Wight County, which has a population of 6,676 for 2022 based on HomeTownLocator.com and a total area of 142.04 square miles. This indicates a population density of 47 people per square mile which puts this well below the threshold indicated by the Rhode Island Study.

I therefore conclude that the Rhode Island Study supports a finding of no impact on adjoining properties for the proposed solar farm.

Carrsville District Data & Demographics (As of July 1, 2022)

POPULATION	
Total Population	6,676 (100%)
Population in Households	6,657 (99.7%)
Population in Families	5,644 (84.5%)
Population in Group Quarters[1]	19 (0.3%)
Population Density	47
Diversity Index[2]	43

HOUSING	
Total HU (Housing Units)	3,034 (100%)
Owner Occupied HU	2,246 (74.0%)
Renter Occupied HU	489 (16.1%)
Vacant Housing Units	299 (9.9%)
Median Home Value	$281,813
Average Home Value	$286,782
Housing Affordability Index[3]	126

INCOME	
Median Household Income	$72,931
Average Household Income	$89,472
% of Income for Mortgage[4]	20%
Per Capita Income	$36,737
Wealth Index[5]	82

HOUSEHOLDS	
Total Households	2,735
Average Household Size	2.43
Family Households	1,977
Average Family Size	3

C. Georgia Institute of Technology, October 2020

Utility-Scale Solar Farms and Agricultural Land Values

This study was completed by Nino Abashidze as Post-Doctoral Research Associate of Health Economics and Analytics Labe (HEAL), School of Economics, Georgia Institute of Technology. This research was started at North Carolina State University and analyzes properties near 451 utility-scale ground-mount solar installations in NC that generate at least 1 MW of electric power. A total of 1,676 land sales within 5-miles of solar farms were considered in the analysis.

This analysis concludes on Page 21 of the study "Although there are no direct effects of solar farms on nearby agricultural land values, we do find evidence that suggests construction of a solar farm may create a small, positive, option -value for land owners that is capitalized into land prices. Specifically, after construction of a nearby solar farm, we find that agricultural land that is also located near transmission infrastructure may increase modestly in value."

This study supports a finding of no impact on adjoining agricultural property values and in some cases could support a modest increase in value.

D. Master's Thesis: ECU by Zachary Dickerson July 2018

A Solar Farm in *My* Backyard? Resident Perspectives of Utility-Scale Solar in Eastern North Carolina

This study was completed as part of a Master of Science in Geography Master's Thesis by Zachary Dickerson in July 2018. This study sets out to address three questions:

1. Are there different aspects that affect resident satisfaction regarding solar farms?

2. Are there variations in satisfaction for residents among different geographic settings, e.g. neighborhoods adjacent to the solar farms or distances from the solar farms?

3. How can insight from both the utility and planning sectors, combined with knowledge gained from residents, fill gaps in communication and policy writing in regard to solar farms?

This was done through survey and interview with adjacent and nearby neighbors of existing solar farms. The positive to neutral comments regarding the solar farms were significantly higher than negative. The researcher specifically indicates on Page 46 "The results show that respondents generally do not believe the solar farms pose a threat to their property values."

The most negative comments regarding the solar farms were about the lack of information about the approval process and the solar farm project prior to construction.

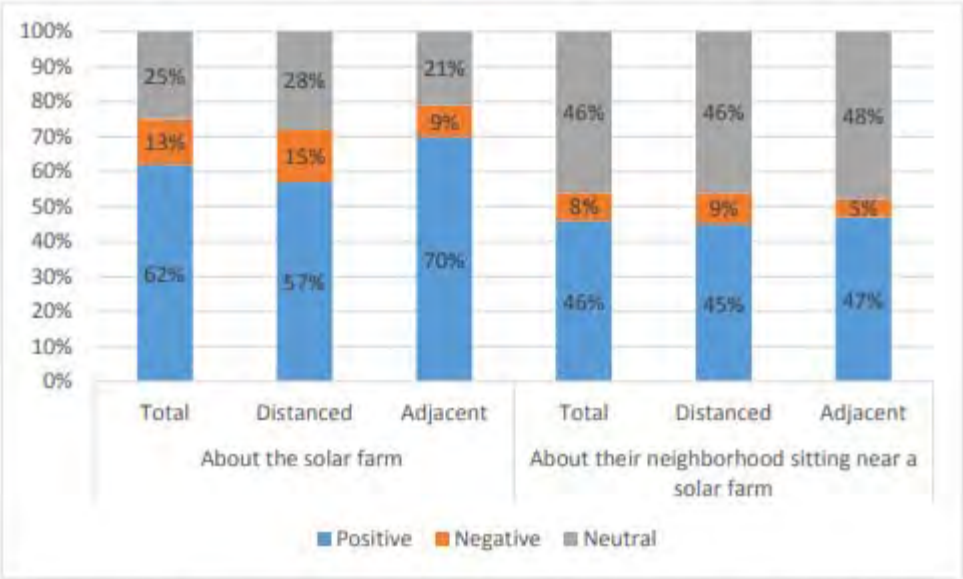


Figure 11: Residents' positive/negative word choices by geographic setting for both questions

E. Honors Thesis: Trinity College of Duke University by Megan Wang with Dr. Christopher Timmins, Faculty Advisor April 2022

Impact of Utility-Scale Solar Farms on Property Values in North Carolina

This study was completed as partial fulfillment of the requirements for Graduation with Distinction in Economics in Trinity College of Duke University.

This analysis focused on solar farms in NC and found a significant 12% increase in sale values for high-income homes within 3 miles of a solar farm, but that low-income homes were associated with a 1.4% decreased in value. This report relied on CoreLogic data and uses sales up to 10 miles from a solar farm for analysis in comparison to sales within 3 miles. No connection is established between how a home 3 miles from a solar farm might be impacted by that solar farm and given the wide range of results I find this to be a good example of how this type of analysis can look impressive, but have significant flaws in reasoning. There is no consideration of whether homes 10 miles out from the site are really in the same market or not. There is no consideration of landscaping buffers or visibility of the site. There is no establishment of any actual relationship in this data and the solar farm other than proximity. There is no indication that any control was performed to look at a similar ring of data to determine if the 3 mile/10 mile comparison really just reflects a difference between rural and suburban/urban areas.

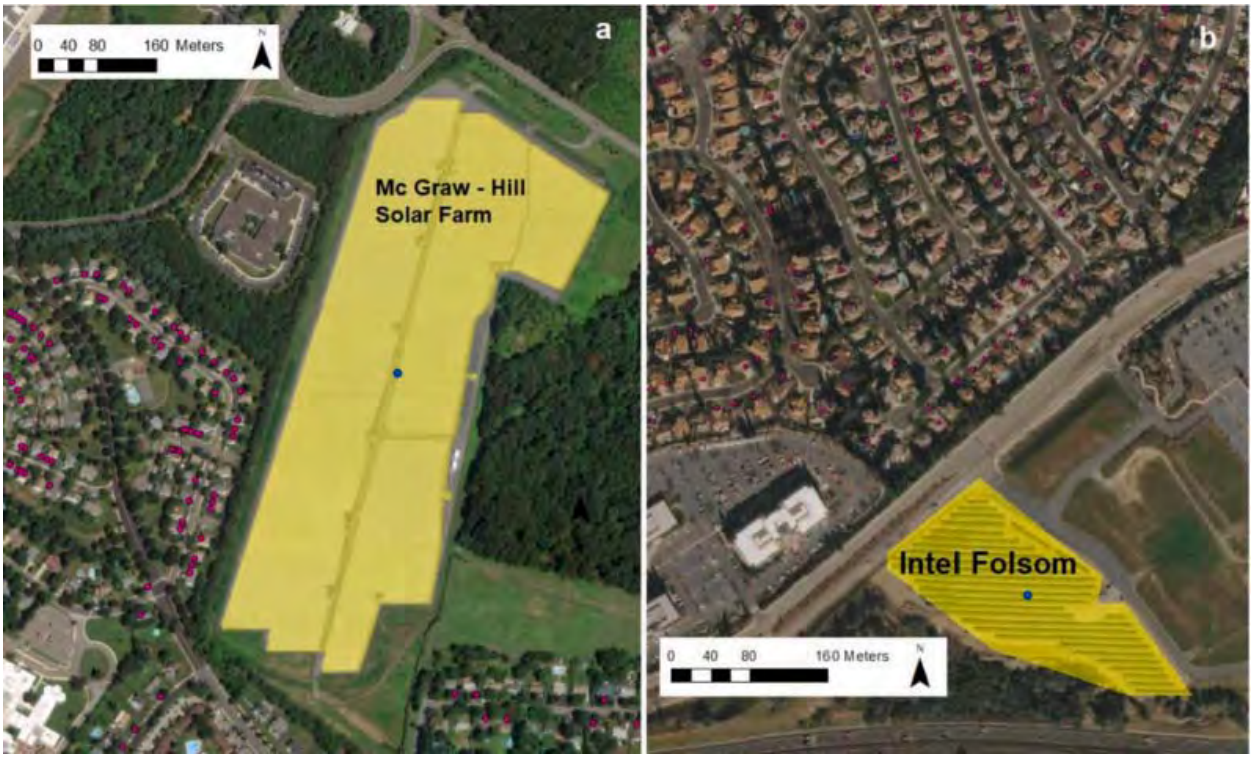
I have included this as it is on point but the conclusion suggests a significant positive relationship from the solar farm in most cases and a negligible impact in others. I have not relied heavily on this study for the reasons stated above.

F. Lawrence Berkeley National Lab, March 2023

Shedding light on large-scale solar impacts: An analysis of property values and proximity to photovoltaics across six U.S. states

This study was completed by researchers including Salma Elmallah, Ben Hoen, K. Sydny Fujita, Dana Robson, and Eric Brunner. This analysis considers home sales before and after solar farms were installed within a 1 mile radius and compared them to home sales before and after the solar farms at a 2-4 mile radius. The conclusion found a 1.5% impact within 1 mile of a solar farm as

compared to homes 2-4 miles from solar farms. This is the largest study of this kind on solar and addresses a number of issues, but also does not address a number of items that could potentially skew these results. First of all, the study found no impact in the three states with the most solar farm activity and only found impacts in smaller sets of data. The data does not in any way discuss actual visibility of solar farms or address existing vegetation screens. This lack of addressing this is highlighted by the fact that they suggest in the abstract that vegetative shading may be needed to address possible impacts. Another notable issue is the fact that they do not address other possible impacts within the radii being considered. This lack of consideration is well illustrated within the study on Figure A.1 where they show satellite images of McGraw Hill Solar Farm in NJ and Intel Folsom in CA. The Folsom image clearly shows large highways separating the solar farm from nearby housing, but with tower office buildings located closer to the housing being considered. In no place do they address the presence of these towers that essentially block those homes from the solar farm in some places. An excerpt of Fig. A.1. is shown below.



For each of these locations, I have panned out a little further on Google Earth to show the areas illustrated to more accurately reflect the general area. For the McGraw Hill Solar Farm you can see there is a large distribution warehouse to the west along with a large offices and other industrial uses. Further to the west is a large/older apartment complex (Princeton Arms). To the east there are more large industrial buildings. However, it is even more notable that 1.67 miles away to the west is Cranbury Golf Club. Given how this analysis was set up, these homes around the industrial buildings are being compared to homes within this country club to help establish impacts from the solar farm. Even considering the idea that each set is compared to itself before and after the solar farm, it is not a reasonable supposition that homes in each area would appreciate at the same rates even if no solar farm was included. Furthermore the site where the solar farm is located an all of the surrounding uses not improved with residential housing to the south is zoned Research Office (RO) which allows for: manufacturing, preparation, processing or fabrication of products, with all activities and product storage taking place within a completely enclosed building, scientific or research laboratories, warehousing, computer centers, pharmaceutical operations, office buildings, industrial office parks among others. Homes adjoining such a district would likely have impacts and influences not seen in areas zoned and surrounded by zoning strictly for residential uses.

East Windsor Township
Windsor Corporate Park
Healthy Kids Pediatric Group
EAG Laboratories
Oak Creek Estates Association
Oak Creek Rd
Oak Creek Dr
Pebble Rd
Princeton Pl
Princeton Dr
Princeton Dr
Princeton Dr

COVENTRY AT NATOMA STATION
NATOMA STATION
Natoma Station Elementary School
Waterford Place
Deer Rabbit Mini Park
Petite Scholars
Redfin | Sacramento Real Estate Agents
RBK Architects
Mylapore South Indian Vegetaria
Safeway
Intel Corporation
Intel - FM7
Intel - FM5
Iron Point Rd
Prairie City Rd
El Dorado Hwy
Alder Creek
50

On the Intel Folsom map I have shown the images of two of the Intel Campus buildings, but there are roughly 8 such buildings on that site with additional solar panels installed in the parking lot as shown in that image. I included two photos that show the nearby housing having clear and close views of adjoining office parking lots. This illustrates that the homes in that 1 mile radius are significantly more impacted by the adjoining office buildings than a solar farm located distantly that are not within the viewshed of those homes. Also, this solar farm is located on land adjoining the Intel Campus on a tract that is zoned M-1 PD, which is a Light Industrial/Manufacturing zoning. Nearby homes. Furthermore, the street view at the solar farm shows not only the divided four-lane highway that separates the office buildings and homes from the solar farm, but also shows that there is no landscaping buffer at this location. All of these factors are ignored by this study. Below is another image of the Folsom Solar at the corner of Iron Point Road and Intel West Driveway which shows just how close and how unscreened this project is.

Compare that image from the McGraw Hill street view facing south from County Rte 571. There is a distant view and much of the project is hidden by a mix of berms and landscaping. The analysis makes no distinction between these projects.

The third issue with this study is that it identifies impacts following development in areas where they note that "more adverse home price impacts might be found where LSPVPS (large-scale

photovoltaic project) displace green space (consistent with results that show higher property values near green space." The problem with this statement is that it assumes that the greenspace is somehow guaranteed in these areas, when in fact, they could just as readily be developed as a residential subdivision and have the same impacts. They have made no effort to differentiate loss of greenspace through other development purposes such as schools, subdivisions, or other uses versus the impact of solar farms. In other words, they may have simply identified the impact of all forms of development on property value. This would in fact be consistent with the comments in the Rhode Island study where the researchers noted that the loss of greenspace in the highly urban areas was likely due to the loss of greenspace in particular and not due to the addition of solar panels.

Despite these three shortcomings in the analysis – the lack of differentiating landscape screening, the lack of consideration of other uses within the area that could be impacting property values, and the lack of consideration of alternative development impacts – the study still only found impacts between 0 and 5% with a conclusion of 1.5% within a 1-mile radius. As discussed later in this report, real estate is an imperfect market and real estate transactions typically sell for much wider variability than 5% even where there are no external factors operating on property value.

I therefore conclude that the minor impacts noted in this study support a finding of no impact on property value. Most appraisals show a variation between the highest and lowest comparable sale that is substantially greater than 1.5% and this measured impact for all it flaws would just be lost in the static of normal real estate transactions.

V. Assessor Surveys

I have been working on a survey of Virginia Assessors regarding property values related to solar farms and whether or not the local assessors have found any data to support any changes to value on property adjoining solar farms. In this process I have contacted every assessor's office by email and I have received responses by email and by phone from a number of these counties. Many of the counties in Virginia rely on outside firms to assist in gathering data for the assessments and where that is the case, we have contacted the outside firms regarding the question of whether or not the assessors are currently making any adjustments to properties adjoining solar farms.

I currently have response from 16 counties that have solar farms in them and of those 16 responses none of the assessors are currently applying a negative impact on property value. One response suggested that adjoining values may go up.

I did speak with Randy Willis with Pearson Assessors. His company assists in the assessments in many of the counties south of Richmond. He indicated that they had found no data to suggest a negative impact on property value and they have looked as they were concerned about that issue. He indicated that they would make no negative impact adjustments and that he recognizes that there are a number of agricultural adjoining uses that have a greater impact on adjoining properties in terms of noise, dust and odor than a solar farm would have. He did indicate that there could be situations where an individual home might have a greater visual impact and those should be looked at on a case-by-case basis, but he also agreed that many allowed agricultural uses could have similar visual impacts on such properties as well.

VIRGINIA Commissioner of the Revenue

County	Assessor Name	Number of Farms in Operation	Change in adjacent property value
Appomattox	Sara Henderson	1, plus one in process	No
Augusta	W. Jean Shrewsbury	no operational	No
Buckingham	Stephanie D. Love	1	No
Charlotte	Naisha Pridgen Carter	1, several others in the works	No
Clarke	Donna Peake	1	No
Frederick	Seth T. Thatcher	none, 2 appoved for 2022	No, assuming compatible with rural area
Goochland	Mary Ann Davis		No
Hanover	Ed Burnett	1	No
Louisa	Stacey C. Fletcher	2 operational by end of year	No, only if supported by market data
Mecklenburg	Joseph E. "Ed" Taylor		No
Nottoway	Randy Willis with Pearson Assessors		No
Powhatan	Charles Everest	2 approved, 1 built	Likely increase in value
Rockingham	Dan Cullers	no operational	Likely no
Southampton	Amy B. Carr	1	Not normally
Surry	Jonathan F. Judkins	1	None at this time
Westmoreland	William K. Hoover	4	No

Responses: 16
Negative Impact on Adjoining Value = Yes: 0
Negative Impact on Adjoining Value = No: 16

I have also attempted to contact all of the assessor departments in North Carolina to determine how local assessors are handling solar farms and adjoining property values. I have spoken personally with a number of assessors, but much of this data was obtained via email. I have 39 counties in NC that have both responded to these questions on property value and also have solar farms in that county. I have excluded responses from assessors from counties where there are no current solar farms.

As can be seen in the chart below, of the 39 responses all of the responses have indicated that they make no adjustment to properties adjoining solar farms. Several assessors indicated that it would require an adjoining property owner to appeal their property value with data showing a negative impact before they would make any adjustment and to date they have not had that happen.

I also point out specifically Clay County. I spoke with the assessor there specifically about adjustments that were applied to some properties near a solar farm back in 2008. She was unaware of the details of that event as she was not in this position at that time. As discussed earlier in this report the lower re-assessments at that solar farm were based on a County Official, who owned property adjacent to the solar farm, who made an appeal to the assessor for reductions for his own property. The noted lack of lot sales after announcement of the solar farm however coincided with the recession in 2008/2009 and lack of lot sales effectively defined that area during that time, but without relying on any data the assessor made that change in that time frame based on conversations with the assessor. Since then, Clay County has confirmed that they do not currently make any changes to adjoining property values and the current county assessor was not even aware that they had in the past done so.

NC Assessor Survey on Solar Farm Property Value Impacts

County	Assessor's Name	Number of Farms	Change in Adjacent Property Value
Alexander	Doug Fox	3	No
Buncombe	Lisa Kirbo	1	No
Burke	Daniel Isenhour	3, 2 on 1 parcel, 1 on 3 parcels	No
Cabarrus	Justin	less than 10, more in the works	No
Caldwell	Monty Woods	3 small	No, but will look at data in 2025
Catawba	Lori Ray	14	No
Chatham	Jenny Williams	13	No
Cherokee	Kathy Killian	9	No
Chowan	Melissa Radke	3, I almost operational	No
Clay	Bonnie L. Lyvers		No
Davidson	Libby	1	No
Duplin	Gary Rose	34, 2 more in planning	No
Franklin	Marion Cascone	11	No
Gaston	Traci Hovis	3	No
Gates	Chris Hill	3	No
Granville	Jenny Griffin	8	No
Halifax	C. Shane Lynch	Multiple	No
Hoke	Mandi Davis	4	No
Hyde	Donnie Shumate	1 to supplement egg processing plant	No
Iredell	Wes Long	2, 3 others approved	No
Lee	Lisa Faulkner	8	No
Lincoln	Susan Sain	2	No
Moore	Michael Howery	10	No
New Hanover	Rhonda Garner	35	No
Orange	Chad Phillip	2 or 7 depending on breakdown	No
Pender	Kayla Bolick Futrell	6	No
Person	Russell Jones	9	No
Pitt	Russell D. Hill	8, 1 in planning	No
Randolph	Mark Frick	19	No
Rockingham	Mark C McClintock	6	No
Rutherford	Kim Aldridge	20	No
Sampson	Jim Johnson	9, 1 in construction	No
Scotland	James Brown	15, 1 in process	No
Stokes	Richard Brim	2	No
Surry	Penny Harrison	4, 2 more in process	No
Union	Robin E. Merry	6	No
Vance	Cathy E. Renn	13	No
Warren	John Preston	7	No
Wayne	Alan Lumpkin	32	No
Wilson	William (Witt) Putney	~16	No, mass appraisal standards applied

Responses: 39
Negative Impact on Adjoining Value = Yes: 0
Negative Impact on Adjoining Value = No: 39

I have also completed surveys in Colorado, New Mexico, and Mississippi as shown below.

I have so far found no responses from any assessor that they make negative adjustments to adjoining properties. I currently have 39 responses in North Carolina, 16 responses from Virginia, 4 from Mississippi, and 15 from Colorado. Adding in the 5 responses in New Mexico, I have a total of 79 assessor responses and all 79 indicate either no negative impacts on adjoining property values, or else they did not respond to that part of the question. A total of 69 of the responses were definitively "No" with an additional 10 being "No response" to that question.

I have included the breakdown of that data on the following pages.

New Mexico Tax Assessors

County	Number of Farms in Operation	Change in adjacent property value
Colfax	3, 1 in planning	No
Curry	1, quite a few in talks	No
Dona Ana	2 owned by city and county	No
Lincoln	1	No
Union	1	No
	Total Responses With Solar	5
	Total Responses "No"	5
	Total Responses "Yes"	0

MS Assessor Survey on Solar Farm Property Value Impacts

County	Assessor's Name	Number of Farms	Change in Adjacent Property Value
Desoto	Jeff Fitch	1, 1 in planning	No response
Monroe	Mitzi Presley	2 in planning	No response
Stone	Charles Williams, Jr.	1 in planning	No
Union	Tameri Dunnam	1	No

CO Assessor Survey on Solar Farm Property Value Impacts

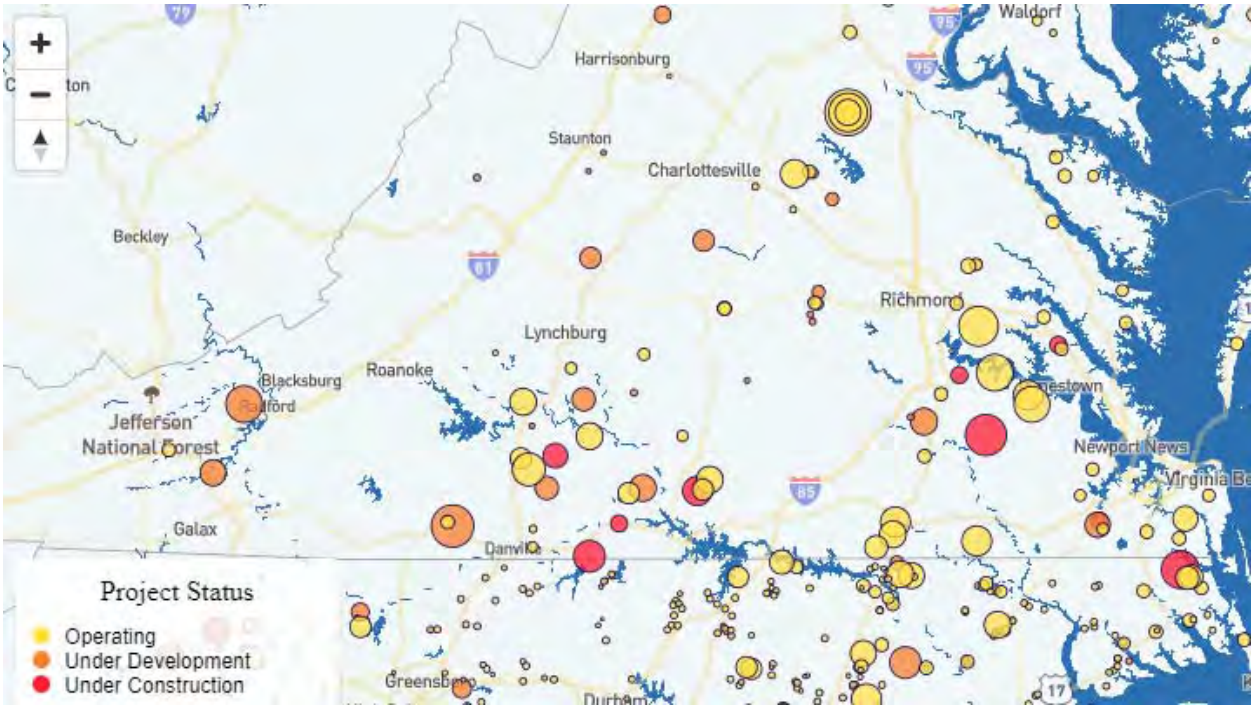
County	Assessor's Name	Number of Farms	Change in Adjacent Property Value
Conejos	Naomi Keys	3 or 4	No response
Denver	Keith Erffmeyer	3	No
Garfield	Jim Yellico (Vicki Riley)	No response	Classification and value could change
Kiowa	Marci Miller	0, 2 in planning	No
La Plata	Carrie Woodson	0, 1 in planning	No response
Las Animas	Jodi Amato	1 operational, 1 in planning	No
Moffat	Charles "Chuck" Cobb	0, 5 in planning	No
Montezuma	Leslie Bugg	3 approved	No
Montrose	Brad Hughes	2, 1 in planning	Maybe, but would be based on sales data
Morgan	Tim Amen	2, operational, 3 in planning	No
Pitkin	Wendy Schultz	1	No
Rio Blanco	Renae Neilson	2	No response
Saguache	Peter Peterson	1	No
San Miguel	Sarah Enders	1	Not enough data
Yuma	Cindy Taylor	1 in planning	No response

Responses: 15
Negative Impact on Adjoining Value = Yes: 0
Negative Impact on Adjoining Value = No: 7
Negative Impact on Adjoining Value = No Response: 8

VI. Summary of Solar Projects In Virginia

I have researched the solar projects in Virginia. I identified the solar farms through the Solar Energy Industries Association (SEIA) Major Projects List and then excluded the roof mounted facilities. I focused on larger solar farms over 10 MW though I have included a couple of smaller solar farms as shown in the chart below.

Below I have an excerpt from that map showing the area around Virginia.



I was able to identify and research 85 additional solar farms in Virginia as shown below. These are primarily over 20 MW in size with adjoining homes as close as 100 feet and the mix of adjoining uses is primarily agricultural and residential.

Solar #	Name	State	County	City	Output (MW)	Total Acres	Used Acres	Avg. Dist to home	Closest Home	Adjoining Use by Acre			
										Res	Agri	Agri/Res	Com
115	Buckingham I	VA	Buckingham	Cumberland	19.8	481.18		N/A	N/A	8%	73%	18%	0%
121	Scott	VA	Powhatan	Powhatan	20	898.4		1,421	730	29%	28%	44%	0%
204	Walker-Correctiona	VA	New Kent	Barhamsville	20	484.65		516	103	13%	68%	20%	0%
205	Sappony	VA	Sussex	Stony Creek	20	322.68				2%	98%	0%	0%
216	Beetle	VA	Southampton	Boykins	40	422.19		1,169	310	0%	10%	90%	0%
222	Grasshopper	VA	Mecklenburg	Chase City	80	946.25				6%	87%	5%	1%
226	Belcher/Desper	VA	Louisa	Louisa	88	1238.1			150	19%	53%	28%	0%
228	Bluestone Farm	VA	Mecklenburg	Chase City	4.99	332.5				0%	100%	0%	0%
257	Nokesville	VA	Prince William	Nokesville		331.01				12%	49%	17%	23%
261	Buckingham II	VA	Buckingham	Buckingham	19.8	460.05				6%	79%	15%	0%
262	Mount Jackson	VA	Shenandoah	Mount Jackson	15.65	652.47				21%	51%	14%	13%
263	Gloucester	VA	Gloucester	Gloucester	20	203.55		508	190	17%	55%	28%	0%
267	Scott II	VA	Powhatan	Powhatan		701				41%	25%	34%	0%
270	TWE Myrtle	VA	Suffolk	Suffolk	15	258.97	120	1,115	150	34%	48%	17%	0%
272	Churchview	VA	Middlesex	Church View	20	567.91				9%	64%	27%	0%
303	Turner	VA	Henrico	Henrico	20	463.12		N/A	N/A	21%	37%	0%	42%
311	Sunnybrook Farm	VA	Halifax	Scottsburg		527.88	340	N/A	N/A	15%	59%	26%	0%
312	Powell Creek	VA	Halifax	Alton		513		N/A	N/A	7%	71%	22%	0%
339	Crystal Hill	VA	Halifax	Crystal Hill		628.67	218	1,570	140	6%	41%	35%	18%
353	Amazon East(ern sh	VA	Accomack	Oak Hall	80	1000		645	135	8%	75%	17%	0%
354	Alton Post	VA	Halifax	Alton		501.96		749	100	2%	58%	40%	0%
357	Water Strider	VA	Halifax	Nathalie		1134	960	821	250	7%	55%	38%	0%
363	Remington	VA	Fauquier	Remington	20	277.2	125	2,755	1,280	10%	41%	31%	18%
364	Greenwood	VA	Culpepper	Stevensburg	100	2266.6	1800	788	200	8%	62%	29%	0%
366	Culpeper Sr	VA	Culpeper	Culpeper		12.53		N/A	N/A	15%	0%	86%	0%
369	Cherrydale	VA	Northampton	Kendall Grove	20	180.17		N/A	N/A	5%	0%	92%	3%
370	Clarke	VA	Clarke	White Post	10	234.84		N/A	N/A	14%	39%	46%	1%
371	Bedford	VA	Bedford	Bedford	3	101	20	N/A	N/A	8%	0%	66%	26%
372	Woodland,VA	VA	Isle of Wight	Smithfield	19.7	211.12		606	190	9%	0%	91%	0%
373	Whitehouse	VA	Louisa	Louisa	20	499.52		1,195	110	24%	55%	18%	4%
406	Foxhound	VA	Halifax	Clover	91	1311.8		885	185	5%	61%	17%	18%
483	Essex Solar Center	VA	Essex	Center Cross	20	106.12		693	360	3%	70%	27%	0%
484	Southampton	VA	Southampton	Newsoms	100	3243.9		-	-	3%	78%	17%	3%
494	Walnut	VA	King and Queen	Shacklefords	110	1700	1173	641	165	14%	72%	13%	1%
496	Piney Creek	VA	Halifax	Clover	80	776.18	422	523	195	15%	62%	24%	0%
500	Rappahannock	VA	Lancaster	White Stone	2	184	25	831	560	30%	0%	70%	0%
510	UVA Puller	VA	Middlesex	Topping	15	120	120	1,095	185	59%	32%	0%	10%
516	Dogwood	VA	Page	Stanley	20	360.7	110	2,207	225	12%	22%	65%	0%
518	Fountain Creek	VA	Greensville	Emporia	80	798.3	595	862	300	6%	23%	71%	0%
557	Winterpock 1	VA	Chesterfield	Chesterfield		518	308	2,106	350	4%	78%	18%	0%
559	Wood Brothers	VA	Middlesex	Hartfield	5	60.61	38.67	878	205	12%	86%	0%	2%
577	Windsor	VA	Isle of Wight	Windsor	85	760.87	760.87	459	160	8%	71%	21%	0%
579	Spotsylvania	VA	Spotsylvania	Paytes	500	6412	3500			9%	52%	11%	27%
586	Sweet Sue	VA	King William	Aylett	77	1262	576	1,617	680	7%	68%	25%	0%
591	Warwick	VA	Prince George	Disputanta	26.5	1090.1	564.53	555	115	12%	67%	21%	0%
621	Loblolly	VA	Surry	Spring Grove	150	2181.9	1000	1,860	110	7%	62%	31%	0%
622	Woodridge	VA	Albemarle	Scottsville	138	2260.9	1000	1,106	215	9%	63%	28%	0%
624	Reams	VA	Dinwiddie	Dinwiddie	5	64.1	37.8	873	270	28%	40%	32%	0%
633	Brunswick	VA	Greensville	Emporia	150.2	2076.4	1387.3	1,091	240	4%	85%	11%	0%
642	Belcher 3	VA	Louisa	Louisa		749.36	658.56	598	180	14%	71%	14%	1%
649	Endless Caverns	VA	Rockingham	New Market	31.5	355	323.6	624	190	15%	27%	51%	7%
664	Watlington	VA	Halifax	South Boston	20	240.09	137	536	215	24%	48%	28%	0%
672	Spout Spring	VA	Appomattox	Appomattox	60	881.12	673.37	836	335	16%	30%	46%	8%

Solar #	Name	State	County	City	Output (MW)	Total Acres	Used Acres	Avg. Dist to home	Closest Home	Adjoining Use by Acre Res	Agri	Agri/Res	Com
703	Lily Pond	VA	Dinwiddie	Carson	80	1107.5	600	628	110	13%	75%	12%	0%
704	Midway	VA	Albemarle	Batesville	8	136	90	858	340	20%	46%	34%	0%
749	Martin	VA	Goochland	Richmond	5	114.2	114.2	1,491	470	7%	54%	39%	0%
750	Palmer	VA	Fluvanna	Zion Crossroads	5	57	41	525	165	31%	55%	0%	14%
755	Danville	VA	Pittsylvania	Danville	6	72.08	72.08	616	135	22%	63%	15%	0%
756	Martin Trail	VA	Halifax	Clover	6	43	37	254	115	6%	13%	81%	0%
757	Route 360	VA	Halifax	Clover	5.65	110	40	1,957	1,275	6%	18%	76%	0%
769	Cavalier	VA	Surry/Isle of Wigh	Elberon	240	5050	3323	1,231	215	2%	78%	20%	0%
772	Riverstone	VA	Buckingham	Arvonia	149.5	1939	1193	814	355	4%	90%	6%	0%
773	Sunfish	VA	Orange	Culpeper	80	1131.5	679.5	1,121	120	4%	13%	38%	44%
776	West Lake	VA	Franklin	Harrisburg	20	592.82	592.82	3,280	1,260	11%	18%	49%	22%
777	Aditya	VA	Louisa	Louisa	11	94.67	60	614	350	15%	85%	0%	0%
781	Waller	VA	Lancaster	Burgess		1400	1400	880	125	28%	72%	0%	0%
795	Harris Staunton	VA	Halifax	South Boston	47	697	697	352	185	3%	89%	8%	0%
803	Hickory	VA	Chesterfield	Chesterfield	4.7	95.21	22	1,286	325	8%	22%	70%	0%
809	Mountain Brook	VA	Franklin	Wirtz	20			427	195	24%	21%	54%	1%
812	Prince Edward	VA	Prince Edward		25	369.2	369.2	1,275	660	0%	55%	45%	0%
813	Redbud	VA	Frederick	Winchester	30	262.99	262.99	529	150	29%	55%	17%	0%
829	OFW	VA	Shenandoah	Mount Jackson	20	126.64	126.64	504	110	6%	57%	31%	6%
831	Knight	VA	Rockingham	Shenandoah	70	461.59	461.59	833	240	0%	100%	0%	0%
833	Dayton Wayland	VA	Rockingham	Dayton	4	50.7	50.7	684	100	45%	53%	2%	0%
834	Firefly	VA	Pittsylvania			3143	3143	-	200	12%	73%	15%	0%
854	Reeve	VA	Prince Edward	Pamplin	5	164.7	164.7	2,232	1,195	7%	71%	22%	0%
858	360 Solar Center	VA	Chesterfield	Skinquarter	100	2000	410	2,036	235	1%	97%	2%	0%
864	Purdy	VA	Greensville	Purdy	65	596	596	825	250	5%	66%	29%	0%
865	Clover Creek	VA	Halifax	Clover	90	1472	1472	1,691	310	10%	89%	1%	0%
870	Pineside	VA	Buckingham	Scottsville	74.9	2242	2242	2,484	500	22%	51%	27%	0%
872	Rosalind	VA	Greensville	Emporia	160	1795	1795	654	500	8%	86%	7%	0%
879	Wheelhouse	VA	Lunenburg	Victoria	912.47	60	60	2,071	900	7%	41%	51%	0%
880	Elam	VA	Prince Edward	Pamplin	138.9	3	3	1,066	425	22%	66%	12%	0%
881	Helios	VA	Pulaski	Pulaski	11.45	141.76	141.76	734	225	48%	28%	24%	0%
882	Enon	VA	Stafford	Stafford	3	36.76	36.76	289	120	37%	63%	0%	0%
900	Land of Promise	VA	Chesapeake	Chesapeake	5	134.66	134.66	1,338	785	44%	48%	8%	0%
901	Pocaty	VA	Chesapeake	Chesapeake	2	27.22	27.22	632	445	21%	79%	0%	0%

	Output (MW)	Total Acres	Used Acres	Avg. Dist to home	Closest Home	Adjoining Use by Acre Res	Agri	Agri/Res	Com
Average	64.6	815.0	624.2	1059	327	14%	54%	28%	4%
Median	20.0	482.9	331.8	836	215	10%	57%	22%	0%
High	912.5	6412.0	3500.0	3280	1280	59%	100%	92%	44%
Low	2.0	3.0	3.0	254	100	0%	0%	0%	0%

On the following pages I have included summary data on constructed solar farms from the list indicated above. Similar information is available for the larger set of solar farms in the adjoining states in my files if requested.

115: Buckingham Solar, E. James Anderson Hwy, Buckingham, VA

This project was proposed in 2017 and located on 460 acres with the closest home proposed to be 150 feet from the closest solar panel.

Adjoining Use Breakdown

	Acreage	Parcels
Residential	5.95%	71.79%
Agricultural	78.81%	20.51%
Agri/Res	15.24%	7.69%
Total	**100.00%**	**100.00%**

121: Scott Solar Project, 1580 Goodes Bridge Rd, Powhatan, VA

This project was built in 2016 and located on 165 acres out of 898 acres for a 17 MW with the closest home proposed to be 730 feet from the closest solar panel.

Adjoining Use Breakdown

	Acreage	Parcels
Residential	28.83%	78.57%
Agri/Res	43.52%	3.57%
Agricultural	27.65%	17.86%
Total	**100.00%**	**100.00%**

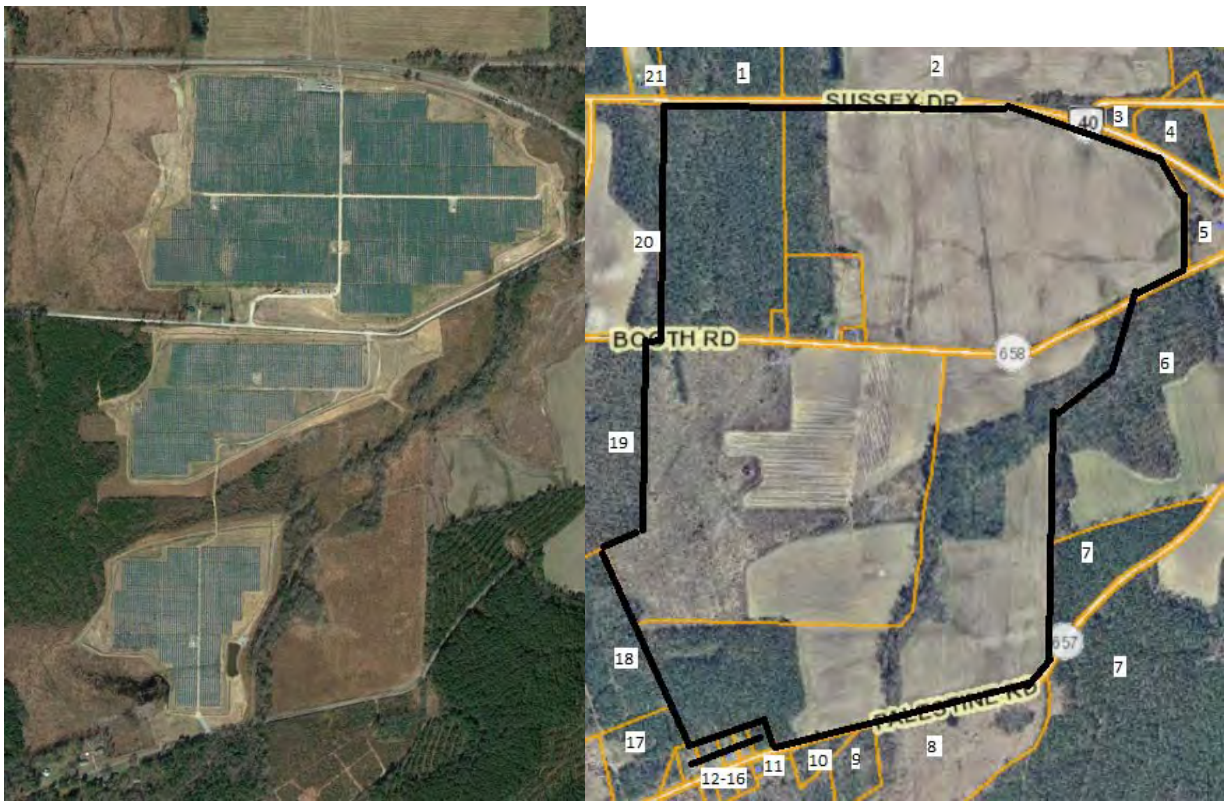
204: Walker-Correctional Solar, Barham Road, Barhamsville, VA

This project was built in 2017 and located on 484.65 acres for a 20 MW with the closest home at 110 feet from the closest solar panel with an average distance of 500 feet.

Adjoining Use Breakdown

	Acreage	Parcels
Residential	12.59%	76.92%
Agricultural	67.71%	15.38%
Agri/Res	19.70%	7.69%
Total	**100.00%**	**100.00%**

205: Sappony Solar, Sussex Drive, Stony Creek, VA



This project was built in 2017 and located on 484.65 acres for a 20 MW with the closest home at 110 feet from the closest solar panel with an average distance of 500 feet.

Adjoining Use Breakdown

	Acreage	Parcels
Residential	12.59%	76.92%
Agricultural	67.71%	15.38%
Agri/Res	19.70%	7.69%
Total	**100.00%**	**100.00%**

354: Amazon Solar project East (Eastern Shore), Accomack, VA

This project was built in 2016 for a solar project on a 1,000-acre assemblage for an 80 MW facility. The closest home is 135 feet from the closest panel.

Adjoining Use Breakdown

	Acreage	**Parcels**
Residential	8.18%	63.74%
Agricultural	75.16%	30.77%
Agri/Res	16.56%	3.30%
Substation	0.08%	1.10%
Church	0.01%	1.10%
Total	**100.00%**	**100.00%**

364: Remington Solar, 12080 Lucky Hill Rd, Remington, VA

This project was built in 2017 for a solar project on a 125-acre tract for a 20 MW facility. There were some recent home sales adjoining this project, but it was difficult to do any matched pairs. One sale was an older home in very poor condition according to the broker and required crossing railroad tracks on a private road to get access to the home and located across from a large industrial building. The other sale is a renovated historic home on a large tract of land just one parcel north of the large industrial building. These sales essentially have too much static around them to isolate any impacts separate from these other factors.

Adjoining Use Breakdown

	Acreage	**Parcels**
Residential	10.24%	65.38%
Agricultural	40.79%	19.23%
Agri/Res	30.87%	7.69%
Warehouse	0.82%	3.85%
Substation	17.28%	3.85%
Total	**100.00%**	**100.00%**

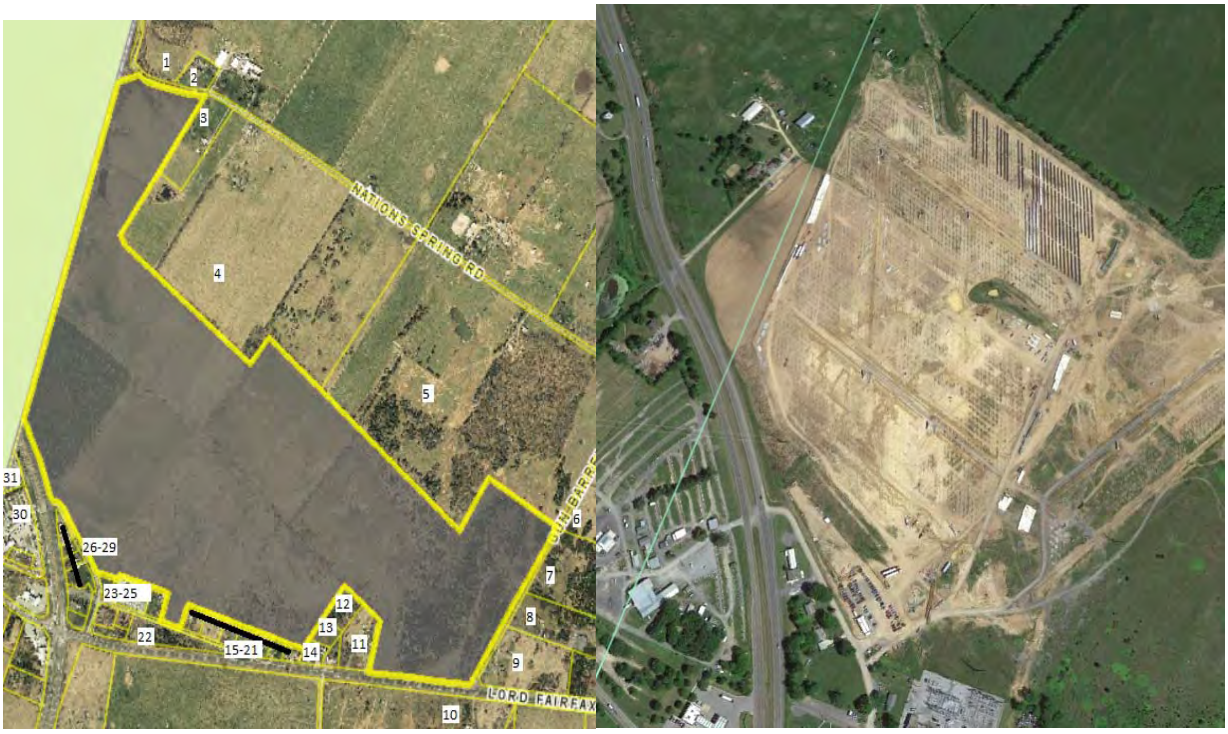
370: Cherrydale Solar, Seaside Road, Kendall Grove, VA

This project was built in 2017 and located on 180.17 acres for a 20 MW facility.

Adjoining Use Breakdown

	Acreage	Parcels
Residential	5.44%	80.77%
Agricultural	92.01%	15.38%
Warehouse	2.55%	3.85%
Total	**100.00%**	**100.00%**

371: Clarke County Solar, Double Tollgate Road, White Post, VA

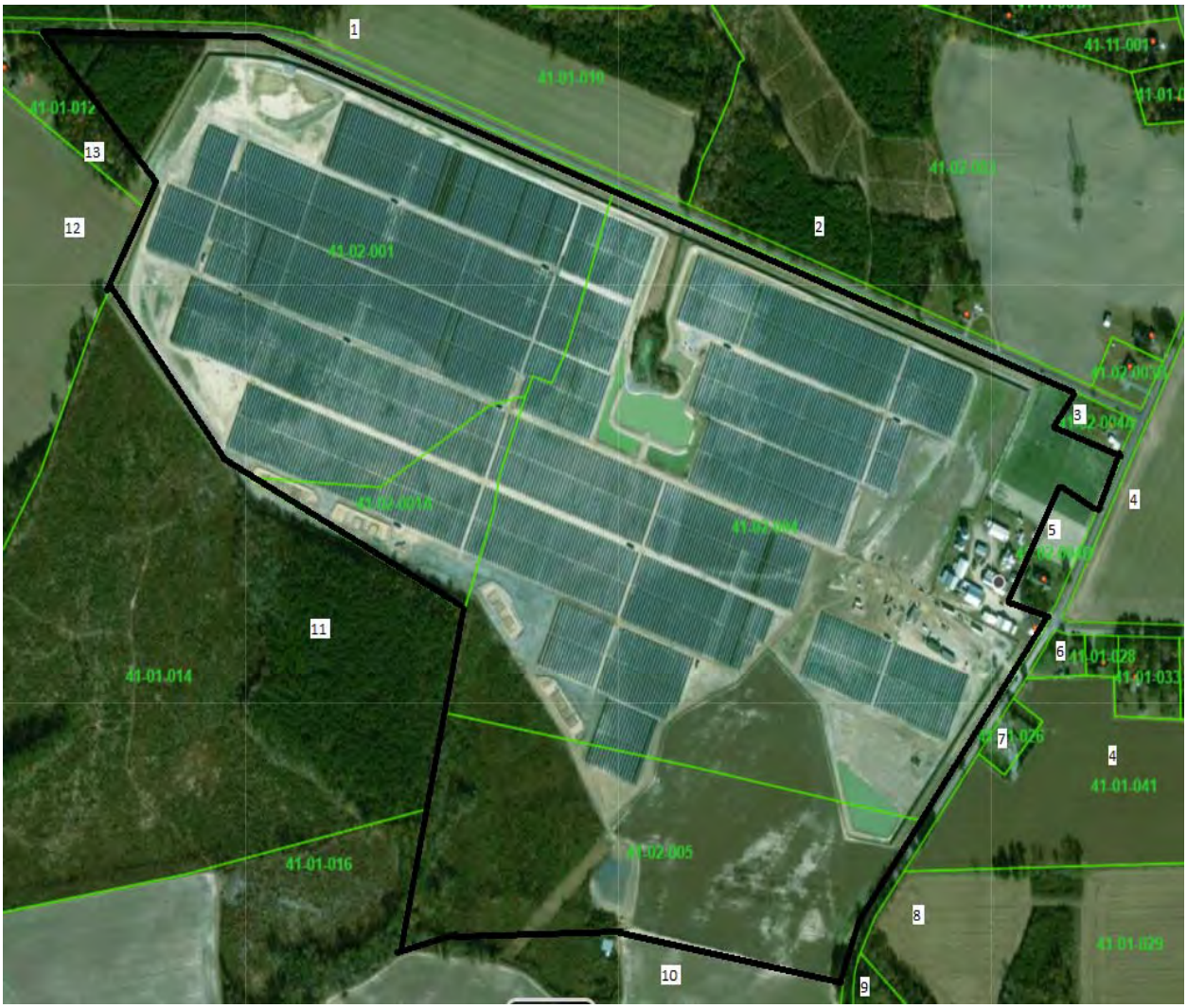


This project was built in 2017 and located on a portion of a 234.84-acre tract for a 20 MW facility.

Adjoining Use Breakdown

	Acreage	Parcels
Residential	13.70%	74.19%
Agricultural	38.89%	6.45%
Agri/Res	46.07%	6.45%
Commercial	0.19%	6.45%
Warehouse	0.85%	3.23%
Substation	0.30%	3.23%
Total	**100.00%**	**100.00%**

373: Woodland Solar, Longview Drive, Smithfield, VA



This project was built in 2016 for a solar project on a 211.12-acre tract for a 19.7 MW facility. The closest single-family home is 190 feet away from the closest solar panel. The average distance is 606 feet.

Adjoining Use Breakdown

	Acreage	Parcels
Residential	8.85%	46.15%
Agricultural	91.08%	46.15%
Cell Tower	0.07%	7.69%
Total	**100.00%**	**100.00%**

374: Whitehouse Solar, Chalklevel Road, Louisa, VA

This project was built in 2016 for a solar project on a 499.52-acre tract for a 20 MW facility. The closest single-family home is 110 feet away from the closest solar panel. The average distance is 1,195 feet.

Adjoining Use Breakdown

	Acreage	**Parcels**
Residential	23.55%	70.27%
Agricultural	54.51%	10.81%
Agri/Res	18.22%	2.70%
Commercial	2.49%	13.51%
Industrial	1.22%	2.70%
Total	**100.00%**	**100.00%**

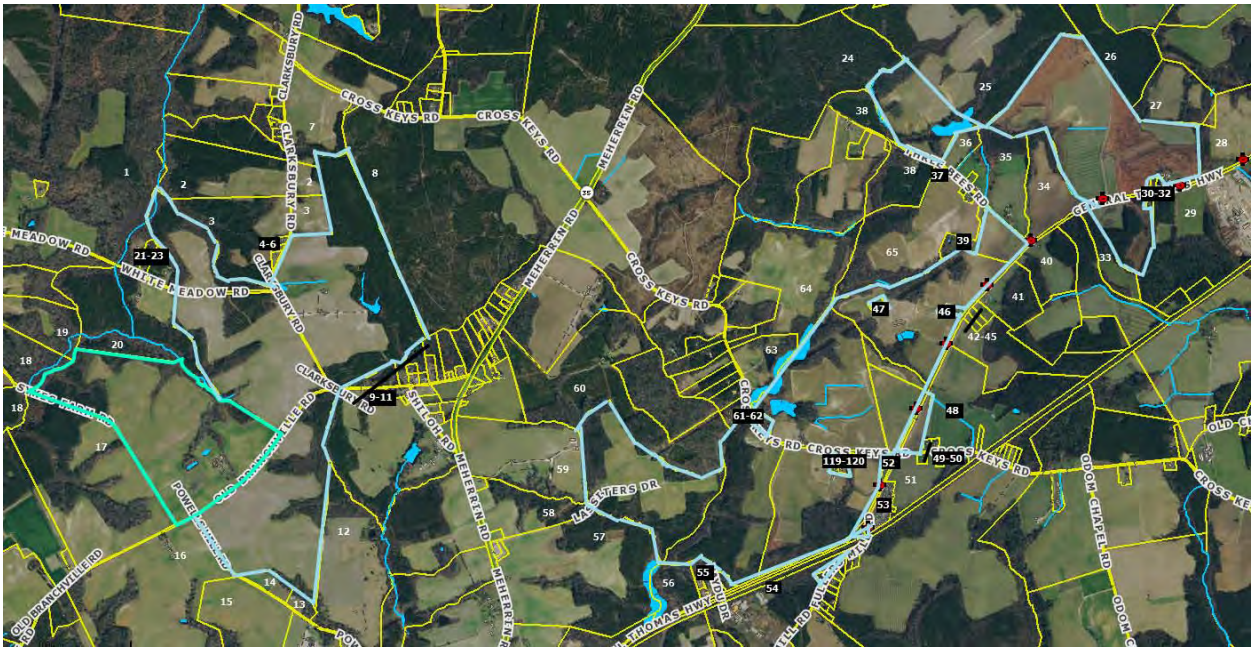
484: Essex Solar, Tidewater Trail, Center Cross, VA

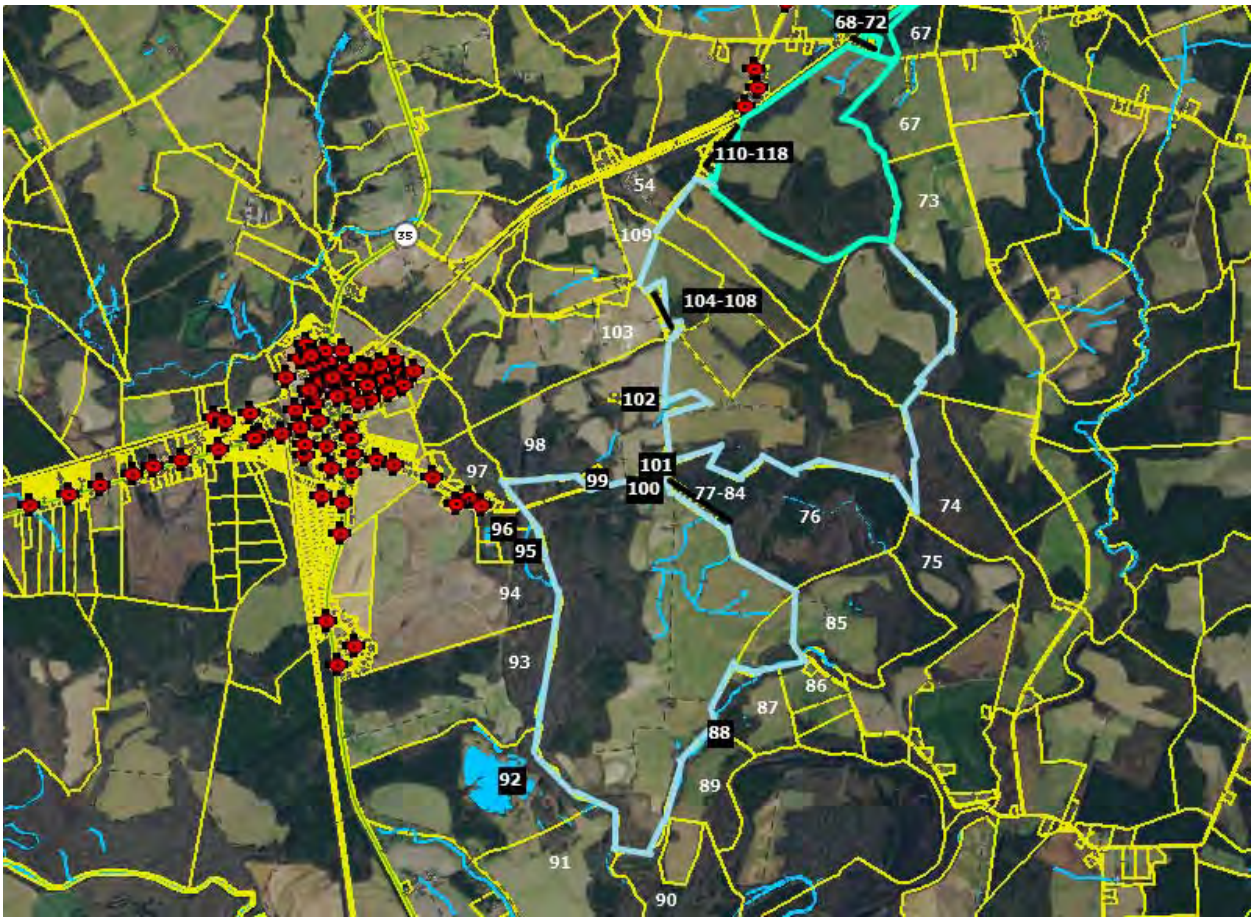
This project was built in 2017 for a solar project on a 106.12-acre tract for a 20 MW facility. The closest single-family home is 360 feet away from the closest solar panel. The average distance is 693 feet.

Adjoining Use Breakdown

	Acreage	**Parcels**
Residential	3.13%	57.89%
Agricultural	69.65%	26.32%
Agri/Res	26.99%	10.53%
Religious	0.23%	5.26%
Total	**100.00%**	**100.00%**

485: Southampton Solar, General Thomas Hwy, Newsoms, VA





This project was built in 2017 for a solar project on an assemblage of 3,244 acres for a 100 MW facility.

Adjoining Use Breakdown

	Acreage	Parcels
Residential	2.56%	53.33%
Agricultural	77.99%	36.67%
Agri/Res	16.56%	8.33%
Industrial	2.89%	1.67%
Total	**100.00%**	**100.00%**

VII. Market Analysis of the Impact on Value from Solar Farms

I have researched hundreds of solar farms in numerous states to determine the impact of these facilities on the value of adjoining property. This research has primarily been in North Carolina, but I have also conducted market impact analyses in Virginia, South Carolina, Tennessee, Texas, Oregon, Mississippi, Maryland, New York, California, Missouri, Florida, Montana, Georgia, Louisiana, and New Jersey.

Wherever I have looked at solar farms, I have derived a breakdown of the adjoining uses to show what adjoining uses are typical for solar farms and what uses would likely be considered consistent with a solar farm use similar to the breakdown that I've shown for the subject property on the previous page. A summary showing the results of compiling that data over hundreds of solar farms is shown later in the Scope of Research section of this report.

I also consider whether the properties adjoining a solar farm in one location have characteristics similar to the properties abutting or adjoining the proposed site so that I can make an assessment of market impact on each proposed site. Notably, in most cases solar farms are placed in areas very similar to the site in question, which is surrounded by low density residential and agricultural uses. In my over 700 studies, I have found a striking repetition of that same typical adjoining use mix in over 90% of the solar farms I have looked at. Matched pair results in multiple states are strikingly similar, and all indicate that solar farms – which generate very little traffic, and do not generate noise, dust or have other harmful effects – do not negatively impact the value of adjoining or abutting properties.

On the following pages I have considered matched pair data specific to Virginia and Kentucky.

In the next section I have considered matched pair data throughout the Southeast of the United States as being the most similar states that would most readily compare to Virginia. This includes data from Florida, Georgia, South Carolina, North Carolina, Tennessee, Virginia and Maryland. I focused on projects of 5 MW and larger though I have significant supplemental data on solar farms just smaller than that in North Carolina that show similar results. This data is available in my files.

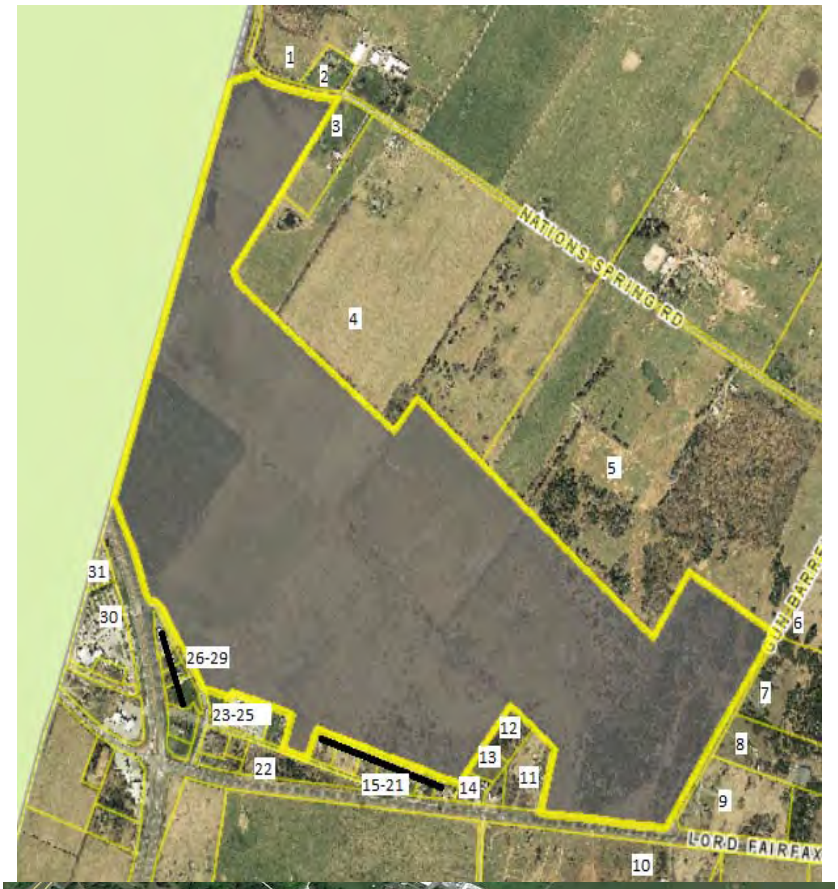
I have additional supporting information from other states in my files that show a consistent pattern across the United States, but again, I have focused on the Southeast in this analysis.

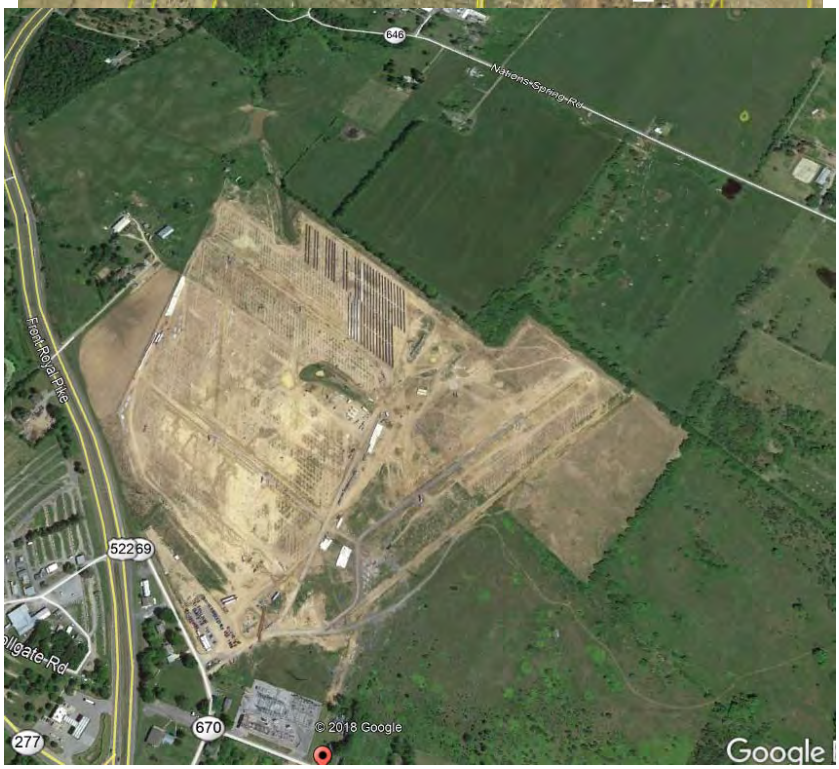
A. Virginia Data

I have identified matched pairs adjoining the solar farms noted above. I have also included data from a solar farm in Kentucky that does a good job of illustrating distant views of solar panels in relation to adjoining housing.

The following pages detail the matched pairs and how they were derived.

1. Matched Pair – Clarke County Solar, Clarke County, VA





This project is a 20 MW facility located on a 234-acre tract that was built in 2017.

I have considered two recent sales of Parcel 3. The home on this parcel is 1,230 feet from the closest panel as measured in the second map from Google Earth, which shows the solar farm under construction. This home sold in January 2017 for $295,000 and again in August 2019 for $385,000. I show each sale below and compare those to similar home sales in each time frame. The significant increase in price between 2017 and 2019 is due to a major kitchen remodel, new roof, and related upgrades as well as improvement in the market in general. The sale and later resale of the home with updates and improvements speaks to pride of ownership and increasing overall value as properties perceived as diminished are less likely to be renovated and sold for profit.

I note that 102 Tilthammer includes a number of barns that I did not attribute any value in the analysis. The market would typically give some value for those barns but even without that adjustment there is an indication of a positive impact on value due to the solar farm. The landscaping buffer from this home is considered light.

Adjoining Residential Sales After Solar Farm Approved

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GLA	BR/BA	Park	Style	Other
3	Adjoins	833 Nations Spr	5.13	8/18/2019	$385,000	1979	1,392	$276.58	3/2	Det Gar	Ranch	UnBsmt
	Not	167 Leslie	5.00	8/19/2020	$429,000	1980	1,665	$257.66	3/2	Det2Gar	Ranch	
	Not	2393 Old Chapel	2.47	8/10/2020	$330,000	1974	1,500	$220.00	3/1.5	Det Gar	Ranch	
	Not	102 Tilthammer	6.70	5/7/2019	$372,000	1970	1,548	$240.31	3/1.5	Det Gar	Ranch	UnBsmt

Adjoining Sales Adjusted

Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
							$385,000			1230
-$13,268		-$2,145	-$56,272		-$5,000	$50,000	$402,315	-4%		
-$9,956	$25,000	$8,250	-$19,008	$5,000		$50,000	$389,286	-1%		
$3,229		$16,740	-$29,991	$5,000			$366,978	5%		
									0%	

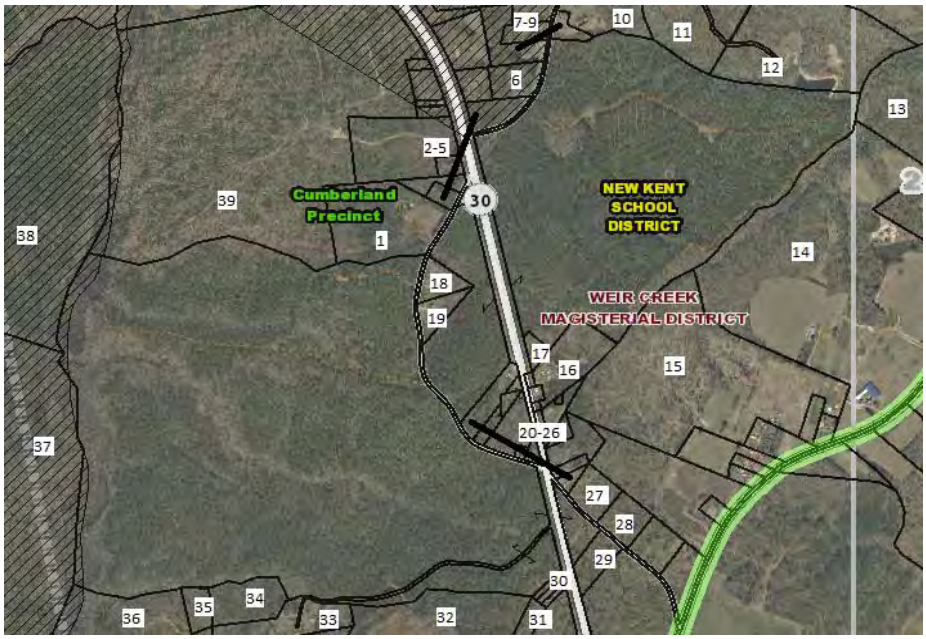
Adjoining Residential Sales After Solar Farm Approved

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GLA	BR/BA	Park	Style	Other
3	Adjoins	833 Nations Spr	5.13	1/9/2017	$295,000	1979	1,392	$211.93	3/2	Det Gar	Ranch	UnBsmt
	Not	6801 Middle	2.00	12/12/2017	$249,999	1981	1,584	$157.83	3/2	Open	Ranch	
	Not	4174 Rockland	5.06	1/2/2017	$300,000	1990	1,688	$177.73	3/2	2 Gar	2-story	
	Not	400 Sugar Hill	1.00	6/7/2018	$180,000	1975	1,008	$178.57	3/1	Open	Ranch	

Adjoining Sales Adjusted

Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
							$295,000			1230
-$7,100	$25,000	-$2,500	-$24,242		$5,000	$50,000	$296,157	0%		
$177		-$16,500	-$42,085		-$10,000	$50,000	$281,592	5%		
-$7,797		$3,600	$54,857	$10,000	$5,000	$50,000	$295,661	0%		
									1%	

2. Matched Pair – Walker-Correctional Solar, Barham Road, Barhamsville, VA



This project was built in 2017 and located on 484.65 acres for a 20 MW with the closest home at 110 feet from the closest solar panel with an average distance of 500 feet.

I considered the recent sale identified on the map above as Parcel 19, which is directly across the street and based on the map shown on the following page is 250 feet from the closest panel. A

limited buffering remains along the road with natural growth being encouraged, but currently the panels are visible from the road. Alex Uminski, SRA with MGMiller Valuations in Richmond VA confirmed this sale with the buying and selling broker. The selling broker indicated that the solar farm was not a negative influence on this sale and in fact the buyer noticed the solar farm and then discovered the listing. The privacy being afforded by the solar farm was considered a benefit by the buyer. I used a matched pair analysis with a similar sale nearby as shown below and found no negative impact on the sales price. Property actually closed for more than the asking price. The landscaping buffer is considered light.

Adjoining Residential Sales After Solar Farm Approved

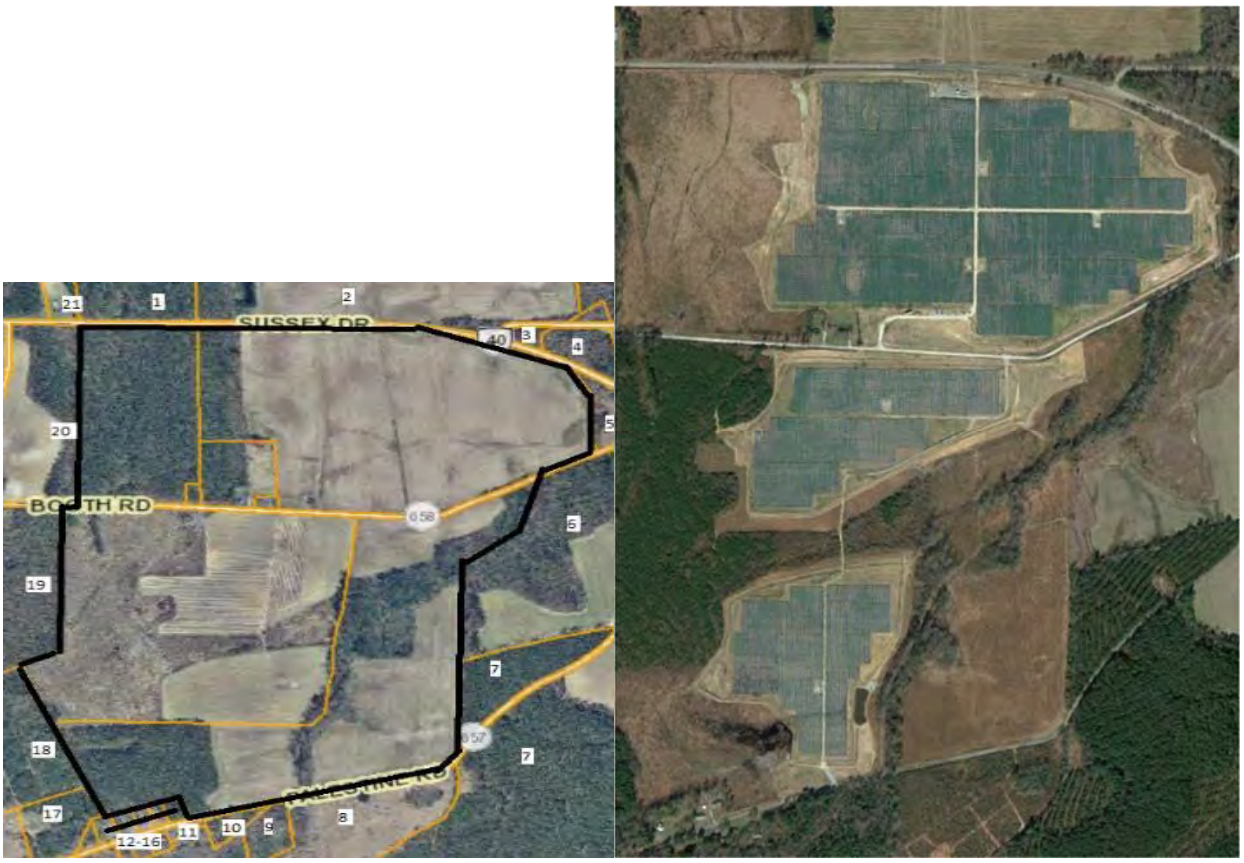
Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
Adjoins	5241 Barham	2.65	10/18/2018	$264,000	2007	1,660	$159.04	3/2	Drive	Ranch	Modular
Not	17950 New Kent	5.00	9/5/2018	$290,000	1987	1,756	$165.15	3/2.5	3 Gar	Ranch	
Not	9252 Ordinary	4.00	6/13/2019	$277,000	2001	1,610	$172.05	3/2	1.5-Gar	Ranch	
Not	2416 W Miller	1.04	9/24/2018	$299,000	1999	1,864	$160.41	3/2.5	Gar	Ranch	

Adjoining Sales Adjusted

Solar	Address	Time	Ac/Loc	YB	GLA	BR/BA	Park	Other	Total	% Diff	Dist
Adjoins	5241 Barham								$264,000		250
Not	17950 New Kent		-$8,000	$29,000	-$4,756	-$5,000	-$20,000	-$15,000	$266,244	-1%	
Not	9252 Ordinary	-$8,310	-$8,000	$8,310	$2,581		-$10,000	-$15,000	$246,581	7%	
Not	2416 W Miller		$8,000	$11,960	-$9,817	-$5,000	-$10,000	-$15,000	$279,143	-6%	
								Average Diff		0%	

I also spoke with Patrick W. McCrerey of Virginia Estates who was marketing a property that sold at 5300 Barham Road adjoining the Walker-Correctional Solar Farm. He indicated that this property was unique with a home built in 1882 and heavily renovated and updated on 16.02 acres. The solar farm was through the woods and couldn't be seen by this property and it had no impact on marketing this property. This home sold on April 26, 2017 for $358,000. I did not set up any matched pairs for this property since it is a unique property that any such comparison would be difficult to rely on. The broker's comments do support the assertion that the adjoining solar farm had no impact on value. The home in this case was 510 feet from the closest panel.

3. Matched Pair – Sappony Solar, Sussex County, VA



This project is a 30 MW facility located on a 322.68-acre tract that was built in the fourth quarter of 2017.

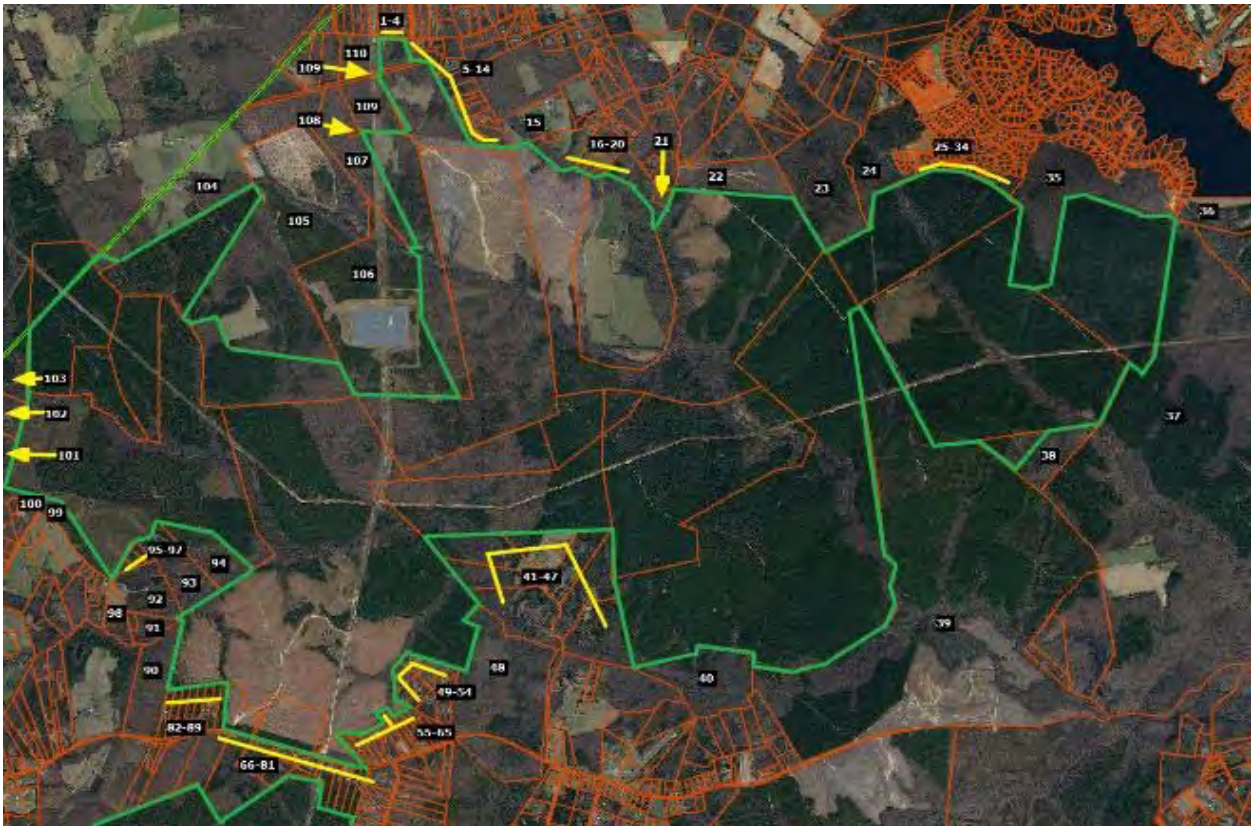
I have considered the 2018 sale of Parcel 17 as shown below. This was a 1,900 s.f. manufactured home on a 6.00-acre lot that sold in 2018. I have compared that to three other nearby manufactured homes as shown below. The range of impacts is within typical market variation with an average of -1%, which supports a conclusion of no impact on property value. The landscaping buffer is considered medium.

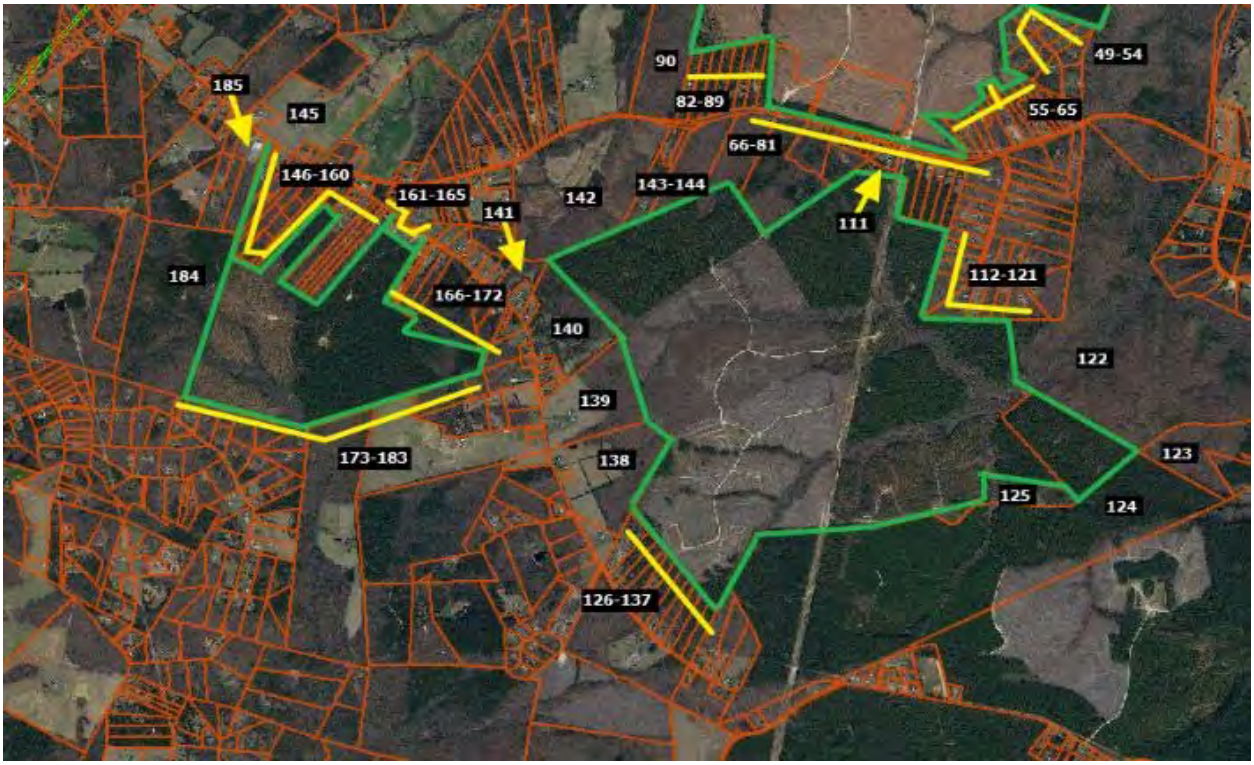
Adjoining Residential Sales After Solar Farm Approved

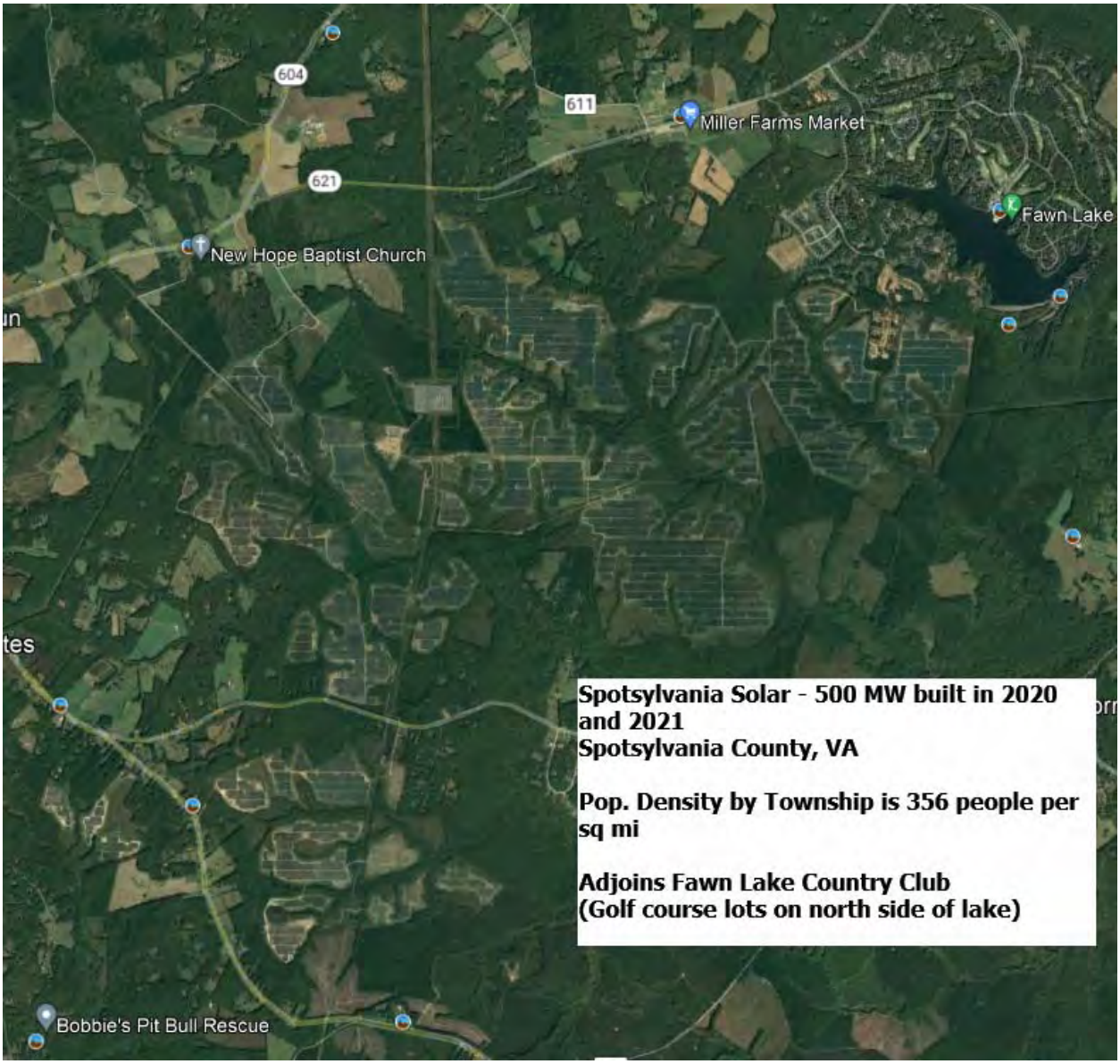
Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GLA	BR/BA	Park	Style	Other
	Adjoins	12511 Palestine	6.00	7/31/2018	$128,400	2013	1,900	$67.58	4/2.5	Open	Manuf	
	Not	15698 Concord	3.92	7/31/2018	$150,000	2010	2,310	$64.94	4/2	Open	Manuf	Fence
	Not	23209 Sussex	1.03	7/7/2020	$95,000	2005	1,675	$56.72	3/2	Det Crpt	Manuf	
	Not	6494 Rocky Br	4.07	11/8/2018	$100,000	2004	1,405	$71.17	3/2	Open	Manuf	

Adjoining Sales Adjusted									Avg	
Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	% Diff	Distance
							$128,400			1425
$0		$2,250	-$21,299	$5,000			$135,951	-6%		
-$5,660	$13,000	$3,800	$10,209	$5,000	$1,500		$122,849	4%		
-$843		$4,500	$28,185				$131,842	-3%		
									-1%	

4. Matched Pair – Spotsylvania Solar, Paytes, VA







This solar farm is being built in four phases with the area known as Site C having completed construction in November 2020 after the entire project was approved in April 2019. Site C, also known as Pleinmont 1 Solar, includes 99.6 MW located in the southeast corner of the project and shown on the maps above with adjoining parcels 111 through 144. The entire Spotsylvania project totals 500 MW on 3500 acres out of a parent tract assemblage of 6,412 acres.

I have identified three adjoining home sales that occurred during construction and development of the site in 2020.

The first is located on the north side of Site A on Orange Plank Road. The second is located on Nottoway Lane just north of Catharpin Road on the south side of Site A and east of Site C. The third is located on Post Oak Road for a home that backs up to Site C that sold in September 2020 near the completion of construction for Site C.

Spotsylvania Solar Farm

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
Adjoins	12901 Orng Plnk	5.20	8/27/2020	$319,900	1984	1,714	$186.64	3/2	Drive	1.5	Un Bsmt
Not	8353 Gold Dale	3.00	1/27/2021	$415,000	2004	2,064	$201.07	3/2	3 Gar	Ranch	
Not	6488 Southfork	7.26	9/9/2020	$375,000	2017	1,680	$223.21	3/2	2 Gar	1.5	Barn/Patio
Not	12717 Flintlock	0.47	12/2/2020	$290,000	1990	1,592	$182.16	3/2.5	Det Gar	Ranch	

Adjoining Sales Adjusted

Address	Time	Ac/Loc	YB	GLA	BR/BA	Park	Other	Total	% Diff	Dist
12901 Orng Plnk								$319,900		1270
8353 Gold Dale	-$5,219	$20,000	-$41,500	-$56,298		-$20,000		$311,983	2%	
6488 Southfork	-$401	-$20,000	-$61,875	$6,071		-$15,000		$283,796	11%	
12717 Flintlock	-$2,312	$40,000	-$8,700	$17,779	-$5,000	-$5,000		$326,767	-2%	
							Average Diff		4%	

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
Adjoins	9641 Nottoway	11.00	5/12/2020	$449,900	2004	3,186	$141.21	4/2.5	Garage	2-Story	Un Bsmt
Not	26123 Lafayette	1.00	8/3/2020	$390,000	2006	3,142	$124.12	3/3.5	Gar/DtG	2-Story	
Not	11626 Forest	5.00	8/10/2020	$489,900	2017	3,350	$146.24	4/3.5	2 Gar	2-Story	
Not	10304 Pny Brnch	6.00	7/27/2020	$485,000	1998	3,076	$157.67	4/4	2Gar/Dt2	Ranch	Fn Bsmt

Adjoining Sales Adjusted

Address	Time	Ac/Loc	YB	GLA	BR/BA	Park	Other	Total	% Diff	Dist
9641 Nottoway								$449,900		1950
26123 Lafayette	-$2,661	$45,000	-$3,900	$4,369	-$10,000	-$5,000		$417,809	7%	
11626 Forest	-$3,624		-$31,844	-$19,187		-$5,000		$430,246	4%	
10304 Pny Brnch	-$3,030		$14,550	$13,875	-$15,000	-$15,000	-$10,000	$470,396	-5%	
							Average Diff		2%	

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
Adjoins	13353 Post Oak	5.20	9/21/2020	$300,000	1992	2,400	$125.00	4/3	Drive	2-Story	Fn Bsmt
Not	9609 Logan Hgt	5.86	7/4/2019	$330,000	2004	2,352	$140.31	3/2	2Gar	2-Story	
Not	12810 Catharpian	6.18	1/30/2020	$280,000	2008	2,240	$125.00	4/2.5	Drive	2-Story	Bsmt/Nd Pnt
Not	10725 Rbrt Lee	5.01	10/26/2020	$295,000	1995	2,166	$136.20	4/3	Gar	2-Story	Fn Bsmt

Adjoining Sales Adjusted

Address	Time	Ac/Loc	YB	GLA	BR/BA	Park	Other	Total	% Diff	Dist
13353 Post Oak								$300,000		1171
9609 Logan Hgt	$12,070		-$19,800	$5,388		-$15,000	$15,000	$327,658	-9%	
12810 Catharpian	$5,408		-$22,400	$16,000	$5,000		$15,000	$299,008	0%	
10725 Rbrt Lee	-$849		-$4,425	$25,496		-$10,000		$305,222	-2%	
							Average Diff		-4%	

All three of these homes are well set back from the solar panels at distances over 1,000 feet and are well screened from the project. All three show no indication of any impact on property value.

There are a couple of recent lot sales located along Southview Court that have sold since the solar farm was approved. The most recent lot sales include 11700 Southview Court that sold on December 29, 2021 for $140,000 for a 0.76-acre lot. This property was on the market for less than 2 months before closing within 6% of the asking price. This lot sold earlier in September 2019 for $55,000 based on a liquidation sale from NTS to an investor.

A similar 0.68-acre lot at 11507 Stonewood Court within the same subdivision located away from the solar farm sold on March 9, 2021 for $109,000. This lot sold for 18% over the asking price within 1 month of listing suggesting that this was priced too low. Adjusting this lot value upward by 12% for very strong growth in the market over 2021, the adjusted indicated value is $122,080 for this lot. This is still showing a 15% premium for the lot backing up to the solar farm.

The lot at 11009 Southview Court sold on August 5, 2019 for $65,000, which is significantly lower than the more recent sales. This lot was sold by NTS the original developer of this subdivision, who was in the process of liquidating lots in this subdivision with multiple lot sales in this time period throughout the subdivision being sold at discounted prices. The home was later improved by the buyer with a home built in 2020 with 2,430 square feet ranch, 3.5 bathrooms, with a full basement, and a current assessed value of $492,300.

I spoke with Chris Kalia, MAI, Mark Doherty, local real estate investor, and Alex Doherty, broker, who are all three familiar with this subdivision and activity in this neighborhood. All three indicated that there was a deep sell off of lots in the neighborhood by NTS at discounted prices under $100,000 each. Those lots since that time are being sold for up to $140,000. The prices paid for the lots below $100,000 were liquidation values and not indicative of market value. Homes are being built in the neighborhood on those lots with home prices ranging from $600,000 to $800,000 with no sign of impact on pricing due to the solar farm according to all three sources.

Fawn Lake Lot Sales

Parcel	Solar?	Address	Acres	Sale Date	Sale Price	Ad. For Time	% Diff
A	Adjoins	11700 Southview Ct	0.76	12/29/2021	$140,000		
1	1 parcel away	11603 Southview Ct	0.44	3/31/2022	$140,000	$141,960	-1.4%
2	Not adjoin	11507 Stonewood Ct	0.68	3/9/2021	$109,000	$118,374	15.4%
3	Not adjoin	11312 Westgate Wy	0.83	10/15/2020	$125,000	$142,000	-1.4%
4	Not adjoin	11409 Darkstone Pl	0.589	9/23/2021	$118,000	$118,000	15.7%

Average	7.1%
Median	7.0%

Least Adjusted	15.7%
2nd Least Adjusted	-1.4%
(Parcel 1 off solar farm)	

Time Adjustments are based on the FHFA Housing Price Index

5. Matched Pair – Crittenden Solar, Crittenden, KY

This solar farm was built in December 2017 on a 181.70-acre tract but utilizing only 34.10 acres. This is a 2.7 MW facility with residential subdivisions to the north and south.

I have identified five home sales to the north of this solar farm on Clairborne Drive and one home sale to the south on Eagle Ridge Drive since the completion of this solar farm. The home sale on Eagle Drive is for a $75,000 home and all of the homes along that street are similar in size and price range. According to local broker Steve Glacken with Cutler Real Estate these are the lowest price range/style home in the market. I have not analyzed that sale as it would unlikely provide significant data to other homes in the area.

Mr. Glacken has been selling lots at the west end of Clairborne for new home construction. He indicated in 2020 that the solar farm near the entrance of the development has been a complete non-factor and none of the home sales are showing any concern over the solar farm. Most of the homes are in the $250,000 to $280,000 price range. The vacant residential lots are being marketed for $28,000 to $29,000. The landscaping buffer is considered light, but the rolling terrain allows for distant views of the panels from the adjoining homes along Clairborne Drive.

The first home considered is a bit of an anomaly for this subdivision in that it is the only manufactured home that was allowed in the community. It sold on January 3, 2019. I compared that sale to three other manufactured home sales in the area making minor adjustments as shown on the next page to account for the differences. After all other factors are considered the adjustments show a -1% to +13% impact due to the adjacency of the solar farm. The best indicator is 1250 Cason, which shows a 3% impact. A 3% impact is within the normal static of real estate transactions and therefore not considered indicative of a positive impact on the property, but it strongly supports an indication of no negative impact.

Adjoining Residential Sales After Solar Farm Approved

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
	Adjoins	250 Claiborne	0.96	1/3/2019	$120,000	2000	2,016	$59.52	3/2	Drive	Manuf	
	Not	1250 Cason	1.40	4/18/2018	$95,000	1994	1,500	$63.33	3/2	2-Det	Manuf	Carport
	Not	410 Reeves	1.02	11/27/2018	$80,000	2000	1,456	$54.95	3/2	Drive	Manuf	
	Not	315 N Fork	1.09	5/4/2019	$107,000	1992	1,792	$59.71	3/2	Drive	Manuf	

Adjustments

Solar	Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
Adjoins	250 Claiborne								$120,000			373
Not	1250 Cason	$2,081		$2,850	$26,144		-$5,000	-$5,000	$116,075	3%		
Not	410 Reeves	$249		$0	$24,615				$104,865	13%		
Not	315 N Fork	-$1,091		$4,280	$10,700				$120,889	-1%		
											5%	

I also looked at three other home sales on this street as shown below. These are stick-built homes and show a higher price range.

Adjoining Residential Sales After Solar Farm Approved

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
	Adjoins	300 Claiborne	1.08	9/20/2018	$212,720	2003	1,568	$135.66	3/3	2-Car	Ranch	Brick
	Not	460 Claiborne	0.31	1/3/2019	$229,000	2007	1,446	$158.37	3/2	2-Car	Ranch	Brick
	Not	2160 Sherman	1.46	6/1/2019	$265,000	2005	1,735	$152.74	3/3	2-Car	Ranch	Brick
	Not	215 Lexington	1.00	7/27/2018	$231,200	2000	1,590	$145.41	5/4	2-Car	Ranch	Brick

Adjustments

Solar	Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
Adjoins	300 Claiborne								$213,000			488
Not	460 Claiborne	-$2,026		-$4,580	$15,457	$5,000			$242,850	-14%		
Not	2160 Sherman	-$5,672		-$2,650	-$20,406				$236,272	-11%		
Not	215 Lexington	$1,072		$3,468	-$2,559	-$5,000			$228,180	-7%		
											-11%	

This set of matched pairs shows a minor negative impact for this property. I was unable to confirm the sales price or conditions of this sale. The best indication of value is based on 215 Lexington, which required the least adjusting and supports a -7% impact.

Adjoining Residential Sales After Solar Farm Approved

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
	Adjoins	350 Claiborne	1.00	7/20/2018	$245,000	2002	1,688	$145.14	3/3	2-Car	Ranch	Brick
	Not	460 Claiborne	0.31	1/3/2019	$229,000	2007	1,446	$158.37	3/2	2-Car	Ranch	Brick
	Not	2160 Sherman	1.46	6/1/2019	$265,000	2005	1,735	$152.74	3/3	2-Car	R/FBsmt	Brick
	Not	215 Lexington	1.00	7/27/2018	$231,200	2000	1,590	$145.41	5/4	2-Car	Ranch	Brick

Adjustments

Solar	Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
Adjoins	350 Claiborne								$245,000			720
Not	460 Claiborne	-$3,223		-$5,725	$30,660	$5,000			$255,712	-4%		
Not	2160 Sherman	-$7,057		-$3,975	-$5,743				$248,225	-1%		
Not	215 Lexington	-$136		$2,312	$11,400	-$5,000			$239,776	2%		
											-1%	

The following photograph shows the light landscaping buffer and the distant view of panels that was included as part of the marketing package for this property. The panels are visible somewhat on the left and somewhat through the trees in the center of the photograph. The first photograph is from the home, with the second photograph showing the view near the rear of the lot.

This set of matched pairs shows a no negative impact for this property. The range of adjusted impacts is -4% to +2%. The best indication is -1%, which as described above is within the typical market static and supports no impact on adjoining property value.

Adjoining Residential Sales After Solar Farm Approved

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
	Adjoins	370 Claiborne	1.06	8/22/2019	$273,000	2005	1,570	$173.89	4/3	2-Car	2-Story	Brick
	Not	2160 Sherman	1.46	6/1/2019	$265,000	2005	1,735	$152.74	3/3	2-Car	R/FBsmt	Brick
	Not	2290 Dry	1.53	5/2/2019	$239,400	1988	1,400	$171.00	3/2.5	2-Car	R/FBsmt	Brick
	Not	125 Lexington	1.20	4/17/2018	$240,000	2001	1,569	$152.96	3/3	2-Car	Split	Brick

Adjustments

Solar	Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
Adjoins	370 Claiborne								$273,000			930
Not	2160 Sherman	$1,831		$0	-$20,161				$246,670	10%		
Not	2290 Dry	$2,260		$20,349	$23,256	$2,500			$287,765	-5%		
Not	125 Lexington	$9,951		$4,800					$254,751	7%		
											4%	

This set of matched pairs shows a general positive impact for this property. The range of adjusted impacts is -5% to +10%. The best indication is +7%. I typically consider measurements of +/-5% to be within the typical variation in real estate transactions. This indication is higher than that and suggests a positive relationship.

The photograph from the listing shows panels visible between the home and the trampoline shown in the picture.

Adjoining Residential Sales After Solar Farm Approved

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
Adjoins	330 Claiborne	1.00	12/10/2019	$282,500	2003	1,768	$159.79	3/3	2-Car	Ranch	Brick/pool
Not	895 Osborne	1.70	9/16/2019	$249,900	2002	1,705	$146.57	3/2	2-Car	Ranch	Brick/pool
Not	2160 Sherman	1.46	6/1/2019	$265,000	2005	1,735	$152.74	3/3	2-Car	R/FBsmt	Brick
Not	215 Lexington	1.00	7/27/2018	$231,200	2000	1,590	$145.41	5/4	2-Car	Ranch	Brick

Solar	Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
Adjoins	330 Claiborne								$282,500			665
Not	895 Osborne	$1,790		$1,250	$7,387	$5,000		$0	$265,327	6%		
Not	2160 Sherman	$4,288		-$2,650	$4,032			$20,000	$290,670	-3%		
Not	215 Lexington	$9,761		$3,468	$20,706	-$5,000		$20,000	$280,135	1%		
											1%	

This set of matched pairs shows a general positive impact for this property. The range of adjusted impacts is -3% to +6%. The best indication is +6%. I typically consider measurements of +/-5% to be within the typical variation in real estate transactions. This indication is higher than that and suggests a positive relationship. The landscaping buffer on these is considered light with a fair visibility of the panels from most of these comparables and only thin landscaping buffers separating the homes from the solar panels.

I also looked at four sales that were during a rapid increase in home values around 2021, which required significant time adjustments based on the FHFA Housing Price Index. Sales in this time frame are less reliable for impact considerations as the peak buyer demand allowed for homes to sell with less worry over typical issues such as repairs.

The home at 250 Claiborne Drive sold with no impact from the solar farm according to the buyer's broker Lisa Ann Lay with Keller Williams Realty Service. As noted earlier, this is the only manufactured home in the community and is a bit of an anomaly. There was an impact on this sale due to an appraisal that came in low likely related to the manufactured nature of the home. Ms. Lay indicated that there was significant back and forth between both brokers and the appraiser to address the low appraisal, but ultimately, the buyers had to pay $20,000 out of pocket to cover the difference in appraised value and the purchase price. The low appraisal was not attributed to the solar farm, but the difficulty in finding comparable sales and likely the manufactured housing.

Adjoining Residential Sales After Solar Farm Built

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
Adjoins	250 Claiborne	1.05	1/5/2022	$210,000	2002	1,592	$131.91	4/2	Drive	Ranch	Manuf
Not	255 Spillman	0.64	3/4/2022	$166,000	1991	1,196	$138.80	3/1	Drive	Ranch	Remodel
Not	546 Waterworks	0.28	4/29/2021	$179,500	2007	1,046	$171.61	4/2	Drive	Ranch	3/4 Fin B
Not	240 Shawnee	1.18	6/7/2021	$180,000	1977	1,352	$133.14	3/2	Gar	Ranch	N/A

Solar	Address	Time	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
Adjoins	250 Claiborne							$210,000			365
Not	255 Spillman	-$379	$9,130	$43,971	$10,000		-$20,000	$208,722	1%		
Not	546 Waterworks	$1,772	-$4,488	$74,958			-$67,313	$184,429	12%		
Not	240 Shawnee	$1,501	$22,500	$25,562		-$10,000		$219,563	-5%		
										3%	

The photograph of the rear view from the listing is shown below.

The home at 260 Claiborne Drive sold with no impact from the solar farm according to the buyer's broker Jim Dalton with Ashcraft Real Estate Services. He noted that there was significant wood rot and a heavy smoker smell about the house, but even that had no impact on the price due to high demand in the market.

Adjoining Residential Sales After Solar Farm Built

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
Adjoins	260 Claiborne	1.00	10/13/2021	$175,000	2001	1,456	$120.19	3/2	Drive	Ranch	N/A
Not	355 Oakwood	0.58	10/27/2020	$186,000	2002	1,088	$170.96	3/2	Gar	Ranch	3/4 Fin B
Not	30 Ellen Kay	0.50	1/30/2020	$183,000	1988	1,950	$93.85	3/2	Gar	2-Story	N/A
Not	546 Waterworks	0.28	4/29/2021	$179,500	2007	1,046	$171.61	4/2	Drive	Ranch	3/4 Fin B

Solar	Address	Time	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
Adjoins	260 Claiborne							$175,000			390
Not	355 Oakwood	$18,339	-$930	$50,329		-$10,000	-$69,750	$173,988	1%		
Not	30 Ellen Kay	$31,974	$11,895	-$37,088		-$10,000		$179,781	-3%		
Not	546 Waterworks	$8,420	-$5,385	$56,287			-$67,313	$171,510	2%		
										0%	

The photograph of the rear view from the listing is shown below.

These next two were brick and with unfinished basements which made them easier to compare and therefore more reliable. For 300 Claiborne I considered the sale of a home across the street that did not back up to the solar farm and it adjusted to well below the range of the other comparables. I have included it, but would not rely on that which means this next comparable strongly supports a range of 0 to +3% and not up to +19%.

djoining Residential Sales After Solar Farm Built

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
Adjoins	300 Claiborne	0.89	12/18/2021	$290,000	2002	1,568	$184.95	3/3	2-Car	Br Rnch	Bsmt
Not	405 Claiborne	0.41	2/1/2022	$267,750	2004	1,787	$149.83	3/2	2-Car	Br Rnch	Bsmt
Not	39 Pinhook	0.68	3/31/2022	$299,000	1992	1,680	$177.98	3/2	2-Car	Br Rnch	Bsmt
Not	5 Pinhook	0.70	4/7/2022	$309,900	1992	1,680	$184.46	3/2	2-Car	Br Rnch	Bsmt

Solar	Address	Time	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
Adjoins	300 Claiborne							$290,000			570
Not	405 Claiborne	-$3,384	-$2,678	-$26,251				$235,437	19%		
Not	39 Pinhook	-$8,651	$14,950	-$15,947				$289,352	0%		
Not	5 Pinhook	-$9,576	$15,495	-$16,528				$299,291	-3%		
										5%	

The photograph of the rear view from the listing is shown below.

The home at 410 Claiborne included an inground pool with significant landscaping around it that was a challenge. Furthermore, two of the comparables had finished basements. I made no adjustment for the pool on those two comparables and considered the two factors to cancel out

Adjoining Residential Sales After Solar Farm Built

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
Adjoins	410 Claiborne	0.31	2/10/2021	$275,000	2006	1,595	$172.41	3/2	2-Car	Br Rnch	Bsmt/Pool
Not	114 Austin	1.40	12/23/2020	$248,000	1994	1,650	$150.30	3/2	2-Car	Br Rnch	Bsmt
Not	125 Liza	0.29	6/25/2021	$315,000	2005	1,913	$164.66	4/3	2-Car	Br Rnch	Ktchn Bsmt
Not	130 Hannahs	0.42	2/9/2021	$295,000	2007	1,918	$153.81	3/3	2-Car	Br Rnch	Fin Bsmt

Solar	Address	Time	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
Adjoins	410 Claiborne							$275,000			1080
Not	114 Austin	$3,413	$14,880	-$6,613			$20,000	$279,680	-2%		
Not	125 Liza	-$11,945	$1,575	-$41,890	-$10,000			$252,740	8%		
Not	130 Hannahs	$83	-$1,475	-$39,743	-$10,000			$243,864	11%		
										6%	

The nine matched pairs considered in this analysis includes five that show no impact on value, one that shows a negative impact on value, and three that show a positive impact. The negative indication supported by one matched pair is -7% and the positive impacts are +6% and +7%. The two neutral indications show impacts of -5% to +5%. The average indicated impact is +2% when all nine of these indicators are blended.

Furthermore, the comments of the local real estate brokers strongly support the data that shows no negative impact on value due to the proximity to the solar farm.

6. Matched Pair – White House Solar, Louisa, VA

This project was built in 2016 for a solar project on a 499.52-acre tract for a 20 MW facility. The closest single-family home is 110 feet away from the closest solar panel. The average distance is 1,195 feet.

I have identified one recent adjoining home sale to the north of this project that sold in 2020. I spoke with the broker, Stacie Chandler, who represented the buyer in that transaction. She indicated that the solar farm had no impact on the price that they negotiated on that home. That is supported by the matched pair shown below.

The adjustments shown below make no adjustment for the difference in acreage for the smaller parcels. One of these is on a smaller lot, but located in a golf course community with rear exposure to the golf course. The other is in Mineral and while the lots are not the same size, they are similarly valued. I also adjusted this property upward by $50,000 for the condition/lack of renovation. This adjustment is based on the fact that this home was renovated following the 2020 purchase and then resold in 2021 for $75,000 more than the 2020 value. Comparing the 2021 renovated price at $144/s.f. to the subject property and adjusting on the same rates would require a downward adjustment to the comparable of $10,400 for time, upward by $8,325 for year built, and downward by $5,000 for the extra half bathroom for an indicated adjusted value of $252,925 which suggests a 5% reduction in value due to the solar farm. Either way this comparable requires significant adjustments and suggests a range of -5% to 0% impact. The Woodger comparable required less

adjustment and suggests an 11% enhancement due to proximity to the solar farm and that is without any consideration of this home having a superior exposure to a golf course.

Whitehouse Solar

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
Adjoins	127 Walnut Wds	4.09	3/27/2020	$240,000	1984	1,824	$131.58	3/2	2 Gar	Br Rnch	Reno
Not	126 Woodger	0.63	4/29/2019	$240,000	1992	1,956	$122.70	3/2+2	2 Gar	Br Rnch	Golf
Not	808 Virginia	0.51	3/16/2020	$185,000	1975	1,806	$102.44	3/2.5	2 Gar	Br Rnch	
Not	273 Carsons	3.94	9/29/2018	$248,500	1985	2,224	$111.74	4/3	Drive	Ranch	Not Brck

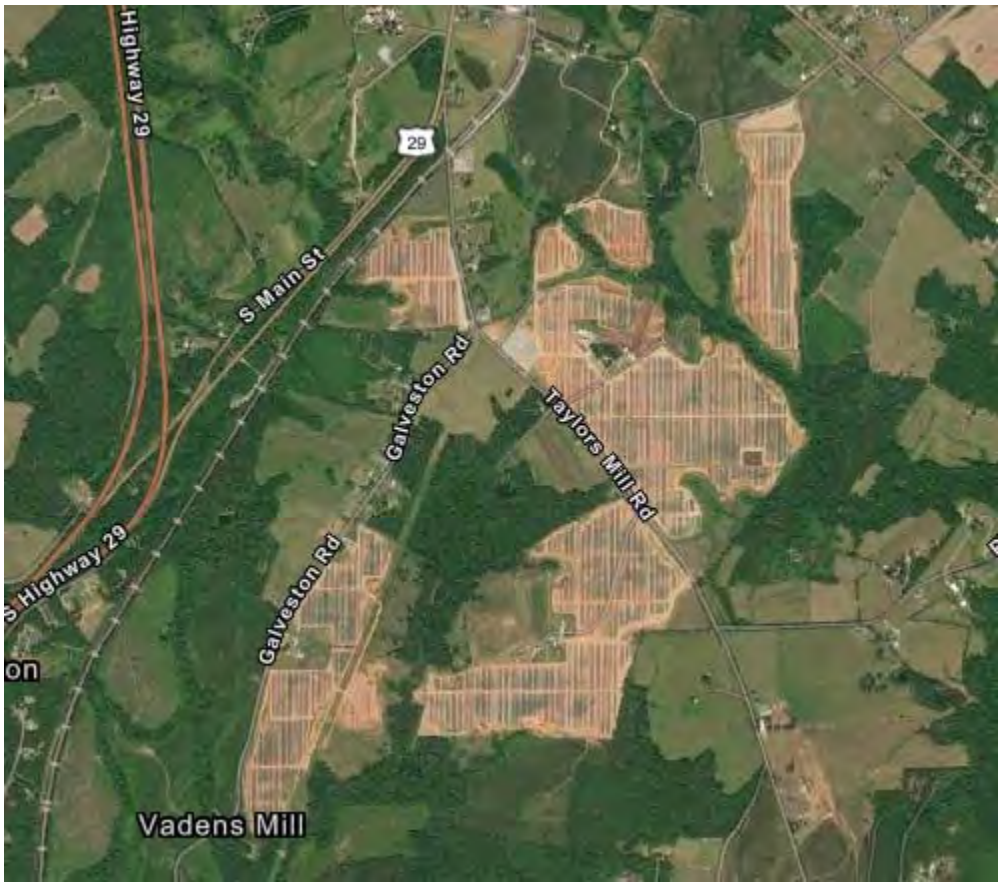
Adjoining Sales Adjusted

Address	Time	Ac/Loc	YB	GLA	BR/BA	Park	Other	Total	% Diff	Dist
127 Walnut Wds								$240,000		1400
126 Woodger	$6,569		-$9,600	-$12,957	-$10,000			$214,012	11%	
808 Virginia	$167		$8,325	$1,475	-$5,000		$50,000	$239,967	0%	
273 Carsons	$11,131		-$1,243	-$35,755	-$10,000	$15,000	$12,425	$240,059	0%	
							Average Diff		4%	

These matched pairs are generally challenging in that one is shown before and after a renovation suggesting impacts of -5% to 0%. The comparable requiring the least adjustment is on a golf course but it also was not recently renovated which makes it less reliable. Finally, the Carsons property was similar, but older and is not brick. While I adjusted for those factors it really does not make for a great matched pair.

The best indication by the matched pairs is -5% to 0%. The broker involved in the transaction indicated that the solar farm had no impact on property value. Given those comments and the range of impacts shown, I conclude that this home sale near the White House solar project indicates no impact on property value.

7. Matched Pair – Whitehorn Solar, Gretna, Pittsylvania, VA



This project was built in 2021 for a solar project with 50 MW. Adjoining uses are residential and agricultural. There was a sale located at 1120 Taylors Mill Road that sold on December 20, 2021, which is about the time the solar farm was completed. This sold for $224,000 for 2.02 acres with a 2,079 s.f. mobile home on it that was built in 2010. The property was listed for $224,000 and sold for that same price within two months (went under contract almost exactly 30 days from listing). This sales price works out to $108 per square foot. This home is 255 feet from the nearest panel.

I have compared this sale to an August 20, 2020 sale at 1000 Long Branch Drive that included 5.10 acres with a 1,980 s.f. mobile home that was built in 1993 and sold for $162,000, or $81.82 per square foot. Adjusting this upward for significant growth between this sale date and December 2021 relied on data provided by the FHFA House Pricing Index, which indicates that for homes in the Roanoke, VA MSA would be expected to appreciate from $162,000 to $191,000 over that period of time. Using $191,000 as the effective value as of the date of comparison, the indicated value of this sale works out to $96.46 per square foot. Adjusting this upward by 17% for the difference in year built, but downward by 5% for the much larger lot size at this comparable, I derive an adjusted indication of value of $213,920, or $108 per square foot.

This indicates no impact on value attributable to the new solar farm located across from the home on Taylors Mill Road.

8. Matched Pair – Altavista Solar, Altavista, Campbell County, VA

This project was mostly built in 2021 with final construction finished in 2022. This is an 80 MW facility on 720 acres just north of Roanoke River and west of Altavista. Adjoining uses are residential and agricultural.

I have done a Sale/Resale analysis of 3211 Leesville Road which is approximately 540 feet from the nearest solar panel. There was an existing row of trees between this home and the panels that was supplemented with additional screening for a narrow landscaped buffer between the home and the solar panels.

This home sold in December 2018 for $72,500 for this 1,451 s.f. home built in 1940 with a number of additional outbuildings on 3.35 acres. This was before any announcement of a solar farm. This home sold again on March 28, 2022 for $124,048 after the solar farm was constructed. This shows a 71% increase in value on this property since 2018. There was significant growth in the market between these dates and to accurately reflect that I have considered the FHFA House Price Index that is specific for the Lynchburg area of Virginia (the closest regional category), which shows an expected increase in home values over that same time period of 33.8%, which would suggest a normal growth in value up to $97,000. The home sold for significantly more than this which certainly does not support a finding of a negative impact and in fact suggests a significant positive impact. However, I was not able to discuss this sale with the broker and it is possible that the home also was renovated between 2018 and 2022, which may account for that additional increase in value. Still give that the home increased in value so significantly over the initial amount there is no sign of any negative impact due to the solar farm adjacency.

Similarly, I looked at 3026 Bishop Creek Road that is approximately 600 feet from the nearest solar panel. This home sold on July 16, 2019 for $120,000, which was before construction of the solar farm. This home sold again on February 23, 2022 for $150,000. This shows a 25% increase in value over that time period. Using the same FHFA House Price Index Calculator, the expected increase in value was 29.2% for an indicated expected value of $155,000. This is within 3% of the actual closed price, which supports a finding of no impact from the solar farm. This home has a dense wooded area between it and the adjoining solar farm.

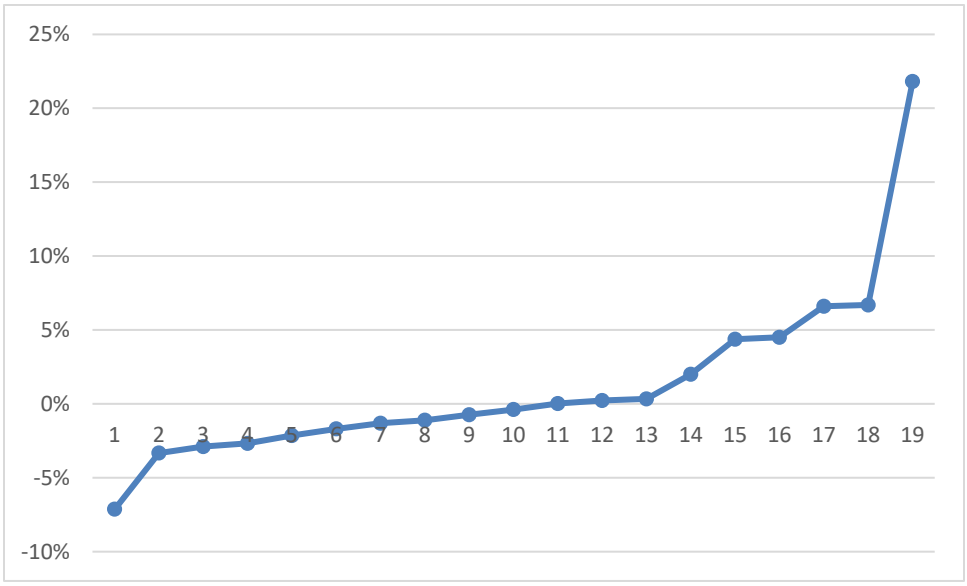
Conclusion

The solar farm matched pairs shown above have similar characteristics to each other in terms of population, but with several outliers showing solar farms in far more urban areas. The median income for the population within 1 mile of a solar farm among this subset of matched pairs is $58,651 with a median housing unit value of $264,681. Most of the comparables are under $500,000 in the home price, with $483,333 being the high end of the set, though I have matched pairs in other states over $1,600,000 in price adjoining large solar farms. The predominate adjoining uses are residential and agricultural. These figures are in line with the larger set of solar farms that I have looked at with the predominant adjoining uses being residential and agricultural and similar to the solar farm breakdown shown for Virginia and adjoining states as well as the proposed subject property.

Based on the similarity of adjoining uses and demographic data between these sites and the subject property, I consider it reasonable to compare these sites to the subject property.

Matched Pair Summary							Adj. Uses By Acreage				1 mile Radius (2010-2022 Data)			
	Name	City	State	Acres	MW	Topo Shift	Res	Ag	Ag/Res	Com/Ind	Population	Med. Income	Avg. Housing Unit	Veg. Buffer
1	Clarke Cnty	White Post	VA	234	20.00	70	14%	39%	46%	1%	578	$81,022	$374,453	Light
2	Walker	Barhamsville	VA	485	20.00	N/A	12%	68%	20%	0%	203	$80,773	$320,076	Light
3	Sappony	Stony Crk	VA	322	20.00	N/A	2%	98%	0%	0%	74	$51,410	$155,208	Medium
4	Spotyslvania	Paytes	VA	3,500	500.00	160	37%	52%	11%	0%	74	$120,861	$483,333	Med to Hvy
5	Crittenden	Crittenden	KY	34	2.70	40	22%	51%	27%	0%	1,419	$60,198	$178,643	Light
6	White House	Louisa	VA	500	20.00	N/A	24%	55%	18%	3%	409	$57,104	$209,286	Medium
7	Whitehorn	Gretna	VA	N/A	50.00	N/A	N/A	N/A	N/A	N/A	166	$43,179	$168,750	None to Lgt
8	Altavista	Altavista	VA	720	80.00	N/A	N/A	N/A	N/A	N/A	7	$50,000	$341,667	Light
	Average			828	89.09	90	19%	61%	20%	1%	366	$68,068	$278,927	
	Median			485	20.00	70	18%	54%	19%	0%	185	$58,651	$264,681	
	High			3,500	500.00	160	37%	98%	46%	3%	1,419	$120,861	$483,333	
	Low			34	2.70	40	2%	39%	0%	0%	7	$43,179	$155,208	
	Moonlight													
	1 Mile Radius			524	44.00	5	5%	92%	3%	0%	79	$78,887	$350,000	
	3 Mile Radius			524	44.00	5	5%	92%	3%	0%	954	$80,159	$349,425	
	5 Mile Radius			524	44.00	5	5%	92%	3%	0%	3,999	$82,691	$341,621	

On the following page is a summary of the matched pairs for all of the solar farms noted above. They show a pattern of results from -7% to +22% with an average of 1% and a median finding of 0%. As can be seen in the chart of those results below, most of the data points are between -3% and +2%. This variability is common with real estate and consistent with market "static." I therefore conclude that these results strongly support an indication of no impact on property value due to the adjacent solar farm. Only 1 of the 19 data points show a negative impact greater than the typical variability due to market imperfection, while 4 of the 19 data points show a positive impact. This leaves 14 of the 19 indications showing no impact and within the typical market variability/imperfection that would be expected for any property.



I have further broken down these results based on the MWs, Landscaping, and distance from panel to show the following range of findings for these different categories.

This breakdown shows no homes between 100-200 feet. Solar farms up to 75 MW show homes between 201 and 500 feet with no impact on value. Most of the findings are for homes between 201 and 500 feet.

Light landscaping screens are showing no impact on value at any distances, though solar farms over 75.1 MW only show Medium and Heavy landscaping screens in 4 of the examples identified.

Residential Dwelling Matched Pairs Adjoining Solar Farms

Pair	Solar Farm	City	State	Area	MW	Approx Distance	Tax ID/Address	Date	Sale Price	Adj. Sale Price	% Diff	Veg. Buffer
1	Clarke Cnty	White Post	VA	Rural	20	1230	833 Nations Spr	Jan-17	$295,000			Light
							6801 Middle	Dec-17	$249,999	$296,157	0%	
2	Walker	Barhamsville	VA	Rural	20	250	5241 Barham	Oct-18	$264,000			Light
							9252 Ordinary	Jun-19	$277,000	$246,581	7%	
3	Clarke Cnty	White Post	VA	Rural	20	1230	833 Nations Spr	Aug-19	$385,000			Light
							2393 Old Chapel	Aug-20	$330,000	$389,286	-1%	
4	Sappony	Stony Creek	VA	Rural	20	1425	12511 Palestine	Jul-18	$128,400			Medium
							6494 Rocky Branch	Nov-18	$100,000	$131,842	-3%	
5	Spotsylvania	Paytes	VA	Rural	617	1270	12901 Orange Plnk	Aug-20	$319,900			Medium
							12717 Flintlock	Dec-20	$290,000	$326,767	-2%	
6	Spotsylvania	Paytes	VA	Rural	617	1950	9641 Nottoway	May-20	$449,900			Medium
							11626 Forest	Aug-20	$489,900	$430,246	4%	
7	Spotsylvania	Paytes	VA	Rural	617	1171	13353 Post Oak	Sep-20	$300,000			Heavy
							12810 Catharpin	Jan-20	$280,000	$299,008	0%	
8	Crittenden	Crittenden	KY	Suburban	2.7	373	250 Claiborne	Jan-19	$120,000			Light
							315 N Fork	May-19	$107,000	$120,889	-1%	
9	Crittenden	Crittenden	KY	Suburban	2.7	488	300 Claiborne	Sep-18	$213,000			Light
							1795 Bay Valley	Dec-17	$231,200	$228,180	-7%	
10	Crittenden	Crittenden	KY	Suburban	2.7	720	350 Claiborne	Jul-18	$245,000			Light
							2160 Sherman	Jun-19	$265,000	$248,225	-1%	
11	Crittenden	Crittenden	KY	Suburban	2.7	930	370 Claiborne	Aug-19	$273,000			Light
							125 Lexington	Apr-18	$240,000	$254,751	7%	
12	Crittenden	Crittenden	KY	Suburban	2.7	665	330 Claiborne	Dec-19	$282,500			Light
							2160 Sherman	Jun-19	$265,000	$290,680	-3%	
13	Crittenden	Crittenden	KY	Suburban	2.7	390	260 Claiborne	Oct-21	$175,000			Light
							546 Waterworks	Apr-21	$179,500	$171,510	2%	
14	Crittenden	Crittenden	KY	Suburban	2.7	570	300 Claiborne	Dec-21	$290,000			Light
							39 Pinhook	Mar-22	$299,000	$289,352	0%	
15	Crittenden	Crittenden	KY	Suburban	2.7	1080	410 Claiborne	Feb-21	$275,000			Light
							114 Austin	Dec-20	$248,000	$279,680	-2%	
16	White House	Louisa	VA	Rural	20	1400	127 Walnut	Mar-20	$240,000			Light
							126 Woodger	Apr-19	$240,000	$239,967	0%	
17	Whitehorn	Gretna	VA	Rural	50	255	1120 Taylors Mill	Dec-21	$224,000			Light
							1000 Long Branch	Aug-20	$162,000	$213,920	5%	
18	Altavista	Altavista	VA	Rural	80	540	3211 Leesville	Mar-22	$124,048			Light
							3211 Leesville	Dec-18	$72,500	$97,000	22%	
19	Altavista	Altavista	VA	Rural	80	600	3026 Bishop Crk	Feb-22	$150,000			Heavy
							3026 Bishop Crk	Jul-19	$120,000	$155,000	-3%	

	MW	Avg. Distance
Average	114.87	870
Median	20.00	720
High	617.00	1,950
Low	2.70	250

	Indicated Impact
Average	1%
Median	0%
High	22%
Low	-7%

MW Range 4.4 to 10 Landscaping Distance	Light 100-200	Light 201-500	Light 500+	Medium 100-200	Medium 201-500	Medium 500+	Heavy 100-200	Heavy 201-500	Heavy 500+
Average	N/A	-2%	4%	N/A	N/A	N/A	N/A	N/A	N/A
Median	N/A	-1%	-1%	N/A	N/A	N/A	N/A	N/A	N/A
High	N/A	2%	22%	N/A	N/A	N/A	N/A	N/A	N/A
Low	N/A	-7%	-3%	N/A	N/A	N/A	N/A	N/A	N/A

10.1 to 30 Landscaping Distance	Light 100-200	Light 201-500	Light 500+	Medium 100-200	Medium 201-500	Medium 500+	Heavy 100-200	Heavy 201-500	Heavy 500+
Average	N/A	7%	-1%	N/A	N/A	-3%	N/A	N/A	N/A
Median	N/A	7%	-1%	N/A	N/A	-3%	N/A	N/A	N/A
High	N/A	7%	0%	N/A	N/A	-3%	N/A	N/A	N/A
Low	N/A	7%	-1%	N/A	N/A	-3%	N/A	N/A	N/A

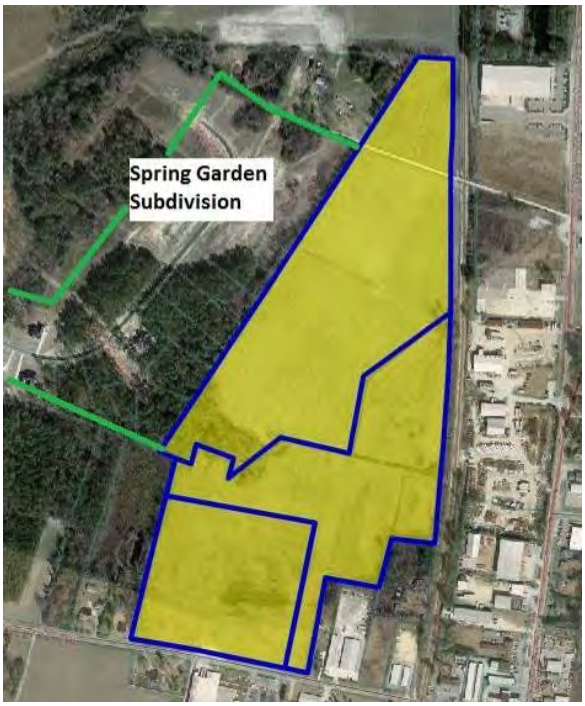
30.1 to 75 Landscaping Distance	Light 100-200	Light 201-500	Light 500+	Medium 100-200	Medium 201-500	Medium 500+	Heavy 100-200	Heavy 201-500	Heavy 500+
Average	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Median	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
High	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Low	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

75.1+ Landscaping Distance	Light 100-200	Light 201-500	Light 500+	Medium 100-200	Medium 201-500	Medium 500+	Heavy 100-200	Heavy 201-500	Heavy 500+
Average	N/A	N/A	22%	N/A	N/A	1%	N/A	N/A	-3%
Median	N/A	N/A	22%	N/A	N/A	1%	N/A	N/A	-3%
High	N/A	N/A	22%	N/A	N/A	4%	N/A	N/A	-3%
Low	N/A	N/A	22%	N/A	N/A	-2%	N/A	N/A	-3%

B. Southeastern USA Data – Over 5 MW

1. Matched Pair – AM Best Solar Farm, Goldsboro, NC

This 5 MW solar farm adjoins Spring Garden Subdivision which had new homes and lots available for new construction during the approval and construction of the solar farm. The recent home sales have ranged from $200,000 to $250,000. This subdivision sold out the last homes in late 2014. The solar farm is clearly visible particularly along the north end of this street where there is only a thin line of trees separating the solar farm from the single-family homes.

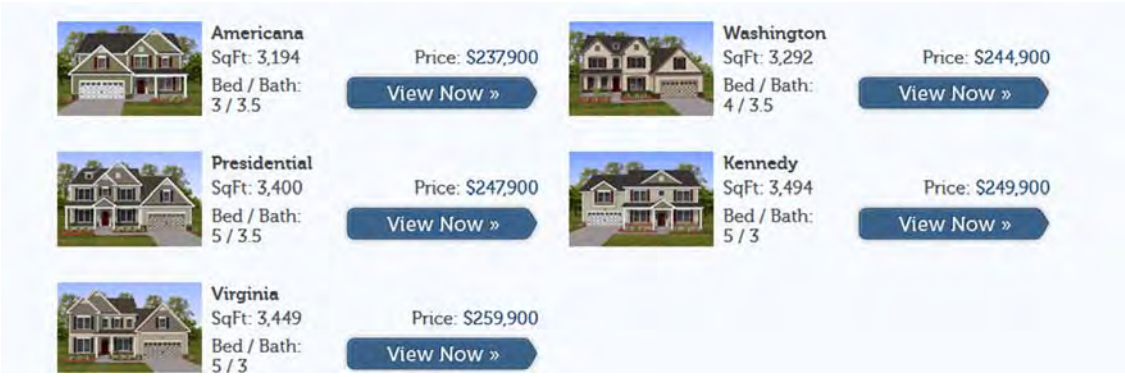


Homes backing up to the solar farm are selling at the same price for the same floor plan as the homes that do not back up to the solar farm in this subdivision. According to the builder, the solar farm has been a complete non-factor. Not only do the sales show no difference in the price paid for the various homes adjoining the solar farm versus not adjoining the solar farm, but there are actually more recent sales along the solar farm than not. There is no impact on the sellout rate, or time to sell for the homes adjoining the solar farm.

I spoke with a number of owners who adjoin the solar farm and none of them expressed any concern over the solar farm impacting their property value.

The data presented on the following page shows multiple homes that have sold in 2013 and 2014 adjoining the solar farm at prices similar to those not along the solar farm. These series of sales indicate that the solar farm has no impact on the adjoining residential use.

The homes that were marketed at Spring Garden are shown below.



The homes adjoining the solar farm are considered to have a light landscaping screen as it is a narrow row of existing pine trees supplemented with evergreen plantings.

Matched Pairs
As of Date: 9/3/2014

Adjoining Sales After Solar Farm Completed

TAX ID	Owner	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	Style
3600195570	Helm	0.76	Sep-13	$250,000	2013	3,292	$75.94	2 Story
3600195361	Leak	1.49	Sep-13	$260,000	2013	3,652	$71.19	2 Story
3600199891	McBrayer	2.24	Jul-14	$250,000	2014	3,292	$75.94	2 Story
3600198632	Foresman	1.13	Aug-14	$253,000	2014	3,400	$74.41	2 Story
3600196656	Hinson	0.75	Dec-13	$255,000	2013	3,453	$73.85	2 Story
	Average	1.27		$253,600	2013.4	3,418	$74.27	
	Median	1.13		$253,000	2013	3,400	$74.41	

Adjoining Sales After Solar Farm Announced

TAX ID	Owner	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	Style
0	Feddersen	1.56	Feb-13	$247,000	2012	3,427	$72.07	Ranch
0	Gentry	1.42	Apr-13	$245,000	2013	3,400	$72.06	2 Story
	Average	1.49		$246,000	2012.5	3,414	$72.07	
	Median	1.49		$246,000	2012.5	3,414	$72.07	

Adjoining Sales Before Solar Farm Announced

TAX ID	Owner	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	Style
3600183905	Carter	1.57	Dec-12	$240,000	2012	3,347	$71.71	1.5 Story
3600193097	Kelly	1.61	Sep-12	$198,000	2012	2,532	$78.20	2 Story
3600194189	Hadwan	1.55	Nov-12	$240,000	2012	3,433	$69.91	1.5 Story
	Average	1.59		$219,000	2012	2,940	$74.95	
	Median	1.59		$219,000	2012	2,940	$74.95	

Nearby Sales After Solar Farm Completed

TAX ID	Owner	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	Style
3600193710	Barnes	1.12	Oct-13	$248,000	2013	3,400	$72.94	2 Story
3601105180	Nackley	0.95	Dec-13	$253,000	2013	3,400	$74.41	2 Story
3600192528	Mattheis	1.12	Oct-13	$238,000	2013	3,194	$74.51	2 Story
3600198928	Beckman	0.93	Mar-14	$250,000	2014	3,292	$75.94	2 Story
3600196965	Hough	0.81	Jun-14	$224,000	2014	2,434	$92.03	2 Story
3600193914	Preskitt	0.67	Jun-14	$242,000	2014	2,825	$85.66	2 Story
3600194813	Bordner	0.91	Apr-14	$258,000	2014	3,511	$73.48	2 Story
3601104147	Shaffer	0.73	Apr-14	$255,000	2014	3,453	$73.85	2 Story
	Average	0.91		$246,000	2013.625	3,189	$77.85	
	Median	0.92		$249,000	2014	3,346	$74.46	

Nearby Sales Before Solar Farm Announced

TAX ID	Owner	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	Style
3600191437	Thomas	1.12	Sep-12	$225,000	2012	3,276	$68.68	2 Story
3600087968	Lilley	1.15	Jan-13	$238,000	2012	3,421	$69.57	1.5 Story
3600087654	Burke	1.26	Sep-12	$240,000	2012	3,543	$67.74	2 Story
3600088796	Hobbs	0.73	Sep-12	$228,000	2012	3,254	$70.07	2 Story
	Average	1.07		$232,750	2012	3,374	$69.01	
	Median	1.14		$233,000	2012	3,349	$69.13	

Matched Pair Summary

	Adjoins Solar Farm		Nearby Solar Farm	
	Average	**Median**	**Average**	**Median**
Sales Price	$253,600	$253,000	$246,000	$249,000
Year Built	2013	2013	2014	2014
Size	3,418	3,400	3,189	3,346
Price/SF	$74.27	$74.41	$77.85	$74.46

Percentage Differences

Median Price	-2%
Median Size	-2%
Median Price/SF	0%

I note that 2308 Granville Drive sold again in November 2015 for $267,500, or $7,500 more than when it was purchased new from the builder two years earlier (Tax ID 3600195361, Owner: Leak). The neighborhood is clearly showing appreciation for homes adjoining the solar farm.

The Median Price is the best indicator to follow in any analysis as it avoids outlying samples that would otherwise skew the results. The median sizes and median prices are all consistent throughout the sales both before and after the solar farm whether you look at sites adjoining or nearby to the solar farm. The average size for the homes nearby the solar farm shows a smaller building size and a higher price per square foot. This reflects a common occurrence in real estate where the price per square foot goes up as the size goes down. So even comparing averages the indication is for no impact, but I rely on the median rates as the most reliable indication for any such analysis.

I have also considered four more recent resales of homes in this community as shown on the following page. These comparable sales adjoin the solar farm at distances ranging from 315 to 400 feet. The matched pairs show a range from -9% to +6%. The range of the average difference is -2% to +1% with an average of 0% and a median of +0.5%. These comparable sales support a finding of no impact on property value.

Adjoining Residential Sales After Solar Farm Approved

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other	Distance
	Adjoins	103 Granville Pl	1.42	7/27/2018	$265,000	2013	3,292	$80.50	4/3.5	2-Car	2-Story		385
	Not	2219 Granville	1.15	1/8/2018	$260,000	2012	3,292	$78.98	4/3.5	2-Car	2-Story		
	Not	634 Friendly	0.96	7/31/2019	$267,000	2018	3,053	$87.45	4/4.5	2-Car	2-Story		
	Not	2403 Granville	0.69	4/23/2019	$265,000	2014	2,816	$94.11	5/3.5	2-Car	2-Story		

Solar	Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff
Adjoins	103 Granville Pl								$265,000		-2%
Not	2219 Granville	$4,382		$1,300	$0				$265,682	0%	
Not	634 Friendly	-$8,303		-$6,675	$16,721	-$10,000			$258,744	2%	
Not	2403 Granville	-$6,029		-$1,325	$31,356				$289,001	-9%	

Adjoining Residential Sales After Solar Farm Approved

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other	Distance
	Adjoins	104 Erin	2.24	6/19/2017	$280,000	2014	3,549	$78.90	5/3.5	2-Car	2-Story		315
	Not	2219 Granville	1.15	1/8/2018	$260,000	2012	3,292	$78.98	4/3.5	2-Car	2-Story		
	Not	634 Friendly	0.96	7/31/2019	$267,000	2018	3,053	$87.45	4/4.5	2-Car	2-Story		
	Not	2403 Granville	0.69	4/23/2019	$265,000	2014	2,816	$94.11	5/3.5	2-Car	2-Story		

Solar	Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff
Adjoins	104 Erin								$280,000		0%
Not	2219 Granville	-$4,448		$2,600	$16,238				$274,390	2%	
Not	634 Friendly	-$17,370		-$5,340	$34,702	-$10,000			$268,992	4%	
Not	2403 Granville	-$15,029		$0	$48,285				$298,256	-7%	

Adjoining Residential Sales After Solar Farm Approved

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other	Distance
	Adjoins	2312 Granville	0.75	5/1/2018	$284,900	2013	3,453	$82.51	5/3.5	2-Car	2-Story		400
	Not	2219 Granville	1.15	1/8/2018	$260,000	2012	3,292	$78.98	4/3.5	2-Car	2-Story		
	Not	634 Friendly	0.96	7/31/2019	$267,000	2018	3,053	$87.45	4/4.5	2-Car	2-Story		
	Not	2403 Granville	0.69	4/23/2019	$265,000	2014	2,816	$94.11	5/3.5	2-Car	2-Story		

Solar	Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff
Adjoins	2312 Granville								$284,900		1%
Not	2219 Granville	$2,476		$1,300	$10,173				$273,948	4%	
Not	634 Friendly	-$10,260		-$6,675	$27,986	-$10,000			$268,051	6%	
Not	2403 Granville	-$7,972		-$1,325	$47,956				$303,659	-7%	

Adjoining Residential Sales After Solar Farm Approved

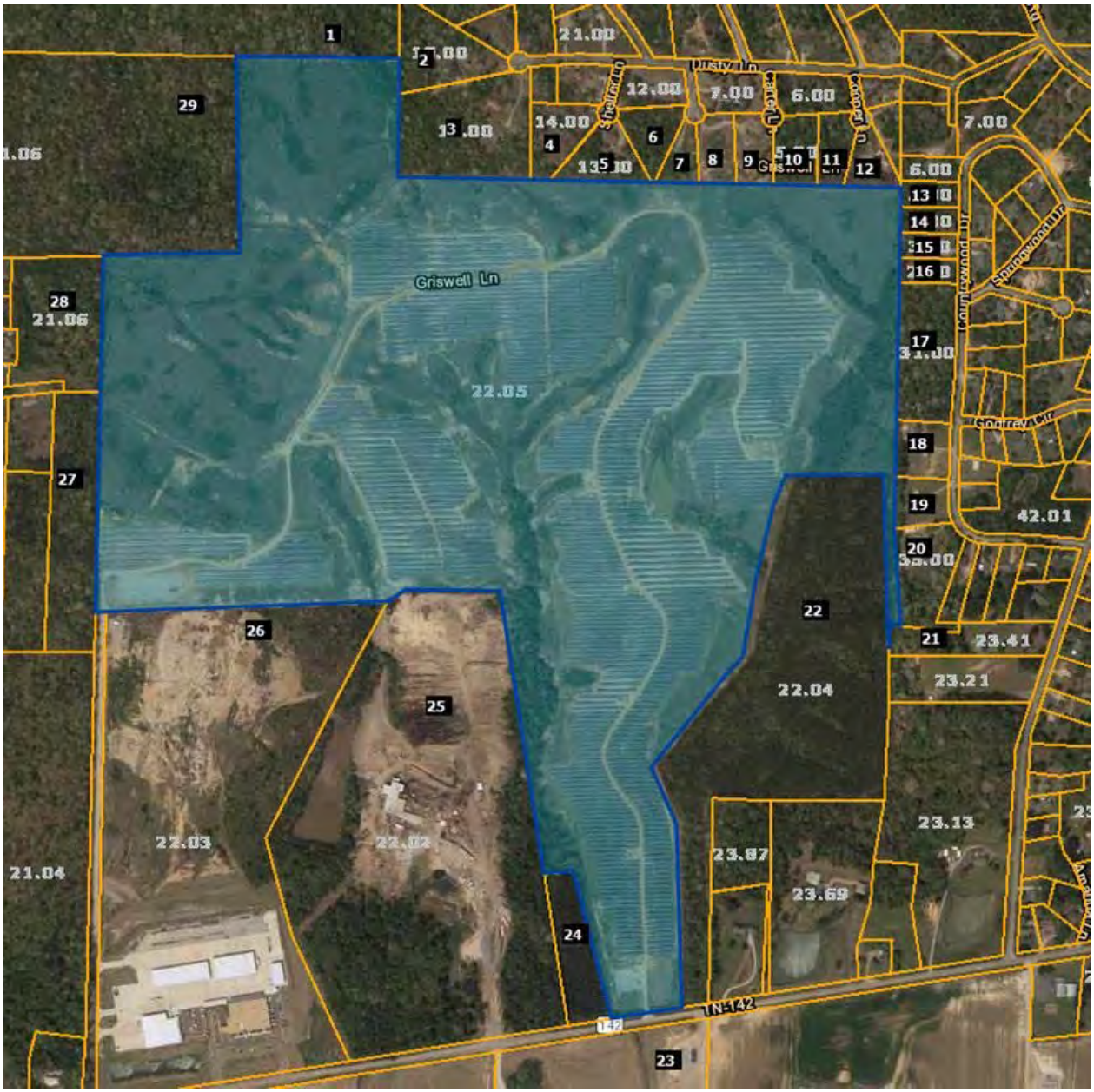
Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other	Distance
	Adjoins	2310 Granville	0.76	5/14/2019	$280,000	2013	3,292	$85.05	5/3.5	2-Car	2-Story		400
	Not	2219 Granville	1.15	1/8/2018	$260,000	2012	3,292	$78.98	4/3.5	2-Car	2-Story		
	Not	634 Friendly	0.96	7/31/2019	$267,000	2018	3,053	$87.45	4/4.5	2-Car	2-Story		
	Not	2403 Granville	0.69	4/23/2019	$265,000	2014	2,816	$94.11	5/3.5	2-Car	2-Story		

Solar	Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff
Adjoins	2310 Granville								$280,000		1%
Not	2219 Granville	$10,758		$1,300	$0				$272,058	3%	
Not	634 Friendly	-$1,755		-$6,675	$16,721	-$10,000			$265,291	5%	
Not	2403 Granville	$469		-$1,325	$31,356				$295,500	-6%	

I have also considered the original sales prices in this subdivision relative to the recent resale values as shown in the chart below. This rate of appreciation is right at 2.5% over the last 6 years. Zillow indicates that the average home value within the 27530-zip code as of January 2014 was $101,300 and as of January 2020 that average is $118,100. This indicates an average increase in the market of 2.37%. I conclude that the appreciation of the homes adjoining the solar farm are not impacted by the presence of the solar farm based on this data.

	Address	Initial Sale Date	Price	Second Sale Date	Price	Year Diff	Apprec.	% Apprec.	Apprec. %/Year
1	103 Granville Pl	4/1/2013	$245,000	7/27/2018	$265,000	5.32	$20,000	8.16%	1.53%
2	105 Erin	7/1/2014	$250,000	6/19/2017	$280,000	2.97	$30,000	12.00%	4.04%
3	2312 Granville	12/1/2013	$255,000	5/1/2015	$262,000	1.41	$7,000	2.75%	1.94%
4	2312 Granville	5/1/2015	$262,000	5/1/2018	$284,900	3.00	$22,900	8.74%	2.91%
5	2310 Granville	8/1/2013	$250,000	5/14/2019	$280,000	5.79	$30,000	12.00%	2.07%
6	2308 Granville	9/1/2013	$260,000	11/12/2015	$267,500	2.20	$7,500	2.88%	1.31%
7	2304 Granville	9/1/2012	$198,000	6/1/2017	$225,000	4.75	$27,000	13.64%	2.87%
8	102 Erin	8/1/2014	$253,000	11/1/2016	$270,000	2.25	$17,000	6.72%	2.98%
								Average	2.46%
								Median	2.47%

2. Matched Pair – Mulberry, Selmer, TN



This 16 MW solar farm was built in 2014 on 208.89 acres with the closest home being 480 feet.

This solar farm adjoins two subdivisions with Central Hills having a mix of existing and new construction homes. Lots in this development have been marketed for $15,000 each with discounts offered for multiple lots being used for a single home site. I spoke with the agent with Rhonda Wheeler and Becky Hearnsberger with United County Farm & Home Realty who noted that they have seen no impact on lot or home sales due to the solar farm in this community.

I have included a map below as well as data on recent sales activity on lots that adjoin the solar farm or are near the solar farm in this subdivision both before and after the announced plan for this solar farm facility. I note that using the same method I used to breakdown the adjoining uses at the subject property I show that the predominant adjoining uses are residential and agricultural, which is consistent with the location of most solar farms.

Adjoining Use Breakdown

	Acreage	Parcels
Commercial	3.40%	0.034
Residential	12.84%	79.31%
Agri/Res	10.39%	3.45%
Agricultural	73.37%	13.79%
Total	**100.00%**	**100.00%**

I have run a number of direct matched comparisons on the sales adjoining this solar farm as shown below. These direct matched pairs include some of those shown above as well as additional more recent sales in this community. In each of these I have compared the one sale adjoining the solar farm to multiple similar homes nearby that do not adjoin a solar farm to look for any potential impact from the solar farm.

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
3	Adjoins	491 Dusty	6.86	10/28/2016	$176,000	2009	1,801	$97.72	3/2	2-Gar	Ranch	
	Not	820 Lake Trail	1.00	6/8/2018	$168,000	2013	1,869	$89.89	4/2	2-Gar	Ranch	
	Not	262 Country	1.00	1/17/2018	$145,000	2000	1,860	$77.96	3/2	2-Gar	Ranch	
	Not	35 April	1.15	8/16/2016	$185,000	2016	1,980	$93.43	3/2	2-Gar	Ranch	

Adjoining Sales Adjusted

Parcel	Solar	Address	Time	Site	YB	GLA	Park	Other	Total	% Diff	Distance
3	Adjoins	491 Dusty							$176,000		480
	Not	820 Lake Trail	-$8,324	$12,000	-$3,360	-$4,890			$163,426	7%	
	Not	262 Country	-$5,450	$12,000	$6,525	-$3,680			$154,396	12%	
	Not	35 April	$1,138	$12,000	-$6,475	-$13,380			$178,283	-1%	
									Average	6%	

The best matched pair is 35 April Loop, which required the least adjustment and indicates a -1% increase in value due to the solar farm adjacency.

Adjoining Residential Sales After Solar Farm Built

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
12	Adjoins	57 Cooper	1.20	2/26/2019	$163,000	2011	1,586	$102.77	3/2	2-Gar	1.5 Story	Pool
	Not	191 Amelia	1.00	8/3/2018	$132,000	2005	1,534	$86.05	3/2	Drive	Ranch	
	Not	75 April	0.85	3/17/2017	$134,000	2012	1,588	$84.38	3/2	2-Crprt	Ranch	
	Not	345 Woodland	1.15	12/29/2016	$131,000	2002	1,410	$92.91	3/2	1-Gar	Ranch	

Adjoining Sales Adjusted

Parcel	Solar	Address	Sales Price	Time	Site	YB	GLA	Park	Other	Total	% Diff	Distance
12	Adjoins	57 Cooper	$163,000							$163,000		685
	Not	191 Amelia	$132,000	$2,303		$3,960	$2,685	$10,000	$5,000	$155,947	4%	
	Not	75 April	$134,000	$8,029	$4,000	-$670	-$135	$5,000	$5,000	$155,224	5%	
	Not	345 Woodland	$131,000	$8,710		$5,895	$9,811		$5,000	$160,416	2%	
										Average	4%	

The best matched pair is 191 Amelia, which was most similar in time frame of sale and indicates a +4% increase in value due to the solar farm adjacency.

Adjoining Residential Sales After Solar Farm Built

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
15	Adjoins	297 Country	1.00	9/30/2016	$150,000	2002	1,596	$93.98	3/2	4-Gar	Ranch	
	Not	185 Dusty	1.85	8/17/2015	$126,040	2009	1,463	$86.15	3/2	2-Gar	Ranch	
	Not	53 Glen	1.13	3/9/2017	$126,000	1999	1,475	$85.42	3/2	2-Gar	Ranch	Brick

Adjoining Sales Adjusted

Parcel	Solar	Address	Sales Price	Time	Site	YB	GLA	Park	Other	Total	% Diff	Distance
15	Adjoins	297 Country	$150,000							$150,000		650
	Not	185 Dusty	$126,040	$4,355		-$4,411	$9,167	$10,000		$145,150	3%	
	Not	53 Glen	$126,000	-$1,699		$1,890	$8,269	$10,000		$144,460	4%	
										Average	3%	

The best matched pair is 53 Glen, which was most similar in time frame of sale and required less adjustment. It indicates a +4% increase in value due to the solar farm adjacency.

The average indicated impact from these three sets of matched pairs is +4%, which suggests a mild positive relationship due to adjacency to the solar farm. The landscaping buffer for this project is mostly natural tree growth that was retained as part of the development but much of the trees separating the panels from homes are actually on the lots for the homes themselves. I therefore consider the landscaping buffer to be thin to moderate for these adjoining homes.

I have also looked at several lot sales in this subdivision as shown below.

These are all lots within the same community and the highest prices paid are for lots one parcel off from the existing solar farm. These prices are fairly inconsistent, though they do suggest about a $3,000 loss in the lots adjoining the solar farm. This is an atypical finding and additional details suggest there is more going on in these sales than the data crunching shows. First of all Parcel 4 was purchased by the owner of the adjoining home and therefore an atypical buyer seeking to expand a lot and the site is not being purchased for home development. Moreover, using the SiteToDoBusiness demographic tools, I found that the 1-mile radius around this development is expecting a total population increase over the next 5 years of 3 people. This lack of growing demand for lots is largely explained in that context. Furthermore, the fact that finished home sales as shown above are showing no sign of a negative impact on property value makes this data unreliable and inconsistent with the data shown in sales to an end user. I therefore place little weight on this outlier data.

Parcel	Solar	Address	Acres	Date Sold	Sales Price	4/18/2019 Adj for Time	$/AC	4/18/2019 Adj for Time
4	Adjoins	Shelter	2.05	10/25/2017	$16,000	$16,728	$7,805	$8,160
10	Adjoins	Carter	1.70	8/2/2018	$14,000	$14,306	$8,235	$8,415
11	Adjoins	Cooper	1.28	9/17/2018	$12,000	$12,215	$9,375	$9,543
	Not	75 Dusty	1.67	4/18/2019	$20,000	$20,000	$11,976	$11,976
	Not	Lake Trl	1.47	11/7/2018	$13,000	$13,177	$8,844	$8,964
	Not	Lake Trl	1.67	4/18/2019	$20,000	$20,000	$11,976	$11,976

	Adjoins	Per Acre	Not Adjoins	Per Acre	% DIF/Lot	% DIF/AC
Average	$14,416	$8,706	$17,726	$10,972	19%	21%
Median	$14,306	$8,415	$20,000	$11,976	28%	30%
High	$16,728	$9,543	$20,000	$11,976	16%	20%
Low	$12,215	$8,160	$13,177	$8,964	7%	9%

3. Matched Pair – Leonard Road Solar Farm, Hughesville, MD

This 5 MW solar farm is located on 47 acres and mostly adjoins agricultural and residential uses to the west, south and east as shown above. The property also adjoins retail uses and a church. I looked at a 2016 sale of an adjoining home with a positive impact on value adjoining the solar farm of 2.90%. This is within typical market friction and supports an indication of no impact on property value.

I have shown this data below. The landscaping buffer is considered heavy.

Leonardtown Road Solar Farm, Hughesville, MD

Nearby Residential Sale After Solar Farm Construction

Address	Solar Farm	Acres	Date Sold	Sales Price*	Built	GBA	$/GBA	Style	BR/BA	Bsmt	Park	Upgrades	Other
14595 Box Elder Ct	Adjoins	3.00	2/12/2016	$291,000	1991	2,174	$133.85	Colonial	5/2.5	No	2 Car Att	N/A	Deck
15313 Bassford Rd	Not	3.32	7/20/2016	$329,800	1990	2,520	$130.87	Colonial	3/2.5	Finished	2 Car Att	Custom	Scr Por/Patio

*$9,000 concession deducted from sale price for Box Elder and $10,200 deducted from Bassford

Adjoining Sales Adjusted			Adjustments					
Address	Date Sold	Sales Price	Time	GLA	Bsmt	Upgrades	Other	Total
14595 Box Elder Ct	2/12/2016	$291,000						$291,000
15313 Bassford Rd	7/20/2016	$329,800	-$3,400	-$13,840	-$10,000	-$15,000	-$5,000	$282,560

Difference Attributable to Location $8,440
2.90%

This is within typical market friction and supports an indication of no impact on property value.

4. Matched Pair – Gastonia SC Solar, Gastonia, NC

This 5 MW project is located on the south side of Neal Hawkins Road just outside of Gastonia. The property identified above as Parcel 4 was listed for sale while this solar farm project was going

through the approval process. The property was put under contract during the permitting process with the permit being approved while the due diligence period was still ongoing. After the permit was approved the property closed with no concerns from the buyer. I spoke with Jennifer Bouvier, the broker listing the property and she indicated that the solar farm had no impact at all on the sales price. She considered some nearby sales to set the price and the closing price was very similar to the asking price within the typical range for the market. The buyer was aware that the solar farm was coming and they had no concerns.

This two-story brick dwelling was sold on March 20, 2017 for $270,000 for a 3,437 square foot dwelling built in 1934 in average condition on 1.42 acres. The property has four bedrooms and two bathrooms. The landscaping screen is light for this adjoining home due to it being a new planted landscaping buffer.

Adjoining Residential Sales After Solar Farm Approved

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GLA	BR/BA	Park	Style	Other
Adjoins	609 Neal Hawkins	1.42	3/20/2017	$270,000	1934	3,427	$78.79	4/2	Open	2-Brick	
Not	1418 N Modena	4.81	4/17/2018	$225,000	1930	2,906	$77.43	3/3	2-Crprt	2-Brick	
Not	363 Dallas Bess	2.90	11/29/2018	$265,500	1968	2,964	$89.57	3/3	Open	FinBsmt	
Not	1612 Dallas Chry	2.74	9/17/2018	$245,000	1951	3,443	$71.16	3/2	Open	2-Brick	Unfin bath

Adjoining Sales Adjusted

Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
609 Neal Hawkins								$270,000			225
1418 N Modena	$7,319		$2,700	$32,271		-$10,000		$257,290	5%		
363 Dallas Bess	$746		-$27,081	$33,179	-$10,000		$53,100	$262,456	3%		
1612 Dallas Chry	$4,110		-$12,495	-$911			$10,000	$235,704	13%		
										7%	

I also considered the newer adjoining home identified as Parcel 5 that sold later in 2017 and it likewise shows no negative impact on property value. This is also considered a light landscaping buffer.

Adjoining Residential Sales After Solar Farm Approved

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GLA	BR/BA	Park	Style
Adjoins	611 Neal Hawkins	0.78	7/6/2017	$288,000	1991	2,256	$127.66	5/3	2-Gar	1.5 Brick
Not	1211 Still Frst	0.51	7/30/2018	$280,000	1989	2,249	$124.50	3/3	2-Gar	Br Rnch
Not	2867 Colony Wds	0.52	8/14/2018	$242,000	1990	2,006	$120.64	3/3	2-Gar	Br Rnch
Not	1010 Strawberry	1.00	10/4/2018	$315,000	2002	2,330	$135.19	3/2.5	2-Gar	1.5 Brick

Adjoining Sales Adjusted

Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
611 Neal Hawkins								$288,000			145
1211 Still Frst	$1,341		$2,800	$697				$284,838	1%		
2867 Colony Wds	$7,714		$1,210	$24,128				$275,052	4%		
1010 Strawberry	-$4,555		-$17,325	-$8,003	$5,000			$290,116	-1%		
										2%	

5. Matched Pair – Summit/Ranchlands Solar, Moyock, NC

This project is located at 1374 Caritoke Highway, Moyock, NC. This is an 80 MW facility on a parent tract of 2,034 acres. Parcels Number 48 and 53 as shown in the map above were sold in 2016. The project was under construction during the time period of the first of the matched pair sales and the permit was approved well prior to that in 2015.

I looked at multiple sales of adjoining and nearby homes and compared each to multiple comparables to show a range of impacts from -10% up to +11% with an average of +2% and a median of +3%. These ranges are well within typical real estate variation and supports an indication of no impact on property value.

Adjoining Residential Sales After Solar Farm Approved

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other	Distance
48	Adjoins	129 Pinto	4.29	4/15/2016	$170,000	1985	1,559	$109.04	3/2	Drive	MFG		1,060
	Not	102 Timber	1.30	4/1/2016	$175,500	2009	1,352	$129.81	3/2	Drive	MFG		
	Not	120 Ranchland	0.99	10/1/2014	$170,000	2002	1,501	$113.26	3/2	Drive	MFG		

Solar	Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff
Adjoins	129 Pinto								$170,000		-3%
Not	102 Timber	$276	$10,000	-$29,484	$18,809				$175,101	-3%	
Not	120 Ranchland	$10,735	$10,000	-$20,230	$4,598				$175,103	-3%	

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GLA	BR/BA	Park	Style	Other
Adjoins	105 Pinto	4.99	12/16/2016	$206,000	1978	1,484	$138.81	3/2	Det G	Ranch	
Not	111 Spur	1.15	2/1/2016	$193,000	1985	2,013	$95.88	4/2	Gar	Ranch	
Not	103 Marshall	1.07	3/29/2017	$196,000	2003	1,620	$120.99	3/2	Drive	Ranch	
Not	127 Ranchland	0.00	6/9/2015	$219,900	1988	1,910	$115.13	3/2	Gar/3Det	Ranch	

Adjoining Sales Adjusted

Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
105 Pinto								$206,000			980
111 Spur	$6,747	$10,000	-$6,755	-$25,359				$177,633	14%		
103 Marshall	-$2,212	$10,000	-$24,500	-$8,227		$5,000		$176,212	14%		
127 Ranchland	$13,399	$10,000	-$10,995	-$24,523		-$10,000		$197,781	4%		
										11%	

Adjoining Residential Sales After Solar Farm Built

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other	Distance
15	Adjoins	318 Green View	0.44	9/15/2019	$357,000	2005	3,460	$103.18	4/4	2-Car	1.5 Brick		570
	Not	195 St Andrews	0.55	6/17/2018	$314,000	2002	3,561	$88.18	5/3	2-Car	2.0 Brick		
	Not	336 Green View	0.64	1/13/2019	$365,000	2006	3,790	$96.31	6/4	3-Car	2.0 Brick		
	Not	275 Green View	0.36	8/15/2019	$312,000	2003	3,100	$100.65	5/3	2-Car	2.0 Brick		

Solar	Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff
Adjoins	318 Green View								$357,000		4%
Not	195 St Andrews	$12,040		$4,710	-$7,125	$10,000			$333,625	7%	
Not	336 Green View	$7,536		-$1,825	-$25,425			-$5,000	$340,286	5%	
Not	275 Green View	$815		$3,120	$28,986	$10,000			$354,921	1%	

Adjoining Residential Sales After Solar Farm Built

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other	Distance
29	Adjoins	164 Ranchland	1.01	4/30/2019	$169,000	1999	2,052	$82.36	4/2	Gar	MFG		440
	Not	150 Pinto	0.94	3/27/2018	$168,000	2017	1,920	$87.50	4/2	Drive	MFG		
	Not	105 Longhorn	1.90	10/10/2017	$184,500	2002	1,944	$94.91	3/2	Drive	MFG		
	Not	112 Pinto	1.00	7/27/2018	$180,000	2002	1,836	$98.04	3/2	Drive	MFG	Fenced	

Solar	Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff
Adjoins	164 Ranchland								$169,000		-10%
Not	150 Pinto	$5,649		-$21,168	$8,085			$5,000	$165,566	2%	
Not	105 Longhorn	$8,816	-$10,000	-$3,875	$7,175			$5,000	$191,616	-13%	
Not	112 Pinto	$4,202		-$3,780	$14,824			$5,000	$200,245	-18%	

Adjoining Residential Sales After Solar Farm Built

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other	Distance
	Adjoins	358 Oxford	10.03	9/16/2019	$478,000	2008	2,726	$175.35	3/3	2 Gar	Ranch		635
	Not	276 Summit	10.01	12/20/2017	$355,000	2006	1,985	$178.84	3/2	2 Gar	Ranch		
	Not	176 Providence	6.19	5/6/2019	$425,000	1990	2,549	$166.73	3/3	4 Gar	Ranch	Brick	
	Not	1601 B Caratoke	12.20	9/26/2019	$440,000	2016	3,100	$141.94	4/3.5	5 Gar	Ranch	Pool	

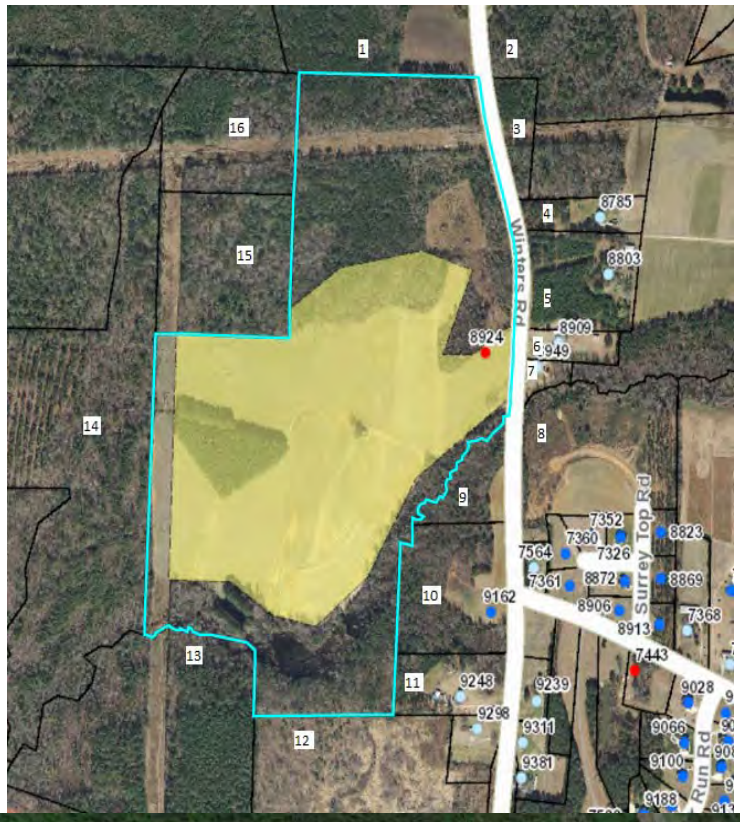
Solar	Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff
Adjoins	358 Oxford								$478,000		5%
Not	276 Summit	$18,996		$3,550	$106,017	$10,000			$493,564	-3%	
Not	176 Providence	$4,763		$38,250	$23,609		-$10,000	-$25,000	$456,623	4%	
Not	1601 B Caratoke	-$371	$50,000	-$17,600	-$42,467	-$5,000	-$10,000		$414,562	13%	

Adjoining Residential Sales After Solar Farm Approved

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other	Distance
	Nearby	343 Oxford	10.01	3/9/2017	$490,000	2016	3,753	$130.56	3/3	2 Gar	1.5 Story	Pool	970
	Not	287 Oxford	10.01	9/4/2017	$600,000	2013	4,341	$138.22	5/4.5	8-Gar	1.5 Story	Pool	
	Not	301 Oxford	10.00	4/23/2018	$434,000	2013	3,393	$127.91	5/3	2 Gar	1.5 Story		
	Not	218 Oxford	10.01	4/4/2017	$525,000	2006	4,215	$124.56	4/3	4 Gar	1.5 Story	VG Barn	

Solar	Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff
Adjoins	343 Oxford								$490,000		3%
Not	287 Oxford	-$9,051		$9,000	-$65,017	-$15,000	-$25,000		$494,932	-1%	
Not	301 Oxford	-$14,995	-$10,000	$6,510	$36,838				$452,353	8%	
Not	218 Oxford	-$1,150		$26,250	-$46,036		-$10,000	-$10,000	$484,064	1%	

6. Matched Pair – Tracy Solar, Bailey, NC



This project is located in rural Nash County on Winters Road with a 5 MW facility that was built in 2016 on 50 acres. A local builder acquired parcels 9 and 10 following construction as shown below

at rates comparable to other tracts in the area. They then built a custom home for an owner and sold that at a price similar to other nearby homes as shown in the matched pair data below. The retained woods provide a heavy landscaped buffer for this homesite.

Adjoining Land Sales After Solar Farm Completed

#	Solar Farm	TAX ID	Grantor	Grantee	Address	Acres	Date Sold	Sales Price	$/AC	Other
9 &10	Adjoins	316003 & 316004	Cozart	Kingsmill	9162 Winters	13.22	7/21/2016	$70,000	$5,295	
	Not	6056	Billingsly		427 Young	41	10/21/2016	$164,000	$4,000	
	Not	33211	Fulcher	Weikel	10533 Cone	23.46	7/18/2017	$137,000	$5,840	Doublewide, structures
	Not	106807	Perry	Gardner	Claude Lewis	11.22	8/10/2017	$79,000	$7,041	Gravel drive for sub, cleared
	Not	3437	Vaughan	N/A	11354 Old Lewis Sch	18.73	Listing	$79,900	$4,266	Small cemetery,wooded

Adjoining Sales Adjusted

Time	Acres	Location	Other	Adj $/Ac	% Diff
				$5,295	
$0	$400	$0	$0	$4,400	17%
-$292	$292	$0	-$500	$5,340	-1%
-$352	$0	$0	-$1,000	$5,689	-7%
-$213	$0	$0	$213	$4,266	19%
				Average	7%

Adjoining Residential Sales After Solar Farm Completed

#	Solar Farm	n	Address	Acres	Date Sold	Sales Price	Built	GLA	$/GLA	BR/BA	Style	Other
9 &10	Adjoins	gs	9162 Winters	13.22	1/5/2017	$255,000	2016	1,616	$157.80	3/2	Ranch	1296 sf wrkshp
	Not	w	7352 Red Fox	0.93	6/30/2016	$176,000	2010	1,529	$115.11	3/2	2-story	

Adjoining Sales Adjusted

Time	Acres	YB	GLA	Style	Other	Total	% Diff
						$255,000	
$0	$44,000	$7,392	$5,007	$5,000	$15,000	$252,399	1%

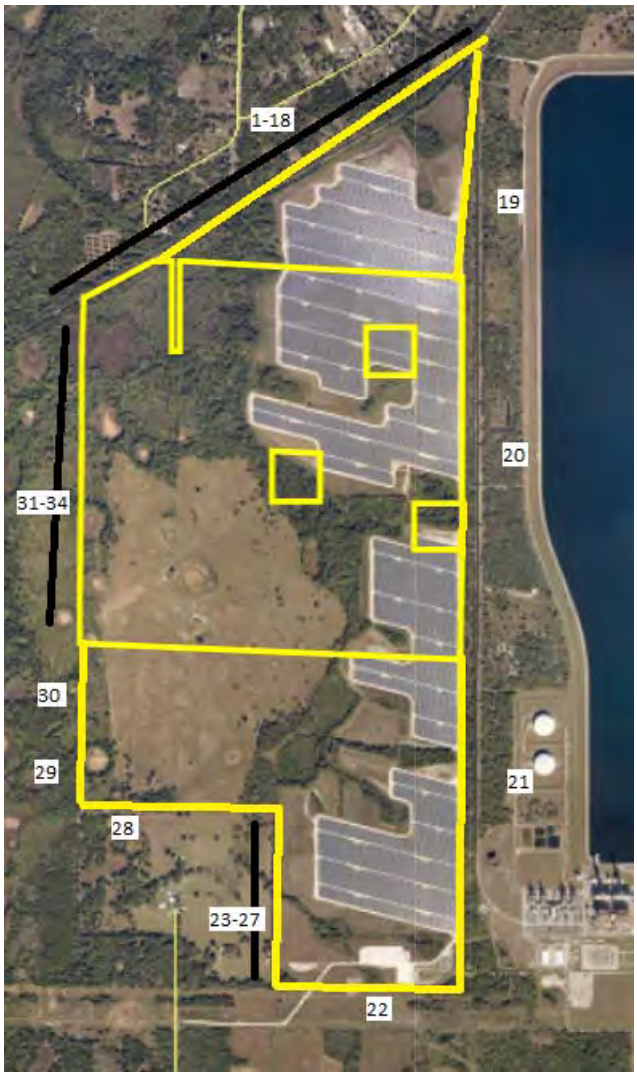
The comparables for the land show either a significant positive relationship or a mild negative relationship to having and adjoining solar farm, but when averaged together they show no negative impact. The wild divergence is due to the difficulty in comping out this tract of land and the wide variety of comparables used. The two comparables that show mild negative influences include a property that was partly developed as a residential subdivision and the other included a doublewide with some value and accessory agricultural structures. The tax assessed value on the improvements were valued at $60,000. So both of those comparables have some limitations for comparison. The two that show significant enhancement due to adjacency includes a property with a cemetery located in the middle and the other is a tract almost twice as large. Still that larger tract after adjustment provides the best matched pair as it required the least adjustment. I therefore conclude that there is no negative impact due to adjacency to the solar farm shown by this matched pair.

The dwelling that was built on the site was a build-to-suit and was compared to a nearby homesale of a property on a smaller parcel of land. I adjusted for that differenced based on a $25,000 value for a 1-acre home site versus the $70,000 purchase price of the larger subject tract. The other adjustments are typical and show no impact due to the adjacency to the solar farm.

The closest solar panel to the home is 780 feet away.

I note that the representative for Kingsmill Homes indicated that the solar farm was never a concern in purchasing the land or selling the home. He also indicated that they had built a number of nearby homes across the street and it had never come up as an issue.

7. Matched Pair – Manatee Solar Farm, Parrish, FL



This solar farm is located near Seminole Trail, Parrish, FL. The solar farm has a 74.50 MW output and is located on a 1,180.38-acre tract and was built in 2016. The tract is owned by Florida Power & Light Company.

I have considered the recent sale of 13670 Highland Road, Wimauma, Florida. This one-story, concrete block home is located just north of the solar farm and separated from the solar farm by a railroad corridor. This home is a 3 BR, 3 BA 1,512 s.f. home with a carport and workshop. The property includes new custom cabinets, granite counter tops, brand-new stainless-steel appliances, updated bathrooms and new carpet in the bedrooms. The home is sitting on 5 acres. The home was built in 1997.

I have compared this sale to several nearby homesales as part of this matched pair analysis as shown below. The landscaping separating the home from the solar farm is considered heavy.

Solar	TAX ID/Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Note
Adjoins	13670 Highland	5.00	8/21/2017	$255,000	1997	1,512	$168.65	3/3	Carport/Wrkshp	Ranch	Renov.
Not	2901 Arrowsmith	1.91	1/31/2018	$225,000	1979	1,636	$137.53	3/2	2 Garage/Wrkshp	Ranch	
Not	602 Butch Cassidy	1.00	5/5/2017	$220,000	2001	1,560	$141.03	3/2	N/A	Ranch	Renov.
Not	2908 Wild West	1.23	7/12/2017	$254,000	2003	1,554	$163.45	3/2	2 Garage/Wrkshp	Ranch	Renov.
Not	13851 Highland	5.00	9/13/2017	$240,000	1978	1,636	$146.70	4/2	3 Garage	Ranch	Renov.

		Adjoining Sales Adjusted								
Solar	**TAX ID/Address**	**Time**	**Acres**	**YB**	**GLA**	**BR/BA**	**Park**	**Note**	**Total**	**% Diff**
Adjoins	13670 Highland								$255,000	
Not	2901 Arrowsmith	$2,250	$10,000	$28,350	-$8,527	$5,000	-$10,000	$10,000	$262,073	-3%
Not	602 Butch Cassidy	-$2,200	$10,000	-$6,160	-$3,385	$5,000	$2,000		$225,255	12%
Not	2908 Wild West	$0	$10,000	-$10,668	-$3,432	$5,000	-$10,000		$244,900	4%
Not	13851 Highland	$0	$0	$31,920	-$9,095	$3,000	-$10,000		$255,825	0%
									Average	3%

The sales prices of the comparables before adjustments range from $220,000 to $254,000. After adjustments they range from $225,255 to $262,073. The comparables range from no impact to a strong positive impact. The comparables showing -3% and +4% impact on value is considered within a typical range of value and therefore not indicative of any impact on property value.

This set of matched pair data falls in line with the data seen in other states. The closest solar panel to the home at 13670 Highland is 1,180 feet. There is a wooded buffer between these two properties.

I have included a map showing the relative location of these properties below.

8. Matched Pair – McBride Place Solar Farm, Midland, NC

This project is located on Mount Pleasant Road, Midland, North Carolina. The property is on 627 acres on an assemblage of 974.59 acres. The solar farm was approved in early 2017 for a 74.9 MW facility.

I have considered the sale of 4380 Joyner Road which adjoins the proposed solar farm near the northwest section. This property was appraised in April of 2017 for a value of $317,000 with no consideration of any impact due to the solar farm in that figure. The property sold in November

2018 for $325,000 with the buyer fully aware of the proposed solar farm. The landscaping buffer relative to Joyner Road, Hayden Way, Chanel Court and Kristi Lane is considered medium, while the landscaping for the home at the north end of Chanel Court is considered very light.

I have considered the following matched pairs to the subject property.

Adjoining Residential Sales After Solar Farm Approved

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
Adjoins	4380 Joyner	12.00	11/22/2017	$325,000	1979	1,598	$203.38	3/2	2xGar	Ranch	Outbldg
Not	3870 Elkwood	5.50	8/24/2016	$250,000	1986	1,551	$161.19	3/2.5	Det 2xGar	Craft	
Not	8121 Lower Rocky	18.00	2/8/2017	$355,000	1977	1,274	$278.65	2/2	2xCarprt	Ranch	Eq. Fac.
Not	13531 Cabarrus	7.89	5/20/2016	$267,750	1981	2,300	$116.41	3/2	2xGar	Ranch	

Adjoining Sales Adjusted

Time	Acres	YB	Condition	GLA	BR/BA	Park	Other	Total	% Diff
								$325,000	
$7,500	$52,000	-$12,250	$10,000	$2,273	-$2,000	$2,500	$7,500	$317,523	2%
$7,100	-$48,000	$4,970		$23,156	$0	$3,000	-$15,000	$330,226	-2%
$8,033	$33,000	-$3,749	$20,000	-$35,832	$0	$0	$7,500	$296,702	9%
								Average	3%

The home at 4380 Joyner Road is 275 feet from the closest solar panel.

I also considered the recent sale of a lot at 5800 Kristi Lane that is on the east side of the proposed solar farm. This 4.22-acre lot sold in December 2017 for $94,000. A home was built on this lot in 2019 with the closest point from home to panel at 689 feet. The home site is heavily wooded and their remains a wooded buffer between the solar panels and the home. I spoke with the broker, Margaret Dabbs, who indicated that the solar farm was considered a positive by both buyer and seller as it ensures no subdivision will be happening in that area. Buyers in this market are looking for privacy and seclusion.

The breakdown of recent lot sales on Kristi are shown below with the lowest price paid for the lot with no solar farm exposure, though that lot has exposure to Mt Pleasant Road South. Still the older lot sales have exposure to the solar farm and sold for higher prices than the front lot and adjusting for time would only increase that difference.

Adjoining Lot Sales After Solar Farm Built

Parcel	Solar	Address	Acres	Date Sold	Sales Price	$/AC	$/Lot
	Adjoins	5811 Kristi	3.74	5/1/2018	$100,000	$26,738	$100,000
	Adjoins	5800 Kristi	4.22	12/1/2017	$94,000	$22,275	$94,000
	Not	5822 Kristi	3.43	2/24/2020	$90,000	$26,239	$90,000

The lot at 5811 Kristi Lane sold in May 2018 for $100,000 for a 3.74-acre lot. The home that was built later in 2018 is 505 feet to the closest solar panel. This home then sold to a homeowner for $530,000 in April 2020. I have compared this home sale to other properties in the area as shown below.

Adjoining Residential Sales After Solar Farm Built

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
Adjoins	5811 Kristi	3.74	3/31/2020	$530,000	2018	3,858	$137.38	5/3.5	2 Gar	2-story	Cement Ext
Not	3915 Tania	1.68	12/9/2019	$495,000	2007	3,919	$126.31	3/3.5	2 Gar	2-story	3Det Gar
Not	6782 Manatee	1.33	3/8/2020	$460,000	1998	3,776	$121.82	4/2/2h	2 Gar	2-story	Water
Not	314 Old Hickory	1.24	9/20/2019	$492,500	2017	3,903	$126.18	6/4.5	2 Gar	2-story	

Solar	Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff
Adjoins	5811 Kristi								$530,000		5%
Not	3915 Tania	$6,285		$27,225	-$3,852		-$20,000		$504,657	5%	
Not	6782 Manatee	$1,189		$46,000	$4,995	$5,000			$517,183	2%	
Not	314 Old Hickory	$10,680		$2,463	-$2,839	-$10,000			$492,803	7%	

After adjusting the comparables, I found that the average adjusted value shows a slight increase in value for the subject property adjoining a solar farm. As in the other cases, this is a mild positive impact on value but within the typical range of real estate transactions.

I also looked at 5833 Kristi Lane that sold on 9/14/2020 for $625,000. This home is 470 feet from the closest panel.

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GLA	BR/BA	Park	Style	Other
Nearby	5833 Kristi	4.05	9/14/2020	$625,000	2008	4,373	$142.92	5/4	3-Car	2-Brick	
Not	4055 Dakeita	4.90	12/30/2020	$629,000	2005	4,427	$142.08	4/4	4-Car	2-Brick	4DetGar/Stable
Not	9615 Bales	2.16	6/30/2020	$620,000	2007	4,139	$149.79	4/5	3-Car	2-Stone	2DetGar
Not	9522 Bales	1.47	6/18/2020	$600,000	2007	4,014	$149.48	4/4.5	3-Car	2-Stone	

Adjoining Sales Adjusted

Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
5833 Kristi								$625,000			470
4055 Dakeita	-$9,220		$5,661	-$6,138		-$25,000		$594,303	5%		
9615 Bales	$6,455		$1,860	$28,042	-$10,000	-$15,000		$631,356	-1%		
9522 Bales	$7,233		$1,800	$42,930	-$5,000			$646,963	-4%		
										0%	

The average difference is 0% impact and the differences are all within a close range with this set of comparables and supports a finding of no impact on property value.

I have also looked at 4504 Chanel Court. This home sold on January 1, 2020 for $393,500 for this 3,010 square foot home built in 2004 with 3 bedrooms, 3.5 bathrooms, and a 3-car garage. This home includes a full partially finished basement that significantly complicates comparing this to other sales. This home previously sold on January 23, 2017 for $399,000. This was during the time that the solar farm was a known factor as the solar farm was approved in early 2017 and public discussions had already commenced. I spoke with Rachelle Killman with Real Estate Realty, LLC the buyer's agent for this transaction and she indicated that the solar farm was not a factor or consideration for the buyer. She noted that you could see the panels sort of through the trees, but it wasn't a concern for the buyer. She was not familiar with the earlier 2017 sale, but indicated that it was likely too high. This again goes back to the partially finished basement issue. The basement has a fireplace, and an installed 3/4 bathroom but otherwise bare studs and concrete floors with different buyers assigning varying value to that partly finished space. I also reached out to Don Gomez with Don Anthony Realty, LLC as he was the listing agent.

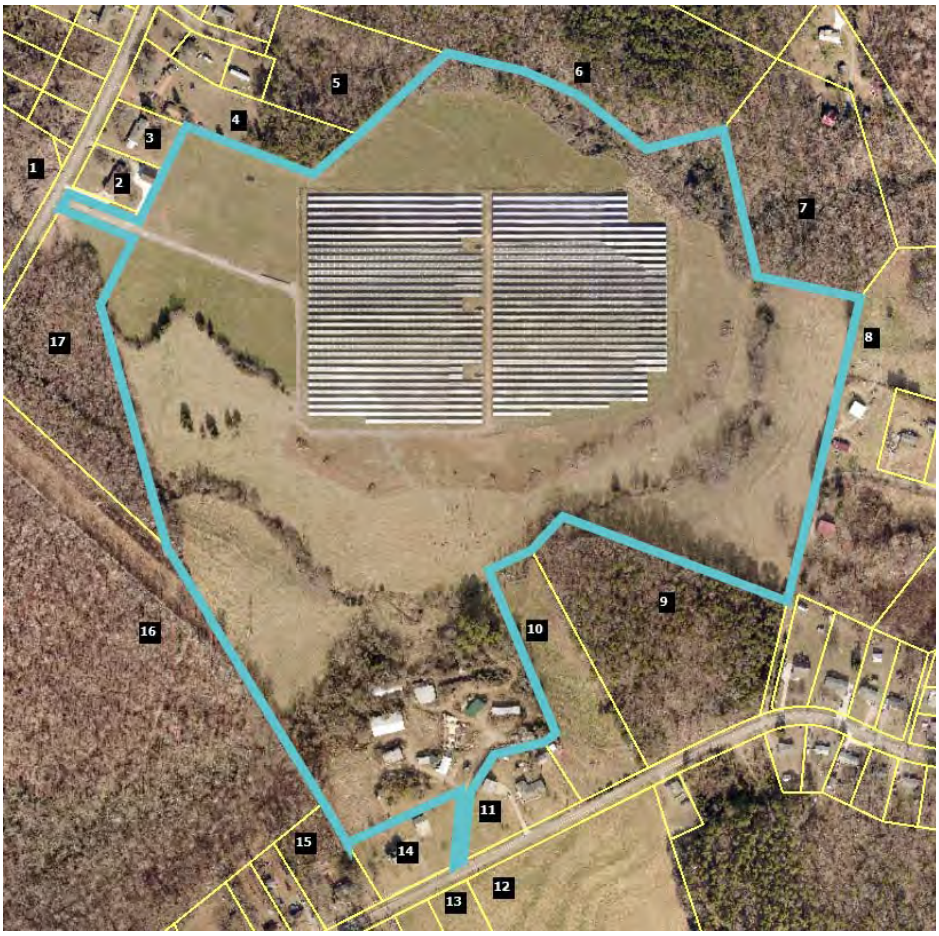
I also looked at the recent sale of 4599 Chanel Court. This home is within 310 feet of solar panels but notably does not have a good landscaping screen in place as shown in the photo below. The plantings appear to be less than 3-feet in height and only a narrow, limited screen of existing hardwoods were kept. The photograph is from the listing.

According to Scott David with Better Homes and Gardens Paracle Realty, this property was under contract for $550,000 contingent on the buyer being able to sell their former home. The former home was apparently overpriced and did not sell and the contract stretched out over 2.5 months.

The seller was in a bind as they had a home they were trying to buy contingent on this closing and were about to lose that opportunity. A cash buyer offered them a quick close at $500,000 and the seller accepted that offer in order to not lose the home they were trying to buy. According to Mr. David, the original contracted buyer and the actual cash buyer never considered the solar farm as a negative. In fact Mr. David noted that the actual buyer saw it as a great opportunity to purchase a home where a new subdivision could not be built behind his house. I therefore conclude that this property supports a finding of no impact on adjoining property, even where the landscaping screen still requires time to grow in for a year-round screen.

I also considered a sale/resale analysis on this property. This same home sold on September 15, 2015 for $462,000. Adjusting this upward by 5% per year for the five years between these sales dates suggests a value of $577,500. Comparing that to the $550,000 contract that suggests a 5% downward impact, which is within a typical market variation. Given that the broker noted no negative impact from the solar farm and the analysis above, I conclude this sale supports a finding of no impact on value.

9. Matched Pair – Mariposa Solar, Gaston County, NC



This project is a 5 MW facility located on 35.80 acres out of a parent tract of 87.61 acres at 517 Blacksnake Road, Stanley that was built in 2016.

I have considered a number of recent sales around this facility as shown below.

The first is identified in the map above as Parcel 1, which is 215 Mariposa Road. This is an older dwelling on large acreage with only one bathroom. I've compared it to similar nearby homes as shown below. The landscaping buffer for this home is considered light.

Adjoining Residential Sales After Solar Farm Approved

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style
Adjoins	215 Mariposa	17.74	12/12/2017	$249,000	1958	1,551	$160.54	3/1	Garage	Br/Rnch
Not	249 Mariposa	0.48	3/1/2019	$153,000	1974	1,792	$85.38	4/2	Garage	Br/Rnch
Not	110 Airport	0.83	5/10/2016	$166,000	1962	2,165	$76.67	3/2	Crprt	Br/Rnch
Not	1249 Blacksnake	5.01	9/20/2018	$242,500	1980	2,156	$112.48	3/2	Drive	1.5
Not	1201 Abernathy	27.00	5/3/2018	$390,000	1970	2,190	$178.08	3/2	Crprt	Br/Rnch

Adjoining Residential Sales After Solar Farm Approved — Adjoining Sales Adjusted

Solar	Address	Acres	Date Sold	Sales Price	Time	YB	Acres	GLA	BR/BA	Park	Other	Total	% Diff
Adjoins	215 Mariposa	17.74	12/12/2017	$249,000								$249,000	
Not	249 Mariposa	0.48	3/1/2019	$153,000	-$5,583	-$17,136	$129,450	-$20,576	-$10,000			$229,154	8%
Not	110 Airport	0.83	5/10/2016	$166,000	$7,927	-$4,648	$126,825	-$47,078	-$10,000			$239,026	4%
Not	1249 Blacksnake	5.01	9/20/2018	$242,500	-$5,621	-$37,345	$95,475	-$68,048	-$10,000	$5,000		$221,961	11%
Not	1201 Abernathy	27.00	5/3/2018	$390,000	-$4,552	-$32,760	-$69,450	-$60,705	-$10,000			$212,533	15%
												Average	9%

The average difference after adjusting for all factors is +9% on average, which suggests an enhancement due to the solar farm across the street. Given the large adjustments for acreage and size, I will focus on the low end of the adjusted range at 4%, which is within the typical deviation and therefore suggests no impact on value.

I have also considered Parcel 4 that sold after the solar farm was approved but before it had been constructed in 2016. The landscaping buffer for this parcel is considered light.

Adjoining Residential Sales After Solar Farm Approved

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
Adjoins	242 Mariposa	2.91	9/21/2015	$180,000	1962	1,880	$95.74	3/2	Carport	Br/Rnch	Det Wrkshop
Not	249 Mariposa	0.48	3/1/2019	$153,000	1974	1,792	$85.38	4/2	Garage	Br/Rnch	
Not	110 Airport	0.83	5/10/2016	$166,000	1962	2,165	$76.67	3/2	Crprt	Br/Rnch	
Not	1249 Blacksnake	5.01	9/20/2018	$242,500	1980	2,156	$112.48	3/2	Drive	1.5	

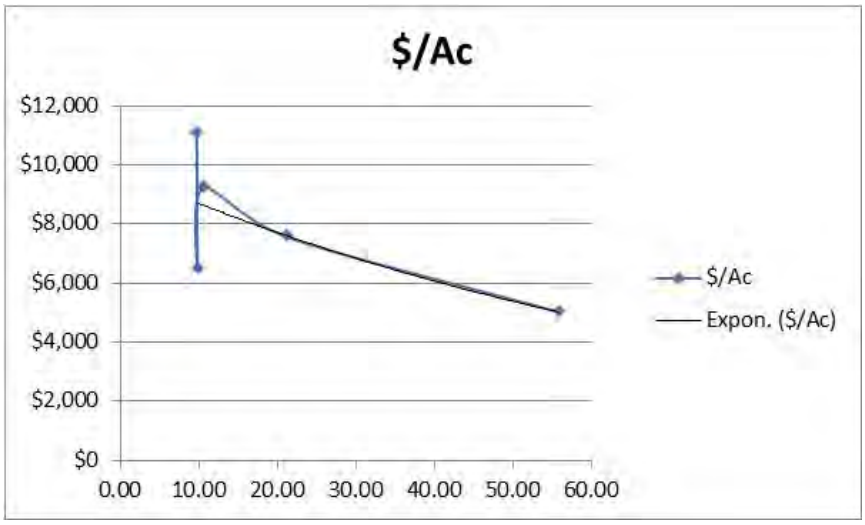
Adjoining Residential Sales After Solar Farm Approved — Adjoining Sales Adjusted

Solar	Address	Acres	Date Sold	Sales Price	Time	YB	Acres	GLA	BR/BA	Park	Other	Total	% Diff
Adjoins	242 Mariposa	2.91	9/21/2015	$180,000								$180,000	
Not	249 Mariposa	0.48	3/1/2019	$153,000	-$15,807	-$12,852	$18,468	$7,513		-$3,000	$25,000	$172,322	4%
Not	110 Airport	0.83	5/10/2016	$166,000	-$3,165	$0	$15,808	-$28,600			$25,000	$175,043	3%
Not	1249 Blacksnake	5.01	9/20/2018	$242,500	-$21,825	-$30,555	-$15,960	-$40,942		$2,000	$25,000	$160,218	11%
												Average	6%

The average difference after adjusting for all factors is +6%, which is again suggests a mild increase in value due to the adjoining solar farm use. The median is a 4% adjustment, which is within a standard deviation and suggests no impact on property value.

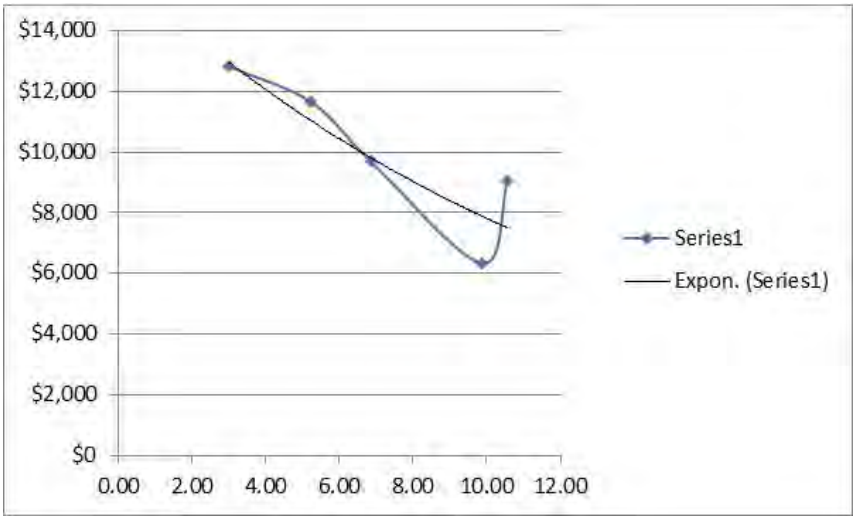
I have also considered the recent sale of Parcel 13 that is located on Blacksnake Road south of the project. I was unable to find good land sales in the same 20-acre range, so I have considered sales of larger and smaller acreage. I adjusted each of those land sales for time. I then applied the price per acre to a trendline to show where the expected price per acre would be for 20 acres. As can be seen in the chart below, this lines up exactly with the purchase of the subject property. I therefore conclude that there is no impact on Parcel 13 due to proximity to the solar farm.

Adjoining Residential Land Sales After Solar Farm Approved						**Adjoining Sales Adjusted**	
Solar	**Tax/Street**	**Acres**	**Date Sold**	**Sales Price**	**$/Ac**	**Time**	**$/Ac**
Adjoins	174339/Blacksnake	21.15	6/29/2018	$160,000	$7,565		$7,565
Not	227852/Abernathy	10.57	5/9/2018	$97,000	$9,177	$38	$9,215
Not	17443/Legion	9.87	9/7/2018	$64,000	$6,484	-$37	$6,447
Not	164243/Alexis	9.75	2/1/2019	$110,000	$11,282	-$201	$11,081
Not	176884/Bowden	55.77	6/13/2018	$280,000	$5,021	$7	$5,027



Finally, I have considered the recent sale of Parcel 17 that sold as vacant land. I was unable to find good land sales in the same 7-acre range, so I have considered sales of larger and smaller acreage. I adjusted each of those land sales for time. I then applied the price per acre to a trendline to show where the expected price per acre would be for 7 acres. As can be seen in the chart below, this lines up with the trendline running right through the purchase price for the subject property. I therefore conclude that there is no impact on Parcel 13 due to proximity to the solar farm. I note that this property was improved with a 3,196 square foot ranch built in 2018 following the land purchase, which shows that development near the solar farm was unimpeded.

Adjoining Residential Land Sales After Solar Farm Approved						**Adjoining Sales Adjusted**		
Solar	**Tax/Street**	**Acres**	**Date Sold**	**Sales Price**	**$/Ac**	**Time**	**Location**	**$/Ac**
Adjoins	227039/Mariposa	6.86	12/6/2017	$66,500	$9,694			$9,694
Not	227852/Abernathy	10.57	5/9/2018	$97,000	$9,177	-$116		$9,061
Not	17443/Legion	9.87	9/7/2018	$64,000	$6,484	-$147		$6,338
Not	177322/Robinson	5.23	5/12/2017	$66,500	$12,715	$217	-$1,272	$11,661
Not	203386/Carousel	2.99	7/13/2018	$43,500	$14,548	-$262	-$1,455	$12,832



10. Matched Pair – Clarke County Solar, Clarke County, VA

This project is a 20 MW facility located on a 234-acre tract that was built in 2017.

I have considered two recent sales of Parcel 3. The home on this parcel is 1,230 feet from the closest panel as measured in the second map from Google Earth, which shows the solar farm under construction. This home sold in January 2017 for $295,000 and again in August 2019 for $385,000. I show each sale below and compare those to similar home sales in each time frame. The significant increase in price between 2017 and 2019 is due to a major kitchen remodel, new roof, and related upgrades as well as improvement in the market in general. The sale and later resale of the home with updates and improvements speaks to pride of ownership and increasing overall value as properties perceived as diminished are less likely to be renovated and sold for profit.

I note that 102 Tilthammer includes a number of barns that I did not attribute any value in the analysis. The market would typically give some value for those barns but even without that adjustment there is an indication of a positive impact on value due to the solar farm. The landscaping buffer from this home is considered light.

Adjoining Residential Sales After Solar Farm Approved

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GLA	BR/BA	Park	Style	Other
3	Adjoins	833 Nations Spr	5.13	8/18/2019	$385,000	1979	1,392	$276.58	3/2	Det Gar	Ranch	UnBsmt
	Not	167 Leslie	5.00	8/19/2020	$429,000	1980	1,665	$257.66	3/2	Det2Gar	Ranch	
	Not	2393 Old Chapel	2.47	8/10/2020	$330,000	1974	1,500	$220.00	3/1.5	Det Gar	Ranch	
	Not	102 Tilthammer	6.70	5/7/2019	$372,000	1970	1,548	$240.31	3/1.5	Det Gar	Ranch	UnBsmt

Adjoining Sales Adjusted

Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
							$385,000			1230
-$13,268		-$2,145	-$56,272		-$5,000	$50,000	$402,315	-4%		
-$9,956	$25,000	$8,250	-$19,008	$5,000		$50,000	$389,286	-1%		
$3,229		$16,740	-$29,991	$5,000			$366,978	5%		
									0%	

Adjoining Residential Sales After Solar Farm Approved

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GLA	BR/BA	Park	Style	Other
3	Adjoins	833 Nations Spr	5.13	1/9/2017	$295,000	1979	1,392	$211.93	3/2	Det Gar	Ranch	UnBsmt
	Not	6801 Middle	2.00	12/12/2017	$249,999	1981	1,584	$157.83	3/2	Open	Ranch	
	Not	4174 Rockland	5.06	1/2/2017	$300,000	1990	1,688	$177.73	3/2	2 Gar	2-story	
	Not	400 Sugar Hill	1.00	6/7/2018	$180,000	1975	1,008	$178.57	3/1	Open	Ranch	

Adjoining Sales Adjusted

Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
							$295,000			1230
-$7,100	$25,000	-$2,500	-$24,242		$5,000	$50,000	$296,157	0%		
$177		-$16,500	-$42,085		-$10,000	$50,000	$281,592	5%		
-$7,797		$3,600	$54,857	$10,000	$5,000	$50,000	$295,661	0%		
									1%	

11. Matched Pair – Simon Solar, Social Circle, GA

This 30 MW solar farm is located off Hawkins Academy Road and Social Circle Fairplay Road. I identified three adjoining sales to this tract after development of the solar farm. However, one of those is shown as Parcel 12 in the map above and includes a powerline easement encumbering over a third of the 5 acres and adjoins a large substation as well. It would be difficult to isolate those impacts from any potential solar farm impact and therefore I have excluded that sale. I also excluded the recent sale of Parcel 17, which is a farm with conservation restrictions on it that similarly would require a detailed examination of those conservation restrictions in order to see if there was any impact related to the solar farm. I therefore focused on the recent sale of Parcel 7 and the adjoining parcel to the south of that. They are technically not adjoining due to the access road for the flag-shaped lot to the east. Furthermore, there is an apparent access easement serving the two rear lots that encumber these two parcels which is a further limitation on these sales. This analysis assumes that the access easement does not negatively impact the subject property, though it may.

The landscaping buffer relative to this parcel is considered medium.

Adjoining Land Sales After Solar Farm Approved

Parcel	Solar	Address	Acres	Date Sold	Sales Price	$/AC	Type	Other
7+	Adjoins	4514 Hawkins	36.86	3/31/2016	$180,000	$4,883	Pasture	Esmts
	Not	HD Atha	69.95	12/20/2016	$357,500	$5,111	Wooded	N/A
	Not	Pannell	66.94	11/8/2016	$322,851	$4,823	Mixed	*
	Not	1402 Roy	123.36	9/29/2016	$479,302	$3,885	Mixed	**

* Adjoining 1 acre purchased by same buyer in same deed. Allocation assigned on the County Tax Record.

** Dwelling built in 1996 with a 2016 tax assessed value of $75,800 deducted from sales price to reflect land value

Adjoining Sales Adjusted						Avg
Time	Size	Type	Other	Total/Ac	% Diff	% Diff
				$4,883		
$89	$256			$5,455	-12%	
-$90	$241			$4,974	-2%	
-$60	$389			$4,214	14%	
						0%

The range of impact identified by these matched pairs are -12% to +14%, with an average of 0% impact due to the solar farm. The best matched pair with the least adjustment supports a -2% impact due to the solar farm. I note again that this analysis considers no impact for the existing access easements that meander through this property and it may be having an impact. Still at -2% impact as the best indication for the solar farm, I consider that to be no impact given that market fluctuations support +/- 5%.

12. Matched Pair – Candace Solar, Princeton, NC

This 5 MW solar farm is located at 4839 US 70 Highway just east of Herring Road. This solar farm was completed on October 25, 2016.

I identified three adjoining sales to this tract after development of the solar farm with frontage on US 70. I did not attempt to analyze those sales as they have exposure to an adjacent highway and railroad track. Those homes are therefore problematic for a matched pair analysis unless I have similar homes fronting on a similar corridor.

I did consider a land sale and a home sale on adjoining parcels without those complications.

The lot at 499 Herring Road sold to Paradise Homes of Johnston County of NC, Inc. for $30,000 in May 2017 and a modular home was placed there and sold to Karen and Jason Toole on September 29, 2017. I considered the lot sale first as shown below and then the home sale that followed. The landscaping buffer relative to this parcel is considered medium.

Adjoining Land Sales After Solar Farm Approved							**Adjoining Sales Adjusted**				
Parcel	**Solar**	**Address**	**Acres**	**Date Sold**	**Sales Price**	**Other**	**Time**	**Site**	**Other**	**Total**	**% Diff**
16	Adjoins	499 Herring	2.03	5/1/2017	$30,000					$30,000	
	Not	37 Becky	0.87	7/23/2019	$24,500	Sub/Pwr	-$1,679	$4,900		$27,721	8%
	Not	5858 Bizzell	0.88	8/17/2016	$18,000		$390	$3,600		$21,990	27%
	Not	488 Herring	2.13	12/20/2016	$35,000		$389			$35,389	-18%
										Average	5%

Following the land purchase, the modular home was placed on the site and sold. I have compared this modular home to the following sales to determine if the solar farm had any impact on the purchase price.

Adjoining Residential Sales After Solar Farm Approved

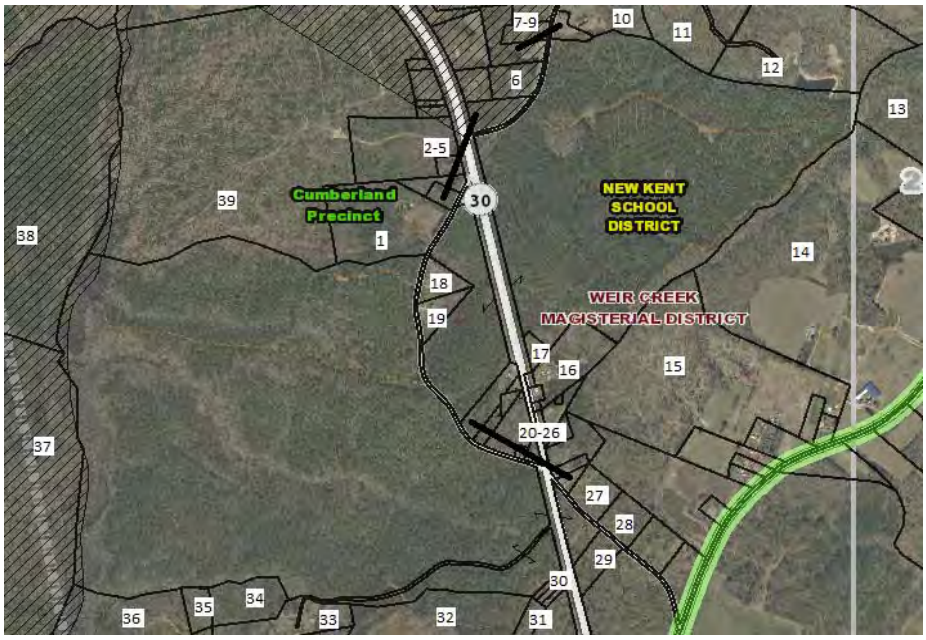
Parcel	**Solar**	**Address**	**Acres**	**Date Sold**	**Sales Price**	**Built**	**GBA**	**$/GBA**	**BR/BA**	**Park**	**Style**	**Other**
16	Adjoins	499 Herring	2.03	9/27/2017	$215,000	2017	2,356	$91.26	4/3	Drive	Modular	
	Not	678 WC	6.32	3/8/2019	$226,000	1995	1,848	$122.29	3/2.5	Det Gar	Mobile	Ag bldgs
	Not	1810 Bay V	8.70	3/26/2018	$170,000	2003	2,356	$72.16	3/2	Drive	Mobile	Ag bldgs
	Not	1795 Bay V	1.78	12/1/2017	$194,000	2017	1,982	$97.88	4/3	Drive	Modular	

Adjoining Residential Sales Af			**Adjoining Sales Adjusted**									**Avg**	
Parcel	**Solar**	**Address**	**Time**	**Site**	**YB**	**GLA**	**BR/BA**	**Park**	**Other**	**Total**	**% Diff**	**% Diff**	**Distance**
16	Adjoins	499 Herring								$215,000			488
	Not	678 WC	-$10,037	-$25,000	$24,860	$37,275	-$5,000	-$7,500	-$20,000	$220,599	-3%		
	Not	1810 Bay V	-$2,579	-$20,000	$11,900	$0				$159,321	26%		
	Not	1795 Bay V	-$1,063		$0	$21,964				$214,902	0%		
												8%	

The best comparable is 1795 Bay Valley as it required the least adjustment and was therefore most similar, which shows a 0% impact. This signifies no impact related to the solar farm.

The range of impact identified by these matched pairs ranges are therefore -3% to +26% with an average of +8% for the home and an average of +4% for the lot, though the best indicator for the lot shows a $5,000 difference in the lot value due to the proximity to the solar farm or a -12% impact.

13. Matched Pair – Walker-Correctional Solar, Barham Road, Barhamsville, VA



This project was built in 2017 and located on 484.65 acres for a 20 MW with the closest home at 110 feet from the closest solar panel with an average distance of 500 feet.

I considered the recent sale identified on the map above as Parcel 19, which is directly across the street and based on the map shown on the following page is 250 feet from the closest panel. A

limited buffering remains along the road with natural growth being encouraged, but currently the panels are visible from the road. Alex Uminski, SRA with MGMiller Valuations in Richmond VA confirmed this sale with the buying and selling broker. The selling broker indicated that the solar farm was not a negative influence on this sale and in fact the buyer noticed the solar farm and then discovered the listing. The privacy being afforded by the solar farm was considered a benefit by the buyer. I used a matched pair analysis with a similar sale nearby as shown below and found no negative impact on the sales price. Property actually closed for more than the asking price. The landscaping buffer is considered light.

Adjoining Residential Sales After Solar Farm Approved

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
Adjoins	5241 Barham	2.65	10/18/2018	$264,000	2007	1,660	$159.04	3/2	Drive	Ranch	Modular
Not	17950 New Kent	5.00	9/5/2018	$290,000	1987	1,756	$165.15	3/2.5	3 Gar	Ranch	
Not	9252 Ordinary	4.00	6/13/2019	$277,000	2001	1,610	$172.05	3/2	1.5-Gar	Ranch	
Not	2416 W Miller	1.04	9/24/2018	$299,000	1999	1,864	$160.41	3/2.5	Gar	Ranch	

Adjoining Sales Adjusted

Solar	Address	Time	Ac/Loc	YB	GLA	BR/BA	Park	Other	Total	% Diff	Dist
Adjoins	5241 Barham								$264,000		250
Not	17950 New Kent		-$8,000	$29,000	-$4,756	-$5,000	-$20,000	-$15,000	$266,244	-1%	
Not	9252 Ordinary	-$8,310	-$8,000	$8,310	$2,581		-$10,000	-$15,000	$246,581	7%	
Not	2416 W Miller		$8,000	$11,960	-$9,817	-$5,000	-$10,000	-$15,000	$279,143	-6%	
								Average Diff		0%	

I also spoke with Patrick W. McCrerey of Virginia Estates who was marketing a property that sold at 5300 Barham Road adjoining the Walker-Correctional Solar Farm. He indicated that this property was unique with a home built in 1882 and heavily renovated and updated on 16.02 acres. The solar farm was through the woods and couldn't be seen by this property and it had no impact on marketing this property. This home sold on April 26, 2017 for $358,000. I did not set up any matched pairs for this property since it is a unique property that any such comparison would be difficult to rely on. The broker's comments do support the assertion that the adjoining solar farm had no impact on value. The home in this case was 510 feet from the closest panel.

14. Matched Pair – Innovative Solar 46, Roslin Farm Rd, Hope Mills, NC

This project was built in 2016 and located on 532 acres for a 78.5 MW solar farm with the closest home at 125 feet from the closest solar panel with an average distance of 423 feet.

I considered the recent sale of a home on Roslin Farm Road just north of Running Fox Road as shown below. This sale supports an indication of no impact on property value. The landscaping buffer is considered light.

Adjoining Residential Sales After Solar Farm Approved

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other	Distance
Adjoins	6849 Roslin Farm	1.00	2/18/2019	$155,000	1967	1,610	$96.27	3/3	Drive	Ranch	Brick	435
Not	6592 Sim Canady	2.43	9/5/2017	$185,000	1974	2,195	$84.28	3/2	Gar	Ranch	Brick	
Not	1614 Joe Hall	1.63	9/3/2019	$145,000	1974	1,674	$86.62	3/2	Det Gar	Ranch	Brick	
Not	109 Bledsoe	0.68	1/17/2019	$150,000	1973	1,663	$90.20	3/2	Gar	Ranch	Brick	

Solar	Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff
Adjoins	6849 Roslin Farm								$155,000		5%
Not	6592 Sim Canady	$8,278		-$6,475	-$39,444	$10,000	-$5,000		$152,359	2%	
Not	1614 Joe Hall	-$2,407		-$5,075	-$3,881	$10,000	-$2,500		$141,137	9%	
Not	109 Bledsoe	$404	$10,000	-$4,500	-$3,346		-$5,000		$147,558	5%	

15. Matched Pair – Innovative Solar 42, County Line Rd, Fayetteville, NC

This project was built in 2017 and located on 413.99 acres for a 71 MW with the closest home at 135 feet from the closest solar panel with an average distance of 375 feet.

I considered the recent sales identified on the map above as Parcels 2 and 3, which is directly across the street these homes are 330 and 340 feet away. Parcel 2 includes an older home built in 1976, while Parcel 3 is a new home built in 2019. So the presence of the solar farm had no impact on new construction in the area.

The matched pairs for each of these are shown below. The landscaping buffer relative to these parcels is considered light.

Adjoining Residential Sales After Solar Farm Approved

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other	Distance
Adjoins	2923 County Ln	8.98	2/28/2019	$385,000	1976	2,905	$132.53	3/3	2-Car	Ranch	Brick/Pond	340
Not	1928 Shaw Mill	17.00	7/3/2019	$290,000	1977	3,001	$96.63	4/4	2-Car	Ranch	Brick/Pond/Rental	
Not	2109 John McM.	7.78	4/25/2018	$320,000	1978	2,474	$129.35	3/2	Det Gar	Ranch	Vinyl/Pool,Stable	

Solar	Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff
Adjoins	2923 County Ln								$385,000		3%
Not	1928 Shaw Mill	-$3,055	$100,000	-$1,450	-$7,422	-$10,000			$368,074	4%	
Not	2109 John McM.	$8,333		-$3,200	$39,023	$10,000		$5,000	$379,156	2%	

Adjoining Residential Sales After Solar Farm Approved

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other	Distance
Adjoins	2935 County Ln	1.19	6/18/2019	$266,000	2019	2,401	$110.79	4/3	Gar	2-Story		330
Not	3005 Hemingway	1.17	5/16/2019	$269,000	2018	2,601	$103.42	4/3	Gar	2-Story		
Not	7031 Glynn Mill	0.60	5/8/2018	$255,000	2017	2,423	$105.24	4/3	Gar	2-Story		
Not	5213 Bree Brdg	0.92	5/7/2019	$260,000	2018	2,400	$108.33	4/3	3-Gar	2-Story		

Solar	Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff
Adjoins	2935 County Ln								$266,000		3%
Not	3005 Hemingway	$748		$1,345	-$16,547				$254,546	4%	
Not	7031 Glynn Mill	$8,724		$2,550	-$1,852				$264,422	1%	
Not	5213 Bree Brdg	$920		$1,300	$76			-$10,000	$252,296	5%	

Both of these matched pairs adjust to an average of +3% on impact for the adjoining solar farm, meaning there is a slight positive impact due to proximity to the solar farm. This is within the standard +/- of typical real estate transactions, which strongly suggests no impact on property value. I noted specifically that for 2923 County Line Road, the best comparable is 2109 John McMillan as it does not have the additional rental unit on it. I made no adjustment to the other sale for the value of that rental unit, which would have pushed the impact on that comparable downward – meaning there would have been a more significant positive impact.

16. Matched Pair – Sunfish Farm, Keenebec Rd, Willow Spring, NC

This project was built in 2015 and located on 49.6 acres (with an inset 11.25-acre parcel) for a 6.4 MW project with the closest home at 135 feet with an average distance of 105 feet.

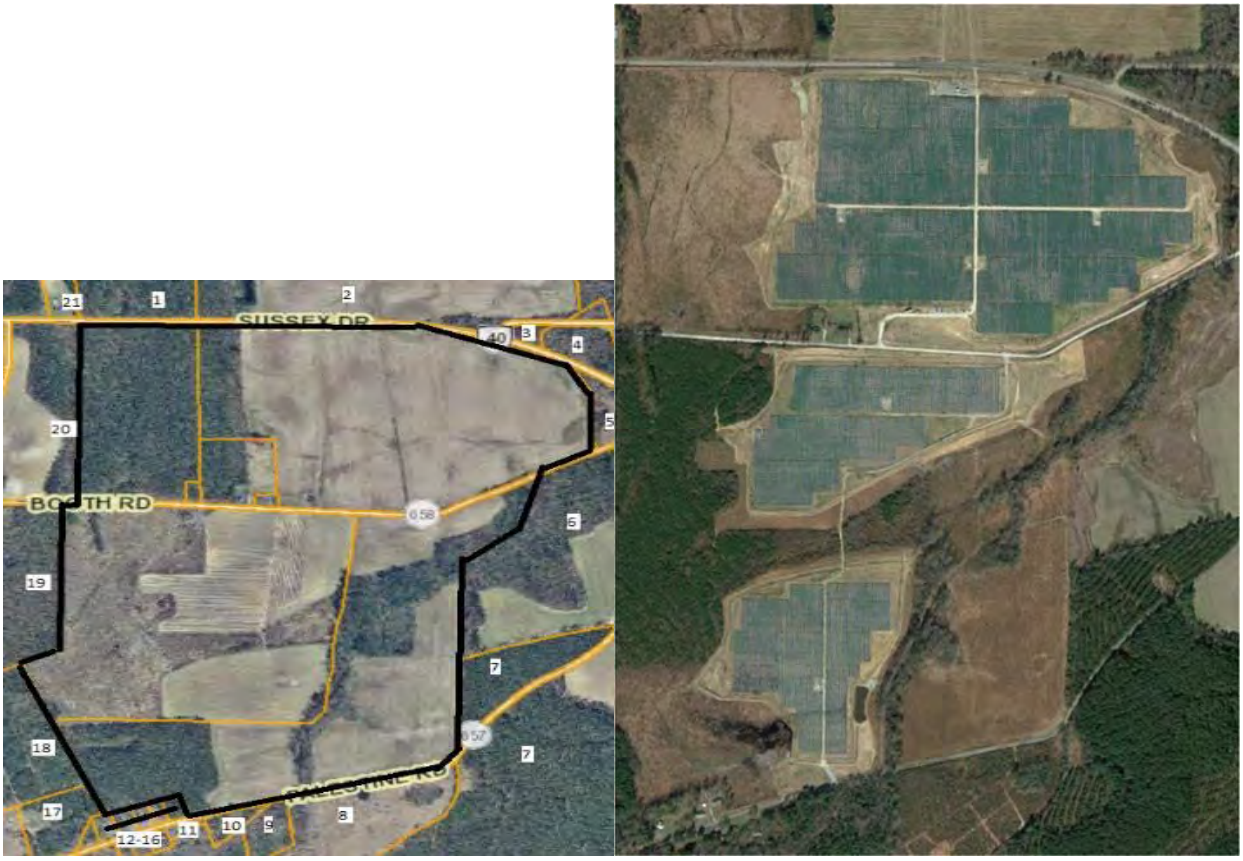
I considered the 2017 sale identified on the map above, which is 205 feet away from the closest panel. The matched pairs for each of these are shown below followed by a more recent map showing the panels at this site. The average difference in the three comparables and the subject property is +3% after adjusting for differences in the sales date, year built, gross living area, and other minor differences. This data is supported by the comments from the broker Brian Schroepfer with Keller Williams that the solar farm had no impact on the purchase price. The landscaping screen is considered light.

Adjoining Residential Sales After Solar Farm Approved

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style
	Adjoins	7513 Glen Willow	0.79	9/1/2017	$185,000	1989	1,492	$123.99	3/2	Gar	BR/Rnch
	Not	2968 Tram	0.69	7/17/2017	$155,000	1984	1,323	$117.16	3/2	Drive	BR/Rnch
	Not	205 Pine Burr	0.97	12/29/2017	$191,000	1991	1,593	$119.90	3/2.5	Drive	BR/Rnch
	Not	1217 Old Honeycutt	1.00	12/15/2017	$176,000	1978	1,558	$112.97	3/2.5	2Carprt	VY/Rnch

Adjustments											Avg
Solar	Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	% Diff
Adjoins	7513 Glen Willow								$185,000		
Not	2968 Tram	$601		$3,875	$15,840		$10,000		$185,316	0%	
Not	205 Pine Burr	-$1,915		-$1,910	-$9,688	-$5,000			$172,487	7%	
Not	1217 Old Honeycutt	-$1,557		$9,680	-$5,965	-$5,000		$5,280	$178,438	4%	
											3%

17. Matched Pair – Sappony Solar, Sussex County, VA



This project is a 30 MW facility located on a 322.68-acre tract that was built in the fourth quarter of 2017.

I have considered the 2018 sale of Parcel 17 as shown below. This was a 1,900 s.f. manufactured home on a 6.00-acre lot that sold in 2018. I have compared that to three other nearby manufactured homes as shown below. The range of impacts is within typical market variation with an average of -1%, which supports a conclusion of no impact on property value. The landscaping buffer is considered medium.

Adjoining Residential Sales After Solar Farm Approved

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GLA	BR/BA	Park	Style	Other
	Adjoins	12511 Palestine	6.00	7/31/2018	$128,400	2013	1,900	$67.58	4/2.5	Open	Manuf	
	Not	15698 Concord	3.92	7/31/2018	$150,000	2010	2,310	$64.94	4/2	Open	Manuf	Fence
	Not	23209 Sussex	1.03	7/7/2020	$95,000	2005	1,675	$56.72	3/2	Det Crpt	Manuf	
	Not	6494 Rocky Br	4.07	11/8/2018	$100,000	2004	1,405	$71.17	3/2	Open	Manuf	

Adjoining Sales Adjusted									Avg	
Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	% Diff	Distance
							$128,400			1425
$0		$2,250	-$21,299	$5,000			$135,951	-6%		
-$5,660	$13,000	$3,800	$10,209	$5,000	$1,500		$122,849	4%		
-$843		$4,500	$28,185				$131,842	-3%		
									-1%	

18. Matched Pair – Camden Dam, Camden, NC

This 5 MW project was built in 2019 and located on a portion of 49.83 acres.

Parcel 1 noted above along with the home on the adjoining parcel to the north of that parcel sold in late 2018 after this solar farm was approved but prior to construction being completed in 2019. I have considered this sale as shown below. The landscaping screen is considered light.

The comparable at 548 Trotman is the most similar and required the least adjustment shows no impact on property value. The other two comparables were adjusted consistently with one showing significant enhancement and another as showing a mild negative. The best indication is the one requiring the least adjustment. The other two sales required significant site adjustments which make them less reliable. The best comparable and the average of these comparables support a finding of no impact on property value.

Adjoining Residential Sales After Solar Farm Approved

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GLA	BR/BA	Park	Style	Other
Adjoins	122 N Mill Dam	12.19	11/29/2018	$350,000	2005	2,334	$149.96	3/3.5	3-Gar	Ranch	
Not	548 Trotman	12.10	5/31/2018	$309,000	2007	1,960	$157.65	4/2	Det2G	Ranch	Wrkshp
Not	198 Sand Hills	2.00	12/22/2017	$235,000	2007	2,324	$101.12	4/3	Open	Ranch	
Not	140 Sleepy Hlw	2.05	8/12/2019	$330,000	2010	2,643	$124.86	4/3	1-Gar	1.5 Story	

Adjoining Sales Adjusted

Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
122 N Mill Dam								$350,000			342
548 Trotman	$6,163		-$3,090	$35,377	$5,000			$352,450	-1%		
198 Sand Hills	$8,808	$45,000	-$2,350	$607		$30,000		$317,064	9%		
140 Sleepy Hlw	-$9,258	$45,000	-$8,250	-$23,149	$5,000	$30,000		$369,343	-6%		
										1%	

19. Matched Pair – Grandy Solar, Grandy, NC

This 20 MW project was built in 2019 and located on a portion of 121 acres.

Parcels 40 and 50 have sold since construction began on this solar farm. I have considered both in matched pair analysis below. I note that the marketing for Parcel 40 (120 Par Four) identified the lack of homes behind the house as a feature in the listing. The marketing for Parcel 50 (269 Grandy) identified the property as "very private." Landscaping for both of these parcels is considered light.

Adjoining Residential Sales After Solar Farm Approved

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GLA	BR/BA	Park	Style	Other
Adjoins	120 Par Four	0.92	8/17/2019	$315,000	2006	2,188	$143.97	4/3	2-Gar	1.5 Story	Pool
Not	102 Teague	0.69	1/5/2020	$300,000	2005	2,177	$137.80	3/2	Det 3G	Ranch	
Not	112 Meadow Lk	0.92	2/28/2019	$265,000	1992	2,301	$115.17	3/2	Gar	1.5 Story	
Not	116 Barefoot	0.78	9/29/2020	$290,000	2004	2,192	$132.30	4/3	2-Gar	2 Story	

Adjoining Sales Adjusted

Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
120 Par Four								$315,000			405
102 Teague	-$4,636		$1,500	$910	$10,000		$20,000	$327,774	-4%		
112 Meadow Lk	$4,937		$18,550	-$7,808	$10,000	$10,000	$20,000	$320,679	-2%		
116 Barefoot	-$12,998		$2,900	-$318			$20,000	$299,584	5%		
										0%	

Adjoining Residential Sales After Solar Farm Approved

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GLA	BR/BA	Park	Style	Other
Adjoins	269 Grandy	0.78	5/7/2019	$275,000	2019	1,535	$179.15	3/2.5	2-Gar	Ranch	
Not	307 Grandy	1.04	10/8/2018	$240,000	2002	1,634	$146.88	3/2	Gar	1.5 Story	
Not	103 Branch	0.95	4/22/2020	$230,000	2000	1,532	$150.13	4/2	2-Gar	1.5 Story	
Not	103 Spring Lf	1.07	8/14/2018	$270,000	2002	1,635	$165.14	3/2	2-Gar	Ranch	Pool

Adjoining Sales Adjusted

Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
269 Grandy								$275,000			477
307 Grandy	$5,550		$20,400	-$8,725	$5,000	$10,000		$272,225	1%		
103 Branch	-$8,847		$21,850	$270				$243,273	12%		
103 Spring Lf	$7,871		$22,950	-$9,908	$5,000		-$20,000	$275,912	0%		
										4%	

Both of these matched pairs support a finding of no impact on value. This is reinforced by the listings for both properties identifying the privacy due to no housing in the rear of the property as part of the marketing for these homes.

20. Matched Pair – Champion Solar, Lexington County, SC

This project is a 10 MW facility located on a 366.04-acre tract that was built in 2017.

I have considered the 2020 sale of an adjoining home located off 517 Old Charleston Road. Landscaping is considered light.

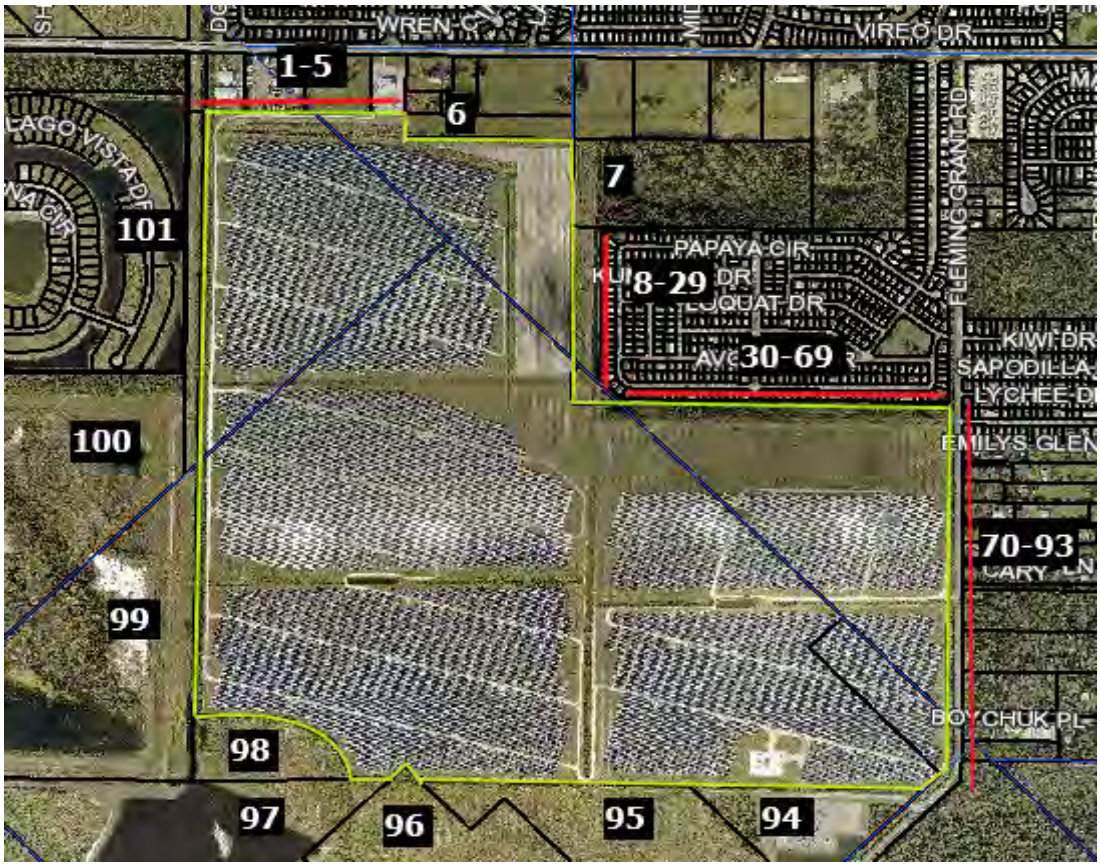
Adjoining Residential Sales After Solar Farm Approved

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
Adjoins	517 Old Charleston	11.05	8/25/2020	$110,000	1962	925	$118.92	3/1	Crport	Br Rnch	
Not	133 Buena Vista	2.65	6/21/2020	$115,000	1979	1,104	$104.17	2/2	Crport	Br Rnch	
Not	214 Crystal Spr	2.13	6/10/2019	$102,500	1970	1,025	$100.00	3/2	Crport	Rnch	
Not	1429 Laurel	2.10	2/21/2019	$126,000	1960	1,250	$100.80	2/1.5	Open	Br Rnch	3 Gar/Brn

Adjoining Sales Adjusted

Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
517 Old Charleston								$110,000			505
133 Buena Vista	$410	$17,000	-$9,775	-$14,917	-$10,000			$97,718	11%		
214 Crystal Spr	$2,482	$18,000	-$4,100	-$8,000	-$10,000		$10,000	$110,882	-1%		
1429 Laurel	$3,804	$18,000	$1,260	-$26,208	-$5,000	$5,000	-$15,000	$107,856	2%		
										4%	

21. Matched Pair – Barefoot Bay Solar Farm, Barefoot Bay, FL



This project is located on 504 acres for a 74.5 MW facility. Most of the adjoining uses are medium density residential with some lower density agricultural uses to the southwest. This project was built in 2018. There is a new subdivision under development to the west.

I have considered a number of recent home sales from the Barefoot Bay Golf Course in the Barefoot Bay Recreation District. There are a number of sales of these mobile/manufactured homes along the eastern boundary and the lower northern boundary. I have compared those home sales to other similar homes in the same community but without the exposure to the solar farm. Staying within the same community keeps location and amenity impacts consistent. I did avoid any comparison with home sales with golf course or lakefront views as that would introduce another variable.

The six manufactured/double wide homes shown below were each compared to three similar homes in the same community and are consistently showing no impact on the adjoining property values. Based on the photos from the listings, there is limited but some visibility of the solar farm to the east, but the canal and landscaping between are providing a good visual buffer and actually are commanding a premium over the non-canal homes.

Landscaping for these adjoining homes is considered light, though photographs from the listings show that those homes on Papaya that adjoin the solar farm from east/west have no visibility of the solar farm and is effectively medium density due to the height differential. The homes that adjoin the solar farm from north/south along Papaya have some filtered view of the solar farm through the trees.

Adjoining Residential Sales After Solar Farm Approved

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GLA	BR/BA	Park	Style	Other
14	Adjoins	465 Papaya Cr	0.12	7/21/2019	$155,000	1993	1,104	$140.40	2/2	Drive	Manuf	Canal
	Not	1108 Navajo	0.14	2/27/2019	$129,000	1984	1,220	$105.74	2/2	Crprt	Manuf	Canal
	Not	1007 Barefoot	0.11	9/3/2020	$168,000	2005	1,052	$159.70	2/2	Crprt	Manuf	Canal
	Not	1132 Waterway	0.11	7/10/2020	$129,000	1982	1,012	$127.47	2/2	Crprt	Manuf	Canal

Adjoining Sales Adjusted

Address	Time	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
465 Papaya Cr							$155,000			765
1108 Navajo	$1,565	$5,805	-$9,812				$126,558	18%		
1007 Barefoot	-$5,804	-$10,080	$6,643				$158,759	-2%		
1132 Waterway	-$3,859	$7,095	$9,382				$141,618	9%		
									8%	

Adjoining Residential Sales After Solar Farm Approved

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GLA	BR/BA	Park	Style	Other
19	Adjoins	455 Papaya	0.12	9/1/2020	$183,500	2005	1,620	$113.27	3/2	Crprt	Manuf	Canal
	Not	938 Waterway	0.11	2/12/2020	$160,000	1986	1,705	$93.84	2/2	Crprt	Manuf	Canal
	Not	719 Barefoot	0.12	4/14/2020	$150,000	1996	1,635	$91.74	3/2	Crprt	Manuf	Canal
	Not	904 Fir	0.17	9/27/2020	$192,500	2010	1,626	$118.39	3/2	Crprt	Manuf	Canal

Adjoining Sales Adjusted

Address	Time	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
455 Papaya							$183,500			750
938 Waterway	$2,724	$15,200	-$6,381				$171,542	7%		
719 Barefoot	$1,770	$6,750	-$1,101				$157,419	14%		
904 Fir	-$422	-$4,813	-$568				$186,697	-2%		
									6%	

Adjoining Residential Sales After Solar Farm Approved

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GLA	BR/BA	Park	Style	Other
37	Adjoins	419 Papaya	0.09	7/16/2019	$127,500	1986	1,303	$97.85	2/2	Crprt	Manuf	Green
	Not	865 Tamarind	0.12	2/4/2019	$133,900	1995	1,368	$97.88	2/2	Crprt	Manuf	Green
	Not	501 Papaya	0.10	6/15/2018	$109,000	1986	1,234	$88.33	2/2	Crprt	Manuf	
	Not	418 Papaya	0.09	8/28/2019	$110,000	1987	1,248	$88.14	2/2	Crprt	Manuf	

Adjoining Sales Adjusted

Address	Time	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
419 Papaya							$127,500			690
865 Tamarind	$1,828	-$6,026	-$5,090				$124,613	2%		
501 Papaya	$3,637	$0	$4,876			$5,000	$122,513	4%		
418 Papaya	-$399	-$550	$3,878			$5,000	$117,930	8%		
									5%	

Adjoining Residential Sales After Solar Farm Approved

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GLA	BR/BA	Park	Style	Other
39	Adjoins	413 Papaya	0.09	7/16/2020	$130,000	2001	918	$141.61	2/2	Crprt	Manuf	Grn/Upd
	Not	341 Loquat	0.09	2/3/2020	$118,000	1985	989	$119.31	2/2	Crprt	Manuf	Full Upd
	Not	1119 Pocatella	0.19	1/5/2021	$120,000	1993	999	$120.12	2/2	Crprt	Manuf	Green
	Not	1367 Barefoot	0.10	1/12/2021	$130,500	1987	902	$144.68	2/2	Crprt	Manuf	Green/Upd

Adjoining Sales Adjusted

Address	Time	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
413 Papaya							$130,000			690
341 Loquat	$1,631	$9,440	-$6,777				$122,294	6%		
1119 Pocatella	-$1,749	$4,800	-$7,784			$5,000	$120,267	7%		
1367 Barefoot	-$1,979	$9,135	$1,852				$139,507	-7%		
									2%	

Adjoining Residential Sales After Solar Farm Approved

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GLA	BR/BA	Park	Style	Other
48	Adjoins	343 Papaya	0.09	12/17/2019	$145,000	1986	1,508	$96.15	3/2	Crprt	Manuf	Gn/Fc/Upd
	Not	865 Tamarind	0.12	2/4/2019	$133,900	1995	1,368	$97.88	2/2	Crprt	Manuf	Green
	Not	515 Papaya	0.09	3/22/2018	$145,000	2005	1,376	$105.38	3/2	Crprt	Manuf	Green
	Not	849 Tamarind	0.15	6/26/2019	$155,000	1997	1,716	$90.33	3/2	Crprt	Manuf	Grn/Fnce

Adjoining Sales Adjusted

Address	Time	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
343 Papaya							$145,000			690
865 Tamarind	$3,566	-$6,026	$10,963				$142,403	2%		
515 Papaya	$7,759	-$13,775	$11,128				$150,112	-4%		
849 Tamarind	$2,273	-$8,525	-$15,030			$5,000	$138,717	4%		
									1%	

Adjoining Residential Sales After Solar Farm Approved

Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GLA	BR/BA	Park	Style	Other
52	Nearby	335 Papaya	0.09	4/17/2018	$110,000	1987	1,180	$93.22	2/2	Crprt	Manuf	Green
	Not	865 Tamarind	0.12	2/4/2019	$133,900	1995	1,368	$97.88	2/2	Crprt	Manuf	Green
	Not	501 Papaya	0.10	6/15/2018	$109,000	1986	1,234	$88.33	2/2	Crprt	Manuf	
	Not	604 Puffin	0.09	10/23/2018	$110,000	1988	1,320	$83.33	2/2	Crprt	Manuf	

Adjoining Sales Adjusted

Address	Time	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
335 Papaya							$110,000			710
865 Tamarind	-$3,306	-$5,356	-$14,721			$0	$110,517	0%		
501 Papaya	-$542	$545	-$3,816			$5,000	$110,187	0%		
604 Puffin	-$1,752	-$550	-$9,333			$5,000	$103,365	6%		
									2%	

I also identified a new subdivision being developed just to the west of this solar farm called The Lakes at Sebastian Preserve. These are all canal-lot homes that are being built with homes starting at $271,000 based on the website and closed sales showing up to $342,000. According to Monique, the onsite broker with Holiday Builders, the solar farm is difficult to see from the lots that back up to that area and she does not anticipate any difficulty in selling those future homes or lots or any impact on the sales price. The closest home that will be built in this development will be approximately 340 feet from the nearest panel.

Based on the closed home prices in Barefoot Bay as well as the broker comments and activity at The Lakes at Sebastian Preserve, the data around this solar farm strongly indicates no negative impact on property value.

22. Matched Pair – Miami-Dade Solar Farm, Miami, FL

This project is located on 346.80 acres for a 74.5 MW facility. All of the adjoining uses are agricultural and residential. This project was built in 2019.

I considered the recent sale of Parcel 26 to the south that sold for over $1.6 million dollars. This home is located on 4.2 acres with additional value in the palm trees according to the listing. The comparables include similar homes nearby that are all actually on larger lots and several include avocado or palm tree income as well. All of the comparables are in similar proximity to the subject and all have similar proximity to the Miami-Dade Executive airport that is located 2.5 miles to the east.

These sales are showing no impact on the value of the property from the adjoining solar farm. The landscaping is considered light.

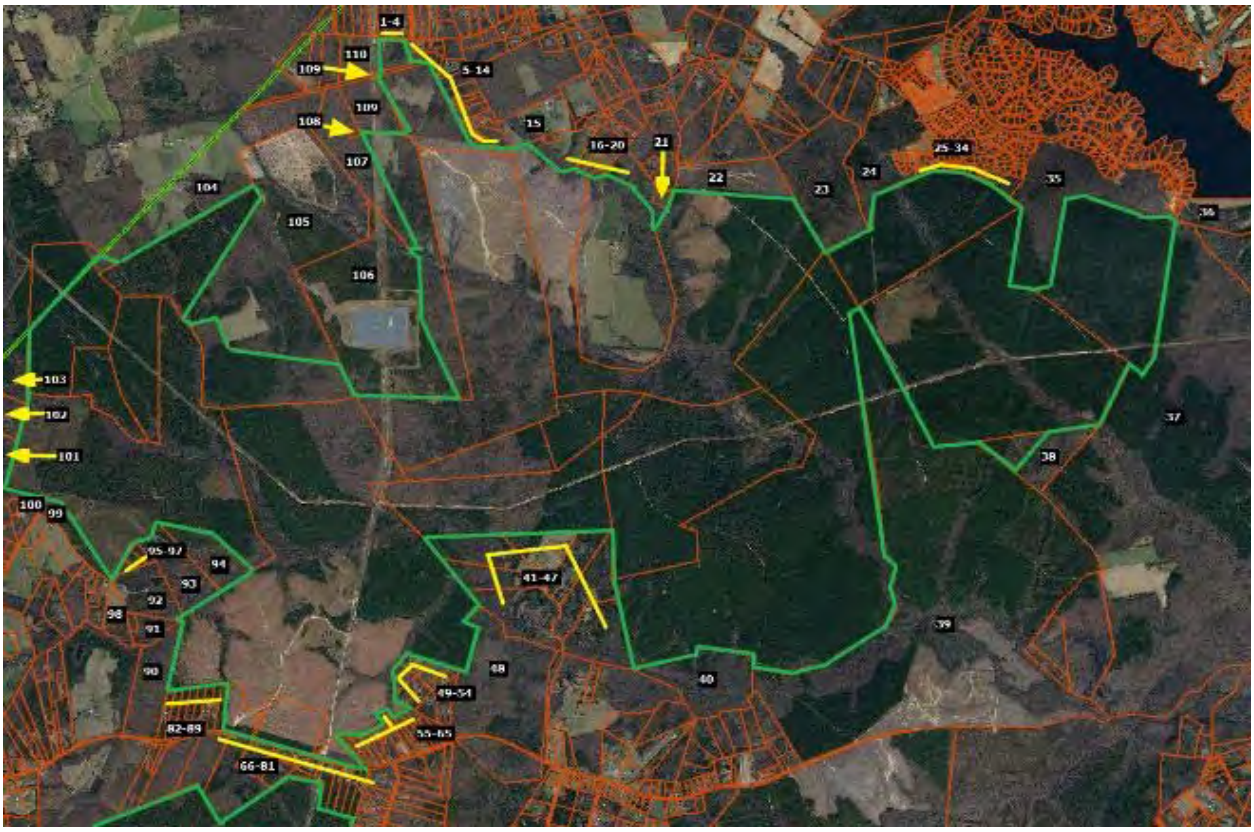
Adjoining Residential Sales After Solar Farm Approved

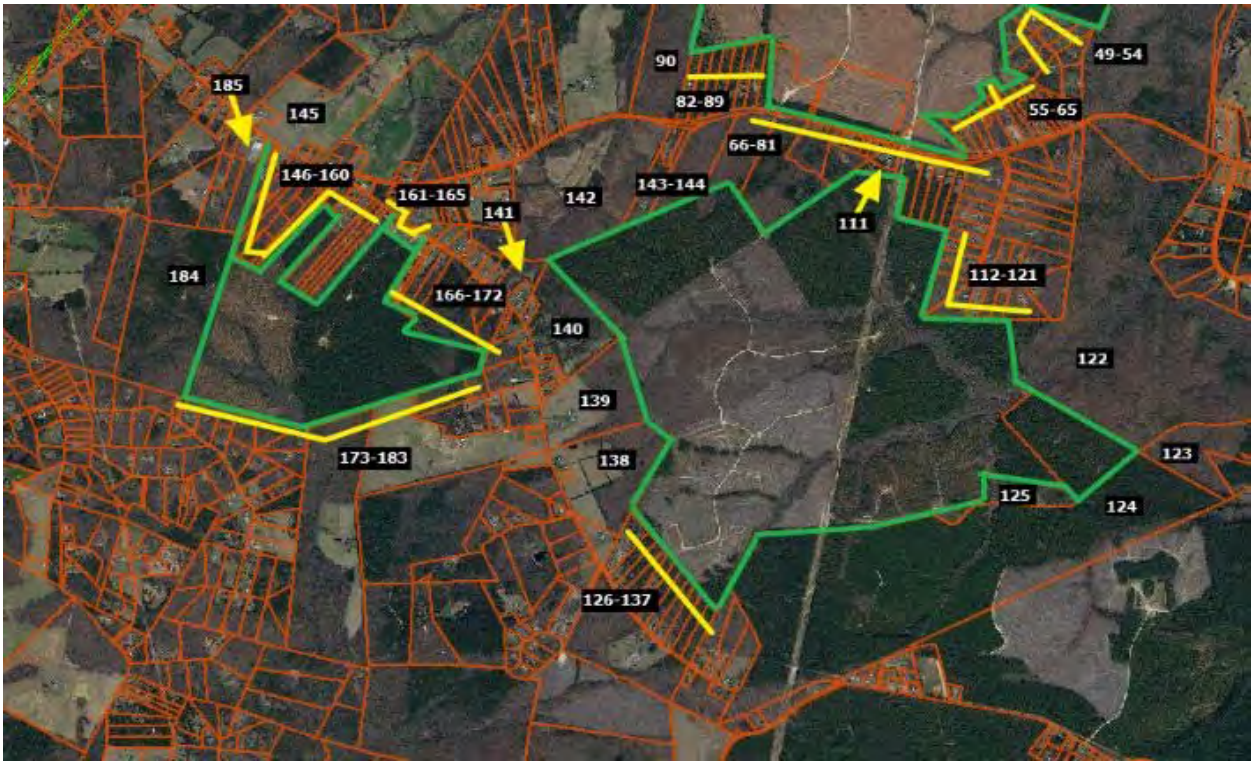
Parcel	Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GLA	BR/BA	Park	Style	Other
26	Adjoins	13600 SW 182nd	4.20	11/5/2020	$1,684,000	2008	6,427	$262.02	5/5.5	3 Gar	CBS Rnch	Pl/Guest
	Not	18090 SW 158th	5.73	10/8/2020	$1,050,000	1997	3,792	$276.90	5/4	3 Gar	CBS Rnch	
	Not	14311 SW 187th	4.70	10/22/2020	$1,100,000	2005	3,821	$287.88	6/5	3 Gar	CBS Rnch	Pool
	Not	17950 SW 158th	6.21	10/22/2020	$1,730,000	2000	6,917	$250.11	6/5.5	2 Gar	CBS Rnch	Pool

Adjoining Sales Adjusted

Address	Time	Site	YB	GLA	BR/BA	Park	Other	Total	% Diff	Avg % Diff	Distance
13600 SW 182nd								$1,684,000			1390
18090 SW 158th	$2,478		$57,750	$583,703	$30,000			$1,723,930	-2%		
14311 SW 187th	$1,298		$16,500	$600,178	$10,000			$1,727,976	-3%		
17950 SW 158th	$2,041		$69,200	-$98,043		$10,000		$1,713,199	-2%		
										-2%	

23. Matched Pair – Spotsylvania Solar, Paytes, VA





This solar farm is being built in four phases with the area known as Site C having completed construction in November 2020 after the entire project was approved in April 2019. Site C, also known as Pleinmont 1 Solar, includes 99.6 MW located in the southeast corner of the project and shown on the maps above with adjoining parcels 111 through 144. The entire Spotsylvania project totals 617 MW on 3500 acres out of a parent tract assemblage of 6,412 acres.

I have identified three adjoining home sales that occurred during construction and development of the site in 2020.

The first is located on the north side of Site A on Orange Plank Road. The second is located on Nottoway Lane just north of Caparthin Road on the south side of Site A and east of Site C. The third is located on Post Oak Road for a home that backs up to Site C that sold in September 2020 near the completion of construction for Site C.

Spotsylvania Solar Farm

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
Adjoins	12901 Orng Plnk	5.20	8/27/2020	$319,900	1984	1,714	$186.64	3/2	Drive	1.5	Un Bsmt
Not	8353 Gold Dale	3.00	1/27/2021	$415,000	2004	2,064	$201.07	3/2	3 Gar	Ranch	
Not	6488 Southfork	7.26	9/9/2020	$375,000	2017	1,680	$223.21	3/2	2 Gar	1.5	Barn/Patio
Not	12717 Flintlock	0.47	12/2/2020	$290,000	1990	1,592	$182.16	3/2.5	Det Gar	Ranch	

Adjoining Sales Adjusted

Address	Time	Ac/Loc	YB	GLA	BR/BA	Park	Other	Total	% Diff	Dist
12901 Orng Plnk								$319,900		1270
8353 Gold Dale	-$5,219	$20,000	-$41,500	-$56,298		-$20,000		$311,983	2%	
6488 Southfork	-$401	-$20,000	-$61,875	$6,071		-$15,000		$283,796	11%	
12717 Flintlock	-$2,312	$40,000	-$8,700	$17,779	-$5,000	-$5,000		$326,767	-2%	
							Average Diff		4%	

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
Adjoins	9641 Nottoway	11.00	5/12/2020	$449,900	2004	3,186	$141.21	4/2.5	Garage	2-Story	Un Bsmt
Not	26123 Lafayette	1.00	8/3/2020	$390,000	2006	3,142	$124.12	3/3.5	Gar/DtG	2-Story	
Not	11626 Forest	5.00	8/10/2020	$489,900	2017	3,350	$146.24	4/3.5	2 Gar	2-Story	
Not	10304 Pny Brnch	6.00	7/27/2020	$485,000	1998	3,076	$157.67	4/4	2Gar/Dt2	Ranch	Fn Bsmt

Adjoining Sales Adjusted

Address	Time	Ac/Loc	YB	GLA	BR/BA	Park	Other	Total	% Diff	Dist
9641 Nottoway								$449,900		1950
26123 Lafayette	-$2,661	$45,000	-$3,900	$4,369	-$10,000	-$5,000		$417,809	7%	
11626 Forest	-$3,624		-$31,844	-$19,187		-$5,000		$430,246	4%	
10304 Pny Brnch	-$3,030		$14,550	$13,875	-$15,000	-$15,000	-$10,000	$470,396	-5%	
							Average Diff		2%	

Solar	Address	Acres	Date Sold	Sales Price	Built	GBA	$/GBA	BR/BA	Park	Style	Other
Adjoins	13353 Post Oak	5.20	9/21/2020	$300,000	1992	2,400	$125.00	4/3	Drive	2-Story	Fn Bsmt
Not	9609 Logan Hgt	5.86	7/4/2019	$330,000	2004	2,352	$140.31	3/2	2Gar	2-Story	
Not	12810 Catharpian	6.18	1/30/2020	$280,000	2008	2,240	$125.00	4/2.5	Drive	2-Story	Bsmt/Nd Pnt
Not	10725 Rbrt Lee	5.01	10/26/2020	$295,000	1995	2,166	$136.20	4/3	Gar	2-Story	Fn Bsmt

Adjoining Sales Adjusted

Address	Time	Ac/Loc	YB	GLA	BR/BA	Park	Other	Total	% Diff	Dist
13353 Post Oak								$300,000		1171
9609 Logan Hgt	$12,070		-$19,800	$5,388		-$15,000	$15,000	$327,658	-9%	
12810 Catharpian	$5,408		-$22,400	$16,000	$5,000		$15,000	$299,008	0%	
10725 Rbrt Lee	-$849		-$4,425	$25,496		-$10,000		$305,222	-2%	
							Average Diff		-4%	

All three of these homes are well set back from the solar panels at distances over 1,000 feet and are well screened from the project. All three show no indication of any impact on property value.

There are a couple of recent lot sales located along Southview Court that have sold since the solar farm was approved. The most recent lot sales include 11700 Southview Court that sold on December 29, 2021 for $140,000 for a 0.76-acre lot. This property was on the market for less than 2 months before closing within 6% of the asking price. This lot sold earlier in September 2019 for $55,000 based on a liquidation sale from NTS to an investor.

A similar 0.68-acre lot at 11507 Stonewood Court within the same subdivision located away from the solar farm sold on March 9, 2021 for $109,000. This lot sold for 18% over the asking price within 1 month of listing suggesting that this was priced too low. Adjusting this lot value upward by 12% for very strong growth in the market over 2021, the adjusted indicated value is $122,080 for this lot. This is still showing a 15% premium for the lot backing up to the solar farm.

The lot at 11009 Southview Court sold on August 5, 2019 for $65,000, which is significantly lower than the more recent sales. This lot was sold by NTS the original developer of this subdivision, who was in the process of liquidating lots in this subdivision with multiple lot sales in this time period throughout the subdivision being sold at discounted prices. The home was later improved by the buyer with a home built in 2020 with 2,430 square feet ranch, 3.5 bathrooms, with a full basement, and a current assessed value of $492,300.

I spoke with Chris Kalia, MAI, Mark Doherty, local real estate investor, and Alex Doherty, broker, who are all three familiar with this subdivision and activity in this neighborhood. All three indicated that there was a deep sell off of lots in the neighborhood by NTS at discounted prices under $100,000 each. Those lots since that time are being sold for up to $140,000. The prices paid for the lots below $100,000 were liquidation values and not indicative of market value. Homes are being built in the neighborhood on those lots with home prices ranging from $600,000 to $800,000 with no sign of impact on pricing due to the solar farm according to all three sources.

Conclusion – SouthEast Over 5 MW

Southeast USA Over 5 MW
Matched Pair Summary

							Adj. Uses By Acreage				1 mile Radius (2010-2020 Data)			
	Name	City	State	Acres	MW	Topo Shift	Res	Ag	Ag/Res	Com/Ind	Pop.	Med. Income	Avg. Housing Unit	Veg. Buffer
1	AM Best	Goldsboro	NC	38	5.00	2	38%	0%	23%	39%	1,523	$37,358	$148,375	Light
2	Mulberry	Selmer	TN	160	5.00	60	13%	73%	10%	3%	467	$40,936	$171,746	Lt to Med
3	Leonard	Hughesville	MD	47	5.00	20	18%	75%	0%	6%	525	$106,550	$350,000	Light
4	Gastonia SC	Gastonia	NC	35	5.00	48	33%	0%	23%	44%	4,689	$35,057	$126,562	Light
5	Summit	Moyock	NC	2,034	80.00	4	4%	0%	94%	2%	382	$79,114	$281,731	Light
6	Tracy	Bailey	NC	50	5.00	10	29%	0%	71%	0%	312	$43,940	$99,219	Heavy
7	Manatee	Parrish	FL	1,180	75.00	20	2%	97%	1%	0%	48	$75,000	$291,667	Heavy
8	McBride	Midland	NC	627	75.00	140	12%	10%	78%	0%	398	$63,678	$256,306	Lt to Med
9	Mariposa	Stanley	NC	36	5.00	96	48%	0%	52%	0%	1,716	$36,439	$137,884	Light
10	Clarke Cnty	White Post	VA	234	20.00	70	14%	39%	46%	1%	578	$81,022	$374,453	Light
11	Simon	Social Circle	GA	237	30.00	71	1%	63%	36%	0%	203	$76,155	$269,922	Medium
12	Candace	Princeton	NC	54	5.00	22	76%	24%	0%	0%	448	$51,002	$107,171	Medium
13	Walker	Barhamsville	VA	485	20.00	N/A	12%	68%	20%	0%	203	$80,773	$320,076	Light
14	Innov 46	Hope Mills	NC	532	78.50	0	17%	83%	0%	0%	2,247	$58,688	$183,435	Light
15	Innov 42	Fayetteville	NC	414	71.00	0	41%	59%	0%	0%	568	$60,037	$276,347	Light
16	Sunfish	Willow Spring	NC	50	6.40	30	35%	35%	30%	0%	1,515	$63,652	$253,138	Light
17	Sappony	Stony Crk	VA	322	20.00	N/A	2%	98%	0%	0%	74	$51,410	$155,208	Light
18	Camden Dam	Camden	NC	50	5.00	0	17%	72%	11%	0%	403	$84,426	$230,288	Light
19	Grandy	Grandy	NC	121	20.00	10	55%	24%	0%	21%	949	$50,355	$231,408	Light
20	Champion	Pelion	SC	100	10.00	N/A	4%	70%	8%	18%	1,336	$46,867	$171,939	Light
21	Barefoot Bay	Barefoot Bay	FL	504	74.50	0	11%	87%	0%	3%	2,446	$36,737	$143,320	Lt to Med
22	Miami-Dade	Miami	FL	347	74.50	0	26%	74%	0%	0%	127	$90,909	$403,571	Light
23	Spotyslvania	Paytes	VA	3,500	617.00	160	37%	52%	11%	0%	74	$120,861	$483,333	Md to Hvy
	Average			485	57.04	38	24%	48%	22%	6%	923	$63,955	$237,700	
	Median			234	20.00	20	17%	59%	11%	0%	467	$60,037	$231,408	
	High			3,500	617.00	160	76%	98%	94%	44%	4,689	$120,861	$483,333	
	Low			35	5.00	0	1%	0%	0%	0%	48	$35,057	$99,219	

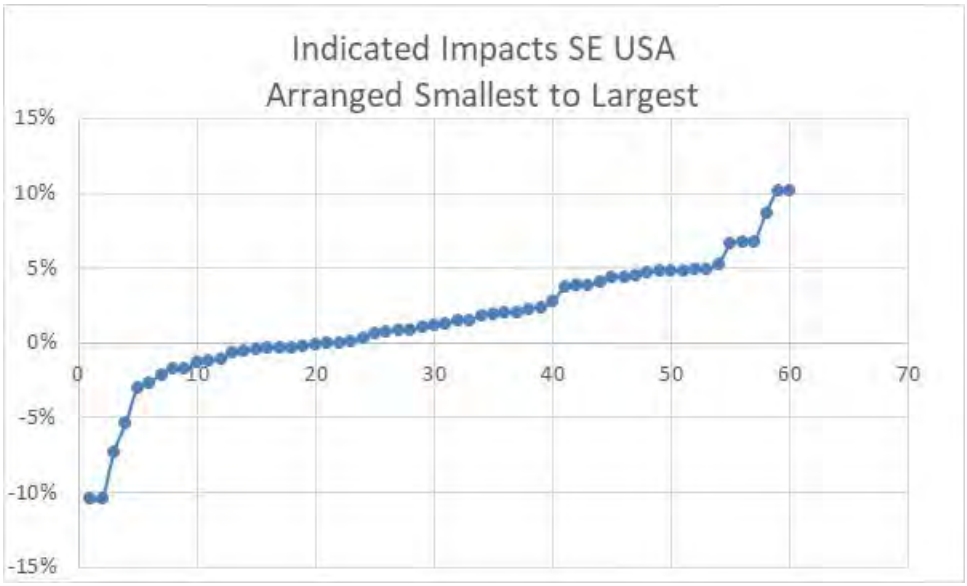
The solar farm matched pairs shown above have similar characteristics to each other in terms of population, but with several outliers showing solar farms in farm more urban areas. The median income for the population within 1 mile of a solar farm is $60,037 with a median housing unit value of $231,408. Most of the comparables are under $300,000 in the home price, with $483,333 being the high end of the set, though I have matched pairs in multiple states over $1,000,000 adjoining solar farms. The adjoining uses show that residential and agricultural uses are the predominant adjoining uses. These figures are in line with the larger set of solar farms that I have looked at with the predominant adjoining uses being residential and agricultural and similar to the solar farm breakdown shown for Virginia and adjoining states as well as the proposed subject property.

Based on the similarity of adjoining uses and demographic data between these sites and the subject property, I consider it reasonable to compare these sites to the subject property.

I have pulled 56 matched pairs from the above referenced solar farms to provide the following summary of home sale matched pairs and land sales next to solar farms. The summary shows that the range of differences is from -10% to +10% with an average of +1% and median of +1%. This means that the average and median impact is for a slight positive impact due to adjacency to a solar farm. However, this +1 to rate is within the typical variability I would expect from real estate. I therefore conclude that this data shows no negative or positive impact due to adjacency to a solar farm.

While the range is seemingly wide, the graph below clearly shows that the vast majority of the data falls between -5% and +5% and most of those are clearly in the 0 to +5% range. This data strongly supports an indication of no impact on adjoining residential uses to a solar farm.

I therefore conclude that these matched pairs support a finding of no impact on value at the subject property for the proposed project, which as proposed will include a landscaped buffer to screen adjoining residential properties.


Indicated Impacts SE USA
Arranged Smallest to Largest
15%
10%
5%
0%
-5%
-10%
-15%
0
10
20
30
40
50
60
70

Residential Dwelling Matched Pairs Adjoining Solar Farms

Pair	Solar Farm	City	State	MW	Approx Distance	Tax ID/Address	Date	Sale Price	Adj. Sale Price	% Diff	Veg. Buffer
1	AM Best	Goldsboro	NC	5	280	3600195570	Sep-13	$250,000			Light
						3600198928	Mar-14	$250,000	$250,000	0%	
2	AM Best	Goldsboro	NC	5	280	3600195361	Sep-13	$260,000			Light
						3600194813	Apr-14	$258,000	$258,000	1%	
3	AM Best	Goldsboro	NC	5	280	3600199891	Jul-14	$250,000			Light
						3600198928	Mar-14	$250,000	$250,000	0%	
4	AM Best	Goldsboro	NC	5	280	3600198632	Aug-14	$253,000			Light
						3600193710	Oct-13	$248,000	$248,000	2%	
5	AM Best	Goldsboro	NC	5	280	3600196656	Dec-13	$255,000			Light
						3601105180	Dec-13	$253,000	$253,000	1%	
6	AM Best	Goldsboro	NC	5	280	3600182511	Feb-13	$247,000			Light
						3600183905	Dec-12	$240,000	$245,000	1%	
7	AM Best	Goldsboro	NC	5	280	3600182784	Apr-13	$245,000			Light
						3600193710	Oct-13	$248,000	$248,000	-1%	
8	AM Best	Goldsboro	NC	5	280	3600195361	Nov-15	$267,500			Light
						3600195361	Sep-13	$260,000	$267,800	0%	
9	Mulberry	Selmer	TN	5	400	0900A011	Jul-14	$130,000			Light
						099CA043	Feb-15	$148,900	$136,988	-5%	
10	Mulberry	Selmer	TN	5	400	099CA002	Jul-15	$130,000			Light
						0990NA040	Mar-15	$120,000	$121,200	7%	
11	Mulberry	Selmer	TN	5	480	491 Dusty	Oct-16	$176,000			Light
						35 April	Aug-16	$185,000	$178,283	-1%	
12	Mulberry	Selmer	TN	5	650	297 Country	Sep-16	$150,000			Medium
						53 Glen	Mar-17	$126,000	$144,460	4%	
13	Mulberry	Selmer	TN	5	685	57 Cooper	Feb-19	$163,000			Medium
						191 Amelia	Aug-18	$132,000	$155,947	4%	
14	Leonard Rd	Hughesville	MD	5.5	230	14595 Box Elder	Feb-16	$291,000			Light
						15313 Bassford Rd	Jul-16	$329,800	$292,760	-1%	
15	Neal Hawkins	Gastonia	NC	5	225	609 Neal Hawkins	Mar-17	$270,000			Light
						1418 N Modena	Apr-18	$225,000	$242,520	10%	
16	Summit	Moyock	NC	80	1,060	129 Pinto	Apr-16	$170,000			Light
						102 Timber	Apr-16	$175,500	$175,101	-3%	
17	Summit	Moyock	NC	80	980	105 Pinto	Dec-16	$206,000			Light
						127 Ranchland	Jun-15	$219,900	$198,120	4%	
18	Tracy	Bailey	NC	5	780	9162 Winters	Jan-17	$255,000			Heavy
						7352 Red Fox	Jun-16	$176,000	$252,399	1%	
19	Manatee	Parrish	FL	75	1180	13670 Highland	Aug-18	$255,000			Heavy
						13851 Highland	Sep-18	$240,000	$255,825	0%	
20	McBride Place	Midland	NC	75	275	4380 Joyner	Nov-17	$325,000			Medium
						3870 Elkwood	Aug-16	$250,000	$317,523	2%	
21	McBride Place	Midland	NC	75	505	5811 Kristi	Mar-20	$530,000			Medium
						3915 Tania	Dec-19	$495,000	$504,657	5%	
22	Mariposa	Stanley	NC	5	1155	215 Mariposa	Dec-17	$249,000			Light
						110 Airport	May-16	$166,000	$239,026	4%	
23	Mariposa	Stanley	NC	5	570	242 Mariposa	Sep-15	$180,000			Light
						110 Airport	Apr-16	$166,000	$175,043	3%	
24	Clarke Cnty	White Post	VA	20	1230	833 Nations Spr	Jan-17	$295,000			Light
						6801 Middle	Dec-17	$249,999	$296,157	0%	
25	Candace	Princeton	NC	5	488	499 Herring	Sep-17	$215,000			Medium
						1795 Bay Valley	Dec-17	$194,000	$214,902	0%	
26	Walker	Barhamsville	VA	20	250	5241 Barham	Oct-18	$264,000			Light
						9252 Ordinary	Jun-19	$277,000	$246,581	7%	
27	AM Best	Goldsboro	NC	5	385	103 Granville Pl	Jul-18	$265,000			Light
						2219 Granville	Jan-18	$260,000	$265,682	0%	
28	AM Best	Goldsboro	NC	5	315	104 Erin	Jun-17	$280,000			Light
						2219 Granville	Jan-18	$265,000	$274,390	2%	
29	AM Best	Goldsboro	NC	5	400	2312 Granville	May-18	$284,900			Light
						2219 Granville	Jan-18	$265,000	$273,948	4%	

Residential Dwelling Matched Pairs Adjoining Solar Farms

Pair	Solar Farm	City	State	MW	Approx Distance	Tax ID/Address	Date	Sale Price	Adj. Sale Price	% Diff	Veg. Buffer
30	AM Best	Goldsboro	NC	5	400	2310 Granville	May-19	$280,000			Light
						634 Friendly	Jul-19	$267,000	$265,291	5%	
31	Summit	Moyock	NC	80	570	318 Green View	Sep-19	$357,000			Light
						336 Green View	Jan-19	$365,000	$340,286	5%	
32	Summit	Moyock	NC	80	440	164 Ranchland	Apr-19	$169,000			Light
						105 Longhorn	Oct-17	$184,500	$186,616	-10%	
33	Summit	Moyock	NC	80	635	358 Oxford	Sep-19	$478,000			Light
						176 Providence	Sep-19	$425,000	$456,623	4%	
34	Summit	Moyock	NC	80	970	343 Oxford	Mar-17	$490,000			Light
						218 Oxford	Apr-17	$525,000	$484,064	1%	
35	Innov 46	Hope Mills	NC	78.5	435	6849 Roslin Farm	Feb-19	$155,000			Light
						109 Bledsoe	Jan-19	$150,000	$147,558	5%	
36	Innov 42	Fayetteville	NC	71	340	2923 County Line	Feb-19	$385,000			Light
						2109 John McMillan	Apr-18	$320,000	$379,156	2%	
37	Innov 42	Fayetteville	NC	71	330	2935 County Line	Jun-19	$266,000			Light
						7031 Glynn Mill	May-18	$255,000	$264,422	1%	
38	Sunfish	Willow Sprng	NC	6.4	205	7513 Glen Willow	Sep-17	$185,000			Light
						205 Pine Burr	Dec-17	$191,000	$172,487	7%	
39	Neal Hawkins	Gastonia	NC	5	145	611 Neal Hawkins	Jun-17	$288,000			Light
						1211 Still Forrest	Jul-18	$280,000	$274,319	5%	
40	Clarke Cnty	White Post	VA	20	1230	833 Nations Spr	Aug-19	$385,000			Light
						2393 Old Chapel	Aug-20	$330,000	$389,286	-1%	
41	Sappony	Stony Creek	VA	20	1425	12511 Palestine	Jul-18	$128,400			Medium
						6494 Rocky Branch	Nov-18	$100,000	$131,842	-3%	
42	Camden Dam	Camden	NC	5	342	122 N Mill Dam	Nov-18	$350,000			Light
						548 Trotman	May-18	$309,000	$352,450	-1%	
43	Grandy	Grandy	NC	20	405	120 Par Four	Aug-19	$315,000			Light
						116 Barefoot	Sep-20	$290,000	$299,584	5%	
44	Grandy	Grandy	NC	20	477	269 Grandy	May-19	$275,000			Light
						103 Spring Leaf	Aug-18	$270,000	$275,912	0%	
45	Champion	Pelion	SC	10	505	517 Old Charleston	Aug-20	$110,000			Light
						1429 Laurel	Feb-19	$126,000	$107,856	2%	
46	Barefoot Bay	Barefoot Bay	FL	74.5	765	465 Papaya	Jul-19	$155,000			Medium
						1132 Waterway	Jul-20	$129,000	$141,618	9%	
47	Barefoot Bay	Barefoot Bay	FL	74.5	750	455 Papaya	Sep-20	$183,500			Medium
						904 Fir	Sep-20	$192,500	$186,697	-2%	
48	Barefoot Bay	Barefoot Bay	FL	74.5	690	419 Papaya	Jul-19	$127,500			Medium
						865 Tamarind	Feb-19	$133,900	$124,613	2%	
49	Barefoot Bay	Barefoot Bay	FL	74.5	690	413 Papaya	Jul-20	$130,000			Medium
						1367 Barefoot	Jan-21	$130,500	$139,507	-7%	
50	Barefoot Bay	Barefoot Bay	FL	74.5	690	343 Papaya	Dec-19	$145,000			Light
						865 Tamarind	Feb-19	$133,900	$142,403	2%	
51	Barefoot Bay	Barefoot Bay	FL	74.5	710	335 Papaya	Apr-18	$110,000			Light
						865 Tamarind	Feb-19	$133,900	$110,517	0%	
52	Miami-Dade	Miami	FL	74.5	1390	13600 SW 182nd	Nov-20	$1,684,000			Light
						17950 SW 158th	Oct-20	$1,730,000	$1,713,199	-2%	
53	Spotsylvania	Paytes	VA	617	1270	12901 Orange Plnk	Aug-20	$319,900			Medium
						12717 Flintlock	Dec-20	$290,000	$326,767	-2%	
54	Spotsylvania	Paytes	VA	617	1950	9641 Nottoway	May-20	$449,900			Medium
						11626 Forest	Aug-20	$489,900	$430,246	4%	
55	Spotsylvania	Paytes	VA	617	1171	13353 Post Oak	Sep-20	$300,000			Heavy
						12810 Catharpin	Jan-20	$280,000	$299,008	0%	
56	McBride Place	Midland	NC	75	470	5833 Kristi	Sep-20	$625,000			Light
						4055 Dakeita	Dec-20	$600,000	$594,303	5%	

MW	Avg. Distance
64.91	612
20.00	479
617.00	1,950
5.00	145

	Indicated Impact
Average	1%
Median	1%
High	10%
Low	-10%

I have further broken down these results based on the MWs, Landscaping, and distance from panel to show the following range of findings for these different categories.

Most of the findings are for homes between 201 and 500 feet. Most of the findings are for Light landscaping screens.

Light landscaping screens are showing no impact on value at any distances, including for solar farms over 75.1 MW.

MW Range 4.4 to 10									
Landscaping	**Light**	**Light**	**Light**	**Medium**	**Medium**	**Medium**	**Heavy**	**Heavy**	**Heavy**
Distance	**100-200**	**201-500**	**500+**	**100-200**	**201-500**	**500+**	**100-200**	**201-500**	**500+**
#	1	19	2	0	1	2	0	0	1
Average	5%	2%	3%	N/A	0%	4%	N/A	N/A	1%
Median	5%	1%	3%	N/A	0%	4%	N/A	N/A	1%
High	5%	10%	4%	N/A	0%	4%	N/A	N/A	1%
Low	5%	-5%	3%	N/A	0%	4%	N/A	N/A	1%

10.1 to 30									
Landscaping	**Light**	**Light**	**Light**	**Medium**	**Medium**	**Medium**	**Heavy**	**Heavy**	**Heavy**
Distance	**100-200**	**201-500**	**500+**	**100-200**	**201-500**	**500+**	**100-200**	**201-500**	**500+**
#	0	3	2	0	0	1	0	0	0
Average	N/A	4%	-1%	N/A	N/A	-3%	N/A	N/A	N/A
Median	N/A	5%	-1%	N/A	N/A	-3%	N/A	N/A	N/A
High	N/A	7%	0%	N/A	N/A	-3%	N/A	N/A	N/A
Low	N/A	0%	-1%	N/A	N/A	-3%	N/A	N/A	N/A

30.1 to 75									
Landscaping	**Light**	**Light**	**Light**	**Medium**	**Medium**	**Medium**	**Heavy**	**Heavy**	**Heavy**
Distance	**100-200**	**201-500**	**500+**	**100-200**	**201-500**	**500+**	**100-200**	**201-500**	**500+**
#	0	2	3	0	0	4	0	0	0
Average	N/A	1%	0%	N/A	N/A	0%	N/A	N/A	N/A
Median	N/A	1%	0%	N/A	N/A	0%	N/A	N/A	N/A
High	N/A	2%	2%	N/A	N/A	9%	N/A	N/A	N/A
Low	N/A	1%	-2%	N/A	N/A	-7%	N/A	N/A	N/A

75.1+									
Landscaping	**Light**	**Light**	**Light**	**Medium**	**Medium**	**Medium**	**Heavy**	**Heavy**	**Heavy**
Distance	**100-200**	**201-500**	**500+**	**100-200**	**201-500**	**500+**	**100-200**	**201-500**	**500+**
#	0	2	5	0	0	2	0	0	1
Average	N/A	-3%	2%	N/A	N/A	1%	N/A	N/A	0%
Median	N/A	-3%	4%	N/A	N/A	1%	N/A	N/A	0%
High	N/A	5%	5%	N/A	N/A	4%	N/A	N/A	0%
Low	N/A	-10%	-3%	N/A	N/A	-2%	N/A	N/A	0%

C. Summary of National Data on Solar Farms

I have worked in 19 states related to solar farms and I have been tracking matched pairs in most of those states. On the following pages I provide a brief summary of those findings showing 37 solar farms over 5 MW studied with each one providing matched pair data supporting the findings of this report.

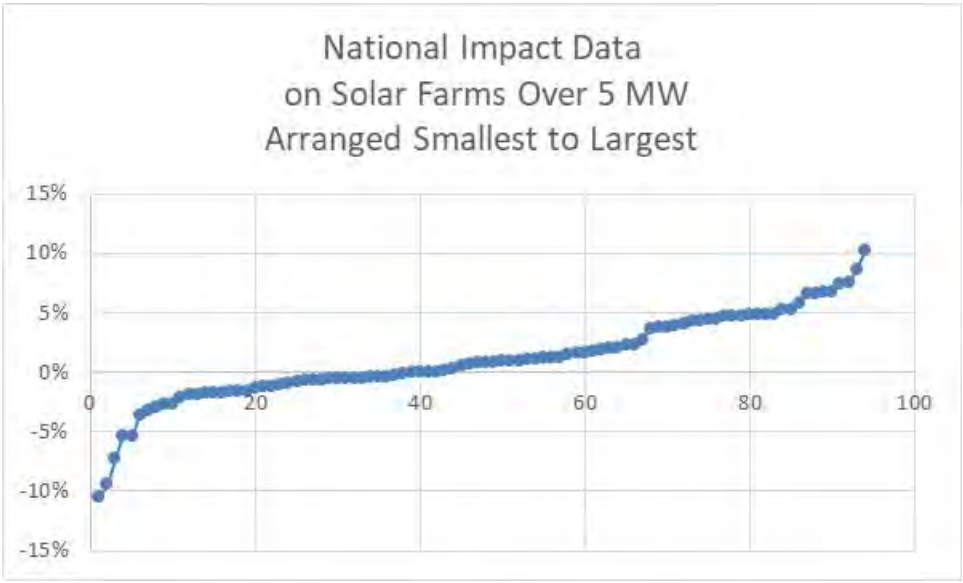
The solar farms summary is shown below with a summary of the matched pair data shown on the following page.

Matched Pair Summary							**Adj. Uses By Acreage**				**1 mile Radius (2010-2020 Data)**			
	Name	**City**	**State**	**Acres**	**MW**	**Topo Shift**	**Res**	**Ag**	**Ag/Res**	**Com/Ind**	**Popl.**	**Med. Income**	**Avg. Housing Unit**	**Veg. Buffer**
1	AM Best	Goldsboro	NC	38	5.00	2	38%	0%	23%	39%	1,523	$37,358	$148,375	Light
2	Mulberry	Selmer	TN	160	5.00	60	13%	73%	10%	3%	467	$40,936	$171,746	Lt to Med
3	Leonard	Hughesville	MD	47	5.00	20	18%	75%	0%	6%	525	$106,550	$350,000	Light
4	Gastonia SC	Gastonia	NC	35	5.00	48	33%	0%	23%	44%	4,689	$35,057	$126,562	Light
5	Summit	Moyock	NC	2,034	80.00	4	4%	0%	94%	2%	382	$79,114	$281,731	Light
7	Tracy	Bailey	NC	50	5.00	10	29%	0%	71%	0%	312	$43,940	$99,219	Heavy
8	Manatee	Parrish	FL	1,180	75.00	20	2%	97%	1%	0%	48	$75,000	$291,667	Heavy
9	McBride	Midland	NC	627	75.00	140	12%	10%	78%	0%	398	$63,678	$256,306	Lt to Med
10	Grand Ridge	Streator	IL	160	20.00	1	8%	87%	5%	0%	96	$70,158	$187,037	Light
11	Dominion	Indianapolis	IN	134	8.60	20	3%	97%	0%	0%	3,774	$61,115	$167,515	Light
12	Mariposa	Stanley	NC	36	5.00	96	48%	0%	52%	0%	1,716	$36,439	$137,884	Light
13	Clarke Cnty	White Post	VA	234	20.00	70	14%	39%	46%	1%	578	$81,022	$374,453	Light
14	Flemington	Flemington	NJ	120	9.36	N/A	13%	50%	28%	8%	3,477	$105,714	$444,696	Lt to Med
15	Frenchtown	Frenchtown	NJ	139	7.90	N/A	37%	35%	29%	0%	457	$111,562	$515,399	Light
16	McGraw	East Windsor	NJ	95	14.00	N/A	27%	44%	0%	29%	7,684	$78,417	$362,428	Light
17	Tinton Falls	Tinton Falls	NJ	100	16.00	N/A	98%	0%	0%	2%	4,667	$92,346	$343,492	Light
18	Simon	Social Circle	GA	237	30.00	71	1%	63%	36%	0%	203	$76,155	$269,922	Medium
19	Candace	Princeton	NC	54	5.00	22	76%	24%	0%	0%	448	$51,002	$107,171	Medium
20	Walker	Barhamsville	VA	485	20.00	N/A	12%	68%	20%	0%	203	$80,773	$320,076	Light
21	Innov 46	Hope Mills	NC	532	78.50	0	17%	83%	0%	0%	2,247	$58,688	$183,435	Light
22	Innov 42	Fayetteville	NC	414	71.00	0	41%	59%	0%	0%	568	$60,037	$276,347	Light
23	Demille	Lapeer	MI	160	28.40	10	10%	68%	0%	22%	2,010	$47,208	$187,214	Light
24	Turrill	Lapeer	MI	230	19.60	10	75%	59%	0%	25%	2,390	$46,839	$110,361	Light
25	Sunfish	Willow Spring	NC	50	6.40	30	35%	35%	30%	0%	1,515	$63,652	$253,138	Light
26	Picture Rocks	Tucson	AZ	182	20.00	N/A	6%	88%	6%	0%	102	$81,081	$280,172	None
27	Avra Valley	Tucson	AZ	246	25.00	N/A	3%	94%	3%	0%	85	$80,997	$292,308	None
28	Sappony	Stony Crk	VA	322	20.00	N/A	2%	98%	0%	0%	74	$51,410	$155,208	Medium
29	Camden Dam	Camden	NC	50	5.00	0	17%	72%	11%	0%	403	$84,426	$230,288	Light
30	Grandy	Grandy	NC	121	20.00	10	55%	24%	0%	21%	949	$50,355	$231,408	Light
31	Champion	Pelion	SC	100	10.00	N/A	4%	70%	8%	18%	1,336	$46,867	$171,939	Light
32	Eddy II	Eddy	TX	93	10.00	N/A	15%	25%	58%	2%	551	$59,627	$139,088	Light
33	Somerset	Somerset	TX	128	10.60	N/A	5%	95%	0%	0%	1,293	$41,574	$135,490	Light
34	DG Amp Piqua	Piqua	OH	86	12.60	2	26%	16%	58%	0%	6,735	$38,919	$96,555	Light
45	Barefoot Bay	Barefoot Bay	FL	504	74.50	0	11%	87%	0%	3%	2,446	$36,737	$143,320	Lt to Med
36	Miami-Dade	Miami	FL	347	74.50	0	26%	74%	0%	0%	127	$90,909	$403,571	Light
37	Spotyslvania	Paytes	VA	3,500	617.00	160	37%	52%	11%	0%	74	$120,861	$483,333	Med to Hvy
	Average			362	42.05	32	24%	52%	19%	6%	1,515	$66,292	$242,468	
	Median			150	17.80	10	16%	59%	7%	0%	560	$62,384	$230,848	
	High			3,500	617.00	160	98%	98%	94%	44%	7,684	$120,861	$515,399	
	Low			35	5.00	0	1%	0%	0%	0%	48	$35,057	$96,555	

From these 37 solar farms, I have derived 94 matched pairs. The matched pairs show no negative impact at distances as close as 105 feet between a solar panel and the nearest point on a home. The range of impacts is -10% to +10% with an average and median of +1%.

	MW	Avg. Distance		Indicated Impact
Average	44.80	569	**Average**	1%
Median	14.00	400	**Median**	1%
High	617.00	1,950	**High**	10%
Low	5.00	145	**Low**	-10%

While the range is broad, the two charts below show the data points in range from lowest to highest. There is only 3 data points out of 94 that show a negative impact. The rest support either a finding of no impact or 9 of the data points suggest a positive impact due to adjacency to a solar farm. As discussed earlier in this report, I consider this data to strongly support a finding of no impact on value as most of the findings are within typical market variation and even within that, most are mildly positive findings.



D. Larger Solar Farms

I have also considered larger solar farms to address impacts related to larger projects. Projects have been increasing in size and most of the projects between 100 and 1000 MW are newer with little time for adjoining sales. I have included a breakdown of solar farms with 20 MW to 80 MW facilities with one 617 MW facility.

Matched Pair Summary - @20 MW And Larger							Adj. Uses By Acreage				1 mile Radius (2010-2019 Data)			
	Name	City	State	Acres	MW	Topo Shift	Res	Ag	Ag/Res	Com/Ind	Popl.	Med. Income	Avg. Housing Unit	Veg. Buffer
1	Summit	Moyock	NC	2,034	80.00	4	4%	0%	94%	2%	382	$79,114	$281,731	Light
2	Manatee	Parrish	FL	1,180	75.00	20	2%	97%	1%	0%	48	$75,000	$291,667	Heavy
3	McBride	Midland	NC	627	75.00	140	12%	10%	78%	0%	398	$63,678	$256,306	Lt to Med
4	Grand Ridge	Streator	IL	160	20.00	1	8%	87%	5%	0%	96	$70,158	$187,037	Light
5	Clarke Cnty	White Post	VA	234	20.00	70	14%	39%	46%	1%	578	$81,022	$374,453	Light
6	Simon	Social Circle	GA	237	30.00	71	1%	63%	36%	0%	203	$76,155	$269,922	Medium
7	Walker	Barhamsville	VA	485	20.00	N/A	12%	68%	20%	0%	203	$80,773	$320,076	Light
8	Innov 46	Hope Mills	NC	532	78.50	0	17%	83%	0%	0%	2,247	$58,688	$183,435	Light
9	Innov 42	Fayetteville	NC	414	71.00	0	41%	59%	0%	0%	568	$60,037	$276,347	Light
10	Demille	Lapeer	MI	160	28.40	10	10%	68%	0%	22%	2,010	$47,208	$187,214	Light
11	Turrill	Lapeer	MI	230	19.60	10	75%	59%	0%	25%	2,390	$46,839	$110,361	Light
12	Picure Rocks	Tucson	AZ	182	20.00	N/A	6%	88%	6%	0%	102	$81,081	$280,172	Light
13	Avra Valley	Tucson	AZ	246	25.00	N/A	3%	94%	3%	0%	85	$80,997	$292,308	None
14	Sappony	Stony Crk	VA	322	20.00	N/A	2%	98%	0%	0%	74	$51,410	$155,208	None
15	Grandy	Grandy	NC	121	20.00	10	55%	24%	0%	21%	949	$50,355	$231,408	Medium
16	Barefoot Bay	Barefoot Bay	FL	504	74.50	0	11%	87%	0%	3%	2,446	$36,737	$143,320	Lt to Med
17	Miami-Dade	Miami	FL	347	74.50	0	26%	74%	0%	0%	127	$90,909	$403,571	Light
18	Spotyslvania	Paytes	VA	3,500	617.00	160	37%	52%	11%	0%	74	$120,861	$483,333	Med to Hvy
	Average			640	76.03		19%	64%	17%	4%	721	$69,501	$262,659	
	Median			335	29.20		12%	68%	2%	0%	293	$72,579	$273,135	
	High			3,500	617.00		75%	98%	94%	25%	2,446	$120,861	$483,333	
	Low			121	19.60		1%	0%	0%	0%	48	$36,737	$110,361	

The breakdown of adjoining uses, population density, median income and housing prices for these projects are very similar to those of the larger set. The matched pairs for each of these were considered earlier and support a finding of no negative impact on the adjoining home values.

I have included a breakdown of solar farms with 50 MW to 617 MW facilities adjoining.

Matched Pair Summary - @50 MW And Larger							Adj. Uses By Acreage				1 mile Radius (2010-2019 Data)			
	Name	City	State	Acres	MW	Topo Shift	Res	Ag	Ag/Res	Com/Ind	Popl.	Med. Income	Avg. Housing Unit	Veg. Buffer
1	Summit	Moyock	NC	2,034	80.00	4	4%	0%	94%	2%	382	$79,114	$281,731	Light
2	Manatee	Parrish	FL	1,180	75.00	20	2%	97%	1%	0%	48	$75,000	$291,667	Heavy
3	McBride	Midland	NC	627	75.00	140	12%	10%	78%	0%	398	$63,678	$256,306	Lt to Med
4	Innov 46	Hope Mills	NC	532	78.50	0	17%	83%	0%	0%	2,247	$58,688	$183,435	Light
5	Innov 42	Fayetteville	NC	414	71.00	0	41%	59%	0%	0%	568	$60,037	$276,347	Light
6	Barefoot Bay	Barefoot Bay	FL	504	74.50	0	11%	87%	0%	3%	2,446	$36,737	$143,320	Lt to Med
7	Miami-Dade	Miami	FL	347	74.50	0	26%	74%	0%	0%	127	$90,909	$403,571	Light
8	Spotyslvania	Paytes	VA	3,500	617.00	160	37%	52%	11%	0%	74	$120,861	$483,333	Med to Hvy
	Average			1,142	143.19		19%	58%	23%	1%	786	$73,128	$289,964	
	Median			580	75.00		15%	67%	0%	0%	390	$69,339	$279,039	
	High			3,500	617.00		41%	97%	94%	3%	2,446	$120,861	$483,333	
	Low			347	71.00		2%	0%	0%	0%	48	$36,737	$143,320	

The breakdown of adjoining uses, population density, median income and housing prices for these projects are very similar to those of the larger set. The matched pairs for each of these were considered earlier and support a finding of no negative impact on the adjoining home values.

The data for these larger solar farms is shown in the SE USA and the National data breakdowns with similar landscaping, setbacks and range of impacts that fall mostly in the +/-5% range as can be seen earlier in this report.

On the following page I show 81 projects ranging in size from 50 MW up to 1,000 MW with an average size of 111.80 MW and a median of 80 MW. The average closest distance for an adjoining home is 263 feet, while the median distance is 188 feet. The closest distance is 57 feet. The mix of adjoining uses is similar with most of the adjoining uses remaining residential or agricultural in nature. This is the list of solar farms that I have researched for possible matched pairs and not a complete list of larger solar farms in those states.

Parcel #	State	City	Name	Output (MW)	Total Acres	Used Acres	Avg. Dist to home	Closest Home	Adjoining Use by Acre			
									Res	Agri	Ag/R	Com
78	NC	Moyock	Summit/Ranchland	80	2034		674	360	4%	94%	0%	2%
133	MS	Hattiesburg	Hattiesburg	50	1129	479.6	650	315	35%	65%	0%	0%
179	SC	Ridgeland	Jasper	140	1600	1000	461	108	2%	85%	13%	0%
211	NC	Enfield	Chestnut	75	1428.1		1,429	210	4%	96%	0%	0%
222	VA	Chase City	Grasshopper	80	946.25				6%	87%	5%	1%
226	VA	Louisa	Belcher	88	1238.1			150	19%	53%	28%	0%
305	FL	Dade City	Mountain View	55	347.12		510	175	32%	39%	21%	8%
319	FL	Jasper	Hamilton	74.9	1268.9	537	3,596	240	5%	67%	28%	0%
336	FL	Parrish	Manatee	74.5	1180.4		1,079	625	2%	50%	1%	47%
337	FL	Arcadia	Citrus	74.5	640				0%	0%	100%	0%
338	FL	Port Charlotte	Babcock	74.5	422.61				0%	0%	100%	0%
353	VA	Oak Hall	Amazon East(ern sh	80	1000		645	135	8%	75%	17%	0%
364	VA	Stevensburg	Greenwood	100	2266.6	1800	788	200	8%	62%	29%	0%
368	NC	Warsaw	Warsaw	87.5	585.97	499	526	130	11%	66%	21%	3%
390	NC	Ellerbe	Innovative Solar 34	50	385.24	226	N/A	N/A	1%	99%	0%	0%
399	NC	Midland	McBride	74.9	974.59	627	1,425	140	12%	78%	9%	0%
400	FL	Mulberry	Alafia	51	420.35		490	105	7%	90%	3%	0%
406	VA	Clover	Foxhound	91	1311.8		885	185	5%	61%	17%	18%
410	FL	Trenton	Trenton	74.5	480		2,193	775	0%	26%	55%	19%
411	NC	Battleboro	Fern	100	1235.4	960.71	1,494	220	5%	76%	19%	0%
412	MD	Goldsboro	Cherrywood	202	1722.9	1073.7	429	200	10%	76%	13%	0%
434	NC	Conetoe	Conetoe	80	1389.9	910.6	1,152	120	5%	78%	17%	0%
440	FL	Debary	Debary	74.5	844.63		654	190	3%	27%	0%	70%
441	FL	Hawthorne	Horizon	74.5	684				3%	81%	16%	0%
484	VA	Newsoms	Southampton	100	3243.9		-	-	3%	78%	17%	3%
486	VA	Stuarts Draft	Augusta	125	3197.4	1147	588	165	16%	61%	16%	7%
491	NC	Misenheimer	Misenheimer 2018	80	740.2	687.2	504	130	11%	40%	22%	27%
494	VA	Shacklefords	Walnut	110	1700	1173	641	165	14%	72%	13%	1%
496	VA	Clover	Piney Creek	80	776.18	422	523	195	15%	62%	24%	0%
511	NC	Scotland Neck	American Beech	160	3255.2	1807.8	1,262	205	2%	58%	38%	3%
514	NC	Reidsville	Williamsburg	80	802.6	507	734	200	25%	12%	63%	0%
517	VA	Luray	Cape	100	566.53	461	519	110	42%	12%	46%	0%
518	VA	Emporia	Fountain Creek	80	798.3	595	862	300	6%	23%	71%	0%
525	NC	Plymouth	Macadamia	484	5578.7	4813.5	1,513	275	1%	90%	9%	0%
526	NC	Mooresboro	Broad River	50	759.8	365	419	70	29%	55%	16%	0%
555	FL	Mulberry	Durrance	74.5	463.57	324.65	438	140	3%	97%	0%	0%
560	NC	Yadkinville	Sugar	60	477	357	382	65	19%	39%	20%	22%
561	NC	Enfield	Halifax 80mw 2019	80	1007.6	1007.6	672	190	8%	73%	19%	0%
577	VA	Windsor	Windsor	85	564.1	564.1	572	160	9%	67%	24%	0%
579	VA	Paytes	Spotsylvania	500	6412	3500			9%	52%	11%	27%
582	NC	Salisbury	China Grove	65	428.66	324.26	438	85	58%	4%	38%	0%
583	NC	Walnut Cove	Lick Creek	50	1424	185.11	410	65	20%	64%	11%	5%
584	NC	Enfield	Sweetleaf	94	1956.3	1250	968	160	5%	63%	32%	0%
586	VA	Aylett	Sweet Sue	77	1262	576	1,617	680	7%	68%	25%	0%
593	NC	Windsor	Sumac	120	3360.6	1257.9	876	160	4%	90%	6%	0%
599	TN	Somerville	Yum Yum	147	4000	1500	1,862	330	3%	32%	64%	1%
602	GA	Waynesboro	White Oak	76.5	516.7	516.7	2,995	1,790	1%	34%	65%	0%
603	GA	Butler	Butler GA	103	2395.1	2395.1	1,534	255	2%	73%	23%	2%
604	GA	Butler	White Pine	101.2	505.94	505.94	1,044	100	1%	51%	48%	1%
605	GA	Metter	Live Oak	51	417.84	417.84	910	235	4%	72%	23%	0%
606	GA	Hazelhurst	Hazelhurst II	52.5	947.15	490.42	2,114	105	9%	64%	27%	0%
607	GA	Bainbridge	Decatur Parkway	80	781.5	781.5	1,123	450	2%	27%	22%	49%
608	GA	Leslie-DeSoto	Americus	1000	9661.2	4437	5,210	510	1%	63%	36%	0%
616	FL	Fort White	Fort White	74.5	570.5	457.2	828	220	12%	71%	17%	0%
621	VA	Spring Grove	Loblolly	150	2181.9	1000	1,860	110	7%	62%	31%	0%
622	VA	Scottsville	Woodridge	138	2260.9	1000	1,094	170	9%	63%	28%	0%
625	NC	Middlesex	Phobos	80	754.52	734	356	57	14%	75%	10%	0%
628	MI	Deerfield	Carroll Road	200	1694.8	1694.8	343	190	12%	86%	0%	2%
633	VA	Emporia	Brunswick	150.2	2076.4	1387.3	1,091	240	4%	85%	11%	0%
634	NC	Elkin	Partin	50	429.4	257.64	945	155	30%	25%	15%	30%

Parcel #	State	City	Name	Output (MW)	Total Acres	Used Acres	Avg. Dist to home	Closest Home	Adjoining Use by Acre Res	Agri	Ag/R	Com
638	GA	Dry Branch	Twiggs	200	2132.7	2132.7	-	-	10%	55%	35%	0%
639	NC	Hope Mills	Innovative Solar 46	78.5	531.87	531.87	423	125	17%	83%	0%	0%
640	NC	Hope Mills	Innovative Solar 42	71	413.99	413.99	375	135	41%	59%	0%	0%
645	NC	Stanley	Hornet	75	1499.5	858.4	663	110	30%	40%	23%	6%
650	NC	Grifton	Grifton 2	56	681.59	297.6	363	235	1%	99%	0%	0%
651	NC	Grifton	Buckleberry	52.1	367.67	361.67	913	180	5%	54%	41%	0%
657	KY	Greensburg	Horseshoe Bend	60	585.65	395	1,394	63	3%	36%	61%	0%
658	KY	Campbellsville	Flat Run	55	429.76	429.76	408	115	13%	52%	35%	0%
666	FL	Archer	Archer	74.9	636.94	636.94	638	200	43%	57%	0%	0%
667	FL	New Smyrna Bea	Pioneer Trail	74.5	1202.8	900	1,162	225	14%	61%	21%	4%
668	FL	Lake City	Sunshine Gateway	74.5	904.29	472	1,233	890	11%	80%	8%	0%
669	FL	Florahome	Coral Farms	74.5	666.54	580	1,614	765	19%	75%	7%	0%
672	VA	Appomattox	Spout Spring	60	881.12	673.37	836	335	16%	30%	46%	8%
676	TX	Stamford	Alamo 7	106.4	1663.1	1050	-	-	6%	83%	0%	11%
677	TX	Fort Stockton	RE Roserock	160	1738.2	1500	-	-	0%	100%	0%	0%
678	TX	Lamesa	Lamesa	102	914.5	655	921	170	4%	41%	11%	44%
679	TX	Lamesa	Ivory	50	706	570	716	460	0%	87%	2%	12%
680	TX	Uvalde	Alamo 5	95	830.35	800	925	740	1%	93%	6%	0%
684	NC	Waco	Brookcliff	50	671.03	671.03	560	150	7%	21%	15%	57%
689	AZ	Arlington	Mesquite	320.8	3774.5	2617	1,670	525	8%	92%	0%	0%
692	AZ	Tucson	Avalon	51	479.21	352	-	-	0%	100%	0%	0%
				81								
			Average	111.80	1422.4	968.4	1031	263	10%	62%	22%	6%
			Median	80.00	914.5	646.0	836	188	7%	64%	17%	0%
			High	1000.00	9661.2	4813.5	5210	1790	58%	100%	100%	70%
			Low	50.00	347.1	185.1	343	57	0%	0%	0%	0%

VIII. Distance Between Homes and Panels

I have measured distances at matched pairs as close as 105 feet between panel and home to show no impact on value. This measurement goes from the closest point on the home to the closest solar panel. This is a strong indication that at this distance there is no impact on adjoining homes.

However, in tracking other approved solar farms across Virginia, North Carolina and other states, I have found that it is common for there to be homes within 100 to 150 feet of solar panels. Given the visual barriers in the form of privacy fencing or landscaping, there is no sign of negative impact.

I have also tracked a number of locations where solar panels are between 50 and 100 feet of single-family homes. In these cases the landscaping is typically a double row of more mature evergreens at time of planting. There are many examples of solar farms with one or two homes closer than 100-feet, but most of the adjoining homes are further than that distance.

IX. Topography

As shown on the summary charts for the solar farms, I have been identifying the topographic shifts across the solar farms considered. Differences in topography can impact visibility of the panels, though typically this results in distant views of panels as opposed to up close views. The topography noted for solar farms showing no impact on adjoining home values range from as much as 160-foot shifts across the project. Given that appearance is the only factor of concern and that distance plus landscape buffering typically addresses up close views, this leaves a number of potentially distant views of panels. I specifically note that in Crittenden in KY there are distant views of panels from the adjoining homes that showed no impact on value.

General rolling terrain with some distant solar panel views are showing no impact on adjoining property value.

X. Potential Impacts During Construction

Any development of a site will have a certain amount of construction, whether it is for a commercial agricultural use such as large-scale poultry operations or a new residential subdivision. Construction will be temporary and consistent with other development uses of the land and in fact dust from the construction will likely be less than most other construction projects given the minimal grading. I would not anticipate any impacts on property value due to construction on the site.

I note that in the matched pairs that I have included there have been a number of home sales that happened after a solar farm was approved but before the solar farm was built showing no impact on property value. Therefore the anticipated construction had no impact as shown by that data.

XI. Scope of Research

I have researched over 750 solar farms and sites on which solar farms are existing and proposed in Virginia, Illinois, Tennessee, North Carolina, Kentucky as well as other states to determine what uses are typically found in proximity with a solar farm. The data I have collected and provide in this report strongly supports the assertion that solar farms are having no negative consequences on adjoining agricultural and residential values.

Beyond these references, I have quantified the adjoining uses for a number of solar farm comparables to derive a breakdown of the adjoining uses for each solar farm. The chart below shows the breakdown of adjoining or abutting uses by total acreage.

Percentage By Adjoining Acreage

	Res	Ag	Res/AG	Comm	Ind	Avg Home	Closest Home	All Res Uses	All Comm Uses
Average	19%	53%	20%	2%	6%	887	344	91%	8%
Median	11%	56%	11%	0%	0%	708	218	100%	0%
High	100%	100%	100%	93%	98%	5,210	4,670	100%	98%
Low	0%	0%	0%	0%	0%	90	25	0%	0%

Res = Residential, Ag = Agriculture, Com = Commercial

Total Solar Farms Considered: 705

I have also included a breakdown of each solar farm by number of adjoining parcels to the solar farm rather than based on adjoining acreage. Using both factors provide a more complete picture of the neighboring properties.

Percentage By Number of Parcels Adjoining

	Res	Ag	Res/AG	Comm	Ind	Avg Home	Closest Home	All Res Uses	All Comm Uses
Average	61%	24%	9%	2%	4%	887	344	93%	6%
Median	65%	19%	5%	0%	0%	708	218	100%	0%
High	100%	100%	100%	60%	78%	5,210	4,670	105%	78%
Low	0%	0%	0%	0%	0%	90	25	0%	0%

Res = Residential, Ag = Agriculture, Com = Commercial

Total Solar Farms Considered: 705

Both of the above charts show a marked residential and agricultural adjoining use for most solar farms. Every single solar farm considered included an adjoining residential or residential/agricultural use.

XII. Specific Factors Related To Impacts on Value

I have completed a number of Impact Studies related to a variety of uses and I have found that the most common areas for impact on adjoining values typically follow a hierarchy with descending levels of potential impact. I will discuss each of these categories and how they relate to a solar farm.

1. Hazardous material
2. Odor
3. Noise
4. Traffic
5. Stigma
6. Appearance

1. Hazardous material

A solar farm presents no potential hazardous waste byproduct as part of normal operation. Any fertilizer, weed control, vehicular traffic, or construction will be significantly less than typically applied in a residential development and even most agricultural uses.

The various solar farms that I have inspected and identified in the addenda have no known environmental impacts associated with the development and operation.

2. Odor

The various solar farms that I have inspected produced no odor.

3. Noise

Whether discussing passive fixed solar panels, or single-axis trackers, there is no negative impact associated with noise from a solar farm. The transformer reportedly has a hum similar to an HVAC that can only be heard in close proximity to this transformer and the buffers on the property are sufficient to make emitted sounds inaudible from the adjoining properties. No sound is emitted from the facility at night.

The various solar farms that I have inspected were inaudible from the roadways.

4. Traffic

The solar farm will have no onsite employee's or staff. The site requires only minimal maintenance. Relative to other potential uses of the site (such as a residential subdivision), the additional traffic generated by a solar farm use on this site is insignificant.

5. Stigma

There is no stigma associated with solar farms and solar farms and people generally respond favorably towards such a use. While an individual may express concerns about proximity to a solar farm, there is no specific stigma associated with a solar farm. Stigma generally refers to things such as adult establishments, prisons, rehabilitation facilities, and so forth.

Solar panels have no associated stigma and in smaller collections are found in yards and roofs in many residential communities. Solar farms are adjoining elementary, middle and high schools as well as churches and subdivisions. I note that one of the solar farms in this report not only adjoins a church, but is actually located on land owned by the church. Solar panels on a roof are often cited as an enhancement to the property in marketing brochures.

I see no basis for an impact from stigma due to a solar farm.

6. Appearance

I note that larger solar farms using fixed or tracking panels are a passive use of the land that is in keeping with a rural/residential area. As shown below, solar farms are comparable to larger greenhouses. This is not surprising given that a greenhouse is essentially another method for collecting passive solar energy. The greenhouse use is well received in residential/rural areas and has a similar visual impact as a solar farm.

The solar panels are all less than 15 feet high, which means that the visual impact of the solar panels will be similar in height to a typical greenhouse and lower than a single-story residential dwelling. Were the subject property developed with single family housing, that development would have a much greater visual impact on the surrounding area given that a two-story home with attic could be three to four times as high as these proposed panels.

Whenever you consider the impact of a proposed project on viewshed or what the adjoining owners may see from their property it is important to distinguish whether or not they have a protected viewshed or not. Enhancements for scenic vistas are often measured when considering properties that adjoin preserved open space and parks. However, adjoining land with a preferred view today conveys no guarantee that the property will continue in the current use. Any consideration of the impact of the appearance requires a consideration of the wide variety of other uses a property already has the right to be put to, which for solar farms often includes subdivision development, agricultural business buildings such as poultry, or large greenhouses and the like.

Dr. Randall Bell, MAI, PhD, and author of the book **Real Estate Damages**, Third Edition, on Page 146 "Views of bodies of water, city lights, natural settings, parks, golf courses, and other amenities are considered desirable features, particularly for residential properties." Dr. Bell continues on Page 147 that "View amenities may or may not be protected by law or regulation. It is sometimes argued that views have value only if they are protected by a view easement, a zoning ordinance, or covenants, conditions, and restrictions (CC&Rs), although such protections are relatively

uncommon as a practical matter. The market often assigns significant value to desirable views irrespective of whether or not such views are protected by law."

Dr. Bell concludes that a view enhances adjacent property, even if the adjacent property has no legal right to that view. He then discusses a "borrowed" view where a home may enjoy a good view of vacant land or property beyond with a reasonable expectation that the view might be partly or completely obstructed upon development of the adjoining land. He follows that with "This same concept applies to potentially undesirable views of a new development when the development conforms to applicable zoning and other regulations. Arguing value diminution in such cases is difficult, since the possible development of the offending property should have been known." In other words, if there is an allowable development on the site then arguing value diminution with such a development would be difficult. This further extends to developing the site with alternative uses that are less impactful on the view than currently allowed uses.

This gets back to the point that if a property has development rights and could currently be developed in such a way that removes the viewshed such as a residential subdivision, then a less intrusive use such as a solar farm that is easily screened by landscaping would not have a greater impact on the viewshed of any perceived value adjoining properties claim for viewshed. Essentially, if there are more impactful uses currently allowed, then how can you claim damages for a less impactful use.

7. Conclusion

On the basis of the factors described above, it is my professional opinion that the proposed solar farm will not negatively impact adjoining property values. The only category of impact of note is appearance, which is addressed through setbacks and landscaping buffers. The matched pair data supports that conclusion.

XIII. Conclusion

The matched pair analysis shows no negative impact in home values due to abutting or adjoining a solar farm as well as no impact to abutting or adjacent vacant residential or agricultural land. The criteria that typically correlates with downward adjustments on property values such as noise, odor, and traffic all support a finding of no impact on property value.

Very similar solar farms in very similar areas have been found by hundreds of towns and counties not to have a substantial injury to abutting or adjoining properties, and many of those findings of no impact have been upheld by appellate courts. Similar solar farms have been approved adjoining agricultural uses, schools, churches, and residential developments.

I have found no difference in the mix of adjoining uses or proximity to adjoining homes based on the size of a solar farm and I have found no significant difference in the matched pair data adjoining larger solar farms versus smaller solar farms. The data in the Southeast is consistent with the larger set of data that I have nationally, as is the more specific data located in and around Virginia.

Based on the data and analysis in this report, it is my professional opinion that the solar farm proposed at the subject property will have no negative impact on the value of adjoining or abutting property. I note that some of the positive implications of a solar farm that have been expressed by people living next to solar farms include protection from future development of residential developments or other more intrusive uses, reduced dust, odor and chemicals from former farming operations, protection from light pollution at night, it's quiet, and there is no traffic.

XIV. Certification

I certify that, to the best of my knowledge and belief:

1. The statements of fact contained in this report are true and correct;

2. The reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions, and are my personal, unbiased professional analyses, opinions, and conclusions;

3. I have no present or prospective interest in the property that is the subject of this report and no personal interest with respect to the parties involved;

4. I have no bias with respect to the property that is the subject of this report or to the parties involved with this assignment;

5. My engagement in this assignment was not contingent upon developing or reporting predetermined results;

6. My compensation for completing this assignment is not contingent upon the development or reporting of a predetermined value or direction in value that favors the cause of the client, the amount of the value opinion, the attainment of a stipulated result, or the occurrence of a subsequent event directly related to the intended use of the appraisal;

7. The reported analyses, opinions, and conclusions were developed, and this report has been prepared, in conformity with the requirements of the Code of Professional Ethics and Standards of Professional Appraisal Practice of the Appraisal Institute;

8. My analyses, opinions and conclusions were developed, and this report has been prepared, in conformity with the Uniform Standards of Professional Appraisal Practice.

9. The use of this report is subject to the requirements of the Appraisal Institute relating to review by its duly authorized representatives;

10. I have not made a personal inspection of the property that is the subject of this report, and;

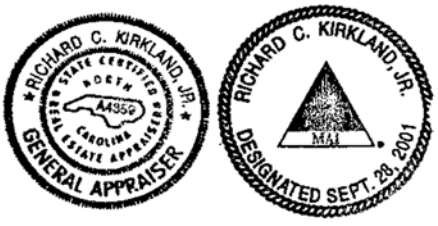
11. No one provided significant real property appraisal assistance to the person signing this certification.

12. As of the date of this report I have completed the continuing education program for Designated Members of the Appraisal Institute;

13. I provided an earlier analysis on this project with a slightly different layout on November 11, 2019. I have not completed any other appraisal related assignments regarding this project within the three years prior to engagement in this current assignment.

Disclosure of the contents of this appraisal report is governed by the bylaws and regulations of the Appraisal Institute and the National Association of Realtors.

Neither all nor any part of the contents of this appraisal report shall be disseminated to the public through advertising media, public relations media, news media, or any other public means of communications without the prior written consent and approval of the undersigned.



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MAI (Member, Appraisal Institute) designation #11796 — 2001
NC State Certified General Appraiser # A4359 — 1999
VA State Certified General Appraiser # 4001017291
SC State Certified General Appraiser # 6209
FL State Certified General Appraiser # RZ3950
GA State Certified General Appraiser # 321885
MI State Certified General Appraiser # 1201076620
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Continuing Education

Uniform Standards of Professional Appraisal Practice Update	2022
Sexual Harassment Prevention Training	2021
Appraisal of Land Subject to Ground Leases	2021
Florida Appraisal Laws and Regulations	2020
Michigan Appraisal Law	2020
Uniform Standards of Professional Appraisal Practice Update	2020
Uniform Appraisal Standards for Federal Land Acquisitions (Yellow Book)	2019
The Cost Approach	2019
Income Approach Case Studies for Commercial Appraisers	2018
Introduction to Expert Witness Testimony for Appraisers	2018
Appraising Small Apartment Properties	2018
Florida Appraisal Laws and Regulations	2018
Uniform Standards of Professional Appraisal Practice Update	2018
Appraisal of REO and Foreclosure Properties	2017
Appraisal of Self Storage Facilities	2017
Land and Site Valuation	2017
NCDOT Appraisal Principles and Procedures	2017
Uniform Standards of Professional Appraisal Practice Update	2016
Forecasting Revenue	2015
Wind Turbine Effect on Value	2015

Supervisor/Trainee Class	2015
Business Practices and Ethics	2014
Subdivision Valuation	2014
Uniform Standards of Professional Appraisal Practice Update	2014
Introduction to Vineyard and Winery Valuation	2013
Appraising Rural Residential Properties	2012
Uniform Standards of Professional Appraisal Practice Update	2012
Supervisors/Trainees	2011
Rates and Ratios: Making sense of GIMs, OARs, and DCFs	2011
Advanced Internet Search Strategies	2011
Analyzing Distressed Real Estate	2011
Uniform Standards of Professional Appraisal Practice Update	2011
Business Practices and Ethics	2011
Appraisal Curriculum Overview (2 Days – General)	2009
Appraisal Review - General	2009
Uniform Standards of Professional Appraisal Practice Update	2008
Subdivision Valuation: A Comprehensive Guide	2008
Office Building Valuation: A Contemporary Perspective	2008
Valuation of Detrimental Conditions in Real Estate	2007
The Appraisal of Small Subdivisions	2007
Uniform Standards of Professional Appraisal Practice Update	2006
Evaluating Commercial Construction	2005
Conservation Easements	2005
Uniform Standards of Professional Appraisal Practice Update	2004
Condemnation Appraising	2004
Land Valuation Adjustment Procedures	2004
Supporting Capitalization Rates	2004
Uniform Standards of Professional Appraisal Practice, C	2002
Wells and Septic Systems and Wastewater Irrigation Systems	2002
Appraisals 2002	2002
Analyzing Commercial Lease Clauses	2002
Conservation Easements	2000
Preparation for Litigation	2000
Appraisal of Nonconforming Uses	2000
Advanced Applications	2000
Highest and Best Use and Market Analysis	1999
Advanced Sales Comparison and Cost Approaches	1999
Advanced Income Capitalization	1998
Valuation of Detrimental Conditions in Real Estate	1999
Report Writing and Valuation Analysis	1999
Property Tax Values and Appeals	1997
Uniform Standards of Professional Appraisal Practice, A & B	1997
Basic Income Capitalization	1996

Prepared By:

TIMMONS GROUP
ENGINEERING | DESIGN | TECHNOLOGY

Moonlight Solar

Decommissioning Plan

Isle of Wight County, VA

Date: 4/21/2023

This cost estimate was not based on detailed construction drawings, but is typical for a project of this size and type. The listed equipment quantities are subject to change based on the actual installed facilities.

Prepared For:

PALLADIUM ENERGY

Moonlight
Solar
Decommissioning Plan

CLIENT NAME	Moonlight Solar
PROJECT NAME	Moonlight Solar
LOCATION	11069 Burwells Bay Road Smithfield, Isle of Wight County, Virginia 23430
PROJECT	Solar PV Electric Generating Facility

Rev.	Date	Description	Prepared	Checked	Approved
0	4/21/2023	Released for Client Use	NBF	KJ	AC

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1 Introduction

Moonlight Solar (the" Project") is a solar electric generation facility ("Facility") up to 44 MWac proposed by Moonlight Solar (the "Project Owner"). The Project will be located at or near 11069 Burwells Bay Road, Smithfield, Isle of Wight County, Virginia. The project area will span approximately 250.1 acres and will connect to a 230 kV transmission line owned by Dominion Energy.

This Decommissioning and Restoration Plan ("Plan") has been prepared to address the requirements of the Isle of Wight County Solar Ordinance. The Project will also comply with any applicable municipal, state, and federal regulations. The Plan assumes decommissioning and restoration will occur at the end of the Project's expected useful life of forty (40) years. An overview of all activities related to the removal of the Project's equipment and panels, appurtenant structures, and for restoration of the site to its previous condition (as much as reasonably practicable) can be found in the Plan.

Within 12 months of initiating the decommissioning, the Project Owner will safely have the relevant components removed from the land and will then restore the site as described below.

This Plan lays out the procedures for restoring the site to its original use, based on the recent historical land use of the property or other economical land uses as desired by the relevant landowner, at the end of the Facility's operational life. The Plan describes procedures for the removal of Facility components. The components of the Facility are described in detail in the Exhibit to the CUP application ("Conceptual Site Plan").

2 Project Components

The Conceptual Site Plan provides detailed information regarding the anticipated location and description of the Facility components. The Facility generally consists of the equipment and infrastructure listed below:

- Steel Piers and Racking;
- PV Panels;
- Inverters;
- Electrical Collection Lines;
- Access Roads;
- Fencing, Gating, and Safety Features;
- Operations and Maintenance (O&M) Building (TBD);
- Weather Stations; and
- Project Collection Substation

3 Regulatory Compliance

Prior to the commencement of decommissioning, the Project Owner will perform the appropriate due diligence requirements and obtain the necessary Isle of Wight County, state, and federal approvals to complete decommissioning activities. To mitigate any environmental impact from decommissioning, the Project Owner will assess the necessary permits and approvals in the future regulatory environment to maintain regulatory compliance. Anticipated types of evaluations may include the following:

- Review of on-site jurisdictional status and potential impacts to wetlands and waterbodies to comply with the Clean Water Act;
- Consultation with the United States Fish and Wildlife Service to evaluate compliance with the Endangered Species Act, Migratory Bird Treaty Act, Bald and Golden Eagle Protection Act, and any other relevant regulations at the time of decommissioning;
- Consultation with the Virginia Department of Environmental Quality for compliance with any pertinent state regulatory requirements;
- Completion of a Phase I Environmental Site Assessment in support of Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) protection;
- Development and implementation of a Stormwater Pollution Prevention Plan (SWPPP);
- Isle of Wight County building, road, discharge, or erosion control permits (as necessary); and
- Special state or local hauling permits (as necessary).

4 Decommissioning

The Project will be decommissioned at the end of its useful life. When the Project Owner determines the Project is at the end of its useful life. At least 60 days prior to the commencement of decommissioning activities, the Project Owner will notify the Isle of Wight County officials. The following general decommissioning activities will occur:

Decommissioning Sequence

1. Obtain required site permits from Authority Having Jurisdiction (AHJ)
2. Disconnect all utility grid power
3. Move all disconnects to the off position
4. Disconnect all above ground wirings, cables, and electrical connections
5. Remove all PV Modules
6. Remove inverters, mounting equipment, and posts
7. Remove all electrical switchgear, transformers, and their foundations
8. Remove Data Acquisition System (DAS) equipment, feeders, and conduit

9. Remove all above ground mounting equipment components and posts
10. Excavate and remove Underground feeders and conduit
11. Remove all MV feeders and utility poles
12. Removal of Collector Substation
13. Removal of weather station
14. Remove access road
15. Remove all fencing
16. Fill/Grade/Seed as needed

Some components may be left in place under certain circumstances. Electrical lines that will not impact future use of the Project Area (at least 3 feet in depth) may be left in place per renewable industry practices. Steel piles, where full removal is unattainable, may be cut and left in place at a depth of 3 feet or greater below the ground surface. Additionally, landowners may desire that certain improvements such as fencing, or access roads remain in place for their use. The Project Owner will obtain a written request from the landowner for any improvement to remain in place.

5 Materials, Recycling, and Disposal

Many components of the Facility, such as racking, wiring, piles, and panels, retain value over time. Panels, while slightly less efficient than when installed, may be reused elsewhere, or their components may be broken down and recycled. Recycling of solar panels and equipment is rapidly evolving and can be handled through a combination of sources such as certain manufacturers, e.g., PV Cycle (an international waste program founded by and for the PV industry), or waste management companies. More than 90 percent of the semiconductor material and glass can be reused in new modules and products. Other waste materials that hold no value will be recycled or disposed of via a licensed solid waste disposal facility.

6 Site Restoration

Following the completion of decommissioning activities, it is anticipated that the site will primarily be converted back to the pre-construction land uses. The land will be graded as necessary, though minimal grading is expected to be required, and decompacted to allow for productive agricultural use. Following completion of the decommissioning activities, the site will be reseeded as necessary with native grasses. Decommissioning of the Facility, including the removal of materials followed by site restoration, should be completed in approximately 12 months.

7 Decommissioning Cost Estimate

7.1 OPINION OF PROBABLE DECOMMISSIONING COST

Detailed Project Description: The Project is single an axis tracking solar electric generating facility, consisting of 27 modules per string, that will be at 11069 Burwells Bay Road Smithfield, VA, Isle of Wight County, 37.0293537, -76.7265584

Table 7-1: Estimated Decommissioning Cost:

PV Module Removal	QUANTITY	UNITS	Unit Cost	Total	Comment
# Solar Panels W540	104,020	EA	$5	$520,100	Disassembly, Haul off-site
SUBTOTAL				$520,100	
Foundations Structural Removal	**QUANTITY**	**UNITS**	**Unit Cost**	**Total**	**Comment**
# Panel Support Steel Piles	17,549	EA	$15	$263,236	Disassembly, Haul off-site
# Panel Racks	3,853	EA	$75	$288,944	Disassembly, Haul off-site
SUBTOTAL				$552,181	
Electrical Equipment Removal	**QUANTITY**	**UNITS**	**Unit Cost**	**Total**	**Comment**
Inverter, 3.6 MW	13	EA	$1,500	$19,500	Disassembly, Haul off-site
MV Transformers, 4,000 kVA	13	EA	$5,000	$65,000	Disassembly, Haul off-site
Tracker Motor	120	EA	$20	$2,400	Disassembly, Haul off-site
SUBTOTAL				$86,900	
Electrical Wires Removal	**QUANTITY**	**UNITS**	**Unit Cost**	**Total**	**Comment**
MV Conductor (10% removal)	14,081	FT	$30	$42,243	Removal, Excavation
DC/LC Conductor	8,984	FT	$2	$377,969	Removal, Non-Excavation
SUBTOTAL				$420,212	
Collector Substation Removal	**QUANTITY**	**UNITS**	**Unit Cost**	**Total**	**Comment**
Circuit Breakers 34.5 kV	2	EA	$9,500	$19,000	Disassembly, Haul off-site
HV Circuit Breakers 230 kV	1	EA	$11,250	$10,000	Disassembly, Haul off-site
Substation Steel	1	LOT	$200,000	$200,000	Disassembly, Haul off-site
Foundation/Fence	1	LOT	$95,000	$95,000	Disassembly, Haul off-site
Main Power Transformers 230 - 34.5 kV 30/40/50 MVA	1	EA	$50,000	$50,000	Disassembly, Haul off-site
Substation Control House	1	EA	$20,000	$20,000	Disassembly, Haul off-site
Capacitor Bank (Size TBD)	0	EA	$50,000	$0	Disassembly, Haul off-site
SUBTOTAL				$394,000	
Fence/land, Removal/Restoration	**QUANTITY**	**UNITS**	**Unit Cost**	**Total**	**Comment**

Fence Perimeter	44,269	FT	$1	$55,336	Disassembly, Haul off-site
Civil Site Remediation (disturbed area)	234.6	Acre	$5,000	$1,173,000	Restoration and seeding
Storm Water Management Ponds	26	EA	$4,000	$104,000	Restoration
Mobilization, Engineering & Permitting				$175,000	Budgeted
SUBTOTAL				$1,507,336	

Summary of Cost Estimates	
PV Module Removal	$520,100
Foundations Structural Removal	$552,181
Electrical Equipment Removal	$86,900
Electrical Wires Removal	$420,212
Collector Substation Removal	$394,000
Fence/land, Removal/Restoration	$1,507,336
ESTIMATED GRAND TOTAL	$3,480,729

The estimate of probable decommissioning costs ($3,480,729) shall serve as the basis for calculating the appropriate escrow, surety, or security for the cost of the decommissioning and reclamation of the project. Any salvage value shall not be used to determine the estimated decommissioning cost of the project.

Data Sources:

1. Material List and Quantities: Based on schematic design.
2. Unit Price Values: Based on R.S. Means and typical quantities for various components.

7.2 OPINION OF PROBABLE SALVAGE VALUE COST

There should be opportunity to reclaim metal scrap value from electrical equipment. Yard equipment such as bus work, circuit breakers, and power transformers contain a significant amount of conductive material such as copper and aluminum. Dead-end and other steel structures contain a significant amount of steel. Rubble from the foundation demolition and all other materials would be sent to landfill at cost. The scrap value of the substation is presented in Table 7-2.

Timmons Group considers that there is a resale market for substation transformers. Therefore, the transformer could be sold as operational second-hand equipment instead of being scrapped. This scenario has been considered.

Table 7-2 Estimated Salvage Value:

PV Module (At: $.3/W before Removal and Hauling)	QUANTITY	UNITS	Estimated New Cost/Unit	Estimated New Total Cost	Estimated Salvage Value 10% of New Cost
# Solar Panels 540W @ $.33/W =$178 less Hauling 20% = $142 net	104,020	EA	$142.00	$14,770,840	$1,477,084
SUBTOTAL					$1,477,084
Foundations Structural (at:$ .20/LB after Removal and Hauling)	**QUANTITY**	**UNITS**	**Estimated Weight LB.**	**Estimated Salvage Value**	**Estimated Salvage Value**
# Panel Support Steel Piles	17,549	EA	100	$0.20	$350,981.99
# Panel Racks	3,853	EA	1,000	$0.20	$770,518.52
SUBTOTAL					$1,121,500.51
Electrical Equipment	**QUANTITY**	**UNITS**	**Estimated New Cost/Unit**	**Estimated New Total Cost**	**Estimated Salvage Value 20% of New Cost**
MV Transformers: 4,000 kVA	13	EA	$105,000	$1,365,000	$273,000
					$273,000
Electrical Collector Substation	**QUANTITY**	**UNITS**	**Estimated New Cost/Unit**	**Estimated New Total Cost**	**Estimated Salvage Value 20% of New Cost**
Circuit Breakers 34.5 kV	2	EA	$50,000	$100,000	$20,000
HV Circuit Breakers 230 kV	1	EA	$160,000	$160,000	$32,000
Substation Steel	1	LOT	$1,200,000	$1,200,000	$240,000
Foundation/Trench/Conduit/Cable*	1	LOT	$200,000	$200,000	$40,000
Main Power Transformers 230 - 34.5 kV 30/40/50 MVA	1	EA	$1,400,000	$1,400,000	$280,000
Substation Control House	1	EA	$400,000	$400,000	$80,000
Capacitor Bank (Size TBD)	0	EA	$250,000	$0	$0
SUBTOTAL				$3,460,000	$692,000
Electrical Wires/cables	**QUANTITY**	**UNITS**	**Estimated New Cost/Unit**	**Estimated New Total Cost**	**Estimated Salvage Value 10% of New Cost**
MV Conductor (only 10% of total)	14,081	FT	$35	$492,837	$49,284
DC/LC Conductor	188,984	FT	$5	$944,922	$94,492
SUBTOTAL					$143,776
Fence	**QUANTITY**	**UNITS**	**Estimated Weight LB.**	**Estimated Salvage Value**	**Estimated Salvage Value/Including Removal**
Fence Perimeter (1.3 lb. per square ft, 6ft height)	44,269	FT	345,298	$0.50	$86,324.55
Fence Post every 10 ft (9 ft length, 2.3 lb./Ft)	4,427	FT	142,644	$0.50	$35,661.00
SUBTOTAL					$121,985.55

Summary of Salvage Values Estimate	
PV Module	$1,477,084
Foundations Structural	$1,121,501
Electrical Equipment	$273,000
Electrical Wires	$692,000
Electrical Collector Substation	$143,776
Fence	$121,986
ESTIMATED GRAND TOTAL	$3,829,346

7.3 NET DECOMMISSIONING COST

Per Isle of Wight County's Ordinance, the Estimated Salvage Value will not be used in calculating the appropriate escrow, surety, or security for the cost of the decommissioning and reclamation of the project.

7.4 DECOMMISSIONING ASSUMPTIONS

1. To develop a cost estimate for the decommissioning of the Project, Timmons Group made the following assumptions, with and costs were estimates based on current pricing, technology, and regulatory requirements. The assumptions are listed in order from top to bottom of the estimate spreadsheet. We developed time and materials-based estimates considering composition of work crews. When materials have a salvage value at the end of the project life, the construction activity costs, and the hauling/freight cost are separated from the disposal costs or salvage value to make future revisions to salvage values more transparent.
2. Decommissioning year is based on a 10-year initial period for the financial security. The projected life of the project is 40 years.
3. This Cost Estimate is based on the Timmons Group data request forwarded April 2023.
4. Common labor will be used for the majority of the tasks except for heavy equipment operation. Pricing is based on local Southeast US labor rates.
5. Permit applications required include the preparation of a Stormwater Pollution Protection Plan (SWPPP) and a Spill Prevention Control and Countermeasure (SPCC) Plan.
6. Road gravel removal was estimated on a time and material basis using a 16 foot width and an 8 inch thickness for the access roads. Substation aggregate is included in the substation quantities. Since the material will not remain on site, a hauling cost is added to the removal cost. Road aggregate can often be disposed of by giving to landowners for use on driveways and parking areas. Many landfills will accept clean aggregate for use as "daily cover" and do not charge for the disposal.

7. Grade Road Corridor reflects the cost of mobilizing and operating light equipment to spread and smooth the topsoil stockpiled on site to replace the aggregate removed from the road.
8. Erosion and sediment control along road reflects the cost of silt fence on the downhill side of the road and surrounding all on-site wetlands.
9. Topsoil is required to be stockpiled on site during construction, therefore this topsoil is available on site to replace the road aggregate, once removed. Subsoiling cost to decompact roadway areas is estimated as $1,500 per acre (based on previous bid prices), and revegetation on removed road area, which includes seed, fertilizer, lime, and care until vegetation is established is $3,500 per acre. The majority of the project area is "over-seeded" since the decommissioning activities are not expected to eliminate the existing grasses and vegetation under the arrays or heavily compact the soils. Over-seeding does not include fertilizer and lime and is estimated at $5,000 per acre.
10. Fence removal includes loading, hauling, and recycling or disposal. Fences and posts weigh approximately 2.3 pounds per foot.
11. Array support posts are generally lightweight "I" beam sections installed with a piece of specialized tracked equipment. Crew productivity is approximately 240 posts per day, and the same crew and equipment should have a similar productivity removing the posts, resulting in a per post cost of approximately $15. We assume a cost of $12.00 per post to include hauling fees and contingencies.
12. A metal recycling facility (FEA Salvage and Recycling) is located in Orange, Virginia and is relatively close to the project site. Steel scrap pricing was acquired from www.scrapmonster.com.
13. The solar panels rated 540 watts can easily be disconnected, removed, and packed by a three-person crew at a rate we estimate at 12 panels per hour.
14. No topsoil shall be removed from the site during decommissioning and most of the site will not have been compacted by heavy truck or equipment traffic so the site turf establishment cost is based on RS Means unit prices for applying lime, fertilizer, and seed at the price of per acre plus an allowance for some areas to be decompacted.
15. There is an active market for reselling and recycling electrical transformers and inverters with several national companies specializing in recycling. We have assumed a 20% recovery of these units based on field experience with used transformers as opposed to trying to break them down into raw material components.
16. The underground collection lines are assumed to be aluminum conductor.
17. Care to prevent damage and breakage of equipment, PV modules, inverters, capacitors, and SCADA must be exercised, but removal assumes unskilled common labor under supervision.

The estimated salvage values are derived from years of experience decommissioning and uprating electric substations, overhead transmission and distribution hardware and underground distribution hardware that would include but not be limited to substation and pad mounted transformers, overhead and underground conductors, poles, fencing, ground grid conductors, control housings, circuit breakers (high and medium voltage), protective relaying, and other hardware items. These individual items have high salvage value either as stand-alone components to be reused or recycled and sold as used items. These items also have a relatively high salvage value as pure scrap for steel, copper and other commodities.

For all medium voltage transformers, breakers and other items, Southeastern Transformer Company in Dunn, NC provides complete repair, upgrading and recycling and resale for all items mentioned above. Their website is: https://www.setransformer.com. They have a national presence.

For any and all recycling and upgrading, Solomon Corporation offers the same set of services for transformer repair and recycling and complete substation decommissioning services. With seven different locations, Solomon is one of several vendors that can decommission and recycle the components as noted above. Their website is: https://www.solomoncorp.com/. Solomon Corporation is only one of many transmission and distribution recycle and decommissioning shops that do this mainly to harvest the components.

For recycling conductor, General Cable and Southwire both utilize extensive scrap procurement programs to reuse copper and aluminum conductor harvested from projects such as this one to supplement and reduce their raw material costs.

Here is the link to the General Cable program which only increases the salvage values found in this Plan: General Cable Recycling https://es.generalcable.com/na/us-can/socialresponsibility/sustainability/recycling

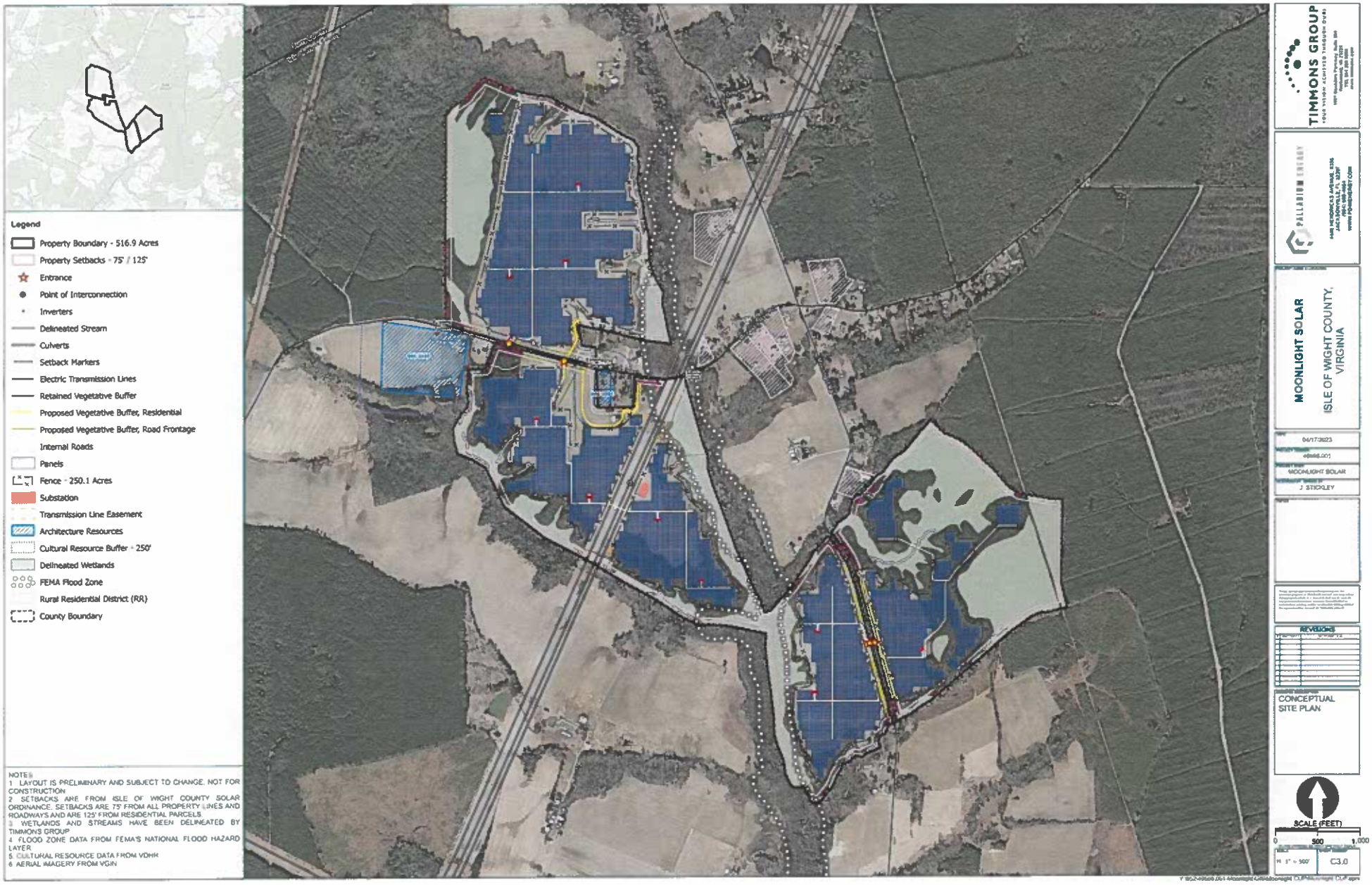
As for solar panels, they are in demand as salvageable items either in whole or for their raw material. According to the International Renewable Energy Agency (IRENA), more than 90% of all the materials are high grade silicon, aluminum and glass and are typically harvested to produce new panels. This is far less expensive than buying unprocessed raw materials for production.

The base industry assumption is that since solar panels are expected to retain about 75% of their production capability after 35 years of use, a salvage value of 10% of original cost is a low estimate of their expected value and as we note in assumption. This considers possible technology improvements and undervalues the anticipated salvage value of the panel's raw materials. The Solar Energy Industries Association (SEIA) has an approved set of PV recycling vendors that specialize in doing this today and they can be found at: https://www.seia.org/initiatives/seia-national-pv-recycling-program.

First Solar, which has been active in the solar industry since its inception, takes solar modules and recycles 90% of the semiconductor material which is then reused in new modules. 90% of the glass product can be reused as new glass products, including panels and fiber optic cable. We can conclude that realistically the estimated 10% salvage value is low and reflects a conservative figure. Information about First Solar's recycling program is at: http://www.firstsolar.com/en/Modules/Recycling.

8 Financial Assurance

The Project Owner will post a financial surety as required by the Isle of Wight County zoning ordinance. Based on industry trends, the projected and actual costs of decommissioning are expected to go down over time based on improvements both to best practices in calculating these costs and the decommissioning process itself. The Project Owner will reevaluate decommissioning costs with a qualified engineering consultant every five years during the life of the Project.


Legend
Property Boundary - 516.9 Acres
Property Setbacks - 75' / 125'
Entrance
Point of Interconnection
Inverters
Delineated Stream
Culverts
Setback Markers
Electric Transmission Lines
Retained Vegetative Buffer
Proposed Vegetative Buffer, Residential
Proposed Vegetative Buffer, Road Frontage
Internal Roads
Panels
Fence - 250.1 Acres
Substation
Transmission Line Easement
Architecture Resources
Cultural Resource Buffer - 250'
Delineated Wetlands
FEMA Flood Zone
Rural Residential District (RR)
County Boundary
NOTES:
1 LAYOUT IS PRELIMINARY AND SUBJECT TO CHANGE. NOT FOR CONSTRUCTION
2 SETBACKS ARE FROM ISLE OF WIGHT COUNTY SOLAR ORDINANCE. SETBACKS ARE 75' FROM ALL PROPERTY LINES AND ROADWAYS AND ARE 125' FROM RESIDENTIAL PARCELS
3 WETLANDS AND STREAMS HAVE BEEN DELINEATED BY TIMMONS GROUP
4 FLOOD ZONE DATA FROM FEMA'S NATIONAL FLOOD HAZARD LAYER
5 CULTURAL RESOURCE DATA FROM VDHR
6 AERIAL IMAGERY FROM VGIN
TIMMONS GROUP
PALLADIUM ENERGY
MOONLIGHT SOLAR
ISLE OF WIGHT COUNTY, VIRGINIA
04/17/2023
MOONLIGHT SOLAR
J. STICKLEY
REVISIONS
CONCEPTUAL SITE PLAN
SCALE (FEET)
0
500
1,000
C3.0

Start of Proposed Transportation Route: Intersection at Burwells Bay Rd and Route 10

Transportation Route: Bend near intersection of Moonlight Rd and Burwells Bay Rd

Moonlight Rd facing North toward 11-01-023A

Moonlight Rd facing South toward 11-01-023A

Moonlight Rd facing South toward 11-01-023

Moonlight Rd facing West toward barn on 11-01-023

Moonlight Rd facing North toward 11-01-023

Transportation Route: Shoulder along Burwells Bay Rd

Transportation Route: Shoulder along Burwells Bay Rd

Transportation Route: Shoulder along Burwells Bay Rd.

Transportation Route: Burwells Bay Rd approaching 11-01-017 on left and 11-01-018 on right

Burwells Bay Rd facing Southeast toward 11-01-017

Burwells Bay Rd facing Southeast toward Carroll Plantation House on adjacent parcel

Burwells Bay Rd facing Northwest toward 11-01-018

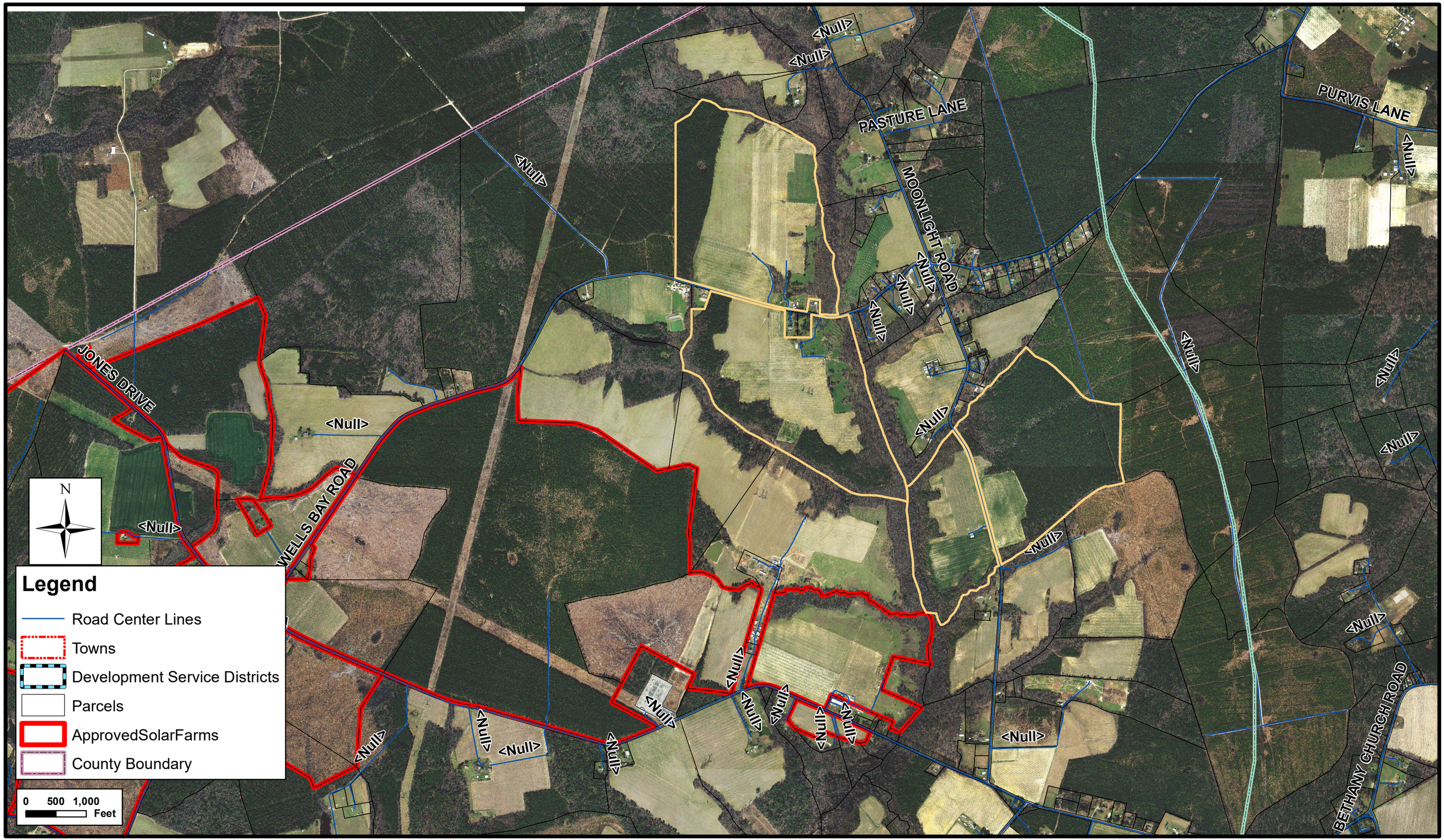
Burwells Bay Rd facing Northwest corner of 11-01-018

CUP-10-23 Conditional Use Permit Request - Location Map

CUP-10-23 Conditional Use Permit Request - Closeup Map #1

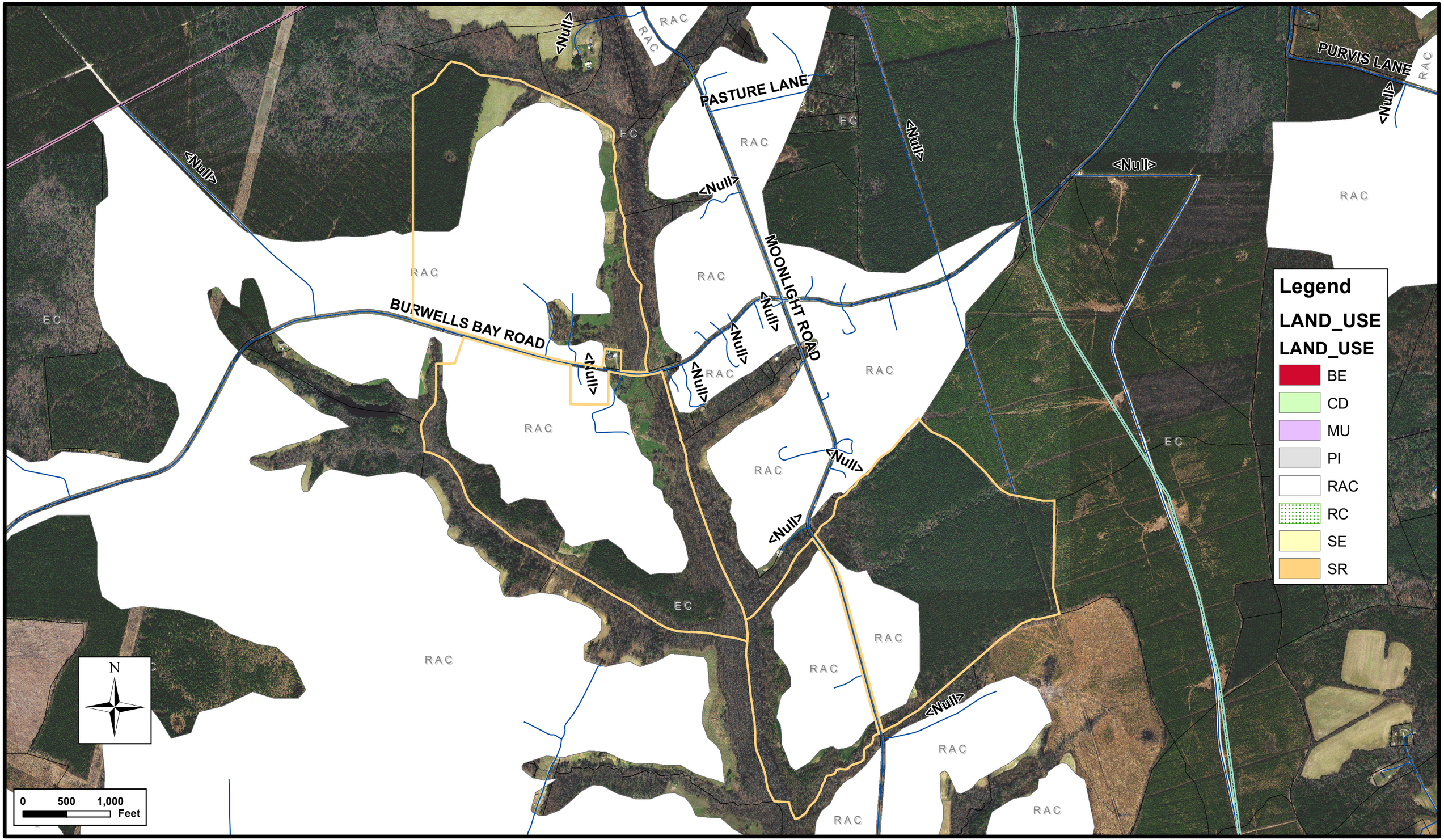
CUP-10-23 Conditional Use Permit Request - Closeup Map #2

CUP-10-23 Cavalier Solar and Moonlight Solar - Proximity Map



CUP-10-23 Zoning Map

CUP-10-23 Land Use Map



Solar Energy Generation Facilities as of 11/16/2023

PROJECT	DEVELOPED AREA (PER CUP)	PRIME FARMLAND /SOILS OF STATEWIDE IMPORTANCE*	% OF TOTAL PRIME SOILS (rounded)	LOCATION	% OF TOTAL FARMLAND**	TOTAL MW	APPROVAL DATE
Woodland	180	124	0.10%	Longview	0.22%	20	2015
Solidago	170	170	0.14%	Redhouse	0.21%	20	2018
Ho-Fel	330	315	0.26%	Lees Mill	0.41%	55	2019; Amended 2023
Windsor PV1	630	630	0.52%	Windsor	0.78%	85	2019; Amended in 2021
Cavalier	500	500	0.41%	Hardy	0.62%	240	2021
Nuby Run	20	20	0.02%	Orbit	0.02%	2	2022
Carver	637	297	0.24%	Windsor	0.79%	71	Approved 7/23/2023
Prairie Solar	152	152	0.12%	Longview	0.19%	20	Approved 8/17/23
Courthouse Solar	18	18	0.01%	Route 258	0.02%	3	Approved 11/16/23
Moonlight (Proposed)	492	274	0.22%	Burwells Bay/Moonlight	0.61%	44	Planning Commission Review 11/28/2023
TOTAL	**3,129**	**2,500**	**2.04%**		**3.88%**	**560**	

Prime soils include Prime Farmland, Prime, If Drained, and Soils of Statewide Importance – 122,296 total acres in County

****Total active agricultural lands as of 2017 Census of Agriculture – 80,672 acres***

RESOLUTION NUMBER PC-23-8

ISLE OF WIGHT COUNTY PLANNING COMMISSION
A RESOLUTION TO PRESENT A REPORT AND RECOMMENDATION TO THE BOARD OF SUPERVISORS FOR CONDITIONAL USE PERMIT REQUEST CUP-10-23 TO ALLOW A MAJOR UTILITY SERVICE, SPECIFICALLY A FORTY-FOUR MW UTILITY SCALE SOLAR ENERGY GENERATION FACILITY ON APPROXIMATELY FOUR HUNDRED AND NINETY-TWO ACRES WITH TAX MAP NUMBERS 11-01-017, 11-01-018, 11-01-023, AND 11-01-023A AND TO WITHDRAW APPROXIMATELY FIVE HUNDRED AND TWENTY-THREE ACRES FROM THE MOONLIGHT AGRICULTURAL AND FORESTAL DISTRICT

WHEREAS, Moonlight Solar, LLC, applicant, on behalf of George Benjamin Edwards, Jeanette J. Edwards, George W. Edwards, LeAnne Ricks Edwards Wait, and Dana Louise Edwards, property owners, has requested issuance of a conditional use permit for approximately four hundred and ninety-three acres of certain tracts of land with tax parcel numbers 11-01-017, 11-01-018, 11-01-023, and 11-01-023A situated in Isle of Wight County and to withdraw approximately five hundred and twenty-three acres of land from the Moonlight Agricultural and Forestal District; and

WHEREAS, the specific request is to permit a major utility service, specifically a forty-four MW utility scale solar energy generation facility as defined in the Zoning Ordinance, in accordance with sections 1-1017 and 4-2003 of the Zoning Ordinance; and

WHEREAS the procedural requirements for the consideration of this request by the Planning Commission have been met; and

NOW, THEREFORE, BE IT RESOLVED by the Planning Commission of Isle of Wight County, that:

Section 1. Findings.

_____ A. The Isle of Wight County Planning Commission finds that the proposed conditional use permit is reasonable and has considered the following factors and finds that the proposed use does not conflict with:

1. the existing use and character of property within the County;

2. the Comprehensive Plan;

3. the suitability of the property for various uses;

4. the trends of growth or change;

5. the current or future requirements of the community as to land for various purposes as determined by population and economic studies and other studies;

6. the transportation requirements of the community;

7. the requirements for airports, housing, schools, parks, playgrounds, recreation

areas, and other public services;

8. the conservation of natural resources;

9. the preservation of floodplains;

10. the preservation of agricultural and forestal land;

11. the conservation of properties and their values; and

12. the encouragement of the most appropriate use of land throughout the County.

_____ B. The Isle of Wight County Planning Commission does not find that the conditional use is reasonable based on the consideration of the factors listed herein.

Section 2. Recommendation to Board of Supervisors.

The Planning Commission recommends to the Board of Supervisors that the request, CUP-10-23, be:

___ a. Granted as submitted, and that the Board of Supervisors adopt the proposed Ordinance without modification.

___b. Denied, and that the Board of Supervisors not adopt the proposed Ordinance.

___c. Granted with the modifications set forth on the attached listing of specific recommendations, and that the Board of Supervisors adopt the proposed Ordinance with such modifications.

DATE: _____

READ AND PASSED: _____
Chairman, Isle of Wight County Planning Commission

TESTE: _____
Secretary, Isle of Wight County Planning Commission

Approved as to Form:

_____
Robert W. Jones, Jr., County Attorney

COUNTY OF ISLE OF WIGHT

OFFICE OF THE COMMISSIONER OF THE REVENUE
Post Office Box 107
Isle of Wight, Virginia 23397
(757) 365-6222

Gerald H. Gwaltney
Commissioner of the Revenue

MEMORANDUM

TO: Caleb J. Kitchen, Planner I
Planning & Zoning Division

FROM: Gerald H. Gwaltney,
Commissioner of the Revenue

DATE: October 11, 2023

RE: Moonlight Solar – 8266 Moonlight Road Conditional Use Permit Application (CUP-10-23), 1st Submittal for 44MW ground-mounted solar photovoltaic (PV) energy system (major utility – solar energy facility) Tax Map Nos. 11-01-017, 11-01-018, 11-01-023, and 11-01-023A

I have reviewed the Conditional Use Application for the above-referenced project. The July 1, 2023 General Reassessment of Real Estate established new criteria for assessment of land associated with conditional use permits.

The new methodology for solar farms establishes an assessment of $15,000 per acre for the entire area approved for the conditional use permit. Moonlight Solar designates a 250-acre fenced-in site as solar use property. The use permit application applies for 492.28 acres. The $15,000 per acre assessment will apply to the 492.38 acres. This will result in an increased amount of taxes, higher than the project's financial analysis projects.

Please let me know if you have any questions as the application moves through the process.

ISLE of WIGHT COUNTY MUSEUM

MEMORANDUM

TO: Caleb J. Kitchen, Planner I

FROM: Jennifer England
Director, Isle of Wight County Museum
Historic Resources Manager, Isle of Wight County

RE: Moonlight Solar – 8266 Moonlight Road
Conditional Use Permit Application (CUP-10-23), 2nd Submittal for 44MW ground-mounted solar photovoltaic (PV) energy system (major utility – solar energy facility)

DATE: October 4, 2023

After reviewing the 2nd submittal documents for the proposed Moonlight Solar Facility to include a Phase IB Archaeological Survey and a Phase I Historic Architecture Survey and Effects Assessment as prepared by Apogee Environmental & Archaeological Inc., the Isle of Wight County Museum/Isle of Wight County Department of Historic Resources finds that no additional archaeological work is recommended within the project area and that the architectural resources located both within the project area and within the ½-mile buffer will not be adversely affected by the project.

Should the project proceed, the potential within the project area for archaeological artifacts is highly likely. If the landowner is willing, the Isle of Wight County Museum should be considered a repository for discovered artifacts and future finds on this site as they could further the interpretation or discovery of Isle of Wight County history.

103 Main Street
Smithfield, VA 23430
(757) 356-1014
(757) 357-0114 FAX

ISLE OF WIGHT COUNTY SHERIFF'S OFFICE

P.O. Box 75 · 17110 Monument Circle · Isle of Wight, VA 23397
Phone (757) 357-2151 · Fax (757) 357-0706

James R. Clarke Jr.
Sheriff

Date June 7, 2023

To Caleb J. Kitchen Planner 1

From Major Joseph M. Willard Isle of Wight Sheriff's Office

Subject: Moonlight Solar 8266 Moonlight Rd.

Conditional Use Permit Application (CUP-10-23) 1st Submittal

Caleb after review of the submitted plan the only needs and concerns of the Sheriff's Office will be the increase in patrol during the construction phase and the traffic situation on the selected routes although they have done a complete study as far as the amount of traffic and past traffic accidents in the area. These are primarily secondary roads with no to minimal shoulders and are also shared with farm vehicles. During the construction phase they will be bringing in heavy equipment and large vehicles which will require escorts or even road closer. Also, there being multiple sites the concern of the operation of heavy equipment on the roads from one site to the other.

PLANNING REPORT

APPLICATION:

Application of NVR, Inc., applicant, and, Henry Layden, special trustee for the William Grover Yeoman, III Trust, property owner, for a Conditional Rezoning (ZA-06-19) of approximately 250 acres of property with tax map number 32-01-009 located on Benns Grant Boulevard (Rte. 10) from the Rural Agricultural Conservation (RAC) zoning district to the Conditional - Planned Development - Mixed Use (C-PD-MX) zoning district

ELECTION DISTRICT:

District 1

LOCATION:

The proposed project is located on an approximately 249.47 acre portion of the property with tax map number 32-01-009, also known as the Yeoman tract. The property is bounded to the north by the Town of Smithfield jurisdictional boundary as well as a residential property in the RAC zoning district, and a property in the Conditional-Limited Industrial zoning district which is currently used by the Sherwin Williams Paint Store. The project site is bounded to the west by Benns Church Boulevard (Rte.10), and the remainder of tax map number 32-01-009 is directly across the Rte. 10. The property is bounded to the east by Jones Creek, residential and agricultural property in the RAC zoning district. To the south, it is adjacent residential and agricultural property in the RAC zoning district as well as one property, known as St. Luke's Village, in the C-PD-MX zoning district.

BACKGROUND:

The portion of the property on which the proposed project is located is currently in agricultural and silvicultural use. There is an approximately twenty acre remaining portion on the west side of Route 10 that is also currently in agricultural use. However, a conditional use permit is currently under review for a convenience store and gasoline station on approximately 3.8 acres of the property at the southwest corner of the Turner Drive and Benns Grant Boulevard intersection. The property has historically been used for agricultural and silvicultural uses.

The Planning Commission held a public hearing on the proposed application at

their September 26, 2023, regular meeting. Following the public hearing, the Planning Commission discussed the application and moved to continue their discussion to their next regular meeting in order to allow staff time to provide additional information to the Commission. Staff subsequently sent the list of questions from the Commission to Dr. Chris Coleman at Isle of Wight County Schools. Dr. Coleman responded that additional time was needed to provide responses to the questions.

Staff also met with Fire and Rescue staff to further discuss the operational impact of the projected 349 additional fire and rescue calls from the proposed development. Based on current call volume, staff determined that the additional calls can be absorbed without degradation of service. Staff analysis shows that the development could generate approximately one additional EMS call per day and one additional fire call per week for the northern service area.

In addition, staff also received additional review comments from the Town of Smithfield and the Economic Development Department which are attached to this staff report. Because additional time is needed to provide the requested school information, staff recommended no action for the Planning Commission at their October 24, 2023, regular meeting. Following additional discussion, the Planning Commission voted to continue their discussion of the application to their November 28, 2023, regular meeting in order to allow school staff additional time to provide responses to the list of questions.

Current Project Status:

Staff updated its assessment of the impact of the proposed development on public facilities in this report based on new information presented since the September 26, 2023, Planning Commission public hearing. Since the Planning Commission's October meeting, Dr. Chris Coleman of Isle of Wight County Schools provided a copy of the new student generation and growth report to the Planning Commission that he presented to the School Board on November 8, 2023. A copy of the report was sent to the Planning Commission via email and is also attached to this staff report.

Although community development staff is awaiting a few more answers to the earlier questions posed by the Planning Commission, staff did prepare responses to most of the questions based on information provided by School staff and the November 8, 2023, School Board presentation. Please find the list of questions followed by staff responses below:

1. **Has schools had any issues with school children coming from the age-**

restricted neighborhoods? During the meeting, you mentioned that you could pull a report to see if there were any school buses picking up or dropping off children in these neighborhoods.

Dr. Coleman will be providing this information.

2. The build-out for the Sweetgrass is six years with a projected 38 non-age restricted townhomes being built each year. How will this impact schools?

The students generated by Sweetgrass would add on average five elementary school students, one middle school student, and two high school students per year for the six year build-out period. According to the County impact model, the development is projected to generate a total of 30 elementary school students, 7 middle schools students and 15 high school students. These students would go to Hardy Elementary, Westside Elementary, Smithfield Middle School, and Smithfield High School. Although there is currently capacity for the students in each school, we have to look at the potential to add incremental operational costs these students may create such as the need for supplies, additional classes to meet demand (i.e., pre-k, CTE, SPED, etc.) because of class size limits and waiting lists, teachers for these additional classes, aids for larger class sizes, fuel, additional bus routes, and drivers, to name a few.

3. What is the actual number of school children generated by Benns Grant? Can you also give numbers for the Crossings condos and the Brewers Station apartments?

The current number of school children generated by Benn's Grant is 363 students. The 240 apartments in Benns Grant are currently under construction. We use four buses to serve the Benn's Grant development. Dr. Coleman will provide the information on Bartlett Station condos and Brewers Station apartments.

4. During the meeting, you mentioned that you were preparing an area plan for the school board that you could also share with the Planning Commission. Do you have a copy of this report available that I could share with the Planning Commission?

A link to the powerpoint presentation from the November 8, 2023, School Board meeting was previously sent to the Planning Commission County

email accounts. In addition, a copy of the presentation is attached to this staff report.

5. What are the per capita operational and capital expenses per student? This may require some stakeholder coordination (legal, school, etc.) to distinguish what can reasonably be attributed to a capital expense and may vary from our budgetary definitions. For example, is a student-issued electronic device, chair, desk, etc. capital? Obviously a bus addition would be, so the scope of this answer should include bus capacity and constraints. Also, please specifically address the increased transportation demand the proposed Sweetgrass project would bring.

The operational cost per student is $10,000 of which $5,600 consist of local funds. The County is fully utilizing all of its available buses and is waiting on the delivery of two new buses in April. In addition, staff will be recommending the purchase of 5-6 additional buses in the forthcoming budget. There is time lag of 10-12 months between when an order is placed and when a bus is delivered. Sweetgrass is projected to generate 52 students according to the County's capital impact model which would require additional bus routes to accommodate. The biggest transportation issues we have is vehicle shortage, maintenance issues, and staff shortages.

6. Is there a reasonable projection of added SPED students per added student population (percentage) that require some added capital need? Also consider STEM, CTE, etc.

Currently the school system uses 15% as a projection of added SPED student needs for new student population. Schools currently has a waiting list for CTE classes. CTE classes fall under OSHA oversight, so these programs are limited to 20 students per class, and there aren't enough classes to meet demand.

7. Is it possible to define a student per capita capital/operational expense projection considering all variables? If so, should this be established and updated at some frequency?

For each new student, we could project an additional operational cost of $10,000 per student with another $1,500 to meet additional SPED needs. The school system updates the average cost per student on annual basis. Average capital cost per student can be found in the County's Capital Impact Model.

8. Request the school provide data of current student load, capacity, and projections based on county projected growth. Also, the school is requested to comment on any recent (last 5 years) mitigation efforts required to maintain adequate classroom occupancy levels (e.g. redistricting, grade level adjustments per school, etc.).

Please refer to the powerpoint presentation on the updated student yield study for current student load, capacity and projections based on current County projected growth. The County is experiencing increased growth in certain areas of the County which has potential impacts on certain schools and grade levels. Total school enrollment is 5,597 as of October 31, 2023. There is a total system-wide school capacity of 7,183 students which represents a 78% utilization rate. If we add the 1,057 projected new students from projects currently under construction as well as those proposed, the utilization rate increases system wide to 93%. However, different schools have different utilization rates. Smithfield Middle School, for example, has a current utilization rate of 95%. The School Board redistricted elementary schools this summer and sent more students to Hardy to provide more room at Carrollton. Even with this measure, there is still not enough room at Carrollton to keep the fourth grade there. We are experiencing increased demand for pre-k, but pre-k classes are capped at 18 students. To go above this number, there needs to be an aid in the classroom which increases operational costs. The school system strives to limit classroom size to 23 students in high school.

9. Request legal opinion on how much school "maneuvering" (redistricting, school grade level service adjustments, etc.) is necessary before a capacity limit requires a significant capital investment in expansion.

The school enrollment projection consultant does not recommend more than a 90% utilization rate. The school system established a 95% utilization rate as a trigger to begin the planning and budgeting process for a capacity expansion.

DESCRIPTION:

The purpose of the application is to allow for up to 390 age-restricted single family

detached residential units, 225 residential townhomes, and approximately five acres of commercial uses to include up to 18,000 square feet of retail and commercial uses and up to 55,000 square feet of office uses.

The elevations and materials for the residential units are attached to the staff report as Sweetgrass Elevations. Although there are no examples of the single family detached models constructed in the County, there are examples of the townhome models located in the Benn's Grant community. Pictures are attached to the staff report. The proffer statement commits to a master bedroom on the first floor of the age-restricted single family homes. The fiscal impact analysis projects the average sales price of an age-restricted unit to be $305,200 and townhomes to be $258,875.

Retail uses are defined separately in the Zoning Ordinance and are considered a commercial use type. In addition to the proffered retail use, other permitted commercial uses in the PD-MX zoning district could include the following:

- Antique shop;
- Business support service;
- Construction office, temporary;
- Event center;
- Garden center;
- Golf course;
- Itinerant merchant;
- Micro-brewery, distillery, cidery;
- Motor vehicle parts/supply, retail;
- Peddler;
- Personal improvement service;
- Personal service;
- Real estate office, temporary;
- Restaurant, drive-in fast food;
- Restaurant, general;
- Retail sales;

- Studio, fine arts;
- Veterinary hospital/clinic; and
- Wholesale sales.

A copy of the proffered conditions, illustrative concept plan, and other supporting documents are attached to this staff report for your information. Among the proffered conditions are a set of residential and commercial design guidelines as well as a proffer that the age-restricted units will have a master bedroom and bathroom on the first floor. Enforcement of the age-restriction condition and the maintenance for all open space, recreational amenities, stormwater facilities, and landscaping shall be the responsibility of the property owner's association.

Staff assessed the application for its consistency with the County's plans and ordinances as well as potential impacts to natural and cultural resources, public facilities and services. The following is a summary of the projected benefits, potential impacts and any mitigation measures proposed by the applicant.

Environmental Assessment:

The project site lies within the Chesapeake Bay watershed area and has several wetland areas and tributary streams to Jones Creek within it which have been confirmed by the US Army Corps of Engineers. In addition, the Resource Protection Area (RPA) buffer has been confirmed by the Virginia Department of Environmental Quality. There is also a large farm pond created many years ago by a dam that still provides connectivity to the tributary stream.

The Department of Conservation and Recreation has classified the areas containing the streams, wetlands, and Jones Creek as having a "high" (C3) ecological core area score. Ecological core areas are classified into five categories of ecological integrity: C1 - Outstanding; C2 - Very High; C3 - High; C4 - Moderate; and C5 - General. Scores are enhanced if the core or habitat fragment is part of a larger complex of natural lands. Scores also increase for those cores and habitat fragments that contribute to water quality enhancement. In general, larger, more biologically diverse areas are given higher scores.

A review of information from the National Fish and Wildlife Service shows the possibility of several endangered and rare species and species of concern in the general including the Bald Eagle, the northern long-eared bat, tri-colored bat, red-headed woodpecker, and several other migratory species. Although it is not known whether there are any of these species present on the property, the USFWS

information does not identify the property as critical habitat for any of these species.

The Sweetgrass project proposes to retain and restore the full extent of the RPA and floodplain areas that are within the ecological core area except for several access road crossings. The lot area as shown on the concept plan do not contain RPA buffer areas. Future construction on the property may be subject to time-of-year restrictions based on the breeding and migratory needs of critical species.

A review of the USDA soils information shows that the areas proposed for development will occur on soils designated either soils of statewide importance or prime farmland soils. Poorly drained soils occur in and near the wetland, stream and floodplain areas of the property. Prior to construction, all habitable structures will require a shrink/swell soils assessment for foundation design.

Even though the concept plan and water quality impact assessment (WQIA) submitted with the project propose impacts for road crossing and stormwater management impacts, these impacts are subject to a separate review and approval process. Although the concept plan notes these impacts are subject to additional review and approval, staff does not include the WQIA as part of the rezoning approval request, because it will be submitted as part of a future RPA Buffer modification application.

Historic Resources Assessment:

The property falls within the high probability area for archeological resources according to County records. The applicant provide a Phase 1A Cultural Resources Analysis study with their initial application. A copy of the report is attached, however, the staff request for a final report without the word "draft" on it has gone unheeded as of the date of this report. The report states that there are no known archeological resources on the site, however, several of the existing out buildings may be of an historic nature and recommends that a Phase I be conducted. The applicant commits to a Phase I study with further Phase II and Phase III studies as appropriate in the proffer statement. These studies shall be submitted prior to subdivision or site plan submittal and shall be subject to review by the Virginia Department of Historic Resources. County Historic Resources staff concerns are satisfied with the proffered condition.

Transportation Facility Impacts:

All of the streets within the proposed project will be public streets, except for the

private drive aisles within the townhome phase which are proposed for a condominium style of ownership. All public roads will be required to be built to the Virginia Department of Transportation (VDOT) standards in order to be accepted into the state secondary street system maintenance program. The project proposes two entrances to serve the development from Benn's Church Boulevard (Rte. 10).

The main entrance will be closest to the Smithfield Town boundary and will utilize an existing median cut. The Traffic Impact Analysis (TIA) recommends and the applicant proffers to a signal at this intersection. The second southern entrance will be a right in/right out entrance only with no signal.

The TIA shows the new development would add an average of 6,685 new vehicle trips per day. The average number of new peak hour morning (6 AM to 8 AM) trips would be 521 trips and new peak hour evening (2:30 PM to 5:30 PM) trips would average 692.

The TIA projects that traffic generated by the development will exceed current turn lane storage length at Turner Drive and Benns Church Boulevard as well as create a need for a new traffic signal and increased turn lane storage at the main entrance of Sweetgrass. The TIA recommends the following traffic improvements be made to mitigate for the projected negative traffic impacts:

1. Construct northbound right turn lane (200' storage plus 200' taper) into right in/right out development entrance off of US 258/Rt 10 (Benns Church Boulevard).
2. Construct northbound right turn lane (200' storage plus 200' taper) into main entrance off of US 258/Rt 10 (Benns Church Boulevard).
3. Lengthen southbound left turn lane to provide 200' storage plus 200' taper into main entrance off of US 258/Rt 10 (Benns Church Boulevard).
4. Install traffic signal at intersection of US 258/Rt 10 (Benns Church Boulevard) and main entrance.
5. Install signal infrastructure to provide a protected eastbound right-turn overlap at US 258/Rt 10 (Benns Church Boulevard) and Turner Drive.
6. Install flashing yellow arrows for the northbound and southbound left turn lanes at the intersection of US 258/Rt 10 (Benns Church Boulevard) at Canterberry Lane, Cypress Run Drive, Turner Drive and the main entrance to allow lead/lag operation.
7. Optimize signal timings along the corridor.

The applicant has committed to making the recommended road improvements in

the proffer statement. The proffered conditions address earlier concerns from VDOT and the County Transportation Manager.

As a matter for informational purposes, the County is currently coordinating a master TIA project for the Benn's Church Boulevard and Turner Drive intersection area that will assess needed road improvements to accommodate future commercial, residential and school development planned in both the County and Town of Smithfield. The Sweetgrass applicants are currently not participating in this project.

Emergency Services, Fire and Public Safety Facility Impacts:

The County Capital Impact Model does not show that the proposed development will generate a need for additional capacity at existing fire and rescue or public safety facilities in the northern service area where the project site is located. However, the capital impact model does not show operational impacts, such as additional staff, equipment or supply needs, to these services.

The County's Department of Fire and Rescue reviewed the proposed development as currently proffered and found that the department will see a significate increase in calls for service. The projected annual increase is 349 calls for service with 296 additional EMS calls and 53 additional Fire calls. Since the public hearing at the September Planning Commission meeting, Community Development staff met with Fire and Rescue staff to analyze operational impacts more closely. Fire and Rescue staff concluded the projected increase in call volume would not be detrimental to the County's current level of service.

School Facility Impacts:

The County Capital Impact Model shows that the proposed development will generate approximately 52 new school students with thirty new elementary school students, seven new middle school students, and fifteen high school students. Although the model shows Sweetgrass generating a need for capacity expansion at the middle school, Dr. Chris Coleman with the Isle of Wight School System stated that there is remaining capacity at the middle school to accommodate the projected number of new students. The new Westside, planned to function as a new middle school, remains in the CIP with an estimated total cost of $38 million.

Please note the capital impact model does not show operational impacts, such as additional staff, equipment or supply needs, to these services.

Parks and Recreation Facility Impacts

The County Capital Impact Model shows that the proposed development will generate approximately 1,297 new people which will create a need for additional regional park, neighborhood park, recreational center, community center, and event center recreational facility space. However, the proposed development will include 9.87 acres of pocket park and central park space as well as a community clubhouse facility, pool, play equipment and pedestrian trails throughout the community to help meet this need. The development will also be required to install its portion of the multipurpose trail along its road frontage with Benn's Church Boulevard. The applicant also proposes to preserve the RPA buffer and floodplain to the maximum extent possible which greatly increases the amount of open space in the neighborhood.

Economic Impact Assessment:

While the County's Capital Impact Model reviews impacts to public facilities only, a fiscal impact analysis compares revenues generated from the project with both the operating and capital costs to a jurisdiction associated with the provision of public services and facilities to serve the new development. It includes all direct revenues and costs associated with the development proposal.

The June 2021 Fiscal Impact Analysis submitted with the application assumes an annual absorption of 65 age-restricted single family units per year and 38 townhouses is assumed in the analysis with a six year build-out. The report states that the average projected price of an age-restricted unit will be $305,200 and townhomes will be $258,875. The FIA concludes that the proposed development, to include both the residential and commercial uses, will generate $43.6 million in revenue compared to $22.7 million in expenditures over a 20-year period, generating a $20.9 million net surplus. Costs include ongoing annual operating expenditures and capital costs that include debt financing with payments that continue beyond the last year in the model projection period. The average annual revenues are estimated at $1.05 million per year. No job creation data was included in either the FIA or community impact statement.

To address staff's concern in regard to market saturation of age-restricted housing units in the County, the applicant submitted a market analysis report. The County currently has several age-restricted communities, including the 340 unit South Harbor development in Carrollton and Church Square in the Town of Smithfield. The 2021 market report states Sweetgrass will draw interest from a broad geographic area, and census data shows 61,234 persons over the age of 55 in that

market area. An average of 13% of this population will desire a living or lifestyle change every year. That produces 6,665 potential buyers per year. The applicant's experience suggests that it will capture a minimum of 10% of this market equating to 67 units per year just for the age-restricted housing.

Viewshed Analysis:

The applicant provided several viewshed renderings showing the perspective from Route 10 as to what the proposed residential buildings will look like after project completion. According to the applicant, many of the residential buildings will be similar to the styles Ryan Homes built in Benn's Grant. Examples of a commercial facade are included in the commercial design guidelines. The renderings are included as an attachment to the staff report. The conceptual site plan also includes a recreational greenspace along Route 10 which will preserve a terminal vista down to the pond and woodland at the rear of the property, preserving a portion of the historical landscape within the proposed development.

Staff Findings

After assessing the project's consistency with the County's Plans, Ordinances and current level of service of public facilities available to current County residents, staff found the application generally consistent with the future recommended land use found in the 2020 Comprehensive Plan and was capable of meeting ordinance requirements. However, staff found that the proposed residential uses may negatively impact existing public facilities and services, such as fire and rescue services and school facilities until such time as public expenditures are made to increase facility and operational capacity.

The Comprehensive Plan projects the County population to reach 45,200 people by 2040. To meet the housing needs of the County's growing population, there will be a need for an additional 2,567 residential units based on the 2022 average of 2.3 people per household.

According to the US Census Bureau, the County had 17,085 existing housing units in 2022 . County records that same year show approximately 2,497 additional units approved but not yet constructed. The County's 2022 total population is estimated to be 40,151 people, representing a 2% average growth rate since the 2020 Census. This rate is double the initial projected rate of 1% a year. Although the number of approved units appears to meet the currently projected future need, a reassessment of the number of housing units needed may be in order, if the future growth trend exceeds expectations, barring any economic downshifts

similar to 2008. A table showing current residential projects is attached to the report.

COMPREHENSIVE LAND USE PLAN:

The subject property is located in the Newport Development Service District (DSD), an area described in the Comprehensive Plan as a focus area for future growth in the County. The Land Use Plan ("Envision the Isle" chapter) designates the property for future Mixed Use (MU) as part of the larger mixed-use activity center surrounding the intersection of Carrollton Boulevard and Benns Church Boulevard. Mixed use areas are described generally in the plan as comprised of "housing mixed with office, commercial, and other uses…located on major transportation routes and at major intersections." The plan describes future residential development anticipated in these areas as "a mix of detached and attached single family residences, multiplexes, townhomes, and apartment style residences, [having] community amenities and preserved natural features" up to density of 14 dwelling units per acre or higher.

The project as conceptually designed accomplishes several Comprehensive Plan policies regarding the preservation of natural resources. The Plan states that mixed-use areas should include abundant open spaces which preserve natural features (e.g., mature forest cover, wetlands, etc.) and create active- and passive-use recreational amenities such as walking and multi-use trails, playgrounds, open spaces, and natural areas for residents of the community.

The proposed development and its proximity to commercial areas help implement policy statements and accomplish the purposes of the Plan's Newport DSD and Urban Development Area (UDA) designations with respect to housing. The Plan's housing policies and actions aim to provide opportunities for a variety of housing types for people of all incomes, backgrounds, and ages, and to increase opportunities within DSDs for residences to be in close proximity to retail, employment, and public facilities such as schools and parks. The proposed rezoning, therefore, is considered consistent with the Comprehensive Plan.

ORDINANCE REVIEW:

The applicant requests a conditional zoning to the Planned Development-Mixed Use zoning district. In addition, the development also lies within the Newport Development Service and Chesapeake Bay Preservation Area Overlay Districts which require additional performance criteria over and above the underlying

zoning district regulations. According to the Zoning Ordinance, all PD-MX areas are also designated urban development areas (UDA) which must meet minimum UDA and Traditional Neighborhood Design requirements in the Zoning and Subdivision Ordinances, such as minimum densities, floor area ratio, open space area, and pedestrian access facilities.

Staff reviewed the proffered residential and commercial design guidelines as well as the conceptual master plan for consistency with the County's Zoning and Subdivision Ordinances. Should the the zoning request be approved, the applicant will be required to submit subdivision plats, construction plans, signage plans, RPA buffer modification applications, and building plans in accordance with the proffered conditions, Zoning, and Subdivision Ordinances.

AGENCY REVIEW:

The application was forwarded to the following departments for their review:

- Economic Development: No concerns.
- Emergency Services: Comments have been incorporated in the project description above. A copy of the comments are also attached to this staff report.
- Utility Services: No concerns.
- Isle of Wight County Museum: No concerns with the application, provided that the proffered archeology condition is followed.
- Virginia Department of Transportation (VDOT): No concerns with the application, provided that the proffered transportation conditions are followed.

Please note that, should the conditional zoning request be approved, the project will be subject to subdivision and site plan review from all applicable agencies.

STAFF CONCLUSIONS:

Strengths:

1. The application is generally consistent with the Comprehensive Plan and can meet all ordinance requirements.
2. The project proposes to preserve the RPA buffer area and floodplain to the greatest extent possible.
3. The proposed development will provide over 9.89 acres of park, trails, community center, pool and play areas to provide parks and recreation

services.

4. The applicant proffers that all age-restricted units will have a first floor master bedroom and bathroom which will help facilitate age-friendly housing.
5. The development will include up to 18,000 square feet of retail and commercial uses as well as 55,000 square feet of office which will create employment opportunities and additional revenues to meet public facility and service needs.
6. The conceptual site plan also includes a recreational greenspace along Route 10 which will preserve a terminal vista down to the pond and woodland at the rear of the property, preserving a portion of the historical landscape within the proposed development.

Weaknesses:

1. The proposed residential uses may negatively impact school operations and facilities, such transportation, until such time as public expenditures are made to increase facility and operational capacity.
2. It is unclear what existing historical and cultural resources exist on the project site which may impact the final layout and design of the community.

STAFF RECOMMENDATION:

Based on the weaknesses listed above, staff recommends denial of the rezoning request.

ATTACHMENTS:

Description	Type	Upload Date
Application	Backup Material	9/6/2023
Land Use Narrative	Backup Material	9/6/2023
Community Impact Statement	Backup Material	9/6/2023
Sweetgrass Proffer Statement exec 090823	Backup Material	9/8/2023
Residential Design Guidelines Aug 18 2023	Backup Material	9/8/2023
Commercial Design Guidelines	Backup Material	9/8/2023
Sweetgrass Concept Plan Aug 2023	Backup Material	9/8/2023
Sweetgrass Traffic Impact Analysis 2023 Update	Backup Material	9/6/2023
Sweetgrass TIA 2021 Supplemental	Backup Material	9/6/2023
Sweetgrass TIA 2019	Backup Material	9/6/2023
Wetland Confirmation	Cover Memo	9/6/2023
Water Quality Impact Assessment	Backup Material	9/6/2023
Fiscal Impact Analysis	Backup Material	9/6/2023
Fiscal Impact Analysis Update	Backup Material	9/6/2023

Market Analysis	Backup Material	9/6/2023
Sweetgrass VIsual Impact Analysis June 15, 2023	Backup Material	9/19/2023
Sweetgrass Elevations	Backup Material	9/19/2023
Townhome model 1	Backup Material	9/19/2023
Townhome model 2	Backup Material	9/19/2023
Cultural Resources Assessment 2022	Backup Material	9/6/2023
VDOT Final Comments Aug 2023	Backup Material	9/6/2023
Residential Development Project list	Backup Material	9/19/2023
PC Resolution	Resolution	9/26/2023
Schools Revised Review Comments 092623	Backup Material	9/26/2023
Smithfield Review Comments	Backup Material	10/18/2023
Economic Development Review Comments	Backup Material	11/21/2023
Schools Enrollment Info	Backup Material	11/15/2023

ISLE OF WIGHT
COUNTY, VIRGINIA
DEPARTMENT OF PLANNING AND ZONING

APPLICATION FOR REZONING/CONDITIONAL ZONING AMENDMENT

This application should be used to petition for a change to the Official Zoning Map or for an amendment of zoning conditions. The following application requirements are consistent with the procedures set forth in Section 1-1015, *Amendments*, of the Isle of Wight County Zoning Ordinance, as amended.

A. APPLICATION FOR (CHECK ALL THAT APPLY):

[ ] Rezoning

[X] Conditional Rezoning (Are voluntary proffered conditions attached?): X Yes _____ No

Request to change the subject property(s) from the RAC to the PD-MX zoning district.

Proposed Use or Activity: Single Family Detached Homes and Townhomes with commercial outparcel as more particularly described in the accompanying submittal materials.

[ ] Amendment to Conditional Zoning

Request to change conditional zoning as follows (Attach current and proposed conditions): _____

B. PROJECT DESCRIPTION:

Project Name: Sweetgrass

Property Address (if any): 14096 Benns Church Boulevard

Election District: Windsor Legal Reference: _____

Deed Book#_____ Page#_____ Instrument #000000662

Comprehensive Plan Designation: _____

The rezoning will apply to 250 ** acres out of 250 ** total acres **North of Route 10

Tax Parcel Identification # 32-01-009 Number of Acres to be Rezoned: 250**

Requesting Zoning District Change from: RAC to PD-MX

Tax Parcel Identification # _____ Number of Acres to be Rezoned: _____

Requesting Zoning District Change from: _____ to _____

Tax Parcel Identification # _____ Number of Acres to be Rezoned: _____

Requesting Zoning District Change from: _____ to _____

Proposed Utilities (check all that apply): Public Water _____ Private Well _____

Public Sewer _____ Private Septic _____

C. **APPLICATION INFORMATION:**

Applicant(s) Name(s): NVR, Inc. Attn: Eric Shirey

Address: 860 Greenbrier Circle, Suite 100

City, State, Zip Code: Chesapeake, VA 23320

Phone No.: 757.603.0802 Email: eshirey@nvrinc.com Fax No.:

Property Owner(s) Name(s): Henry Layden, special Trustee of the William Grover Yeoman, III Trust, dated December 14, 2007, as amended

Address: 1801 S. Church Street, Suite 7

City, State, Zip Code: Smithfield, VA 23430

Phone No.: Email: Fax No.:

Applicants/Owners Affidavit (including compliance with all deed restrictions and covenants)

This application must be signed by the owner(s) of the subject property or must have attached written evidence of the owner's consent, which may be in the form of a binding contract of sale with the owner's signature or a letter signed by the owner(s), containing written authorization to act with full authority on the owner(s) behalf in filing this rezoning application. Signing this application shall certify the owner's compliance with all deed restrictions and covenants, and shall constitute the granting of authority of the County to enter onto the property for the purpose of conducting site analyses and compliance with Federal, State and County regulations.

Applicant: NVR, Inc. Attn: Eric Shirey
Printed or Typed Name

Applicant: _____ Date: _____
Signature

County of Isle of Wight, Commonwealth of Virginia

Subscribed and sworn to before me _____,
A Notary Public in and for the County of Isle of Wight,
Commonwealth of Virginia, this ___day of _____, 20___

_____
Notary Public

My Commission Expires_____

Henry Layden, special Trustee of the William Grover Yeoman, III Trust, dated December 14, 2007, as amended
Owner:
Printed or Typed Name

Owner: Henry Layden Date: 6/5/19
Signature

County of Isle of Wight, Commonwealth of Virginia

Subscribed and sworn to before me Elizabeth Dixon Jones,
A Notary Public in and for the County of Isle of Wight,
Commonwealth of Virginia, this 5th day of June, 2019

Elizabeth Dixon Jones
Notary Public

My Commission Expires Dec. 31, 2022

Owner: _____
Printed or Typed Name

Owner: _____ Date: _____
Signature

County of Isle of Wight, Commonwealth of Virginia

Subscribed and sworn to before me _____,
A Notary Public in and for the County of Isle of Wight,
Commonwealth of Virginia, this ___day of _____, 20___

_____
Notary Public

My Commission Expires_____

Owner: _____
Printed or Typed Name

Owner: _____ Date: _____
Signature

ELIZABETH DIXON JONES
NOTARY PUBLIC
Commonwealth of Virginia
Reg. # 7767629
Com. Exp. Dec. 31, 2022

County of Isle of Wight, Commonwealth of Virginia

Subscribed and sworn to before me _____,
A Notary Public in and for the County of Isle of Wight,
Commonwealth of Virginia, this __day of _____, 20__

_____
Notary Public

My Commission Expires_____

C. **APPLICATION INFORMATION:**

Applicant(s) Name(s): NVR, Inc. Attn: Eric Shirey

Address: 860 Greenbrier Circle, Suite 100

City, State, Zip Code: Chesapeake, VA 23320

Phone No.: 757.603.0802 Email: eshirey@nvrinc.com Fax No.:

Property Owner(s) Name(s): Henry Layden, special Trustee of the William Grover Yeoman, III Trust, dated December 14, 2007, as amended

Address: 1801 S. Church Street, Suite 7

City, State, Zip Code: Smithfield, VA 23430

Phone No.: Email: Fax No.:

Applicants/Owners Affidavit (including compliance with all deed restrictions and covenants)

This application must be signed by the owner(s) of the subject property or must have attached written evidence of the owner's consent, which may be in the form of a binding contract of sale with the owner's signature or a letter signed by the owner(s), containing written authorization to act with full authority on the owner(s) behalf in filing this rezoning application. Signing this application shall certify the owner's compliance with all deed restrictions and covenants, and shall constitute the granting of authority of the County to enter onto the property for the purpose of conducting site analyses and compliance with Federal, State and County regulations.

Applicant: NVR, Inc. Attn: Eric Shirey
Printed or Typed Name

Applicant: Eric Shirey Date: 6/13/19
Signature

County of Isle of Wight, Commonwealth of Virginia

Subscribed and sworn to before me Diane Renee Spieker,
A Notary Public in and for the County of Isle of Wight,
Commonwealth of Virginia, this 13 day of June, 2019

Diane Renee Spieker
NOTARY PUBLIC 7581566
Commonwealth of Virginia
My Commission Expires Mar. 31, 2022

Diane Renee Spieker
Notary Public

My Commission Expires March 31, 2022

Owner: Henry Layden, special Trustee of the William Grover Yeoman, III Trust, dated December 14, 2007, as amended
Printed or Typed Name

Owner: Date:
Signature

County of Isle of Wight, Commonwealth of Virginia

Subscribed and sworn to before me ,
A Notary Public in and for the County of Isle of Wight,
Commonwealth of Virginia, this day of , 20

Notary Public

My Commission Expires

Owner:
Printed or Typed Name

Owner: Date:
Signature

County of Isle of Wight, Commonwealth of Virginia

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A Notary Public in and for the County of Isle of Wight,
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Notary Public

My Commission Expires

NOTICE: THE ATTACHED CHECKLIST MUST BE COMPLETED, CERTIFIED, AND SUBMITTED OR THE APPLICATION WILL BE CONSIDERED INCOMPLETE.

Remit Application to: Isle of Wight County Department of Planning and Zoning, 17140 Monument Circle, Suite 201 P. O. Box 80, Isle of Wight, Virginia 23397

FOR OFFICE USE ONLY:

Complete Application Received On: _____ Fees Paid: _____
Tax Query: [ ] Current [ ] Delinquent Posted/Date to Post: _____

AGENCIES REFERRALS:

_____ Department of Conservation & Recreation
_____ Economic Development
_____ Emergency Services
_____ Engineering
_____ Environmental Planner
_____ Health Department
_____ Other _____

_____ Inspections
_____ Sheriff's Office
_____ Town of Smithfield
_____ Town of Windsor
_____ VDOT
_____ Budget & Finance
_____ County Attorney

Verified By: _____ Date: _____

SWEETGRASS
LAND USE NARRATIVE

14096 Benns Church Boulevard

February 21, 2020

The Applicant, NVR Inc. d/b/a Ryan Homes, was founded in 1948 in Pittsburgh, Pennsylvania to provide housing in the expanding post-war economy. For more than 70 years Ryan Homes has been building exceptional, award-winning homes – one home at a time. What began as a small, family-run business in Pittsburgh has evolved into one of the top builders in the nation. Today, Ryan Homes builds homes in 32 metropolitan areas in 14 states, as well as Washington D.C., and has constructed more than 400,000 homes. The success of Ryan Homes is built upon unparalleled customer service, innovative, award-winning designs, quality construction, affordable prices and unique communities in prime locations. It's no coincidence a large percentage of the homes Ryan Homes sells are a direct result of customer referrals.

Ryan Homes has been building new homes in Isle of Wight County for many years and is very attracted to the sound governance and quality of life the County has to offer its customers. Accordingly, Ryan Homes is excited to present "Sweetgrass" to Isle of Wight County and strongly desires to continue a mutually beneficial relationship with the County. Similar projects include Benn's Grant and Lakeview Cove in Isle of Wight, Stonehouse and Candle Station in James City County, Arbordale and Silverwood in York County, and Culpepper Landing in Chesapeake.

The property upon which Sweetgrass is envisioned is located at 14096 Benns Church Boulevard in the Windsor District of Smithfield. The site contains approximately 249.47 acres located on the East side of Benns Church Boulevard (Parcel ID # 32-01-009) and is currently zoned RAC – Rural Agricultural Conservation. The property is described by deed as lying on the East side of State Highway No. 10, and bounded by said Highway, the lands now or formerly of Daisy M. Bunkley, Philip F. Edwards, Jones' Creek, the lands now or formerly owned by George Yeoman, Christine Jordan, C. E. Johnson, J. F. Minton and others, and being a portion of the same land of which E. K. Batten and Maggie E. Batten, his wife, died seized and possessed, and is more particularly shown on the Applicant's Master Plan.

As the County's commercial hub in the Smithfield area evolves with the "new" economy, it is important to put consumers and employees in close and convenient proximity to such economic centers. Sweetgrass is strategically positioned on the fringe of the commercial hub for the area and will serve to ensure its success by avoiding sprawl and placing a population center with convenient access to one of the County's primary business districts.

The proposal consists of 400 age-restricted single family homes, 285 non age-restricted townhomes, and a parcel reserved for business/commercial uses. The Applicant's Master Plan, Elevations, and Proffers are intended to present a high quality aesthetic that will contribute to and enhance the appearance of the corridor. The proposed site design incorporates the property's natural beauty and ponds into the creation of view sheds and recreational areas for the project which include large contiguous areas of open space, walking trails, clubhouse and pool, and dog park. The Applicant's Traffic Study indicates that, with the proffered improvements, an acceptable level of service will be maintained on adjacent roadways. Finally, the Applicant's Fiscal Impact Analysis projects that the project, at build out, will generate net positive revenue to the County in the amount of approximately $1.2 million per year.

CONSULTING ENGINEERS

5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
Phone (757) 253-0040
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aesva.com

Community Impact Statement

Conditional Rezoning

For

Sweetgrass Development

Prepared For

NVR, INC
860 Greenbrier Circle, Suite 100
Chesapeake, Virginia 23320

And
Timothy O. Trant II
Kaufman & Canoles
11815 Fountain Way, Suite 400
Newport News, Virginia 23606

April 2019
Revised October 2021

AES Project Number: W10516-00

Prepared by:

CONSULTING ENGINEERS

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Williamsburg, Virginia 23188
Phone: 757-253-0040
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Appendix B Wetlands, Water & CBPA Assessment
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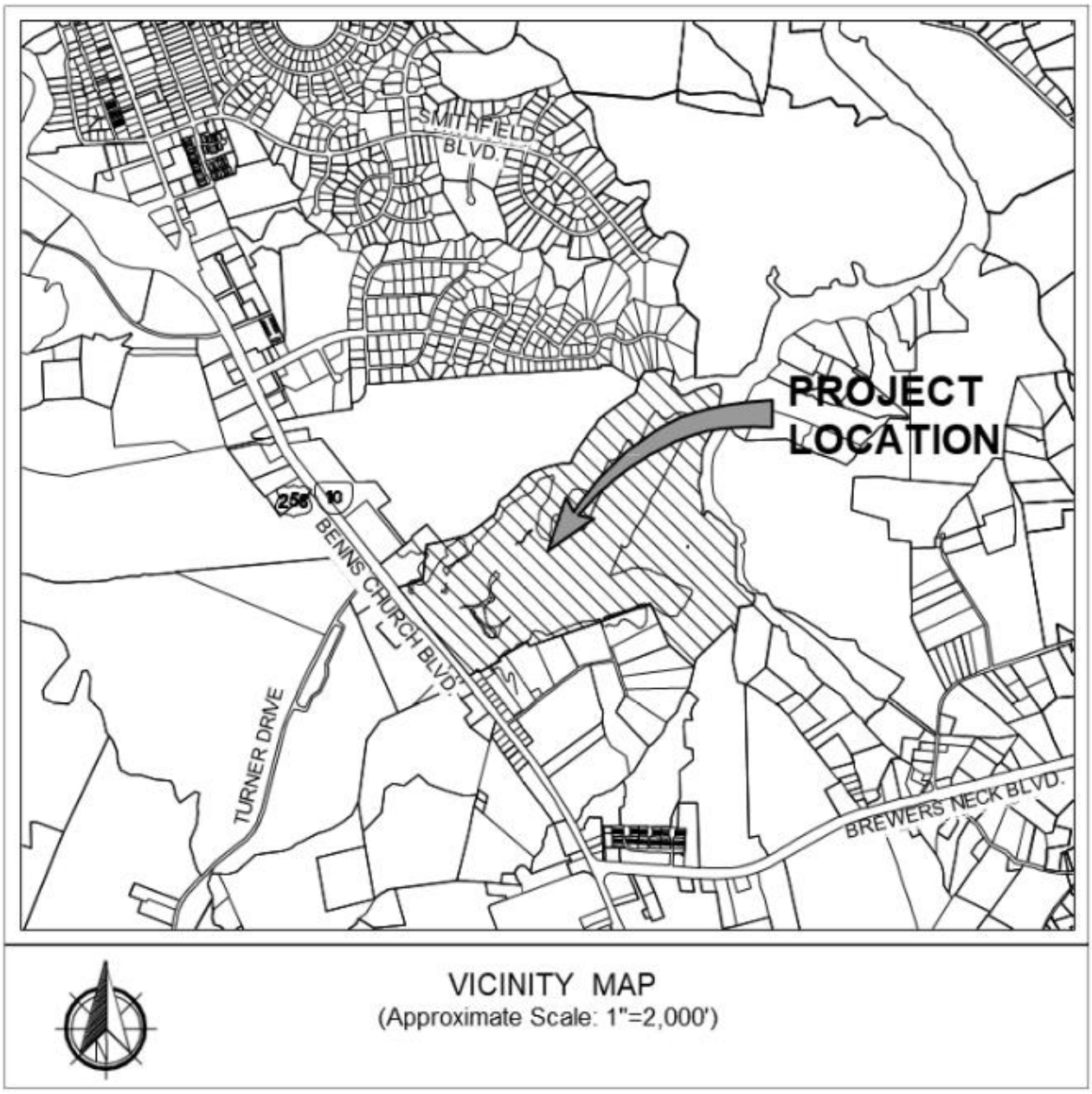
I. INTRODUCTION

The property owner, on behalf of NVR, Inc., proposes to request a conditional rezoning of their parcel within the Windsor Magisterial District containing 249.47 acres located on the east side of Benns Church Boulevard. The property is currently zoned RAC (Rural Conservation District) and the proposed zoning would be to convert the property to PD/MX (Planned Development Mixed Use) at 14096 Benns Church Boulevard, Smithfield Virginia.

The site is currently undeveloped, with a large portion of the property is in active crop land. The property is fully within the County of Isle of Wight but the property borders the Smithfield town limits to the North, Jones Creek to the East, single family subdivision to the South and Benns Church Boulevard (Route 10/Route 258) to the West. The site contains existing ponds which discharge to the existing Jones Creek. The average soils slope 2% to 6%. The site is within the Peanut Soil and Water Conservation District and has a hydrologic unit code of JL41 which represents the Pagan River-Jones Creek drainage areas.

Exhibit 1 – Location Map



II. THE PROJECT TEAM

The organizations that participated in the preparation of the information provided in this impact study are as follows:

- Developer - NVR, LLC
- Planning/Engineering - Jason Grimes, AES Consulting Engineers
- Legal - Tim Trant, Kaufman & Canoles
- Environmental - Bob Kerr, Wetlands Solutions
- Traffic - Kristen Tynch, VHB
- Fiscal - Julie Herlands, Tischler Bise

Key components of this Community Impact Study are:

- Planning Considerations, Project Description and Density Analysis
- Analysis of Impacts to Public Facilities and Services
- Environmental Inventory
- Traffic
- Fiscal Impact Study
- Visual Impact Study

III. PLANNING CONSIDERATIONS AND PROJECT DESCRIPTION

Planning Considerations

This parcel fronts on Benns Church Boulevard and contains 249.47 acres of wooded and cropland areas. Existing Zoning is currently Rural Agricultural Conservation (RAC). With this proposal, we are making a conditional request to rezone the property to Planned Development Mixed Use (PD-MX) zoning. According to the 2020 Comprehensive Plan this site is within the Newport Development Service District (DSD) and the Highway Corridor Overlay District. Additionally, the property falls within the Urban Development Area (UDA).

Project Description

The developer is proposing a development of the entire parcel of 249.47 acres. Under the conditional zoning, there will be a mixture of uses; from Commercial and Townhomes along Benns Church Boulevard to single family detached homes and Townhomes with multiple recreation areas and a large park area at the central core of the property. The development areas within the project will be built in a more urban nature in keeping with the proposed zoning; small lots, sidewalk lined grided streets, pocket parks, centrally located amenities and large perimeter open area will be provided.

Project Phasing

The developer is proposing to develop this project in phases over the course of the next 5 years and bring on to market a mix of unit types and price points of homes with the goal of bringing online 150 units a year. Amenities and offsite improvements will be brought online as the development size increases and as outlined in the project proffers. A phasing plan is provided showing a general anticipated phasing (Appendix E).

IV. ANALYSIS OF IMPACTS TO PUBLIC FACILITIES AND SERVICES

Public water and public sanitary sewer services (and other public services such as police, fire and life rescue) are presently provided to parcel within Benns Church Blvd.

A. Public Water Facilities

The subject property will be served with public drinking water by the existing water main along Benns Church Blvd as indicated on 2020 Comprehensive Plan (Water Service Areas). The general location of the water system and fire hydrants have been provided on the master plan.

Water consumption for the proposed project is estimated at 197,650 gallons per day. Peak Hour Water Demand for this project is estimated at 32,942.4 gallons per hour (approximately 549.04 gallons per minute). See Table 1 below for details of the projected water usage.

Table 1 – Projected Water Usage

Type of Development	No. of Units	Flow (GPD/Unit)	Average Flow (GPD)	Duration (hrs)	Avg Flow (GPM)	Peak Flow* (GPM)
Single-Family	390	310	120,900	24	83.96	335.84
Townhomes	225	310	69,750	24	48.44	193.76
Office/ Commercial	35,000	0.2	7,000	12	4.86	19.44
Total			197,650		137.26	549.04

*Peak Flow = 4 * Avg. Flow

B. Public Sewer Facilities

The subject property will be served with public sewer by the existing force main along Benns Church as indicated on 2020 Comprehensive Plan (Sewer Service Areas). A single centrally located sewage lift station is planned to service the community.

The estimated average daily flow generated from the proposed development is 197,650 gallons per day (GPD) with a peak flow rate of 345.57 gallons per minute (GPM). See Table 2 below for details of projected project wastewater flows.

Table 2 – Wastewater Flows

Type of Development	No. of Units	Flow (GPD/Unit)	Average Flow (GPD)	Duration (hrs)	Avg Flow (GPM)	Peak Flow* (GPM)
Single-Family	390	310	120,900	24	83.96	209.90
Townhomes	225	310	69,750	24	48.44	121.09
Office/ Commercial	35,000	0.2	7,000	12	4.86	14.58
Total			197,650		137.26	345.57

*Peak Flow = 2.5 * Avg. Flow (Residential)
*Peak Flow = 3 * Avg. Flow (Commercial)

C. Public Schools

The parcel is located within the Carrolton PK-3rd grade area, the Westside 4th -6 grades, Smithfield Middle School and the Smithfield high school zones. Projections indicate this development would be anticipated to generate 66 school age children (@ 0.23 students per unit of townhomes). For specific school capacity see the attached Fiscal Impact Analysis by Tischler Bise (See Attached Fiscal Impact Analysis report for additional information).

D. Fire Protection, Emergency Services and Law Enforcement

There are currently two Volunteer fire stations (VDF) located within Smithfield and Carrollton providing fire protection to the proposed development.

There also are two Volunteer Emergency Medical Services (EMS). The Isle of Wight Volunteer Rescue Squad services Smithfield as well as the Carrollton Volunteer Fire Department as backup for protection of the proposed development. Each station is placed within the County in such a way as to help achieve the response goal of 7.5 minutes or less.

Law Enforcement protection is provided by county's Sheriff Department along with the Virginia State Police.

E. Solid Waste

The proposed development on the subject property will generate solid wastes that will require collection and disposal to promote a safe and healthy environment. County approved, private contractors will handle the collection of the solid waste.

F. Utility Service Providers

Virginia Natural Gas, Dominion Energy, and Spectrum Communications provide, respectively, natural gas, electricity, cable TV service, and telephone service to this area. The current policy of these utility service providers is to extend service to the new development at no cost to the developer when positive revenue is identified; plus, with the new land development, these utility service providers are required to place all new utility service underground.

V. ANALYSIS OF ENVIRONMENTAL IMPACTS

A letter of findings dated November 30, 2017, Wetland, Water and CBPA Assessment by Kerr Environmental Services Corp. has been provided. Additionally, Wetlands Solutions has completed additional field observations to refine the limits of RPA resources, those have been incorporated into the master plan set and impacts to those environmental areas are noted in the Water Quality Impact Assessment included with the submitted zoning package. Impacts associated with roads and stormwater outfalls have been anticipated and noted in the environmental inventory sheet of the master plan.

VI. ANALYSIS OF STORMWATER MANAGEMENT (SWM) / BEST MANAGEMENT PRACTICES (BMP)

A conceptual stormwater management program, meeting the general criteria of the Commonwealth of Virginia and Isle of Wight County's stormwater requirements, was completed

as a component of the planning for the proposed Sweetgrass development. The goal of the stormwater management program is to meet and exceed local and state stormwater requirements.

In evaluating preliminary stormwater management solutions of the proposed development on the subject site, the site characteristics are considered. Preliminary site observations and mapping identify the following unique site characteristics to be considered in stormwater management planning:

- The property drains to an unnamed tributary of the Jones Creek watershed.
- The developable portion of the site is mostly active crop field, with limited forested land.
- All of the project area's existing drainage is surface runoff, ultimately converging to the existing farm pond and out to an unnamed tributary of Jones Creek, located in central and the North and the East of the project site.
- The project site largely consists of sloping of 2 to 6% slopes, with >10% slopes located within the RPA buffer. The site consists of mostly hydric soils.

A stormwater management plan is proposed as part of the master plan for this project to meet the general criteria of the Commonwealth of Virginia and Isle of Wight County stormwater requirements. Stormwater is to be managed by a series of best management practices and pipe drainage networks that ultimately discharge into downstream wetlands.

1. Stormwater ponds will be provided around the site as indicated on the master plan. These ponds may not be needed depending on final staff determination on the use of the existing farm ponds.
2. Low impact development measures such as bioretentions and dry swales (along with the possible purchasing of stormwater credits) will be used to meet the additional water quality requirements of the Virginia Runoff Reduction Method. Per compliance with the Virginia Runoff Reduction Method, all proposed site work will be managed by these stormwater measures to negate downstream wetlands impacts and pollution from entering into the Chesapeake Bay. Final design and placement will be determined by site specific geotechnical analysis when preparing the construction plans.
3. The existing wet ponds on the property have served as the primary means of water quality and quantity control for years. These existing ponds are located in the center of

the site and it is the design team's belief that these existing ponds are best suited to provide for stormwater control with the least potential adverse impact on the environment and to minimize long term HOA maintenance costs, however it is understood that this will have to be confirmed with County Staff bases upon CBPA regulations.

These conceptually planned facilities will be designed to detain and release the regulated design storm events for the on-site and the currently uncontrolled off-site drainage. Stormwater management will be accomplished in accordance with all current applicable standards including the Virginia Stormwater Management Handbook and the Virginia Erosion and Sediment Control Handbook. Our preliminary analysis of the Sweetgrass Development project indicates that the stormwater management plan proposed will improve the overall downstream water quality and will help to control the downstream erosion from uncontrolled runoff from the neighboring properties.

VII. ANALYSIS OF IMPACTS TO TRAFFIC

Based on a Traffic Impact Study was prepared by VHB dated March 14, 2019 and a memo update dated June 2021 outlining changes based on IofW and VDOT staff (along with adjustments to total units) has been provided with this submittal. The results show that the proposed site will still have modest impacts on the intersections within the study area. All intersections are expected to continue to operate at an acceptable LOS D or better. There are several offsite roadway improvements planned to address the proposed traffic as outlined in the traffic analysis and within the development proffers. See Attachment: "Yeoman's Tract Traffic Impact Analysis" as prepared by VHB dated March 14, 2019 and the summary memo dated June 25, 2021 for more details. for more details.

VIII. ANALYSIS OF FISCAL IMPACTS

A Fiscal Impact Analysis was prepared by Tischler Bise dated March 29, 2019. This analysis compares operating and capital costs to revenues generated over a 20-year period. The results of

the analysis show the project generates a $19.3 million net surplus over the 20-year projection period. See Attachments for detailed Fiscal Impact Analysis.

IX. ANALYSIS OF CULTURAL RESOURCES IMPACTS

An Archaeological Assessment to be prepared for Isle of Wight County has been included in the proffers for the development.

X. VISUAL IMPACTS

See Appendix F

XI. CONCLUSION

In summary, the Sweetgrass Development proposes 390 single family detached units, 225 townhomes, and approximately 35,000sf of commercial use under the new zoning, Planned Development Mixed Use (PD-MX). The development will provide a positive Fiscal Impact to the County and proposes traffic improvements to address the added traffic from the development.

- The development provides a significant tax benefit to the County.
- There is adequate capacity in the system of roads serving this project. Additional traffic improvements are proposed to offset any impacts and to address preexisting traffic. The improvements include extended turn lanes and traffic signal.
- The proposed stormwater management systems as proposed will protect downstream channels from erosion and the onsite low impact development measures will increase water infiltration and reduce uncontrolled runoff.
- Adequate public facilities (water, sewer and fire), and utility services (gas, electric cable TV, telephone), are available for the development.

PROFFERED CONDITIONS

August 18, 2023

Conditional Zoning Request ZA-6-19 (the "Application") has been filed by Henry Layden, as Special Trustee of The William G. Yeoman III Trust ("Owner"), the owner of certain real property located within the territorial confines of the County of Isle of Wight, Virginia (the "County") being a portion of that property located at 14096 Benns Church Blvd., Smithfield, VA 23430, Tax Parcel # 32-01-009 (the "Property") more particularly described on **Exhibit A** attached hereto and made part hereof. NVR, INC. ("NVR") is the contract purchaser of the Property. Yeoman and NVR (collectively, the "Owner") filed the Application requesting that the zoning of the Property be changed from RAC to C-PD-MX with proffers in order to permit the development of a mixed use planned development consisting of single-family dwellings, townhouses, and a commercial outparcel (the "Project").

The Owner and the County have carefully evaluated, among other things, a traffic impact analysis, community impact analysis, and fiscal impact analysis (copies of which are on file with the County's Community Development Department, hereinafter referred to as the "Department") and the on and off site impacts of the Project and have determined (i) the impacts specifically attributable to the Project (the "Impacts"), (ii) certain Impacts create a need (or identifiable portion of a need) for the expansion of existing capacity of public transportation facilities (the "Expansion of Existing Capacity"), (iii) the Project will receive a direct and material benefit from the Expansion of Existing Capacity and Proffer 6 below, and (iv) the provisions of the County's zoning ordinance ("Zoning Ordinance") are inadequate for addressing various of the Impacts and necessitate supplementation by these Proffers.

In furtherance of the Application, the Owner, for itself and its successors and/or assigns, hereby voluntarily proffers the conditions specifically set forth below, in addition to the regulations provided for by the Zoning Ordinance, which proffered conditions are determined by the Owner and, upon acceptance by the Board of Supervisors in connection with the approval of the Application, the County: (i) to be reasonable, (ii) to address impacts specifically attributable to the Project, (iii) to address the need (or identifiable portion of a need) for the Expansion of Existing Capacity, (iv) to directly and materially benefit the Project, (v) to have a reasonable relation to the proposed change in zoning, (vi) to be in conformity with County's adopted comprehensive plan, and (vii) to be in accordance with the provisions of Section 15.2-2296, et seq. of the Code of Virginia (1950), as amended (the "Virginia Code"), Sections 15.2-2303.2 through 15.2-2303.4 of the Virginia Code, and the County Zoning Ordinance. The following proffered conditions apply only to the Property.

1. Plan of Development. A conceptual development plan of the Project entitled "MASTER PLAN FOR SWEETGRASS", dated June 14, 2019, and last revised August 18, 2023, prepared by AES Consulting Engineers (the "Master Plan"), has been submitted to the County Planning Division for review by the County in connection with the Application. The Master Plan is on file with the Department. Development of the Property shall be in substantial conformance, as determined by the Community Development Director (the "Director") with the Master Plan.

2. Residential Units. There shall be no more than 615 residential dwellings (the "Residential Units") constructed on the Property, of which no more than 390 of the Residential Units shall be single-family (detached) dwellings, and no more than 225 of the Residential Units shall be townhouses.

3. Non-Residential Use Restrictions. The use of the portion of the Property designated as "COMMERCIAL SECTION 5 AC +/-" on the Mater Plan (the "Commercial Area") shall be limited to (a) inline retail and commercial uses (including accessory uses) comprising no more than 18,000 square feet of floor area, and (b) office uses (including accessory uses) comprising no more than 55,000 square feet of floor area. Notwithstanding the foregoing, the Owner shall not be permitted to develop an amount of non-residential floor area on the Commercial Area that would be projected to exceed 220 p.m. peak hour trips (as determined by the then current edition of the Institute of Transportation Engineers Trip Generation Manual) until the Owner submits for review and approval by the County and the Virginia Department of Transportation ("VDOT") an updated traffic impact analysis including such proposed additional square footage and includes in its site plan for such additional commercial square footage any traffic improvements recommended by the updated traffic impact analysis and not already contained in these Proffers.

4. Design. The Residential Units and clubhouse on the Property shall be constructed by the Owner in substantial conformance with the architectural elevations entitled "Sweetgrass Elevations", dated June 15, 2023 (the "Elevations") and the design guidelines entitled "Residential Design Guidelines for Sweetgrass Development", dated June 16, 2023 (the "Residential Guidelines"), as determined by the Director. The development within the Commercial Area shall be constructed by the Owner in substantial conformance with the design guidelines entitled "Commercial Center Design Guidelines for Sweetgrass Development", dated August 18, 2023 (the "Commercial Guidelines"), as determined by the Director. A copy of the Elevations, the Residential Guidelines, and the Commercial Guidelines are on file in the Department. The Elevations, Residential Guidelines, and Commercial Guidelines may be modified from time to time provided that such modifications do not alter the basic concept or character of the Elevations, Residential Guidelines, and Commercial Guidelines and provided that such amendments are approved by the Director for consistency with the terms of this proffer.

5. Age Restriction. All of the single-family (detached) dwellings Residential Units shall be occupied solely as "housing for older persons" as such term is defined in Virginia Code Section 36-96.7(A), provided no person under 19 years of age shall be housed or domiciled or shall reside in any Residential Unit. For purposes of the foregoing, a person shall be deemed to be housed, domiciled or to reside in a Residential Unit if he or she stays overnight for more than 75 days in any 90-day period or for more than 90 days in any 12-month period. Such restriction shall be set forth in the Declaration and enforced by the Association (as such terms are defined in Proffer 9 below). Unless otherwise approved by the Director, each age-restricted Residential Unit shall have a first-floor bedroom and full bath.

6. Traffic Improvements.

a. Prior to the issuance of the first certificate of occupancy for Residential Units on the Property (not including model homes), the construction, installation, and/or implementation of the following improvements shall be completed or guaranteed by the Owner in accordance with Virginia Code Section 15.2-2299 or such successor provision (a "Guarantee"):

i. Westbound right turn lane (200-foot storage plus 200-foot taper) into right in/right out proposed secondary Project entrance off of US 258/Rt 10 (Benns Church Boulevard);

ii. Westbound right turn lane (200-foot storage plus 200-foot taper) into proposed main Project entrance off of US 258/Rt 10 (Benns Church Boulevard);

iii. Lengthen the existing eastbound left turn lane to provide 200-foot storage plus 200-foot taper into proposed main Project entrance off of US 258/Rt 10 (Benns Church Boulevard);

iv. Lengthen the existing westbound left turn lane on US 258/Rt 10 to provide 250-foot storage plus 100-foot taper at the intersection of US 258/Rt 10 (Benns Church Boulevard) and Turner Drive (the "Rt. 10/Turner Drive Turn Lane Improvement");

v. Replace the existing 3 section signal head serving the dedicated right turn lane on eastbound Turner Drive at US 258/Rt 10 (Benns Church Boulevard) with a 5 section signal head to provide a protected eastbound right-turn overlap (the "Rt. 10/Turner Drive Signal Improvement 1"); and

vi. Install flashing yellow arrows for the eastbound and westbound left turn lanes at the intersection of US 258/Rt 10 (Benns Church Boulevard) and Canterberry Lane, Cypress Run Drive, and Turner Drive.

b. At such time as deemed warranted by VDOT, but in no event prior to issuance of the 50th certificate of occupancy ("CO") for Residential Units on the Property (or the commencement of construction of improvements on the Commercial Area, whichever occurs first), the Owner shall replace the existing 3 section signal head serving the dedicated right turn lane on eastbound US 258/Rt 10 (Benns Church Boulevard) at Turner Drive with a 5 section signal head to provide a protected eastbound right-turn overlap (the "Rt. 10/Turner Drive Signal Improvement 2"). In the event that the Rt. 10/Turner Drive Signal Improvement 2 is not warranted by VDOT prior to the issuance of the final CO for Residential Units on the Property, then Owner's development of the Property (and permits and approvals therefor) may proceed through to the issuance of the final CO for Residential Units on the Property; however, unless waived by the Director based on an agreed upon alternative, the Owner shall pay to the County the then estimated cost of Rt. 10/Turner Drive Signal Improvement 2 (including design, construction, labor, and materials) as approved by the County, and upon such payment shall be deemed to have satisfied all of its obligations under this Proffer 6(b).

c. Notwithstanding the preceding subsections a(iv), a(v), and b, if the County, prior to implementation of the Rt. 10/Turner Drive Turn Lane Improvement, Rt. 10/Turner Drive Signal Improvement 1, and/or the Rt. 10/Turner Drive Signal Improvement 2 (collectively, the "Rt. 10/Turner Drive Proffered Improvements") (i) approves or adopts plans for modification of the intersection of US 258/Rt 10 (Benns Church Boulevard) and Turner Drive that conflict with or supersede one or more of the Rt. 10/Turner Drive Proffered Improvements, or (ii) accepts proffers from or imposes conditions upon another developer(s) for substantially the same obligations as one or more of the Rt. 10/Turner Drive Proffered Improvements (each of such affected Rt. 10 Turner Drive Proffered Improvements being an "Affected Improvement"), then the Owner shall contribute to the County an amount of cash equal to the then estimated cost to complete the Affected Improvement(s) (including design, construction, labor, and materials) as approved by the County multiplied by the Project's proportionate share (assuming the Project's full buildout) of the vehicle trips associated with such Affected Improvements (as determined by the then current edition of the Institute of Transportation Engineers Trip Generation Manual) (the "Cash in Lieu Payment") no later than ninety (90) days after (1) the award of the construction contract for the construction of such conflicting, superseding, or substantially similar improvement(s), and (2) issuance a written request from the County to the Owner for such Cash in Lieu Payment; provided, however, under no circumstances shall the Cash in Lieu Payment be due prior to issuance of the 50th CO for Residential

Units on the Property (or the commencement of construction of improvements on the Commercial Area, whichever occurs first). The payment by the Owner to the County of such Cash in Lieu Payment shall be deemed satisfaction in full of the corresponding portion of the Rt. 10/Turner Drive Proffered Improvements.

d. At such time as deemed warranted by the VDOT, the Owner shall install a traffic signal at intersection of US 258/Rt 10 (Benns Church Boulevard) and the Project's main entrance. Prior to the issuance of the 150th CO for Residential Units on the Property, Owner shall submit to VDOT a traffic signal warrant analysis for the intersection of US 258/Rt 10 (Benns Church Boulevard) and the Project's main entrance. In the event the analysis concludes, and VDOT concurs, that a traffic signal is warranted at this intersection, then the Owner shall Guarantee a traffic signal (including flashing yellow arrows for the eastbound and westbound left turn lanes and any planned pedestrian accommodations at the signal at the intersection of US 258/Rt 10 (Benns Church Boulevard) and the Project's main entrance and shall complete the installation of such signal prior to the issuance of certificates of occupancy for more than 50 additional residences after the date upon which VDOT issues to Owner written confirmation that the signal is warranted.

i. In the event that such traffic signal is not warranted by VDOT in connection with the first traffic signal warrant analysis, then Owner's development of the Property (and permits and approvals therefor) may proceed above the foregoing thresholds; however, prior to the issuance of the 300th CO for Residential Units on the Property, Owner shall submit to VDOT a traffic signal warrant analysis for the intersection of US 258/Rt 10 (Benns Church Boulevard) and the Project's main entrance. In the event the analysis concludes, and VDOT concurs, that a traffic signal is warranted at this intersection, then the Owner shall Guarantee a traffic signal at the intersection of US 258/Rt 10 (Benns Church Boulevard) and the Project's main entrance and shall complete the installation of such signal prior to the issuance of certificates of occupancy for more than 50 additional residences after the date upon which VDOT issues to Owner written confirmation that the signal is warranted.

ii. In the event that such traffic signal is not warranted by VDOT in connection with the second traffic signal warrant analysis, then Owner's development of the Property (and permits and approvals therefor) may proceed above the foregoing thresholds; however, prior to the issuance of the 450th CO for Residential Units on the Property, Owner shall submit to VDOT a traffic signal warrant analysis for the intersection of US 258/Rt 10 (Benns Church Boulevard) and the Project's main entrance. In the event the analysis concludes, and VDOT concurs, that a traffic signal is warranted at this intersection, then the Owner shall Guarantee a traffic signal at the intersection of US 258/Rt 10 (Benns Church Boulevard) and the Project's main entrance and shall complete the installation of such signal prior to the issuance of certificates of occupancy for more than 50 additional residences after the date upon which VDOT issues to Owner written confirmation that the signal is warranted.

iii. In the event that such traffic signal is not warranted by VDOT in connection with the third traffic signal warrant analysis, then Owner's development of the Property (and permits and approvals therefor) may proceed above the foregoing thresholds; however, prior to the issuance of the 600th CO for Residential Units on the Property, Owner shall submit to VDOT a traffic signal warrant analysis for the intersection of US 258/Rt 10 (Benns Church Boulevard) and the Project's main

entrance. In the event the analysis concludes, and VDOT concurs, that a traffic signal is warranted at this intersection, then the Owner shall Guarantee a traffic signal at the intersection of US 258/Rt 10 (Benns Church Boulevard) and the Project's main entrance and shall complete the installation of such signal prior to the issuance of the final certificate of occupancy for the Residential Units on the Property.

iv. In the event that such traffic signal is not warranted by VDOT in connection with the fourth traffic signal warrant analysis, then Owner's development of the Property (and permits and approvals therefor) may proceed through to the issuance of the final CO for Residential Units on the Property; however, unless waived by the Director based on an agreed upon alternative, the Owner shall pay to the County the then estimated cost of the traffic signal (including design and construction labor and materials) as approved by the County, and upon such payment shall be deemed to have satisfied all of its obligations under this Proffer 6(d).

7. Timing of Recreational Amenities. The clubhouse and pool described on the Master Plan shall be completed prior to issuance of the 150th CO for Residential Units constructed on the Property. If not sooner constructed, the pedestrian amenities shown on the Master Plan shall be constructed sequentially by phase when the corresponding phase of the development in when such amenities are shown is constructed.

8. Archaeology. A Phase I Archaeological Site Assessment for the Property shall be submitted to the Director for their review and approval prior to preliminary site plan or subdivision plan submittal. A treatment plan or Phase II Archaeological Site Assessment shall be submitted to, and approved by, the Director for all sites in the Phase I study that are recommended for a Phase II evaluation, and/or identified as being eligible for inclusion on the National Register of Historic Places. If a Phase II study is undertaken, such a study shall be approved by the Director and a treatment plan or Phase III Archaeological Site Assessment for said sites shall be submitted to, and approved by, the Director for sites that are determined to be eligible for inclusion on the National Register of Historic Places and/or those sites that require a Phase III study. If in the Phase II study, a site is determined eligible for nomination to the National Register of Historic Places and said site is to be preserved in place, the treatment plan shall include nomination of the site to the National Register of Historic Places. If a Phase III study is undertaken for said sites, such studies shall be approved by the Director prior to land disturbance within the study area. All Phase I, Phase II and Phase III studies shall meet the Virginia Department of Historic Resources' Guidelines for Preparing Archaeological Resource Management Reports and the Secretary of the Interior's Standard and Guidelines for Archaeological Documentation, as applicable, and shall be conducted under the supervision of a qualified archaeologist who meets the qualifications set forth in the Secretary of the Interior's Professional Qualification Standards. All approved treatment plans shall be incorporated into the plan of development for the site and shall be adhered to during the clearing, grading and construction activities thereon.

9. Property Owners Association. The Owner shall form one or more Property Owners' Associations and/or a Condominium Unit Owners Associations (each an "Association"), which may include separate or sub-associations for the age restricted and non-age restricted Residential Units, in accordance with Virginia law, with the preparation and execution of a Declaration of Covenants, Conditions and Restrictions or Declaration of Condominium, as applicable (a "Declaration") with the members thereof being the owners of the portions of the Property designated for residential use (the "Residential Property"). The Declaration shall provide for, among other things, the qualifying age restrictions in Proffer 5 above, design review by a design review board, and the conveyance from the Owner to an Association of all of the common areas, open spaces, green areas, recreation areas and facilities and the stormwater management

system associated with the Residential Property (collectively, the "Common Elements"). The Owner agrees that it shall retain sole responsibility for the maintenance of the Common Elements until such time as the same are conveyed to an Association, at which time the obligation shall be assigned to an Association. Each Residential Unit owner within the Residential Property shall be a voting member of an Association and be subject to assessments as set forth in the Declaration. The Declaration shall be subject to the approval of the County Attorney for consistency with this proffer and upon approval shall be duly recorded in the Clerk's Office for the Circuit Court of Isle of Wight County. The Declaration shall be recorded in connection with the recordation of the first subdivision (or condominium) plat for the Residential Units on the Property.

10. Successors and Assigns. These Proffers shall run with the title to the Property and shall be binding on the parties hereto and their respective successors and assigns; provided, however once a party ceases to own any portion of the Property, such party shall have no continuing liability hereunder.

11. Severability. In the event that (i) the County's approval of the Application and/or acceptance of these Proffers is appealed within 30 days after the date of the Board of Supervisors' action on same, and (ii) any clause, sentence, paragraph, subparagraph, section or subsection of these Proffers shall be judged by any court of competent jurisdiction to be invalid or unenforceable for any reason, including a declaration that it is contrary to the Constitution of the Commonwealth of Virginia or the United States, or if the application thereof to any owner of any portion of the Property or to any government agency is held invalid, then the change in zoning intended to be accomplished by the County's approval of the Application and acceptance of these Proffers shall be deemed void and the zoning of the Property shall automatically revert to that which existed immediately prior to the date of such approval.

12. Headings. All paragraph and subparagraph headings of the Proffers herein are for convenience only and are not part of these Proffers.

13. Conflicts. In the event that there is any conflict between these Proffers and the Zoning Ordinance, the conflict shall be resolved by the County's Director subject to the appeal process to the Board of Zoning Appeals and the Courts as otherwise provided by law.

14. Void if Application not Approved. In the event that the Application is not approved by the County or is overturned by subsequent judicial determination, these Proffers and the Master Plan shall be null and void.

[SIGNATURES LOCATED ON FOLLOWING PAGES]

[SIGNATURE PAGE TO PROFFERS]

WITNESS the following signatures, thereunto duly authorized:

NVR, INC.

By: _____

Print Name: Jesse Faisant

Title: Vice President

COMMONWEALTH OF VIRGINIA
CITY/COUNTY OF Richmond, to wit:

The foregoing instrument was acknowledged before me this 8th day of September, 2023 by Jesse Faisant as VP of Operations of NVR, Inc.

Kimberly D. Hamrick
NOTARY PUBLIC

My commission expires: 8/31/2025
Registration No.: 7714267

Kimberly Denise Hamrick
Commonwealth of Virginia
Notary Public
Commission No. 7714267
My Commission Expires 8/31/2025

[SIGNATURE PAGE TO PROFFERS]

THE WILLIAM G. YEOMAN III TRUST :

Henry Layden, special Trustee of the William Grover Yeoman III Trust, dated December 14, 2007, as amended

COMMONWEALTH OF VIRGINIA
CITY/COUNTY OF Isle of Wight, to wit:

The foregoing instrument was acknowledged before me this 8th day of Sept, 2023 by Henry Layden, special Trustee of the William Grover Yeoman III Trust, dated December 14, 2007, as amended.

ELIZABETH D JONES STATE OF VIRGINIA NOTARY PUBLIC COMMISSION #7761629 EXPIRES DECEMBER 31 2027

Elizabeth D Jones
NOTARY PUBLIC

My commission expires: December 31, 2027
Registration No.: 7761629

ELIZABETH D JONES STATE OF VIRGINIA NOTARY PUBLIC COMMISSION #7761629 EXPIRES DECEMBER 31 2027

EXHIBIT A

All that certain tract, piece or parcel of land containing approximately 249.47 acres, situate, lying and being near Benns Church, in Newport Magisterial District, Isle of Wight County, Virginia; lying on the East side of State Highway No. 10, and bounded by said Highway, the lands now or formerly of Daisy M. Bunkley, Phillip F. Edwards, Jones' Creek, the lands now or formerly owned by George Yeoman, Christie Jordan, C.E. Johnson, J.F. Minton and others and being a portion of the same land of which E.K. Batten and Maggie E. Batten, his wife, died seized and possessed.

RESIDENTIAL

DESIGN GUIDELINES

FOR

SWEETGRASS DEVELOPMENT

DATED _____

BUILDING design guidelines seek to create a distinct yet coherent architecture that will foster a unique identity for Sweetgrass and form the backdrop to a rich street level experience. These guidelines will significantly help distinguish the community, help define its character and eventually raise its value in the marketplace. The following set of principles will be applied to each of the buildings, irrespective of its use or location.

1. Build in the tradition of simple yet elegant designs. Building architecture and elevations promote a more contemporary nature through use of simple unifying roof and window lines and careful selection of materials. The building aesthetic should emerge from elevation components and building details rather than from mere ornamentation.

2. Variety- Single family homes immediately adjacent to or across from one another shall have distinct and different elevations. No identical color schemes for single family detached houses shall be repeated within three consecutive lots.

3. Use traditional, high quality and durable materials throughout the community. When walls are constructed of more than one material, changes in material shall be permitted along a horizontal or vertical line and should reinforce a base, middle and top for the building. Building walls shall be of one or more of the following materials:

- Brick- A variety of traditional brick colors and modules and bonding variations are encouraged
- Stone- Natural stone and stone veneer are permitted and shall be laid predominantly rectilinear stones in a horizontal pattern. Cast stone shall be permitted as sills, headers and accents.
- Siding- Cement or fiber board siding or high-quality vinyl or its equivalent is the prescribed siding material where brick or stone is not utilized. Aluminum siding is not permitted. A variance in color and texture is encouraged.

4. Emphasize main entries of each home regardless of elevation. The main entrance to each home should be easily identifiable from the main travel ways through use of materials and forms.

Single Family Detached Lots Guidelines

"The architecture shown herein is a representation of builders' architecture that may be built in Sweetgrass, but does not represent the full sampling of architecture or builders that may be provided within the community."

In a development like Sweetgrass it is important to capture a broad buyer group including new buyers, upgrade buyers, move-down buyers, etc. Sweetgrass is offering 3 different minimum lot sizes within the community. The minimum lot size of a single family detached lot is 50' wide (measured at the front BSL) x 100'deep.

Minimum Building Setback Line (BSL)

20' front
15' rear
5' side

Architecture Treatments and Materials

Single Family Detached Highly Visible Lots (HV)

Lots on prominent corners will be designated as High Vis or "HV" lots. These prominent corners will be defined as those fronting on multiple public rights of way, or those that directly border any of the defined recreation areas. These lots will be required to have upgraded architectural features on the visible facades.

HV Features required:

- Masonry water table
- Storm shutters or Trimmed windows
- Gable vent or other similar trim

High Visibility "HV" lots must have landscaping placed along the side foundation that faces the street. The corner lot side setback will be 10 from public right of way'.

Elevations and Materials

Creating a unique and diverse streetscape throughout Sweetgrass is a high priority; to continue pursuing this there will be limitations placed on the frequency and location of elevations that can be used on adjacent lots. The following guidelines shall be followed:

- Builder elevations will be reviewed and approved by the developer prior to construction to ensure a cohesive theme throughout the community.
- Lots next to or across the street from each other cannot be the same elevation/model.
- Accent materials shall be varied to create more differentiation between lots.

Traditional, high-quality and durable building materials shall be used throughout the community. Building materials shall meet all current Local, State, and Federal building codes and regulations. Materials include:

- Brick; includes painted brick
- Natural stone
- Stone veneer
- High quality vinyl siding
- Cement or fiber board siding

Fencing, Landscaping, HVAC Equipment, and Height Restrictions

Fences

Fences will be permitted within the Sweetgrass community but must follow the guidelines below and in accordance with County Code:

- Fence material shall be vinyl.
- Vinyl fencing must be white and non-glossy; including vinyl covered picket fencing.
- Maximum fence height shall be six (6) feet.
- No front yard fencing shall be allowed.
- Fencing shall not be used to satisfy upgraded architectural requirements.

Landscaping

Lot landscaping and screening can add a lot of value and create and aesthetically pleasing streetscape throughout the community. The follow guidelines shall be considered:

- Foundation plantings must be included on every house prior to occupancy.
- Corner lots or high vis lots shall have landscape buffers to screen sides of houses from the street.
- Lots that back to other lots shall include landscaping at the rear of the property to create a visual screen between adjacent lots. Buffer shall be located outside drainage or utility easements.

Utility Equipment

- HV lots shall ensure the HVAC equipment is screened from view of the street with a fence or other opaque screen.
- No equipment shall be placed on the side of the house that abuts two public streets.

Height

- No single family detached dwellings median roof height will be taller than 45 feet in height.

Single Family Attached (SFA) Lots Guidelines

"The architecture shown herein is a representation of builders' architecture that may be built in Sweetgrass but does not represent the full sampling of architecture or builders that may be provided within the community."

In a development like Sweetgrass, it is important to capture a broad buyer group including new buyers, upgrade buyers, move-down buyers, etc. Sweetgrass is offering 2 single-family attached Products.

Minimum Lot Size:	Maximum Stories:
Interior Lot: 1400 square feet	3 levels
Exterior Lot: 1800 square feet	

Setbacks

SFA Fee Simple:

Rear Loading Town Home Building Restriction Line (BSL)

Front yard:	5 feet minimum (front door to front property line).
Side yard:	10 feet minimum; 20' minimum building separation between buildings
Rear yard:	Sufficient to accommodate an 18.5 ft parking space (Not to include, right of way or sidewalk)

Front Loading Town Home Building Restriction Line (BSL)

Front yard:	Sufficient to accommodate an 18.5 ft parking space (Not to include, right of way or sidewalk)
Side yard:	10 feet minimum; 20' minimum building separation between buildings
Rear yard:	10 feet minimum (From rear of unit to property line)

SFA Condominium Ownership:

Rear Loading Town Home Building Restriction Line (BSL)

Front yard:	5 feet minimum; 20' minimum building separation between buildings
Side yard:	10 feet minimum; 20' minimum building separation between buildings
Rear yard:	Sufficient to accommodate an 18.5 ft parking space (Not to include, right of way or sidewalk)

Front Loading Town Home Building Restriction Line (BSL)

Front yard:	Sufficient to accommodate an 18.5 ft parking space (Not to include, right of way or sidewalk)
Side yard:	10 feet minimum; 20' minimum building separation between buildings
Rear yard:	10 feet minimum; 20' minimum building separation between buildings

Setback guidelines:

- Every other lot shall be staggered by two (2) feet for each lot located
- The two (2) alternate setback lots must be separated by a Typical front yard setback lot.
- Front porches will be allowed to encroach over the front yard BSL by 3'.

Architecture Treatments and Materials

Single Family Attached (SFA) Highly Visible Lots (HV)

Lots on prominent corners will be designated as High Vis or “HV” lots. These prominent corners will be defined as those fronting on multiple public rights of way, the subdivision entrance road or those that directly border any of the defined recreation areas. These lots will be required to have upgraded architectural features on the visible facades. Features to be included on these lots are outlined below:

Single Family Attached High Vis 1 Lots (HV1)

Features required:

- Masonry water table
- Storm shutters
- Trimmed windows
- Gable vent
- Gable trim
- Siding located in reverse gable shall be architecturally different from main portion of the house. Options include:
    - Tighter spaced siding
    - Shake siding
    - Vertical siding

Elevations and Materials

Creating a unique and diverse streetscape throughout Sweetgrass is a high priority; to continue pursuing this there will be limitations placed on the frequency and location of elevations that can be used on adjacent lots. The following guidelines shall be followed:

- Builder elevations will be reviewed and approved by the developer prior to construction to ensure a cohesive theme throughout the community.
- Accent materials shall be varied to create more differentiation between elevations.

Traditional, high-quality and durable building materials shall be used throughout the community. Building materials shall meet all current Local, State, and Federal building codes and regulations.

- Materials include:
    - Brick; includes painted brick
    - Natural stone
    - Stone veneer
    - High quality vinyl siding
    - Cement or fiber board siding

Fencing, Landscaping and HVAC Equipment

Fences

Fences will be permitted within the Sweetgrass community but must follow the guidelines below and be in accordance with County Code.

- Fence material shall be vinyl.
- Vinyl fencing must be white and non-glossy
- Maximum fence height shall be six (6) feet.
- For end units side yard fencing shall not extend beyond the middle point of the house.
- Corner lot fencing layout shall be reviewed on a case by case basis, and must meet the minimum County ordinance requirements, to determine the appropriate fence location
- No front yard fencing shall be allowed.
- Fencing shall not be used to satisfy upgraded architectural requirements.

Landscaping

Lot landscaping and screening can add a lot of value and create and aesthetically pleasing streetscape through-out the community. The follow guidelines shall be considered:

- Foundation plantings must be included on every house once constructed.
- Lots with walk-out basements or exposed foundations shall include landscaping to break up large architecture planes.
    - Columnar or taller evergreens shall be used to “soften” the architecture.
- Corner lots or high vis lots shall have landscape buffers to screen rear or sides of houses from the street.
- Lots that back to other lots shall include landscaping at the rear of the property to create a visual screen between adjacent lots. Buffers shall be located outside of drainage and utility easements.

HVAC Equipment

- HVAC units shall be placed in the rear yard.
- High Vis 1 lots shall ensure the HVAC equipment is screened from view of the street with a fence or other opaque screen.
- No equipment shall be placed on the side of end units.

Height Restrictions

- No single family attached dwellings median roof height will be taller than 48 feet in height.

COMMERCIAL CENTER

DESIGN GUIDELINES

FOR

SWEETGRASS DEVELOPMENT

DATED JUNE 16, 2023

COMMERCIAL CENTER STANDARDS (Sweetgrass)

1. Introduction

The commercial center within Sweetgrass is located along the frontage of Route 10 on the Town limits of Smithfield. This commercial center establishes the first image and impression of the Sweetgrass Community and the Town of Smithfield to those who pass by or visit from other areas in the region. Architectural character, landscape requirements, parking and service areas, pedestrian interaction, vehicular movement, signage and lighting are all major factors which should be considered in the design of any commercial center.

2. Building Placement & Massing

2.1. Building Orientation

The orientation and massing of a group of buildings or single building within the commercial center should create a positive spatial ensemble rather than occur as free standing random elements. Buildings should be located so that they form an ordered relationship with one another, ideally through the creation of public open space.

2.2. Building Shape and Footprint

Buildings should be predominantly rectangular in shape or composed of simple rectangular pieces.

Where building footprints are larger than 10,000 sf the buildings should be broken up with alternating materials or architectural elements that give the appearance of multiple buildings. Additionally building depths may not be greater than 100' without being divided into what appears to be multiple buildings.

2.3. Building Height

An appropriate building height is desirable to establish a scale to the mixed-use Community and will not exceed the maximum or minimum heights as set forth in the County PDMX ordinance.

2.4. Building Setback Lines/Frontage Zone

- Benn's Church Boulevard BSL: 70' from Right of Way
- Main Entrance Road BSL: 25' from Right of Way
- All other BSL: 50' from Property Line.

3. Visual Character

3.1. Edge Definition and Screening

1. General Provisions

Walls, fences and planting are to be employed to improve the visual environment as well as to reinforce a streetwall condition. These elements are not intended to block views of the fronts of the buildings but to serve two functions: to define street edges and parking areas and to conceal undesirable views into service areas.

Parking lots and landscaped areas of the site should be defined with a continuous hedge, low walls or fences, combined with planting where appropriate, along the property line or established setback line. The walls and fences should be architecturally consistent with the adjacent buildings and should be limited to 60" in height. The canopy of trees planted within the parking areas or other positive features should dominate the view over such walls and fences to soften the effect of parking area along street rights-of-way.

Loading, service and trash areas, as well as mechanical equipment, are to be screened with high walls or fences, a minimum of 5' in height, combined with planting where appropriate, and consistent in character with the buildings or may be screened by the buildings themselves. Walls or fences should have a minimum opacity of 75%.

2. Mechanical Equipment

All roof mounted mechanical equipment, including ductwork, is to be screened from all public view and access.

3.2. Plantings

Planting is encouraged in all setback areas and throughout the parking areas. Within large areas of parking, planting should be designed to break down large parking lots into smaller parking areas. The preservation of existing mature trees within planting and parking areas is encouraged.

3.3. Scale and Articulation

Buildings in the commercial center should not appear monolithic, but should appear consistent with a village character. The use of articulation should be employed to help reduce the overall size of large buildings. Articulation may be expressed through two devices: building massing and architectural elements. Buildings with large profiles may be designed to appear smaller if the overall massing is articulated as a collection of component masses. The use of architectural elements such as bays, balconies, porches, loggias and arcades can add interest to building facades and aid in relating the scale of any building to human dimensions. Roofs may be articulated through the use of dormers, lanterns, monitors, windows watches and other roof-top elements. Each of these devices adds character and interest to the buildings of the town which, in turn, reinforces the village character intended by these guidelines.

The building height limitations will be determined by the applicable County ordinance and should utilize simple geometric shapes in plan and elevation, subject to required treatment of 1 story buildings set forth in Chapter 3, Section 3.3 above. The overall massing of any building should be a collection of small and medium simple volumes. Buildings are encouraged to have pitched roofs, especially if they contain residential uses, with attic

stories and dormers. Wings and additions should be simple rectangles in plan and oriented parallel or perpendicular to the main body of the building or toward a street frontage.

3.4. Site Lighting

All site lighting should prevent light from shining directly up and should be full cut-off fixtures with the light source fully shielded, except for low wattage and fossil fuel sources, temporary emergency lighting, seasonal lighting, sports field lighting and other special situations. Pedestrian luminaries that permit the limited and controlled visibility of indirect light from the source as an aid to way finding and spatial definition are permitted.

Acceptable light sources include incandescent, fluorescent and metal halide lamps, and should produce a color temperature close to daylight. Mercury vapor sources are not permitted.

The maximum height for on-site fixture poles is 20'.

3.5. Architectural Expression

1. Walls

- Recommended Materials

  - Building walls: brick, with limited use of stucco or synthetic stucco, wood or fiber cement shingle, wood or fiber cement clapboard, board and batten
  - Exposed Foundation Walls: Brick or brick facing, or stucco finished poured concrete block or cast-in-place concrete.

2. Building Elements

- Recommended Materials

  - Chimneys: brick, stucco or synthetic stucco.
  - Arcades and colonnades: brick, stucco, synthetic stucco, wood, or high grade synthetic wood alternative.
  - Porches, columns: painted wood, painted metal
  - Posts, spindles, balusters: painted wood, painted metal- Stoops, exterior stairs: brick, concrete
- Decks: wood
- Signs: wood, painted metal
- Awning and canopies: canvas-covered metal structure, designed to be compatible in configuration and color with the architecture of the buildings.

4. <u>Roofs</u>

- Recommended Materials

- Roofs: Wood shingles, metal standing seam, copper, lead-coated copper, slate, synthetic slate, 40-year architectural asphalt shingle
-Gutters and downspouts: painted metal, copper
-Flashing: copper, lead coated copper, anodized aluminum

- Configurational Standards

  Buildings should have a varied character of traditionally shaped roofs.

  Items to be considered are:

  - Principal Roofs: Gabled, hipped, hipped gables, gabled hips or gambrel in a symmetrical fashion with a slope of 4:12 to 8:12; Buildings with roof areas greater than 12,000 sf may have portions which are flat if concealed from view by sloped roofs of the character described above.
  - Secondary Roofs: Shed with minimum slope of 3:12.
  - Flat Roofs: Flat roofs are to have parapets or railings.
  - Parapets: Horizontal or gabled in elevation
  - Dormers: Pitched or eyebrow
  - Special roof-top elements: Symmetrically situated or aligned with the rhythm of structural bays and fenestration.
  - Roof-top mechanical enclosures: Concealed from view by sloped roofs of the character described above.

5. Openings

- Recommended Materials

  - Windows: wood, painted metal
  - Bay windows: wood, painted metal, with metal tops
  - Doors: painted wood, painted metal
  - Storefronts: painted wood, painted metal
  - Shutters: wood
  - Security doors and grilles: metal

The following photographs are not intended to represent actual users or layouts but merely illustrate the quality of materials and design that is intended to be required by these guidelines.

MASTER PLAN

FOR

SWEETGRASS

WINDSOR DISTRICT

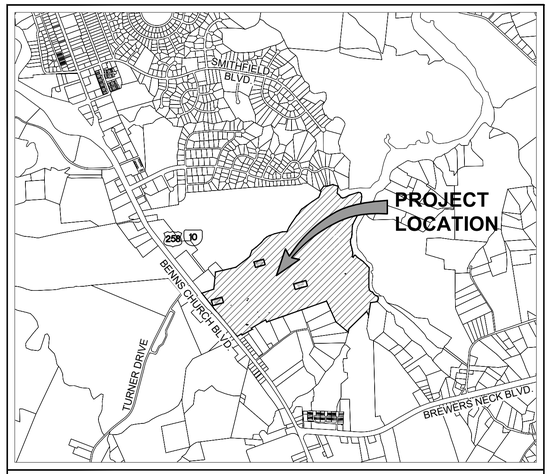
ISLE OF WIGHT, VIRGINIA

APPLICANT INFORMATION:

NVR, INC.
CONTACT: MR. ERIC SHIREY
860 GREENBRIER CIRCLE
CHESAPEAKE, VIRGINIA 23320
PHONE NO.: (757) 603-0802

SITE DATA:

PARCEL ID:	32-01-009
PROPERTY OWNER:	WILLIAM G. YEOMAN III TRUSTEE
PROPERTY ADDRESS:	14096 BENNS CHURCH BOULEVARD
CURRENT ZONING:	RAC, RURAL AGRICULTURAL CONSERVATION DISTRICT
PROPOSED ZONING:	C-PD-MX, CONDITIONAL PLANNED DEVELOPMENT MIXED USE DISTRICT
PROPERTY ACREAGE:	250 AC. ±
OVERLAY DISTRICTS:	NEWPORT DEVELOPMENT SERVICE OVERLAY DISTRICT (DSD) & CHESAPEAKE BAY PRESERVATION AREA OVERLAY DISTRICT



VICINITY MAP
(Approximate Scale: 1"=2,000')

INDEX OF SHEETS

SHEET NO.	SHEET DESCRIPTION
1	COVER SHEET
2	MASTER PLAN
3	ENVIRONMENTAL INVENTORY

County Project No.: ZA-06-19
Original Submittal Date: JUNE 14, 2019

Rev.	Date	Description	Revised By
5	8/18/23	REVISED PER COUNTY COMMENTS	JAG
4	2/15/23	REVISED PER COUNTY COMMENTS	JAG
3	7/22/22	REVISED PER COUNTY COMMENTS	JAG
2	6/01/21	REVISED PER COUNTY COMMENTS	JAG
1		REVISED PER COUNTY COMMENTS	JAG

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AES CONSULTING ENGINEERS
Middle Peninsula | Central Virginia | Hampton Roads

REZONING MASTER PLAN
FOR
SWEETGRASS
ISLE OF WIGHT COUNTY WINDSOR DISTRICT VIRGINIA

Project Contacts:	JAG
Project Number:	W10516-00
Scale: AS NOTED	Date: 6/14/19
Sheet Title:	COVER SHEET
Sheet Number	1 OF 3

DENSITY CALCULATIONS

	SF	AC	%
TOTAL SITE AREA	10,866,832	249.47	100%
COMMERCIAL SECTION:	SF	AC	%
TOTAL AREA	236,520	5.43	2%
SLOPES 15%-30%	3,110	0.07	
SLOPES GREATER THAN 30%	-	-	
100' RPA, TIDAL WETLANDS, 100 YEAR FLOOD PLAIN	21,585	0.50	
AREA OF ROUTE 10 BUFFER	50,863	1.17	
NON-DEVELOPABLE AREA	75,558	1.73	
AREA FOR DENSITY CALCULATION	160,962	3.70	
MINIMUM REQUIRED DENSITY	64,385		
PROPOSED DENSITY	73,000 SF		
TOWNHOME SECTION:	SF	AC	%
TOTAL AREA	3,429,642	78.73	32%
SLOPES 15%-30%	2,517	0.06	
SLOPES GREATER THAN 30%	6,742	0.15	
NON-TIDAL WETLANDS	31,513	0.72	
100' RPA, TIDAL WETLANDS, 100 YEAR FLOOD PLAIN	1,791,639	41.13	
NET DEVELOPABLE AREA	1,614,246	37.06	
AREA FOR DENSITY CALCULATION (less 20% RW)	1,291,397	29.65	
PROPOSED OPEN SPACE	2,180,625 SF		64%
MINIMUM REQUIRED DENSITY	178 UNITS		
PROPOSED DENSITY	225 UNITS		
SINGLE FAMILY SECTION:	SF	AC	%
TOTAL AREA	7,135,818	163.82	66%
SLOPES 15%-30%	23,748	0.55	
SLOPES GREATER THAN 30%	-	-	
100' RPA, TIDAL WETLANDS, 100 YEAR FLOOD PLAIN	2,949,782	67.72	
NET DEVELOPABLE AREA	4,174,162	95.83	
AREA FOR DENSITY CALCULATION (less 20% RW)	3,339,330	76.66	
PROPOSED OPEN SPACE	4,307,625 SF		60%
MINIMUM REQUIRED DENSITY	307 UNITS		
PROPOSED DENSITY	390 UNITS		
OVERALL MAXIMUM RESIDENTIAL UNITS (PER PROFFERS)	615 UNITS		

N/F
THOMAS BARBARA F
910 CANTEBERRY LN
PARCEL ID: 22J-02-150
ZONING: SMITHFIELD: N-R

N/F
EVANS ANTHONY
906 CANTEBERRY LN
PARCEL ID: 22J-02-152
ZONING: SMITHFIELD: N-R

N/F
DIPPO LAWRENCE A & ELIZABETH A
TRS L A & E A DIPPO LIVING TRUST
908 CANTEBERRY LN
PARCEL ID: 22J-02-151
ZONING: SMITHFIELD: N-R

N/F
BERLAND EDNA R
916 CANTEBERRY LN
PARCEL ID: 22J-02-147
ZONING: SMITHFIELD: N-R

N/F
HENDRIX THOMAS
912 CANTEBERRY LN
PARCEL ID: 22J-02-149
ZONING: SMITHFIELD: N-R

N/F
FORSYTHE TIMOTHY A & DEBRA K
TRS T A & D K FORSYTHE FAMILY REV TRUST
914 CANTEBERRY LN
PARCEL ID: 22J-02-148
ZONING: SMITHFIELD: N-R

N/F
EDWARDS PHILLIP F JR & CONNIE A
BENNS CHURCH BLVD
PARCEL ID: 32-01-096
ZONING: SMITHFIELD: C-C

N/F
CROWN CASTLE GT COMPANY LLC
14005 BENNS CHURCH BLVD
PARCEL ID: 32-01-096B
ZONING: RAC

N/F
WILSON ANGELA B & WILSON JAMES G JR
TRS A B WILCON REVOC LIVING TRUST
14041 BENNS CHURCH BLVD
PARCEL ID: 32-01-095
ZONING: LI

N/F
YEOMAN WILLIAM G III
WILLIAM G YEOMAN III TRUST
BENNS CHURCH BLVD
PARCEL ID: 32-01-007
ZONING: RAC

N/F
ISLE OF WIGHT COUNTY SCHOOL BOARD
14171 SMITHFIELD CIR, SMITHFIELD
PARCEL ID: 32-01-010A
ZONING: RAC

N/F
CORNETT GEORGE C
14106 BENNS CHURCH BLVD
PARCEL ID: 32-01-008
ZONING: RAC

N/F
WILLIAM G. YEOMAN, TRUSTEE
14096 BENNS CURCH BOULEVARD
PARCEL ID:32-01-009
ZONING: RAC

N/F
EDWARDS RYLAND B JR &
MARY ANN D &
EDWARDS RYLAND B & ETALS
14202 BENNS CHURCH BLVD
PARCEL ID: 32-01-062
ZONING: RAC

N/F
GIRARD PATRICIA A
14221 BENNS CHURCH BOULEVARD
PARCEL ID:32A-02-012
ZONING: RAC

N/F
TOTTEN CHARLES D
BEECHWOOD LN
PARCEL ID:32-01-094,094C,094D
ZONING: RAC

N/F
BELL LINWOOD E & BARBARA G
19341 BEECHWOOD LN
PARCEL ID:31-01-094B

N/F
WALLACE JIMMY J & MYRTLE T
14108 HAYLOFT LN
PARCEL ID:32-01-094A
ZONING: RAC

N/F
WALLACE JIMMY J & MYRTLE T
14111 HAYLOFT LN
PARCEL ID:32B-01-005
ZONING: RAC

N/F
CARNEY PAMELA D
14125 HAYLOFT LN
PARCEL ID:32B-01-006
ZONING: RAC

N/F
CARNEY PAMELA D
14125 HAYLOFT LN
PARCEL ID:32B-01-006
ZONING: RAC

N/F
BOWDEN RONALD
BREWERS NECK BLVD
PARCEL ID: 33-01-005
ZONING: RAC

N/F
GRAY ROBERTA
C/O GARY LAWRENCE N
CHAPMANS LN
PARCEL ID:33-03-006
ZONING: RAC

N/F
ST LUKES VILLAGES LLC
C/O MCCALE DEV COR
20081 BREWERS NECK BLVD
PARCEL ID: 33-01-012E
ZONING: PD-MX

TOWNHOME PARCEL

EXISTING TREELINE (TYP.)

RECREATION AREA 1

RECREATION AREA 2

RECREATION AREA 3

RECREATION AREA 4

APPROX. LIMITS OF EXISTING TREELINE

PRIVATE CONDOMINIUM ROAD AND PARKING

TOWNHOME SECTION 80 AC.±

"COMMERCIAL" SECTION 5 AC.±

SINGLE FAMILY SECTION 164 AC.±

OPEN AREA

OPEN SPACE

PEDESTRIAN ACCESS

BMP C1

BMP D

BMP A

POTENTIAL BMP C2 LOCATION

POTENTIAL BMP B LOCATION

DOG PARK

CENTRAL PARK

END OF PUBLIC ROAD

PARKING FOR PARK

LIMITS OF 100' RPA

LIMITS OF ZONE AE FLOOD PLAIN ELEV = 8

70' BUILDING SETBACK

MULTI-USE PATHWAY

RESTRICTED ACCESS (RIGHT IN/OUT ONLY)

PUBLIC RIGHT OF WAY EXTENDED TO BOUNDARY

POTENTIAL PUBLIC RIGHT OF WAY EXTENDED TO BOUNDARY. FINAL LOCATION TO BE CONFIRMED WITH DEVELOPMENT PLANS.

BEECHWOOD LANE

BENNS CHURCH BLVD (VARIABLE WIDTH PUBLIC R/W)

1220.51'

686'

60' PUBLIC R/W

53' PUBLIC R/W

S PUBLIC RW

LEGEND

- 100 FOOT RPA BUFFER TO PROPERTY LINE
- 100'RPA — 100 FOOT RPA BUFFER
- WETLANDS
- EX. TREELINE
- FLOOD PLANE ZONE AE
- MULTI-USE PATH
- PARK/RECREATION AREA
- WATER / POND
- CONDO TOWNHOME UNITS
- LOTS LINES

* NOTE: WETLANDS AND RPA BUFFERS ARE SHOWN BASED UPON DATA PROVIDED BY WSSI AND ARE NOT FIELD SURVEYED.

PARK/ RECREATION

RECREATION AREAS 1-4 =	4.7 AC. ±
DOG PARK =	1.5 AC. ±
CENTRAL PARK =	3.67 AC. ±

* RECREATION TO INCLUDE: CLUBHOUSE, POOL, PAVED AND UNPAVED TRAILS, PLAY FIELDS, MINIMUM OF 2 GAZEBOS, BENCHES, FIRE PIT AND OTHER AMENITIES

GRAPHIC SCALE
200' 0' 200' 400'
SCALE: 1" = 200'

Rev.	Date	Description	Revised By
5	8/18/23	REVISED PER COUNTY COMMENTS	JAG
4	2/15/23	REVISED PER COUNTY COMMENTS	JAG
3	7/22/22	REVISED PER COUNTY COMMENTS	JAG
2	6/01/21	REVISED PER COUNTY COMMENTS	JAG
1	11/1/2019	**REVISED PER COUNTY COMMENTS**	**JAG**

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AES CONSULTING ENGINEERS
Hampton Roads | Central Virginia | Middle Peninsula

REZONING MASTER PLAN
FOR
SWEETGRASS
ISLE OF WIGHT COUNTY | WINDSOR DISTRICT | VIRGINIA

Project Contacts:	JAG
Project Number:	W10516-00
Scale: 1"=200'	Date: 06/14/2019

Sheet Title:
CONCEPTUAL MASTER PLAN

Sheet Number
2 OF 3

SOIL CHARACTERISTICS

SOIL#	SOIL NAME	HYDROLOGIC SOIL GROUP	TYPICAL SLOPES	EROSION FACTOR (K)	EROSION FACTOR (T)
2	BOHICKET SILTY CLAY LOAM	D	0–1%	0.32	5
3	Chickahominy silt loam	D	0–2%	0.55	5
7	Kinston loam	B/D	0–4%	0.32	5
11E	Nevarc and Remlik soils	A	15–35%	0.55	5
12A	Peawick silt loam	D	0–2%	0.55	5
12B	Peawick silt loam	D	2–6%	0.55	5
16	Rumford loamy sand	A	0–4%	0.10	5
18B	Slagle fine sandy loam	C	2–6%	0.24	5

INFORMATION TAKEN FROM "SOIL SURVEY OF TIDEWATER CITIES AREA, VIRGINIA" ISSUED IN 2009 BY THE UNITED STATES DEPARTMENT OF AGRICULTURE SOIL CONSERVATION SERVICE IN COOPERATION WITH VIRGINIA POLYTECHNIC INSTITUTE AND STATE UNIVERSITY.

SOIL SUSCEPTIBILITY TO EROSION CLASSIFICATION (K)
0.23 AND LOWER – LOW ERODIBILITY
0.23 – 0.36 – MODERATE ERODIBILITY
0.36 AND UP – HIGH ERODIBILITY

THE MAP SHOWN IS A "BEST FIT MODEL" OF THE SCS MAPS WITH EXISTING BASE INFORMATION.

LEGEND

- SLOPES 15% TO 30%
- SLOPES 30% OR GREATER
- EXISTING WATER
- RPA BUFFER IMPACTS** ± 69,501 S.F.; ± 1.60 AC.
- WETLAND IMPACTS** ± 16,653 S.F. ; ± 0.38 AC.

** NOTE: THE PURPOSE OF THIS MAP IS TO SHOW REPRESENTATIVE IMPACTS BASED ON THE PROPOSED MASTER PLAN. THE APPROVAL OF THIS MASTER PLAN DOES NOT INTEND TO APPROVE THESE IMPACTS. ADDITIONAL PERMITS AND WAIVERS SHALL BE SOUGHT THROUGH THE PROPER REVIEWING AGENCIES.

ENVIRONMENTAL INVENTORY IMPACTS

TIDAL WETLANDS:	NONE IMPACTED
TIDAL SHORES:	NONE IMPACTED
NON-TIDAL WETLANDS IN RPA:	2,670 S.F./0.06 AC.
NON-TIDAL WETLANDS NOT IN RPA:	13,983 S.F./0.32 AC.
100 FT RPA BUFFER:	89,832 S.F./2.07 AC.
NON-TIDAL WETLANDS IN RMA:	NONE IMPACTED
HYDRIC SOILS:	NONE IMPACTED

* SEE WQIA SUBMITTED WITH REZONING APPLICATION FOR DETAILS.

LEGEND

SOILS BOUNDARY

19B SOILS TYPE

GRAPHIC SCALE
200' 0' 200' 400'
SCALE: 1" = 200'

THIS PROPERTY IS IN FLOOD ZONE "X" AND AE (EL 8) AS SHOWN ON MAP NUMBER 51093C0154E, PANEL 0154E AND 51093C0153E, PANEL 0153E FOR COMMUNITY NUMBERS 510303 & 510081, DATED 12/2/2015 OF THE FLOOD INSURANCE RATE MAPS FOR ISLE OF WIGHT COUNTY, VIRGINIA. ZONE "X" IS DEFINED AS AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN. ZONE "AE" IS DEFINED AS SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD.

N/F THOMAS BARBARA F 910 CANTEBERRY LN PARCEL ID: 22J-02-150 ZONING: SMITHFIELD: N-R

N/F HENDRIX THOMAS 912 CANTEBERRY LN PARCEL ID: 22J-02-149 ZONING: SMITHFIELD: N-R

N/F EVANS ANTHONY 906 CANTEBERRY LN PARCEL ID: 22J-02-152 ZONING: SMITHFIELD: N-R

N/F BERLAND EDNA R 916 CANTEBERRY LN PARCEL ID: 22J-02-147 ZONING: SMITHFIELD: N-R

N/F DIPPO LAWRENCE K & ELIZABETH TRS L / A & E A DIPPO LIVING TRUST 908 CANTEBERRY LN PARCEL ID: 22J-02-151 ZONING: SMITHFIELD: N-R

N/F FORSYTHE TIMOTHY A & DEBRA K TRS T A & D K FORSYTHE FAMILY REV TRUST 914 CANTEBERRY LN PARCEL ID: 22J-02-148 ZONING: SMITHFIELD: N-R

RPA BUFFER IMPACT #7 6,734 S.F.±; 0.15 AC.±

TOWNHOME PARCEL

EXISTING TREELINE (TYP.)

N/F EDWARDS PHILLIP F JR & CONNIE A BENNS CHURCH BLVD PARCEL ID: 32-01-096 ZONING: SMITHFIELD: C-C

RECREATION AREA 1

RECREATION AREA 4

OPEN SPACE

BMP C1

APPROX. LIMITS OF EXISTING TREELINE

N/F CROWN CASTLE GT COMPANY LLC 14105 BENNS CHURCH BLVD PARCEL ID: 32-01-096B ZONING: RAC

PRIVATE CONDOMINIUM ROAD AND PARKING

TOWNHOME SECTION 80 AC.±

OPEN AREA

PEDESTRIAN ACCESS

WETLANDS IMPACT #1 1,540 S.F.±; 0.04 AC.±

55' PUBLIC R/W

POTENTIAL BMP C2 LOCATION

RPA BUFFER IMPACT #6 4,870 S.F.±; 0.11 AC.±

PARKING FOR PARK

DOG PARK

TURNER DRIVE

N/F WILSON ANGELA B & WILSON JAMES G TRS A B WILSON REVOCABLE LIVING TRUST 14041 BENNS CHURCH BLVD PARCEL ID: 32-01-095 ZONING: LI

N/F YEOMAN WILLIAM G III WILLIAM G YEOMAN III TRUST BENNS CHURCH BLVD PARCEL ID: 32-01-007 ZONING: RAC

RPA BUFFER IMPACT #1 1,756 S.F.±; 0.04AC.±

RPA BUFFER IMPACT #9 4,962 S.F.±; 0.11AC.±

RPA BUFFER IMPACT #5 5,330 S.F.±; 0.12 AC.±

OPEN AREA

BMP D

CENTRAL PARK

END OF PUBLIC ROAD

BMP A

LIMITS OF 100' RPA

LIMITS OF ZONE AE FLOOD PLAIN ELEV = 8

1220.51'

BENNS CHURCH BLVD

N/F ISLE OF WIGHT COUNTY SCHOOL BOARD 14171 SMITHFIELD CIR, SMITHFIELD PARCEL ID: 32-01-010A ZONING: RAC

COMMERCIAL SECTION 5 AC.±

SINGLE FAMILY SECTION 164 AC.±

N/F CORNELL GEORGE C 14106 BENNS CHURCH BLVD PARCEL ID: 32-01-008 ZONING: RAC

70' BUILDING SETBACK

RPA BUFFER IMPACT #2 12,872 S.F.±; 0.30 AC.±

RPA BUFFER IMPACT #10 1,539 S.F.±; 0.04 AC.± (SANITARY SEWER)

WETLANDS IMPACT #3 2,672 S.F.±;0.06 AC.±

RECREATION AREA 2

RECREATION AREA 3

WETLANDS IMPACT #2 3,041 S.F.±; 0.1 AC.±

60' PUBLIC R/W

53' PUBLIC R/W

OPEN SPACE

PARKING FOR PARK

LIMITS OF 100' RPA

RPA BUFFER IMPACT #3 12,149 S.F.±; 0.28 AC.±

RPA BUFFER IMPACT #4 26,023 S.F.±; 0.60 AC.±

EXISTING TREELINE (TYP.)

POTENTIAL PUBLIC RIGHT OF WAY EXTENDED TO BOUNDARY. FINAL LOCATION TO BE CONFIRMED WITH DEVELOPMENT PLANS.

WETLANDS IMPACT #4 9,516 S.F.±; 0.22 AC.±

POTENTIAL BMP B LOCATION

N/F WILLIAM G. YEOMAN, TRUSTEE 14096 BENNS CURCH BOULEVARD PARCEL ID: 32-01-009 ZONING: RAC

MULTI-USE PATHWAY

N/F EDWARDS RYLAND B JR & MARY ANN D & EDWARDS RYLAND B & ETALS 14202 BENNS CHURCH BLVD PARCEL ID: 32-01-062 ZONING: RAC

PUBLIC RIGHT OF WAY EXTENDED TO BOUNDARY

RESTRICTED ACCESS (RIGHT IN/OUT ONLY)

N/F GIRARD PATRICIA A 14225 BENNS CHURCH BOULEVARD PARCEL ID:32A-02-012 ZONING: RAC

N/F WALLACE JIMMY J & MYRTLE T 14111 HAYLOFT LN PARCEL ID: 32B-01-005 ZONING: RAC

N/F WALLACE JIMMY J & MYRTLE T 14108 HAYLOFT LN PARCEL ID: 32-01-094A ZONING: RAC

N/F CARNEY PAMELA D 14125 HAYLOFT LN PARCEL ID: 32B-01-006 ZONING: RAC

N/F BOWDEN RONALD BREWERS NECK BLVD PARCEL ID: 32-01-005 ZONING: RAC

N/F GRAY ROBERTA C/O GARY LAWRENCE 11 CHAPMANS LN PARCEL ID: 32C1-004 ZONING: RAC

N/F TOTTEN CHARLES D BEECHWOOD LN PARCEL ID: 32-01-094,094C,094D ZONING: RAC

N/F CARNEY PAMELA D 14125 HAYLOFT LN PARCEL ID: 32B-01-006 ZONING: RAC

N/F ST LUKES VILLAGES LLC C/O MCCALE DEV CORP 20081 BREWERS NECK BLVD PARCEL ID: 33-01-012E ZONING: PD-MX

BEECHWOOD LANE

N/F BELL LINWOOD E & BARBARA G 19341 BEECHWOOD LN PARCEL ID: 31-01-094B ZONING: RAC

** NOTE: THE PURPOSE OF THIS MAP IS TO SHOW REPRESENTATIVE IMPACTS BASED ON THE PROPOSED MASTER PLAN. THE APPROVAL OF THIS MASTER PLAN DOES NOT INTEND TO APPROVE THESE IMPACTS. ADDITIONAL PERMITS AND WAIVERS SHALL BE SOUGHT THROUGH THE PROPER REVIEWING AGENCIES.

Rev	Date	Description
5	8/18/23	REVISED PER COUNTY COMMENTS
4	2/16/23	REVISED PER COUNTY COMMENTS
3	7/22/22	REVISED PER COUNTY COMMENTS
2	6/01/21	REVISED PER COUNTY COMMENTS
1	11/12/19	REVISED PER COUNTY COMMENTS

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Middle Peninsula | Central Virginia | Hampton Roads

REZONING MASTER PLAN
FOR
SWEETGRASS

Project Contacts:	JAG
Project Number:	W10516-0C
Scale: 1"=200'	Date: 06/14/2019

Sheet Title:
ENVIRONMENTAL INVENTORY

Sheet Number
3 OF 3

Memorandum

To: VDOT and Isle of Wight County

Date: March 17, 2023

Project #: 34417.00

From: Kirsten Tynch, PE, PTOE
Sean Becker, PE, PMP

Re: Sweetgrass Supplemental Memo to December 2019 Traffic Impact Study and June 2021 Memo

Introduction

Sweetgrass (previously referred to as Yeoman's Tract) is an undeveloped parcel located at 14096 Benns Church Boulevard in Isle of Wight County. The parcel is on the northeast side US 258/Rt (Benns Church Boulevard) between US 258/Rt 32 (Brewers Neck Boulevard) and Canteberry Lane. Ryan Homes is planning a development of single family, and multi-family living residential units as well as a shopping center on this parcel. The developer is in the process of rezoning the property to Conditional Mixed-Use Areas (C-PD-MX). This development is expected to be in full operation in 2026.

The Virginia Department of Transportation (VDOT) and Isle of Wight County require a traffic study in compliance with Chapter 527 Regulations. A traffic impact analysis (TIA) was completed in December 2019 and submitted for approval. This memorandum is a supplement and follow up to the December 2019 traffic impact study, as well as the Memo submitted June 2021. Modifications were made to the development and in response to requests to provide pedestrian signal timings at the proposed entrance to the development, which results in changes on trip generation and Synchro Build traffic analysis discussed herein. Only 2026 and 2032 Build conditions were updated for the purposes of this memo.

Trip Generation

The development plan has been modified since the 2019 TIA and June 2021 memo to reduce the shopping center area (using a different land use code that better reflects the type of development proposed) and adding general office space, summarized in Table 1. These changes result in a net reduction in trips compared to the previous June 2021 submission, shown in Table 2. December 2019 TIA trip generation is shown in Table 3.

Table 1. Trip Generation for Current Development Plan

Land Use	ITE Code	Size	Units	Daily	AM Peak Hour			PM Peak Hour		
					Enter	Exit	Total	Enter	Exit	Total
Conceptual Site Plan										
Single-Family Detached Housing	210	390	Dwelling Units	3,682	72	217	289	243	143	386
Multifamily Housing (Low-Rise)	220	225	Dwelling Units	1,660	24	80	104	79	47	126
Strip Retail Plaza (<40k)	822	18	1000 Sq. Ft. GLA	989	25	17	42	59	60	119
General Office	710	55	1000 Sq. Ft. GLA	690	88	12	100	17	84	101
Subtotal				**7,021**	**209**	**326**	**535**	**398**	**334**	**732**
Pass-by Trips (Shopping Center)	34%		% Pass-by	336	9	6	14	20	20	40
Total New Trips				**6,685**	**200**	**320**	**521**	**378**	**314**	**692**

Note: Used highest of average rate and fitted curve unless fitted curve unless R2<0.75

Table 2. Trip Generation from June 2021 Memo

Land Use	ITE Code	Size	Units	Daily	AM Peak Hour			PM Peak Hour		
					Enter	Exit	Total	Enter	Exit	Total
Conceptual Site Plan										
Single-Family Detached Housing	210	390	Dwelling Units	3,682	72	217	289	243	143	386
Multifamily Housing (Low-Rise)	220	225	Dwelling Units	1,660	24	80	104	79	47	126
Shopping Center	820	35	1000 Sq. Ft. GLA	2,944	20	13	33	120	130	250
Subtotal				**8,286**	**116**	**310**	**426**	**442**	**320**	**762**
Pass-by Trips (Shopping Center)	34%		% Pass-by	1,001	7	4	11	41	44	85
Total New Trips				**7,285**	**109**	**306**	**415**	**401**	**276**	**677**

Reference: Trip Generation, 10th Edition + Supplement, Institute of Transportation Engineers, Washington, DC. 2019.
Note: Used highest of average rate and fitted curve unless fitted curve unless R2<0.75

Table 3. Trip Generation from December 2019 TIA

Land Use	ITE Code	Size	Units	Daily	AM Peak Hour			PM Peak Hour		
					Enter	Exit	Total	Enter	Exit	Total
Conceptual Site Plan										
Single-Family Detached Housing	210	400	Dwelling Units	3,776	74	222	296	249	147	396
Multifamily Housing (Low-Rise)	220	285	Dwelling Units	2,144	30	101	131	101	59	160
Shopping Center	820	30	1000 Sq. Ft. GLA	2,651	17	11	28	107	116	223
Public Park	411	4	Acres	91	0	0	0	13	10	23
Fast Food with Drive-Thru	934	5	1000 Sq. Ft. GLA	2,355	102	99	201	85	78	163
Subtotal				**11,017**	**223**	**433**	**656**	**555**	**410**	**965**
Pass-by Trips (Fast Food only)	49%		% Pass-by	1,154	50	49	98	42	38	80
Pass-by Trips (Shopping Center)	34%		% Pass-by	901	6	4	10	36	39	76
Total New Trips				**8,962**	**167**	**380**	**548**	**477**	**333**	**809**

Reference: Trip Generation, 10th Edition, Institute of Transportation Engineers, Washington, DC. 2017.
Note: Used highest total between aveage rate and fitted curve unless R2<0.75

The site is estimated to generate 6,685 new daily trips with 521 trips in the morning peak hour and 692 trips during the evening peak hour. This is a reduction of 600 daily trips from the June 2021 memo submission, however, AM peak trips increase by 106 and PM peak trips increase by 15. Appendices for this memo include revised figures for trip generation, projected 2026 build volumes, and projected 2032 build volumes for the AM and PM peak.

As compared to the original December 2019 TIA submission, there are 2,277 fewer daily trips, with 27 fewer AM peak hour trips, and 117 fewer PM peak hour trips. Due to lower volumes and generally improved LOS compared to previous analyses, no modifications to mitigation measures are recommended.

Memorandum

Synchro Analysis

To accommodate pedestrian signal timing at the development main entrance, revisions are required to the phase splits along US 258/Rt 10 (Benns Church Blvd) to ensure corridor progression. Split adjustments shift cycle time to the side streets to provide sufficient timing for pedestrian crossings. Results of the updated synchro analysis and comparison to previous analysis are discussed in the following sections.

LOS Summary

A summary of LOS results with timing updates completed is shown in Table 4. Table 5 shows the summary of LOS as submitted in 2019.

In comparing the results from the original TIA against the updated results, LOS and delay is generally reduced across the board or minimally impacted due to the pedestrian timing updates. No approaches are below a LOS D in the updated model. In the 2019 TIA submission, the eastbound approach at US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane was project to be LOS E in both the 2026 and 2032 build conditions model. With the updated model reflecting lower trip generation and new signal timing for pedestrians, this movement is projected to maintain a LOS C or D in both build conditions.

Table 4. Level of Service Results Summary

Detailed Level of Service Results Summary

ID	Intersection and Approach	Control	2026 Build		2032 Build	
			AM	PM	AM	PM
1	**US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane**	Signalized	**B (14.9 sec/veh)**	**C (31.1 sec/veh)**	**B (19.9 sec/veh)**	**D (40.6 sec/veh)**
	Eastbound		C-24.9	D-45.3	D-38.8	D-49.5
	Westbound		D-44	D-35.6	D-52	D-37.6
	Northbound		B-10.9	C-32.3	B-17.8	D-47.1
	Southbound		B-14.1	C-27.4	B-17.1	C-32.7
2	**US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive**	Signalized	**A (2 sec/veh)**	**A (9.1 sec/veh)**	**A (2.6 sec/veh)**	**A (7.8 sec/veh)**
	Eastbound		A-7.6	D-36.6	B-11.2	D-45.2
	Westbound		---	---	---	---
	Northbound		A-2	A-9.1	A-1.7	A-6.7
	Southbound		A-1.9	A-4.9	A-3	A-3.3
3	**US 258/Rt 10 (Benns Church Boulevard) & Turner Drive**	Signalized	**B (17.9 sec/veh)**	**C (22 sec/veh)**	**C (31.0 sec/veh)**	**A (9.1 sec/veh)**
	Eastbound		C-33.5	B-19.7	C-32.8	B-18.7
	Westbound		C-32.7	C-22.7	D-44.8	C-31.0
	Northbound		A-9	C-22.6	C-26.0	A-9.0
	Southbound		B-18.6	C-21.7	C-33.7	A-7.5
4	**US 258/Rt 10 (Benns Church Boulevard) & Proposed Main Entrance**	Signalized	**A (7.6 sec/veh)**	**B (11.6 sec/veh)**	**B (13.6 sec/veh)**	**B (18.6 sec/veh)**
	Eastbound		---	---	---	---
	Westbound		C-28.5	C-27.3	D-41.5	C-27.8
	Northbound		A-8.8	B-12.7	A-6.7	C-22.1
	Southbound		A-3	A-6.4	B-15	B-12
5	**US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)**	Signalized	**A (8.6 sec/veh)**	**B (13.3 sec/veh)**	**B (10.6 sec/veh)**	**B (16 sec/veh)**
	Eastbound		---	---	---	---
	Westbound		A-4.9	B-13.9	A-8.1	C-22.6
	Northbound		B-18.3	D-36	C-23.4	C-33.3
	Southbound		A-9.3	A-8.2	B-10.1	A-4.6
6	**Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)**	Signalized	**B (16.1 sec/veh)**	**B (19.8 sec/veh)**	**C (21.7 sec/veh)**	**C (21.4 sec/veh)**
	Eastbound		C-21.9	C-33.5	B-10.9	D-35.4
	Westbound		B-14.8	B-15.5	D-40	B-17.1
	Northbound		A-3.9	A-3.7	A-5.9	A-3.7
	Southbound		C-23.1	C-26.1	C-27.8	C-26.1
7	**US 258/Rt 10 (Benns Church Boulevard) & Proposed Secondary Entrance**	Unsignalized	**A (0.5 sec/veh)**	**A (0.3 sec/veh)**	**A (0.5 sec/veh)**	**A (0.3 sec/veh)**
	Eastbound		---	---	---	---
	Westbound		C-15.2	C-19.6	C-16.3	C-21.8
	Northbound		--0	--0	--0	--0
	Southbound		--0	--0	--0	--0

Table 5. Level of Service Results Summary from December 2019 Submission

ID	Intersection and Approach	Control	2026 Build		2032 Build	
			AM	PM	AM	PM
	US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane	Signalized	**B (16.6 sec/veh)**	**C (30.3 sec/veh)**	**B (18.5 sec/veh)**	**D (41.6 sec/veh)**
1	Eastbound		C-21.5	E-59	D-39.6	E-68.3
	Westbound		D-43.5	D-38.2	D-50.2	D-40
	Northbound		B-14.2	C-30.6	B-14.7	D-50.5
	Southbound		B-15.2	C-25.1	B-17	C-28.7
	US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive	Signalized	**A (4.1 sec/veh)**	**A (9.5 sec/veh)**	**A (3.6 sec/veh)**	**B (10.9 sec/veh)**
2	Eastbound		A-6.6	D-36.1	B-11.2	D-39.2
	Westbound		---	---	---	---
	Northbound		A-3.4	A-9.4	A-2.6	B-11.2
	Southbound		A-4.5	A-5.6	A-4	A-6.2
	US 258/Rt 10 (Benns Church Boulevard) & Turner Drive	Signalized	**C (25.7 sec/veh)**	**C (23.1 sec/veh)**	**C (31 sec/veh)**	**C (27.6 sec/veh)**
3	Eastbound		C-27.5	B-17.4	C-31.2	B-18.2
	Westbound		C-28.5	C-22.7	C-29	C-22.7
	Northbound		C-22.2	C-23.3	C-27.7	C-27.9
	Southbound		C-27.8	C-23.7	C-33.9	C-28.7
	US 258/Rt 10 (Benns Church Boulevard) & Proposed Main Entrance	Signalized	**B (10.6 sec/veh)**	**B (18.7 sec/veh)**	**B (12.3 sec/veh)**	**C (21.5 sec/veh)**
4	Eastbound		---	---	---	---
	Westbound		C-24.3	C-31.8	C-21.1	C-32.2
	Northbound		B-10.1	C-20.2	B-13.2	C-25.8
	Southbound		A-7.7	B-13.1	A-9.6	B-13
	US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)	Signalized	**A (8.8 sec/veh)**	**B (17.3 sec/veh)**	**B (10.3 sec/veh)**	**C (22.9 sec/veh)**
5	Eastbound		---	---	---	---
	Westbound		A-4.5	C-25.6	A-7.3	D-36
	Northbound		C-21.7	C-25.7	C-22.7	C-29.8
	Southbound		A-9.3	A-5.2	B-10.2	A-5
	Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)	Signalized	**B (17.8 sec/veh)**	**C (20.1 sec/veh)**	**B (19.1 sec/veh)**	**C (22 sec/veh)**
6	Eastbound		C-23.4	D-35.4	B-12.3	D-40.5
	Westbound		B-17.1	B-15.1	C-32.2	B-15.7
	Northbound		A-5	A-3.4	A-5.6	A-3.5
	Southbound		C-25.6	C-23.7	C-27.8	C-26.1
	US 258/Rt 10 (Benns Church Boulevard) & Proposed Secondary Entrance	Unsignalized	**A (0.6 sec/veh)**	**A (0.4 sec/veh)**	**A (0.6 sec/veh)**	**A (0.4 sec/veh)**
7	Eastbound		---	---	---	---
	Westbound		C-15.3	C-20.8	C-16.4	C-23.4
	Northbound		A-0	--0	--0	--0
	Southbound		A-0	--0	--0	--0

Memorandum

Queue Summary

Results of the updated queue analysis are summarized in Table 5. For comparative purposes, queue results from the 2019 analysis are shown in Table 6. For both tables, queues exceeding available queue storage are shown in red. For the intersection of US 258/Rt 10 (Benns Church Boulevard) & Turner Drive, the 2032 Build AM peak eastbound right, 2026 Build PM peak southbound left, and 2032 AM peak southbound right appear to exceed the full storage length shown in the summary table. However, the effective storage length, as measurement in accordance to VDOT's Traffic Operations and Safety Analysis Manual (TOSAM), is sufficient to accommodate these projected queues under both the 2026 and 2032 build conditions. VDOT's TOSAM defines effective storage length as the turn bay length plus one-half taper length, which was utilized in the simulation model, therefore all build condition queue lengths are within effective storage length. The effective storage length was used in the Synchro analyses.

The addition of a right turn overlap at US 258/Rt 10 (Benns Church Boulevard) & Turner Drive during the 2032 Build condition reduces southbound right queue storage to remain within available effective storage. Further, the expansion of the northbound left queue storage at this same intersection to 250 feet as noted in the 2021 provide sufficient storage for the project queues in 2026 and 2032 build conditions.

No additional improvements over those defined in the 2019 TIA and 2021 memo are necessary to mitigate the projected traffic impacts of the revised proposed development and the addition of pedestrian signals at the main entrance into the site.

Table 5. Queue Results Summary

Queuing Analysis - 95th Percentile Queue										
Intersection	Movement	Link Distance	Storage Length	Existing (AM/PM Peak)	2026 No Build (AM/PM Peak)	2032 No Build (AM/PM Peak)	Link Distance	Storage Length	2026 Build (AM/PM Peak)	2032 Build (AM/PM Peak)
US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane	EBLT	277		56/162	50/170	58/178	277		47/145	50/201
	EBR	277		45/65	42/68	50/75	277		36/61	58/64
	WBLT	1172		137/103	147/101	162/110	1172		123/159	164/139
	WBR	1172		64/112	72/122	74/125	1172		64/102	107/122
	NBL		150	32/135	33/177	47/208		150	43/91	34/67
	NBT	663		175/348	197/404	210/546	663		126/322	224/277
	NBT	663		183/359	197/411	216/544	663		134/335	233/306
	NBR		225	35/47	36/93	45/271		225	36/55	45/52
	SBL		150	54/114	63/139	66/182		150	63/136	57/126
	SBT	1895		189/227	224/284	240/347	1895		212/246	270/287
	SBT	1895		198/241	230/290	252/355	1895		222/258	305/318
	SBR		325	24/39	26/40	25/41		325	22/40	23/44
US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive	EBLT	1824		9/128	10/139	13/138	1824		12/135	11/160
	EBR	1824		31/96	38/101	38/103	1824		33/81	20/107
	WBLTR	1402		-/8	-/6	-/12	1402		-/10	-/14
	NBL		175	33/104	39/125	46/137		175	51/134	62/136
	NBT	1913		61/140	58/185	69/205	1913		37/148	48/86
	NBTR	1913		76/150	77/205	83/229	1913		51/161	72/106
	SBL		75	3/-	3/-	2/-		75	3/-	3/-
	SBT	663		56/81	61/86	75/89	663		68/81	84/89
	SBT	663		69/93	77/105	87/101	633		64/94	97/122
	SBR		150	9/46	14/45	14/49		150	9/44	10/53
US 258/Rt 10 (Benns Church Boulevard) & Turner Drive	EBLTR	1442		342/113	-	-			-	-
	EBLT	1440		-	174/91	220/100	1442		194/101	235/125
	EBR		200	-	168/66	197/73		200	183/73	216/98
	WBL		100	8/-	3/-	6/-	648		-/-	-/-
	WBTR	648		87/19	95/19	109/19	648		-/-	-/-
	WBLTR								94/15	121/16
	NBL		75	185/151	179/136	201/168		250	211/195	147/153
	NBT	1098		260/243	204/218	311/327	1065		174/326	356/160
	NBTR	1098		251/242	189/223	259/324	1065		152/330	310/49
	SBL		75	42/77	46/80	52/89		75	17/77	12/79
	SBT	1913		363/230	302/228	391/282	1913		249/251	334/192
	SBT	1913		378/240	307/237	401/288	1913		258/256	359/199
	SBR		175	200/57	153/59	248/93		175	126/60	252/58
US 258/Rt 10 (Benns Church Boulevard) & Proposed Main Entrance	WBL			-	-	-	816		127/127	145/152
	WBL			-	-	-	816		67/75	105/114
	WBR			-	-	-	816		69/106	138/132
	NBU		75	10/10	17/14	16/14		75	53/77	48/76
	NBT	3868	-	-	-/-	-	470		178/498	259/363
	NBT								161/496	234/360
	NBR							200	38/204	39/40
	SBU		100	5/-	4/-	3/-			-	-
	SBL							200	99/138	95/140
	SBT						1065		172/105	188/176
	SBT	1086		-	-	110/-	1065		191/121	190/194
US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)	WBR	1008		104/227	134/284	158/337	1008		72/389	129/437
	WBR	1008		104/229	135/280	154/350	1008		76/418	116/426
	NBT	2766		72/71	64/78	73/92	2766		66/103	76/116
	NBT	2766		70/82	73/86	79/103	2766		90/117	80/141
	SBL		200	147/111	150/119	165/135		200	142/160	190/128
	SBL	3868		172/134	180/147	187/163	3191		175/182	214/137
	SBT	3868		4/-	9/-	-/-	3191		-/4	-/-
Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)	EBL		125	25/25	24/24	28/27		125	17/27	26/30
	EBT	1008		240/200	265/223	324/260	1008		237/326	306/281
	EBTR	1008		249/217	273/233	327/267	1008		256/337	318/301
	WBL		500	150/242	166/300	183/350		500	156/311	164/396
	WBT	785		238/338	262/417	298/447	785		63/513	162/486
	WBT	785		200/327	235/403	275/460	785		46/525	130/531
	WBR		250	4/13	4/41	6/89		250	-/104	8/116
	NBLT	858		14/15	14/16	11/19	858		9/15	6/14
	NBR		250	171/96	187/106	220/127		250	170/122	193/131
	NBR		250	110/35	127/40	172/59		250	110/59	156/71
	SBLT	565		24/25	28/30	31/30	565		27/25	27/26
	SBR	565		33/27	34/31	38/32	565		29/34	24/28
US 258/Rt 10 (Benns Church Boulevard) & Proposed Secondary Entrance	WBR			-	-	-	1244		57/87	54/60
	NBT			-	-	-	3191		-/9	-/-
	NBT			-	-	-	3191		-/8	-/-
	NBR			-	-	-		100	-/-	-/-

Table 6. Queue Results Summary from December 2019 Submission

Queuing Analysis - 95th Percentile Queue										
Intersection	Movement	Link Distance	Storage Length	Existing (AM/PM Peak)	2026 No Build (AM/PM Peak)	2032 No Build (AM/PM Peak)	Link Distance	Storage Length	2026 Build (AM/PM Peak)	2032 Build (AM/PM Peak)
US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane	EBLT	277		56/162	50/170	58/178	277		52/190	55/198
	EBR	277		45/65	42/68	50/75	277		34/62	47/67
	WBLT	1172		137/103	147/101	162/110	1172		123/134	171/171
	WBR	1172		64/112	72/122	74/125	1172		68/108	91/113
	NBL		150	32/135	33/177	47/208		150	37/114	56/137
	NBT	663		175/348	197/404	210/546	663		171/321	231/396
	NBT	663		183/359	197/411	216/544	663		186/329	242/407
	NBR		225	35/47	36/93	45/271		225	47/78	42/154
	SBL		150	54/114	63/139	66/182		150	64/121	70/144
	SBT	1895		189/227	224/284	240/347	1895		199/250	271/276
	SBT	1895		198/241	230/290	252/355	1895		213/255	289/286
	SBR		325	24/39	26/40	25/41		325	25/38	24/41
US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive	EBLT	1824		9/128	10/139	13/138	1824		9/133	11/169
	EBR	1824		31/96	38/101	38/103	1824		22/88	31/99
	WBLTR	1402		-/8	-/6	-/12	1402		-/12	-/11
	NBL		175	33/104	39/125	46/137		175	45/125	53/141
	NBT	1913		61/140	58/185	69/205	1913		58/151	58/164
	NBTR	1913		76/150	77/205	83/229	1913		81/169	86/180
	SBL		75	3/-	3/-	2/-		75	2/-	3/-
	SBT	663		56/81	61/86	75/89	663		59/89	91/96
	SBT	663		69/93	77/105	87/101	633		74/93	120/107
	SBR		150	9/46	14/45	14/49		150	14/49	10/58
US 258/Rt 10 (Benns Church Boulevard) & Turner Drive	EBLTR	1442		342/113	-	-			-	-
	EBLT	1440		-	174/91	220/100	1442		240/93	309/95
	EBR		200	-	168/66	197/73		200	184/87	240/90
	WBL		100	8/-	3/-	6/-	648		-/3	8/-
	WBTR	648		87/19	95/19	109/19	648		93/14	94/17
	NBL		75	185/151	179/136	201/168		75	192/171	204/201
	NBT	1098		260/243	204/218	311/327	1065		277/310	373/375
	NBTR	1098		251/242	189/223	259/324	1065		241/309	300/374
	SBL		75	42/77	46/80	52/89		75	53/95	63/105
	SBT	1913		363/230	302/228	391/282	1913		312/267	356/309
	SBT	1913		378/240	307/237	401/288	1913		315/272	356/314
	SBR		175	200/57	153/59	248/93		175	192/67	218/85
US 258/Rt 10 (Benns Church Boulevard) & Proposed Main Entrance	WBL			-	-	-	816		137/151	123/162
	WBL			-	-	-	816		88/108	71/126
	WBR			-	-	-	816		87/115	157/111
	NBU		75	10/10	17/14	16/14		75	54/60	64/54
	NBT	3868	-	-	-/-	-	470		191/314	221/390
	NBT								175/314	200/378
	NBR							200	38/96	42/156
	SBU		100	5/-	4/-	3/-			-	-
	SBL							200	111/191	108/212
	SBT						1065		142/102	151/118
	SBT	1086		-	-	110/-	1065		168/119	176/125
US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)	WBR	1008		104/227	134/284	158/337	1008		82/442	94/536
	WBR	1008		104/229	135/280	154/350	1008		73/456	88/555
	NBT	2766		72/71	64/78	73/92	2766		80/83	84/101
	NBT	2766		70/82	73/86	79/103	2766		81/101	118/88
	SBL		200	147/111	150/119	165/135		200	165/118	189/121
	SBL	3868		172/134	180/147	187/163	3191		187/146	204/149
	SBT	3868		4/-	9/-	-/-	3191		13/4	5/16
Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)	EBL		125	25/25	24/24	28/27		125	23/28	26/30
	EBT	1008		240/200	265/223	324/260	1008		299/253	317/297
	EBTR	1008		249/217	273/233	327/267	1008		303/259	321/304
	WBL		500	150/242	166/300	183/350		500	117/319	182/437
	WBT	785		238/338	262/417	298/447	785		86/513	82/614
	WBT	785		200/327	235/403	275/460	785		61/528	60/645
	WBR		250	4/13	4/41	6/89		250	4/55	6/98
	NBLT	858		14/15	14/16	11/19	858		6/14	3/16
	NBR		250	171/96	187/106	220/127		250	190/111	200/136
	NBR		250	110/35	127/40	172/59		250	147/43	154/68
	SBLT	565		24/25	28/30	31/30	565		31/25	34/28
	SBR	565		33/27	34/31	38/32	565		34/34	39/30
US 258/Rt 10 (Benns Church Boulevard) & Proposed Secondary Entrance	WBR			-	-	-	1244		71/101	70/137
	NBT			-	-	-	3191		-/4	-/14
	NBT			-	-	-	3191		-/4	-/16
	NBR			-	-	-		100	-/4	-/-

Memorandum

Appendix
Revised Network Figures

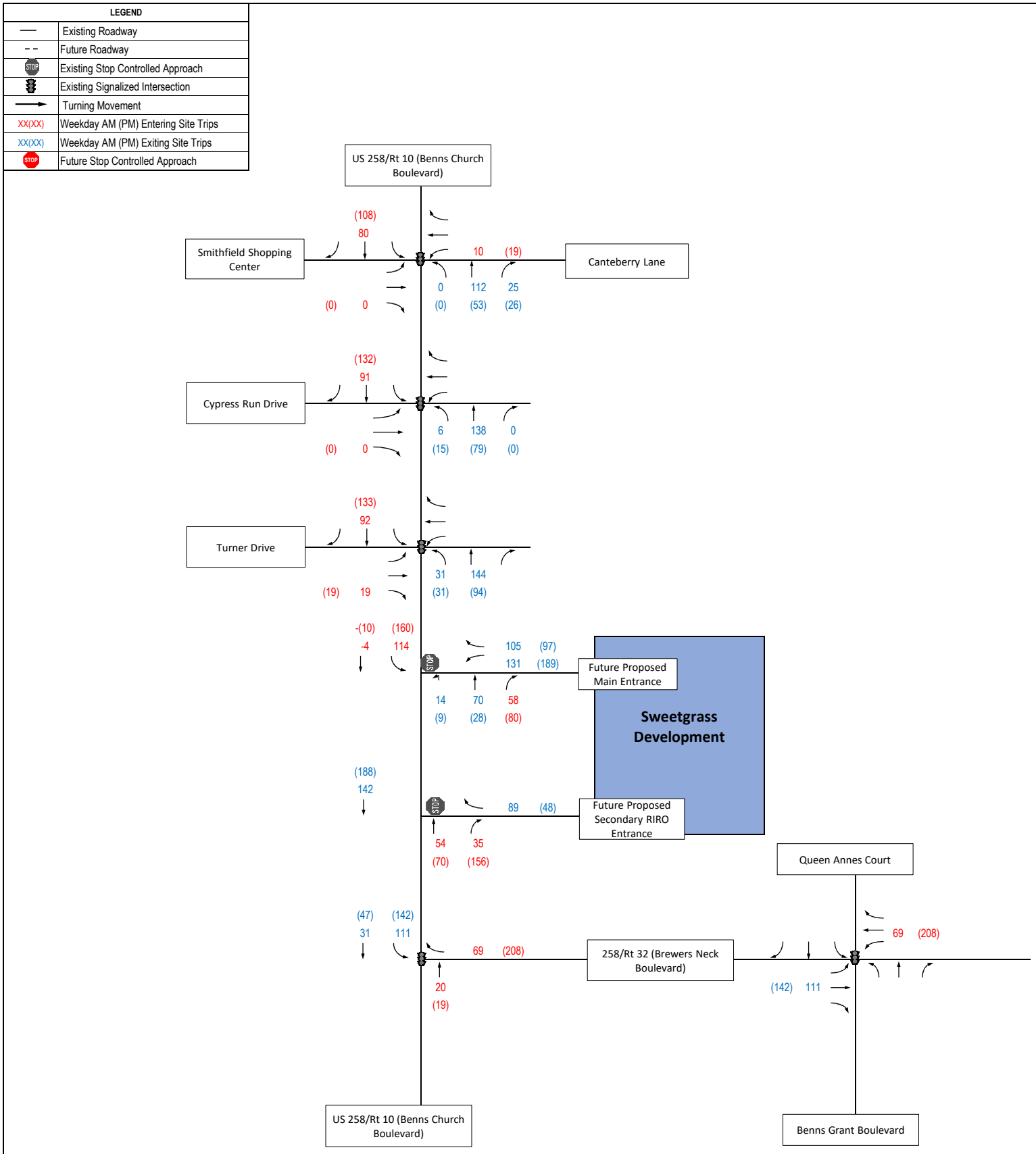

Figure 10
Combined AM and PM Peak Hour Site Trips

Sweetgrass
Isle of Wight County, VA

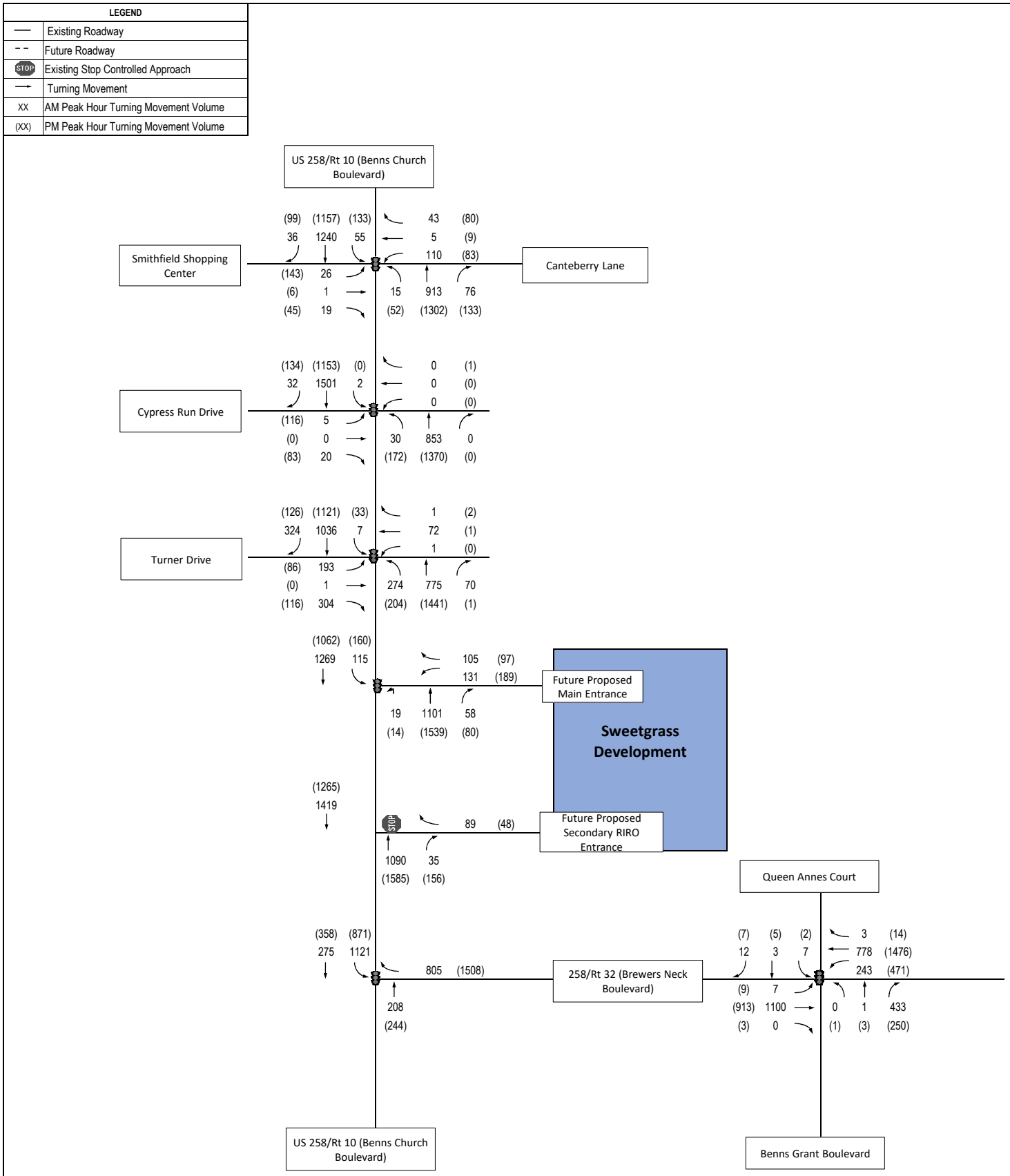

Figure 11
2026 Build AM and PM Peak Hour Traffic Volumes

Sweetgrass
Isle of Wight County, VA

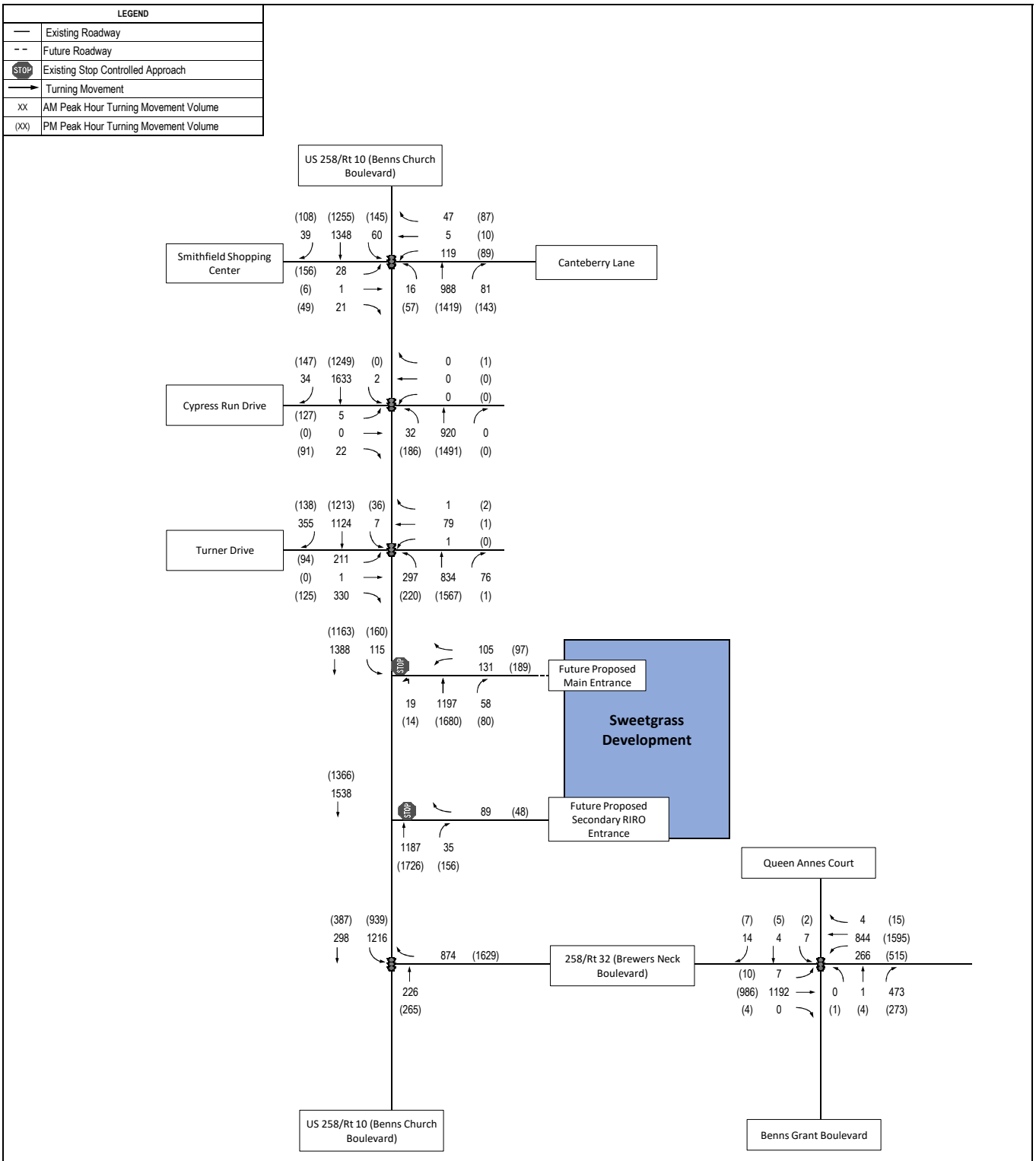

Figure 12
2032 Build AM and PM Peak Hour Traffic Volumes

Sweetgrass
Isle of Wight County, VA

Memorandum

To: VDOT and Isle of Wight County

Date: June 25, 2021
Project #: 34417.00

From: Kirsten Tynch, PE, PTOE

Re: Sweetgrass Supplemental Memo to December 2019 Traffic Impact Study

Introduction

Yeoman's Tract is an undeveloped parcel located at 14096 Benns Church Boulevard in Isle of Wight County. The parcel is on the northeast side US 258/Rt (Benns Church Boulevard) between US 258/Rt 32 (Brewers Neck Boulevard) and Canteberry Lane. Ryan Homes is planning a development of single family, and multi-family living residential units as well as a shopping center on this parcel. The developer is in the process of rezoning the property to Conditional Mixed Use Areas (C-PD-MX). This development is expected to be in full operation in 2026.

The Virginia Department of Transportation (VDOT) and Isle of Wight County require a traffic study in compliance with Chapter 527 Regulations. A traffic study was completed in December 2019 and submitted for approval. The proposed development is now referred to as Sweetgrass, and this memorandum is a supplement to the December 2019 traffic impact study.

Trip Generation

The development plan has been modified since the 2019 TIA to provide a lower number of housing units. It also eliminated the public park and the fast food restaurant with a drive thru. Table 1 shows the land use plan for the proposed development and trips generated by this updated plan, while Table 2 shows the trips that were to be generated from the December 2019 plan.

Table 1. Trip generation for current development plan

Land Use	ITE Code	Size	Units	Daily	AM Peak Hour			PM Peak Hour		
					Enter	Exit	Total	Enter	Exit	Total
Conceptual Site Plan										
Single-Family Detached Housing	210	390	Dwelling Units	3,682	72	217	289	243	143	386
Multifamily Housing (Low-Rise)	220	225	Dwelling Units	1,660	24	80	104	79	47	126
Shopping Center	820	35	1000 Sq. Ft. GLA	2,944	20	13	33	120	130	250
Subtotal				**8,286**	**116**	**310**	**426**	**442**	**320**	**762**
Pass-by Trips (Shopping Center)	34%		% Pass-by	1,001	7	4	11	41	44	85
Total New Trips				**7,285**	**109**	**306**	**415**	**401**	**276**	**677**

Reference: Trip Generation, 10th Edition + Supplement, Institute of Transportation Engineers, Washington, DC. 2019.
Note: Used highest of average rate and fitted curve unless fitted curve unless R2<0.75

4500 Main Street
Suite 400
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Table 2. Trip generation from December 2019 TIA

Land Use	ITE Code	Size	Units	Daily	AM Peak Hour			PM Peak Hour		
					Enter	Exit	Total	Enter	Exit	Total
Conceptual Site Plan										
Single-Family Detached Housing	210	400	Dwelling Units	3,776	74	222	296	249	147	396
Multifamily Housing (Low-Rise)	220	285	Dwelling Units	2,144	30	101	131	101	59	160
Shopping Center	820	30	1000 Sq. Ft. GLA	2,651	17	11	28	107	116	223
Public Park	411	4	Acres	91	0	0	0	13	10	23
Fast Food with Drive-Thru	934	5	1000 Sq. Ft. GLA	2,355	102	99	201	85	78	163
Subtotal				**11,017**	**223**	**433**	**656**	**555**	**410**	**965**
Pass-by Trips (Fast Food only)	49%		% Pass-by	1,154	50	49	98	42	38	80
Pass-by Trips (Shopping Center)	34%		% Pass-by	901	6	4	10	36	39	76
Total New Trips				**8,962**	**167**	**380**	**548**	**477**	**333**	**809**

Reference: Trip Generation, 10th Edition, Institute of Transportation Engineers, Washington, DC. 2017.
Note: Used highest total between aveage rate and fitted curve unless R2<0.75

The site is estimated to generate 7,285 new daily trips with 415 trips in the morning peak hour and 677 trips during the evening peak hour. This equates to a reduction of 1,677 daily trips, 133 AM peak trips and 132 PM peak trips. The Appendix includes figures with the site trips and the projected 2026 and 2032 Build volumes for the AM and PM peak.

Since the anticipated traffic volumes are expected to be lower than those studied in the December 2019 TIA, the mitigation measures recommended as part of that study are still appropriate. One additional recommendation has been included to address a comment received by VDOT in 2020 regarding queuing at Benns Church Boulevard and Turner Drive.

The TIA showed that queuing occurs at the intersection of Benns Church Boulevard and Turner Drive under existing conditions. The proposed development is expected to increase queuing for some movements. In order to address the queuing for the northbound left turn movement that experiences the most significant queuing under existing conditions, it is recommended that the turn lane storage be extended to 250' while maintaining the 100' taper. This would address any projected queuing deficiencies for any of the analyzed scenarios. For the Build conditions, it would allow a reduction in green time for northbound left turn movement which would reduce queuing on the southbound right turn.

Response to June 2020 Comments

VHB received comments on June 12, 2020 for the above referenced project. The project was placed on hold while a new development plan was developed. The following offers responses to the documented comments based on the June 2021 development plan:

Isle of Wight County Comments:

1. On page 1, two different AM peak trips are listed - one for 548 trips in the second paragraph and one for 380 in fifth paragraph. Last bullet refers to planned improvements to Turner Drive. Please note that these are now complete.

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- The total trips generated in the AM peak is 401 trips based on the current development plan. This volume is reflected in the TIA memo dated June 25, 2021.

2. Page 5 should refer to the proposed conditional planned mixed use development and delete the reference to the comprehensive plan amendment application.
    - Noted. Reference to the comprehensive plan amendment can be deleted and land use has been updated to reflect the Conditional Mixed Use Areas (C-PD-MX). This is reflected in the TIA memo dated June 25, 2021.
3. The TIA should not include an assumption that all network signal cycle lengths and splits will be optimized for the 2026 and 2032 build scenarios. There are no plans to do this, and who would perform and pay for this signal optimization?
    - As traffic grows on a state-maintained corridor, signal operations are periodically reviewed by VDOT. By 2026, a new statewide central signal system and controller should be implemented allowing easier review of traffic conditions and more frequent optimization of signal timings by VDOT.
4. Please address the degradation of capacity for the northbound through movement between the 2018-2026 build scenario for the Brewers Neck/Benns Church Blvd. intersection. Explain how capacity improves again in 2032.
    - Optimization of the signal timings for the 2026 and 2032 Build conditions influence the change in level of service from 2018 to 2026 and 2032. Since the background growth factor was applied to all movements, adjustments were made to provide improved traffic flow on individual movements throughout the corridor. By increasing green time for turning movements, there was minor increase in the anticipated delay for the northbound movement under the 2026 Build conditions. As traffic was projected to 2032, additional changes were made to intersection splits that improved the projected delay under the 2032 Build conditions for the northbound through movement. During all analysis periods, the northbound through movement is projected to continue to operate at an acceptable LOS (LOS D or better).
5. In table 7, there is improved queue storage for the northbound left at Benns Church Blvd and Turner Drive in the 2032 build scenario in the am. What changes to increase storage? Similar questions for Tables 8 and 9 where service levels seem to increase in the build scenarios. What accounts for these improvements?
    - The cycle length for 2026 was 90 seconds compared to 130 seconds for 2032. The optimization of signal timings in 2026 and 2032 provides different amounts of green time for the northbound left movement. The amount of green time allocated to movement impacts the expected queuing of stopped vehicles during each cycle.
6. On page 7 of signal warrant analysis, warrant 5 is not met due to no planned school crossing. Because the proposed development is located less than a mile from the assigned high school and middle school, it is a safe assumption that a school crossing will be in place on Route 10 and possibly Turner Drive in the future.

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- Current conditions do not have sidewalks along Benns Church Boulevard or Turned Drive. Without sidewalks, a school crossing is not recommended.

7. Warrant 6 is not met in the signal analysis due to an uncoordinated signal system; however, you assume a coordinated system throughout the rest of the analysis. Please explain.
   - During the initial screening of the signal warrants, the adjacent signal was not part of a coordinated system. Therefore, it did not meet that warrant. Once the modeling was completed, it was determined that coordination of the corridor provided better traffic flow. Since a signal was warranted by other criteria, it was not deemed necessary to modify the original signal warrant documentation.
8. Page 11 of Appendix I shows a 45 mph speed limit at the Queen Anne's Court and Brewers Neck intersection. Please revised to show the actual speed limit of 55 mph.
   - Correction of the speed limit is noted. However, the change doesn't impact analyses or proposed recommendations of the study.
9. Please provide a written narrative as to why a partial median U-turn cannot be used in place of a conventional signal. It appears to provide less conflict points and is considered safer for pedestrians. Copies of the worksheets are hard to read, and no written explanation of the results is provided. Please submit legible copies.

Phase 1 Use	No. of Units	Units
Single Family Detached Housing	400	dwelling units
Multi-Family Housing (Low-Rise)	285	dwelling units
Public Park	4	acres
Shopping Center	30	1000 sq. ft. GLA
Fast Food with Drive Thru	5	1000 sq. ft. GLA

   - Based on the width of the existing median and lane geometry, preliminary evaluations show that a loon, or bulb out of the pavement, would need to be provided to accommodate the U-turn movement of single unit and larger trucks. Based on AASHTO Guidelines, the minimum median width for U-turn crossovers to accommodate trucks varies between 49' to 64' (depending on truck size) without providing a loon, or bulb out, to accommodate the movement. Constructing a loon would require right of way acquisition on property not controlled/owned by the developer.

VDOT Comments:

1. We concur with the proposed trip generation rates as provided in the submitted study based on the following development schedule:

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The proposed uses have the potential to generate 11,017 daily, 656 AM peak hour, and 965PM peak hour trips on the roadway network. As outlined in the study, these trips are reduced by allowable pass-by and internal capture rates to represent new trips on the roadway network (8,962 daily, 548 AM peak, and 809 PM peak).

- Noted. The revised trip distribution provided in the TIA Memo dated June 25, 2021 uses the same methodology and equations as the previous analysis with the revised number of units resulting in a reduction of trips generated by the development. The new totals are 7,285 vpd, 415 vph in the AM peak and 677 vph in the PM peak. No new analysis was performed and the recommendations remain unchanged with the exception of item #2 below.

2. Although queuing is an existing issue for northbound left turns at the Benn's Church Blvd. and Turner Drive intersection, the development adds to the queues during the build scenarios. There are no recommended improvements at this intersection. We recommend providing improvements to mitigate the queuing situation, including the installation of a turn lane with sufficient storage to accommodate the queuing.
   - As discussed earlier in this memo, the development has minor increases in queuing for eastbound right and southbound left movements. These minor increases are less than a car length. No changes in storage based on development are recommended. There is additional storage required for the southbound right due to additional green time allocated to the northbound left to reduce queuing on this leg. The developer will increase the storage to 250' for the northbound left turn movement at Turner + 100' taper. This change would address an existing issue and allow for less green time in the future conditions which should reduce the queuing for the southbound right movement.
3. The construction of dual exiting left turns will likely impact the northbound U-turn lane at the main entrance, as the turn radius required will take up more of the median break. Reconstruction of this intersection shall include constructing the turn lanes to the minimum VDOT standards (100' storage x 100' taper).
   - Site plan will reflect the 100' storage and 100' taper.
4. Our previous recommendation of a 200' storage x 200' taper right turn lane was incorporated into the submitted traffic study. The submitted traffic improvement proffers, particularly Item 6(a)(i), still indicates using a 100' storage x 200' taper right turn lane.
   - Proffer has been adjusted to match traffic study recommendation.

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Recommendations

The following improvements are recommended to address impacts of the proposed development:

2026 Build:

- Construct northbound right turn lane (200' storage plus 200' taper) into right in/right out Proposed Secondary Entrance off of US 258/Rt 10 (Benns Church Boulevard).
- Construct northbound right turn lane (200' storage plus 200' taper) into Proposed Main Entrance off of US 258/ Rt 10 (Benns Church Boulevard).
- Lengthen southbound left turn lane to provide 200' storage plus 200' taper into Proposed Main Entrance off of US 258/Rt 10 (Benns Church Boulevard).
- Install traffic signal at intersection of US 258/Rt 10 (Benns Church Boulevard) and Proposed Main Entrance.
- Install signal infrastructure to provide a protected eastbound right-turn overlap at US 258/Rt 10 (Benns Church Boulevard) and Turner Drive.
- Construct a northbound turn lane with 250' storage and 100' taper at US 258/Rt 10 (Benns Church Boulevard) and Turner Drive.
- Install flashing yellow arrows for the northbound and southbound left turn lanes at the intersection of US 258/ Rt 10 (Benns Church Boulevard) at Canteberry Lane, Cypress Run Drive, Turner Drive and the Proposed Main Entrance to allow lead/lag operation.

2032 Build:

- Install signal infrastructure to provide a protected southbound right-turn overlap at US 258/Rt 10 (Benns Church Boulevard) and Turner Drive.

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Appendix
Revised Figures

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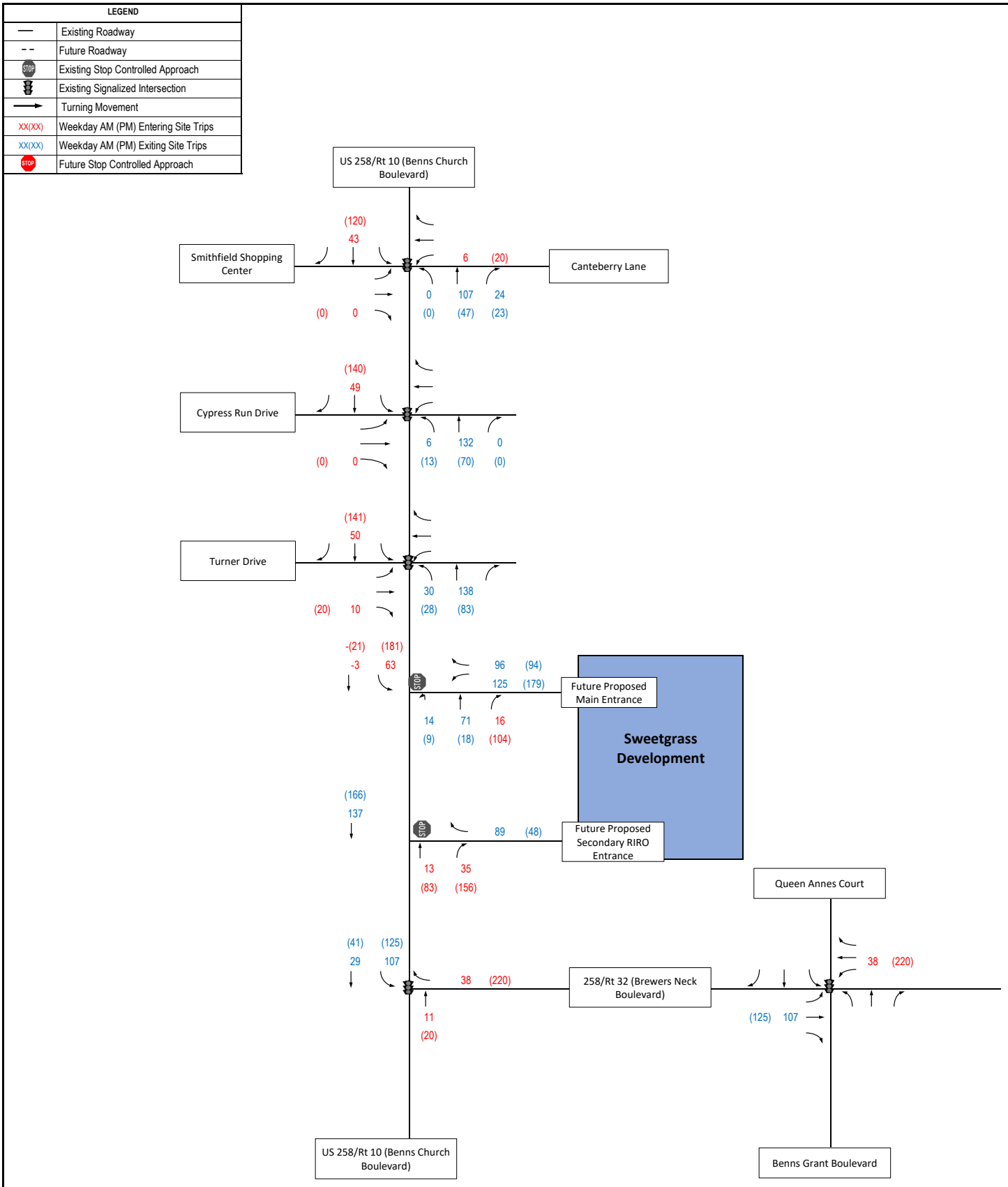

Figure 10
Combined AM and PM Peak Hour Site Trips

Sweetgrass
Isle of Wight County, VA

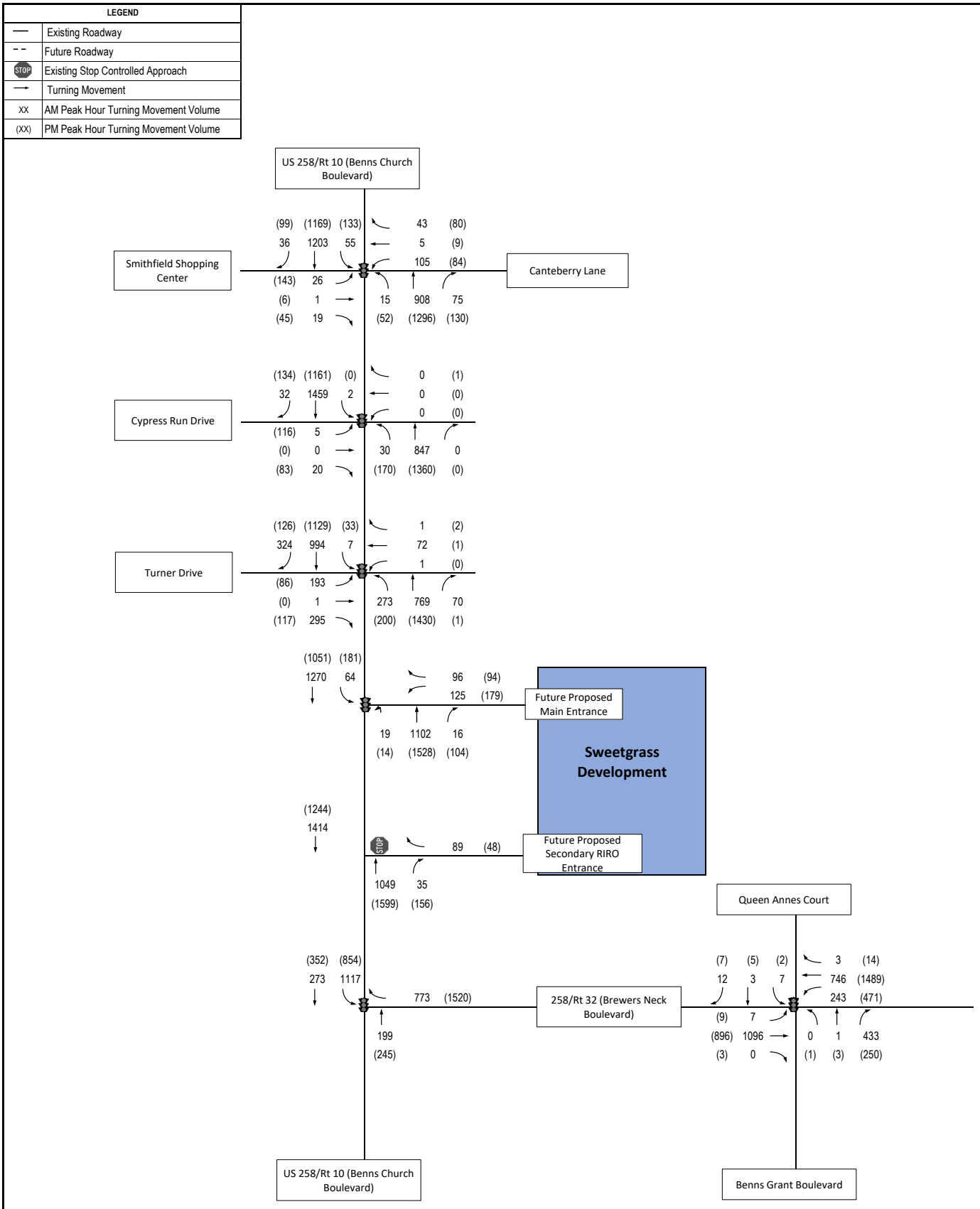

Figure 11
2026 Build AM and PM Peak Hour Traffic Volumes

Sweetgrass
Isle of Wight County, VA

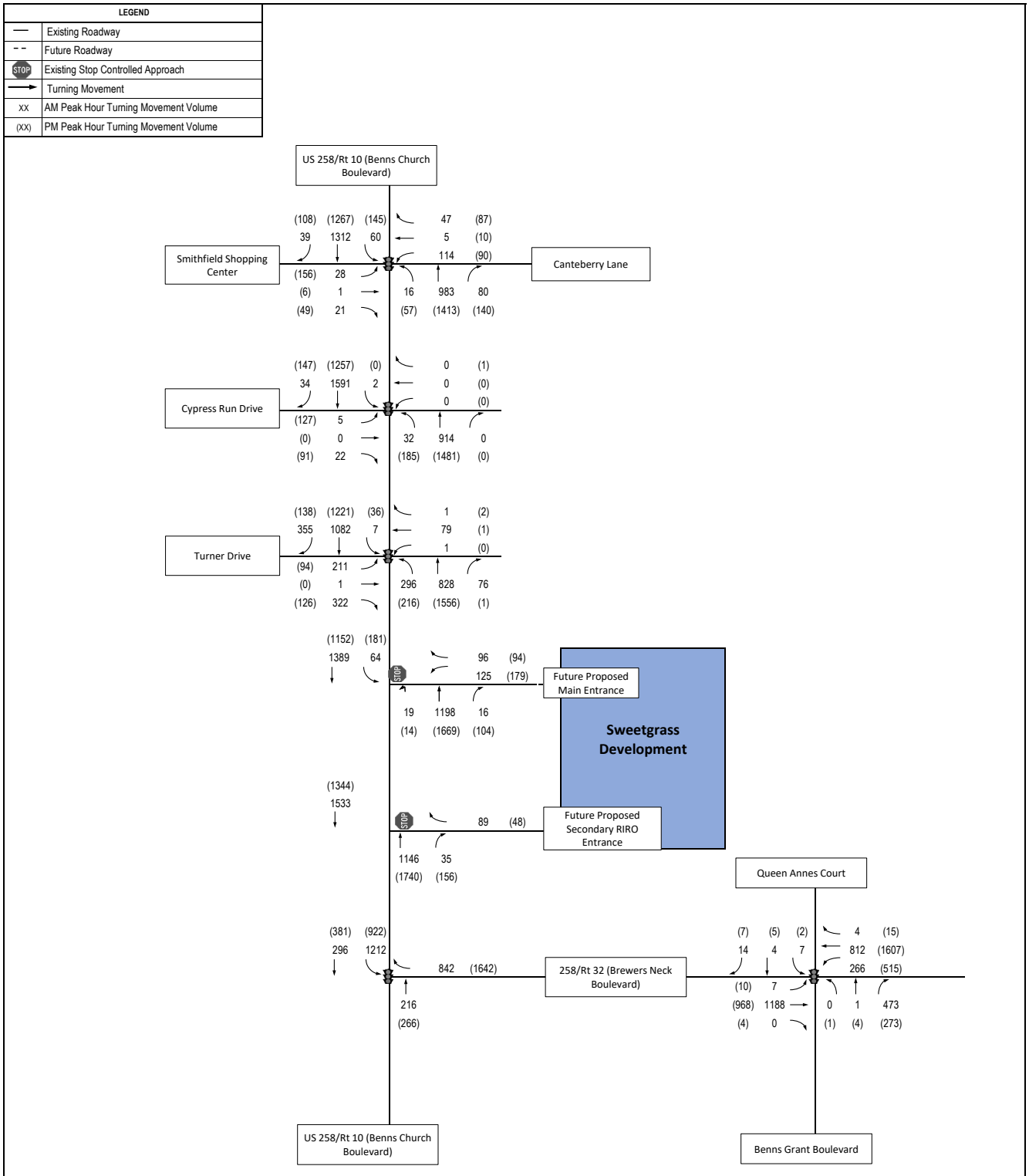

Figure 12
2032 Build AM and PM Peak Hour Traffic Volumes

Sweetgrass
Isle of Wight County, VA

Virginia Department of Transportation

TIA REGULATION SUBMITTAL INFORMATION SHEET

This sheet is a summary of information on a Chapter 527 submittal for entering into the LandTrack data base.

Submission Details

Project Name	Yeoman Tract TIA	Locality's Project ID	
VDOT District	Hampton Roads	Jurisdiction	Isle of Wight
Locality Contact		TIA Preparer	Lisa Simpson

Location

Route Number	Address	Principal Rte	ADT
10	14096 Benns Church Bl	☒	25000
		☐	
		☐	
		☐	
		☐	
		☐	
		☐	
		☐	
		☐	

Site Details

Submission Type	Zoning TIA Review		
Facility Type	Mixed Use - Commercial / Residential	Acreage	0
Residential Units	685	Commercial SqFt	35000
VPH (net)	809	VPD (net)	8962
Principal Parcel ID	32-01-009	Doubles Road VPD	NO
Other Parcel ID(s)			

Payment

Fee Waived	NO	Reason for Waiver	-- Select --
Payment Included	YES	Payment Type	Check
Check #		Check Holder	
Payment Amount		Received From	

Tracking

Date Received by Locality	Locality's Requested Due Date

Comments

December 2019

YEOMAN'S TRACT

Isle of Wight County, Virginia

Traffic Impact Study

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Appendix J	2032 Build Synchro Reports
Appendix K	Queue Reports
Appendix L	Signal Justification Report

Introduction and Summary

Purpose

Yeoman's Tract is an undeveloped parcel located at 14096 Benns Church Boulevard in Isle of Wight County. The parcel is on the northeast side US 258/Rt (Benns Church Boulevard) between US 258/Rt 32 (Brewers Neck Boulevard) and Canteberry Lane. Ryan Homes is planning a development of single family, and multi-family living residential units as well as, a public park, a shopping center and a fast food restaurant on this parcel. The developer is in the process of rezoning the property. This development is expected to be in full operation in 2026.

The site is estimated to generate 8,962 new daily trips with 548 trips in the morning peak hour and 809 trips during the evening peak hour.

The Virginia Department of Transportation (VDOT) and Isle of Wight County require a traffic study in compliance with Chapter 527 Regulations. A scoping meeting was held with VDOT and Isle of Wight County on April 23, 2018. A copy of the approved Pre-Scoping Form is included in Appendix A.

Executive Summary

In order to project the expected impact of the proposed development, trips were generated base on the Institute of Transportation Engineers Trip Generation Manual and distributed to the adjacent roadway network based on anticipated travel patterns. The development plan for the site consists of:

- 400 Single-family Detached Homes
- 285 Multi-family Detached Homes
- 4-acre Public Park
- 30,000 sf Shopping Center
- 5,000 sf Fast Food with Drive-Thru

This development plan is estimated to generate 8,962 new daily trips with 380 trips in the morning peak hour and 809 trips during the evening peak hour. Based on the results of the auxiliary lane, capacity and queuing analyses performed in this study, the following improvements are recommended:

<u>2018 Existing:</u>

- VDOT to construct eastbound right turn lane at US 258/Rt 10 (Benns Church Boulevard) and Turner Lane as planned.

2026 No Build:

- VDOT should review and optimize signal timings along the corridor, if necessary.

2026 Build:

- Construct northbound right turn lane (200' storage plus 200' taper) into right in/right out Proposed Secondary Entrance off of US 258/Rt 10 (Benns Church Boulevard).
- Construct northbound right turn lane (200' storage plus 200' taper) into Proposed Main Entrance off of US 258/Rt 10 (Benns Church Boulevard).
- Lengthen southbound left turn lane to provide 200' storage plus 200' taper into Proposed Main Entrance off of US 258/Rt 10 (Benns Church Boulevard).
- Install traffic signal at intersection of US 258/Rt 10 (Benns Church Boulevard) and Proposed Main Entrance.
- Install signal infrastructure to provide a protected eastbound right-turn overlap at US 258/Rt 10 (Benns Church Boulevard) and Turner Lane.
- Install flashing yellow arrows for the northbound and southbound left turn lanes at the intersection of US 258/Rt 10 (Benns Church Boulevard) at Canterberry Lane, Cypress Run Drive, Turner Drive and the Proposed Main Entrance to allow lead/lag operation.
- Optimize signal timings along the corridor.

2032 No Build:

- No additional improvements required.

2032 Build:

- Install signal infrastructure to provide a protected southbound right-turn overlap at US 258/Rt 10 (Benns Church Boulevard) and Turner Lane.
- Optimize signal timings along the corridor.

Background Information

The intersections included in the study area are:

- US 258/Rt 10 (Benns Church Boulevard) and US 258/Rt 32 (Brewers Neck Boulevard) – signalized;
- US 258/Rt 32 (Brewers Neck Boulevard) and Queen Annes Court – signalized;
- US 258/Rt 10 (Benns Church Boulevard) and Cypress Run Drive – signalized;

- US 258/Rt 10 (Benns Church Boulevard) and Turner Drive – signalized;
- US 258/Rt 10 (Benns Church Boulevard) and Canteberry Lane – signalized;
- US 258/Rt 10 (Benns Church Boulevard) and the Proposed Main Entrance (unsignalized); and,
- US 258/Rt 10 (Benns Church Boulevard) and the Proposed Secondary Entrance (unsignalized).

The vicinity map is shown in Figure 1. Figure 2 shows the site location, study intersections and the street network serving the site. Figure 3 shows the existing lane configurations at each of the intersections.

Study Area Roadways – Existing and Programmed Conditions

US 258/Rt 10 (Benns Church Boulevard)
Benns Church Boulevard is a four-lane divided Minor Arterial which traverses in a north-south direction west of the study site. The posted speed limit in the vicinity of the site is 45 miles per hour (mph). The corridor includes retail and residential land uses.

US 258/Rt 32 (Brewers Neck Boulevard)
Brewers Neck Boulevards is a four-lane divided Principal Arterial south of the study site. It has a posted speed limit of 55 mph. US 258/Rt 32 (Brewers Neck Boulevard) runs east-west and intersects with US 258/Rt 10 (Benns Church Boulevard). Westbound left turns from Brewers Neck Boulevard onto US 258/RT 10 (Benns Church Boulevard) are restricted. South of the site, the corridor contains residential and civic land uses.

Canteberry Lane
Canteberry Lane is a four-lane divided local roadway. It provides access to residential land uses as well as commercial developments. The posted speed limit is 25 mph.

Turner Drive
Turner Drive is a two-lane Major Collector. It provides access to commercial land uses and Smithfield Middle School. A project is planned for summer 2018 to construct an eastbound right turn lane at US 258/Rt 10 (Benns Church Boulevard). The posted speed limit is 40 mph.

Cypress Run Drive
Cypress Run Drive is a two-lane local road with turn lanes. It provides access to commercial land uses. The posted speed limit is 15 mph.

Existing Traffic Volumes

The project area is within the Isle of Wight County. Traffic counts taken by VDOT in 2017 show the following average daily traffic volumes:

- US 258/Rt 10 (Benns Church Boulevard) – 25,000 vpd
- US 258/Rt 32 (Brewers Neck Boulevard) – 24,000 vpd
- Canteberry Lane – 1,300 vpd
- Turner Drive – 3,100 vpd
- Cypress Run Drive – 880 vpd

Historical data shows little or no traffic growth on US 258/Rt 10 or US 258/Rt 32 in the last 10 years.

Peak hour turning movement counts were taken on Tuesday, April 24th, Wednesday, April 25th and Thursday, April 26th, 2018 from 6:00 am to 8:00 am and from 2:30pm to 5:30pm at each intersection in the study area. Detailed count data is provided in Appendix B.

Actual AM and PM peak hour volumes were used in the capacity analysis to model existing traffic conditions.

Existing Pedestrian and Transit Services

The roadways within project area have paved shoulders, but the roadways within the project area do not have pedestrian facilities.

Senior Services of Southeastern Virginia provides transit access along the corridor on I-Ride. The I-Ride is a fixed route system, open to all, that provides access around Smithfield and connects to Hampton Roads Transit (HRT) in Newport News. The closest stop is at the Red Oak Mobile Homes on Benns Church Boulevard. The bus routes are shown on Figure 4.

Proposed Development

The Yeoman's Tract development includes a mixture of residential and commercial uses. The conceptual plan includes:

- 400 Single-family Detached Homes
- 285 Multi-family Detached Homes
- 4-acre Public Park
- 30,000 sf Shopping Center
- 5,000 sf Fast Food with Drive-Thru

Figure 5 shows the proposed site plan.

Currently the property is zoned for Rural Agricultural Conservation (RAC). However, it is being rezoned for Mixed Use Areas (PD-MX). This requires an amendment to Isle of Wight's Comprehensive Plan. In the Comprehensive Plan, the corridor is proposed to be a combination of mixed use areas and business and employment centers. Figure 6 shows the land use zoning for the project.

Site Access

There are two (2) planned access points to the proposed site. One right in/right out entrance off US 258/Rt 10 (Benns Church Boulevard) and one full access intersection at the existing median opening on US 258/Rt 10 (Benns Church Boulevard) south of Turner Drive as shown in Figure 5.

Proposed Pedestrian and Transit Services

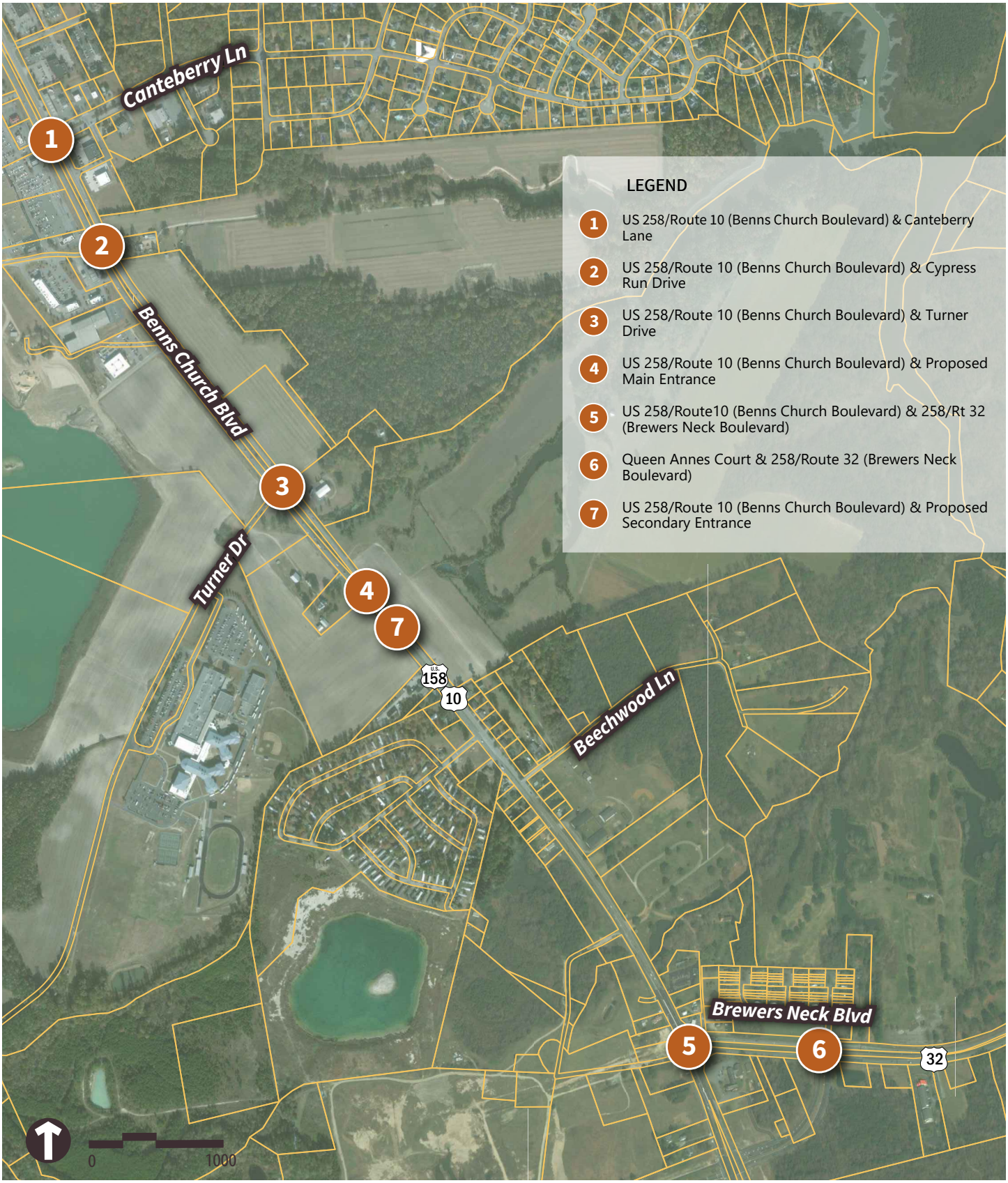
Multipurpose trails will be provided within the development and along the US 258/Rt 10 (Benns Church Boulevard) street frontage. There will be no changes to transit services.

SOURCE: BING, (c) 2015 Microsoft Corporation and its data suppliers.

FIGURE 1

Vicinity Map

Yeoman Tract Traffic Impact Study
Isle of Wight County, Virginia

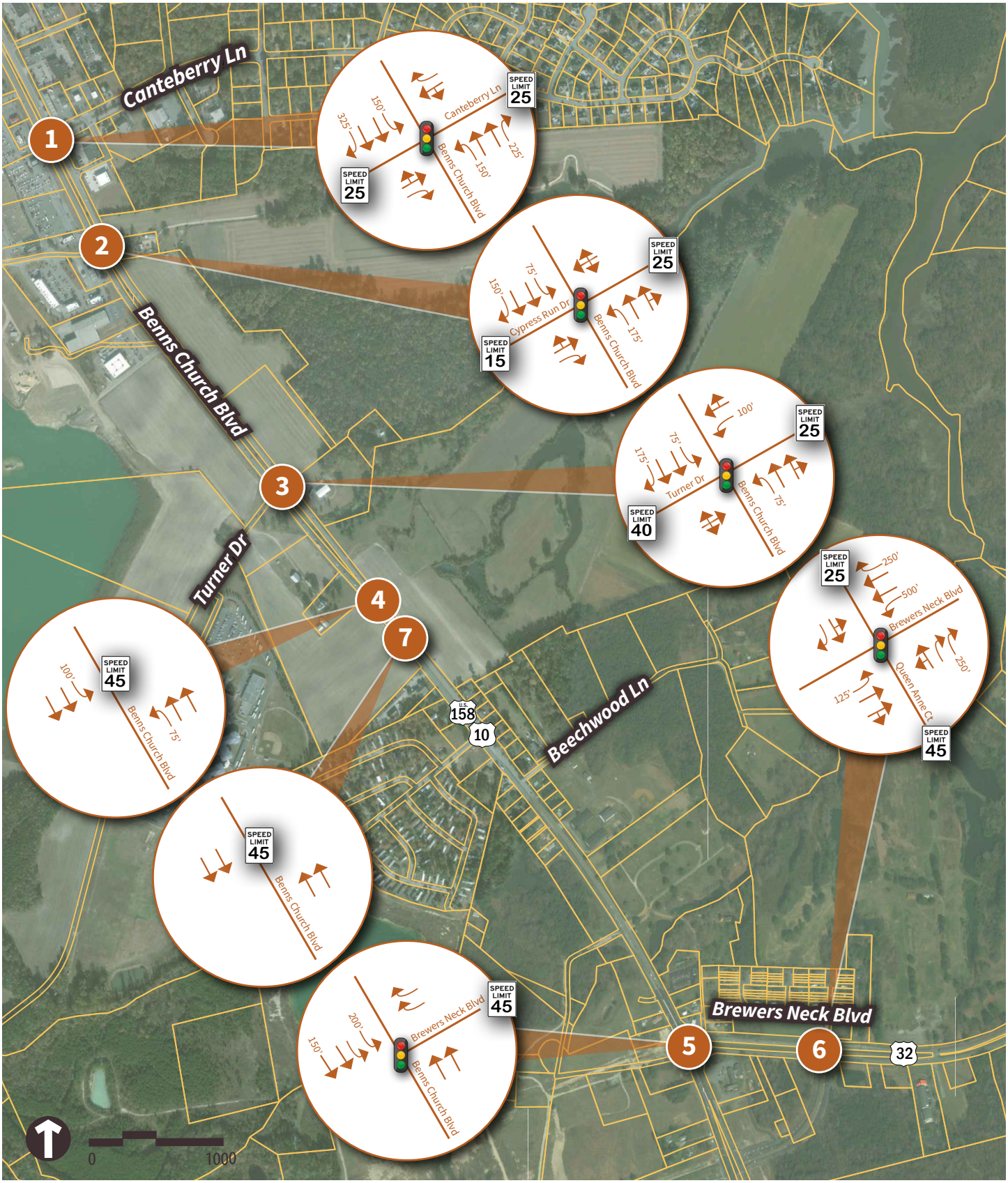


SOURCE: BING, (c) 2015 Microsoft Corporation and its data suppliers.

FIGURE 2

Study Area Map

Yeoman Tract Traffic Impact Study
Isle of Wight County, Virginia



SOURCE: BING, (c) 2015 Microsoft Corporation and its data suppliers.

FIGURE 3

Existing Lane Configuration

Yeoman Tract Traffic Impact Study
Isle of Wight County, Virginia

SOURCE: BING, (c) 2015 Microsoft Corporation and its data suppliers.

FIGURE 4

Bus Routes for Existing and No Build Conditions

Yeoman Tract Traffic Impact Study
Isle of Wight County, Virginia

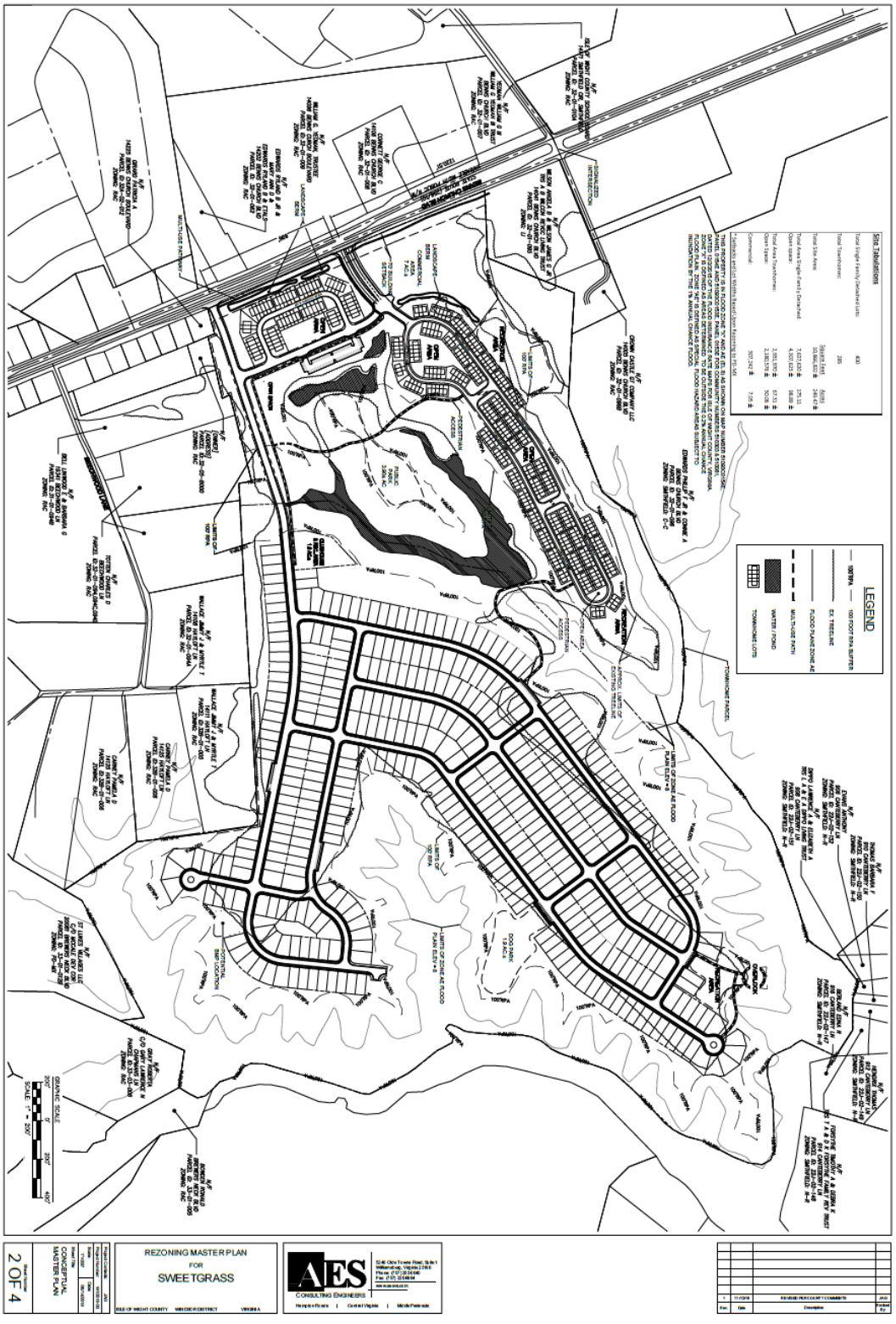


Figure 5. Conceptual Site Plan

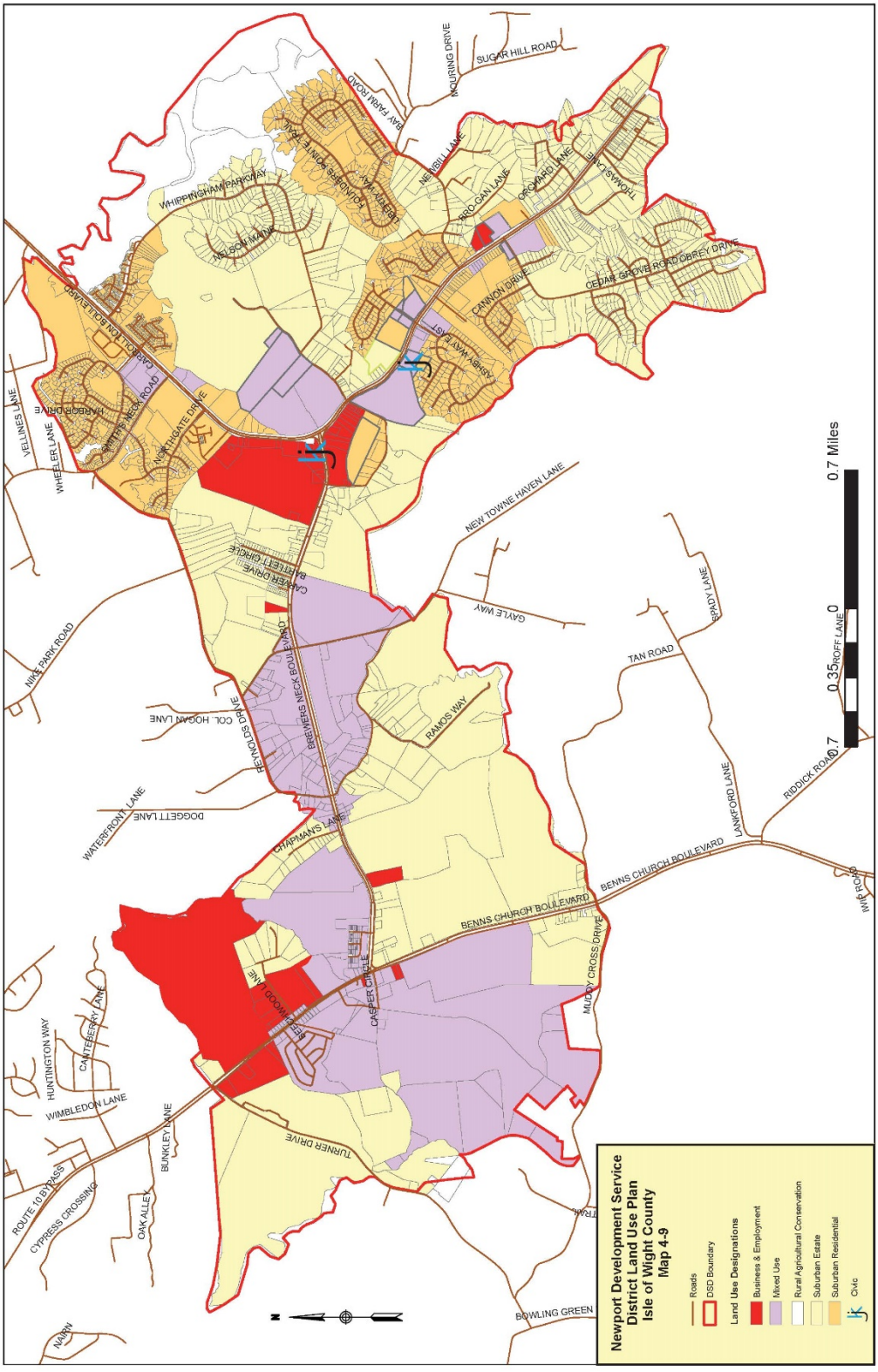


Figure 6. Existing and Proposed Land Use.

Analysis of Existing Conditions

Capacity Analysis

Capacity analysis results are expressed in terms of Level of Service (LOS). LOS is a qualitative measurement of traffic operations. It is translated from a measure of delay to drivers in units of time, seconds per vehicle. The Transportation Research Board's Highway Capacity Manual (HCM) defines six levels of service for intersections with LOS "A" representing operating conditions with minimal constraints on traffic movements and LOS "F" representing extremely congested operating conditions. LOS "D" is considered the threshold of acceptable operations for an overall intersection. Exhibit 18-4 of the HCM gives the criteria for signal controlled intersections, while HCM Exhibit 19-1 gives the criteria for unsignalized intersections.

HCM Exhibit 18-4: Level of Service Criteria

Signalized Level of Service	Signal Delay per Vehicle (sec/veh)
A	≤ 10.0
B	> 10.0 and ≤ 20.0
C	> 20.0 and ≤ 35.0
D	> 35.0 and ≤ 55.0
E	> 55.0 and ≤ 80.0
F	> 80.0

HCM Exhibit 19-1: Level of Service Criteria

Unsignalized Level of Service	Stopped Delay per Vehicle (sec/veh)
A	≤ 10.0
B	> 10.0 and ≤ 15.0
C	> 15.0 and ≤ 25.0
D	> 25.0 and ≤ 35.0
E	> 35.0 and ≤ 50.0
F	> 50.0

Synchro 9.1 was the software tool used in determining the delay, capacity and corresponding LOS of the study intersections. The delay and LOS information calculated in the analysis are presented in Table 1. Appendix C includes the Synchro reports for the 2018 Existing conditions.

Based on the existing conditions analyses, most of the corridor operates acceptably at LOS C or better, with the exception of the intersection of US 258/Rt 10 (Benns Church Boulevard) & Turner Drive. Currently, during morning peak hour, LOS at this intersection experiences an unacceptable LOS F with over 108 seconds per vehicle (sec/veh) in delay. Improvements are planned to improve operations at this intersection. Current plans were provided to VHB by VDOT and the future lane configuration was taken into the account in the future year No Build and Build analyses. Based on the planned improvements, no interim improvements are recommended.

Table 1. 2018 Existing Measures of Effectiveness.

Intersection and Approach	Control	2018 Existing	
		AM	PM
US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane	Signalized	**C (21.4 sec/veh)**	**C (25.4 sec/veh)**
Eastbound		C-28.2	D-43.3
Westbound		D-52.6	D-35
Northbound		B-13	C-23.4
Southbound		C-22.3	C-23.1
US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive	Signalized	**A (3 sec/veh)**	**A (9.2 sec/veh)**
Eastbound		B-11.5	C-33.9
Westbound		---	---
Northbound		A-2.8	A-7.4
Southbound		A-2.8	A-6.1
US 258/Rt 10 (Benns Church Boulevard) & Turner Drive	Signalized	**F (108.1 sec/veh)**	**B (16.9 sec/veh)**
Eastbound		F-131.1	C-26.3
Westbound		C-33.1	C-28.3
Northbound		D-40.8	B-15.6
Southbound		F-152.7	B-16.5
US 258/Rt 10 (Benns Church Boulevard) & Proposed Main Entrance	Unsignalized	**-**	**-**
Eastbound		---	---
Westbound		---	---
Northbound		---	---
Southbound		---	---
US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)	Signalized	**A (6.3 sec/veh)**	**A (7 sec/veh)**
Eastbound		---	---
Westbound		A-2.1	A-6.1
Northbound		C-21.8	C-20.6
Southbound		A-6.8	A-5
Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)	Signalized	**B (18.1 sec/veh)**	**B (18.1 sec/veh)**
Eastbound		C-26.3	C-28.1
Westbound		B-15.6	B-16.2
Northbound		A-4	A-4.6
Southbound		C-20.7	C-22.8

Analysis of Future No Build Conditions

Background Traffic

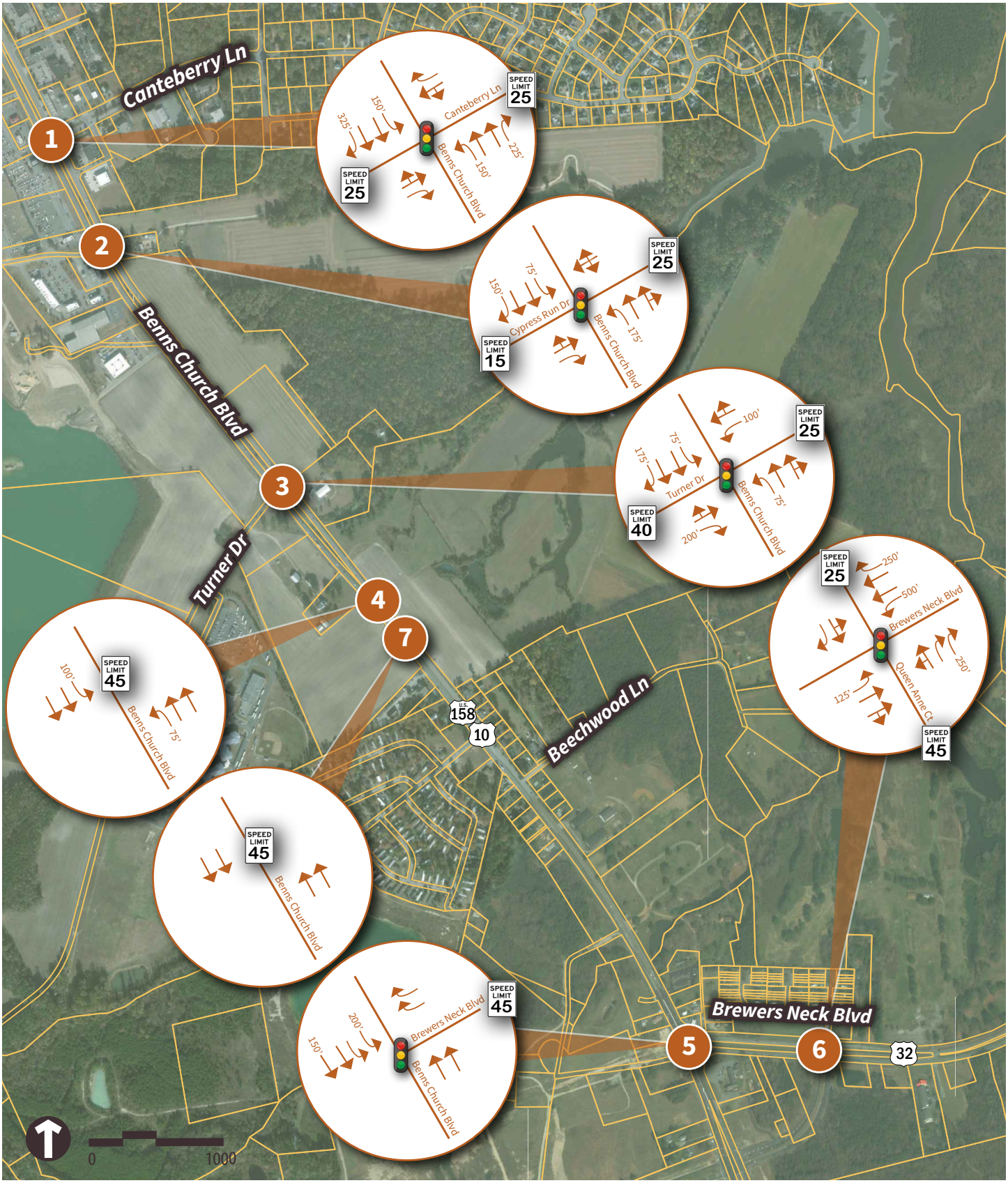
The 2018 am and pm peak hour volumes were projected to horizon years 2026 and 2032 using a growth factor approved by VDOT and Isle of Wight County. One and a half percent (1.5%) growth was used for all intersections within the study area.

Planned Transportation System Improvements

As mentioned earlier in the report, there are improvements planned for the intersection of US 258/Rt 10 (Benns Church Boulevard) & Turner Drive. An exclusive right turn lane, with 200 feet of storage, will be added to eastbound approach. Figure 7 shows the lane configurations for future 2026 and 2032 No Build and Build scenarios. The two (2) site entrances shown in Figure 7 apply to the Build conditions only. The lane configurations at all other intersections used in future conditions analyses are identical to those shown for the existing conditions.

Capacity Analysis

Synchro 9.1 was the software tool used in determining the delay, capacity and corresponding level of service of the study intersections using the projected traffic volumes. The results indicate that all intersections operate at an overall LOS C with the exception of US 258/Rt 10 (Benns Church Boulevard) & Turner Drive is expected to be E during morning peak hour with the constructed eastbound right turn lane. Tables 2 and 3 present the delay and LOS information calculated in the analysis for these conditions. Even though the overall LOS at the intersection of US 258/Rt 10 (Benns Church Boulevard) & Turner Drive is expected to be E during morning peak hour, the eastbound approach will continue to operate at unacceptable LOS F with almost 96 sec/veh in delay in 2026. With signal optimization the delay to the eastbound movement is reduced to 74 seconds (LOS F) in the 2032 AM No Build condition, however the northbound and southbound movements are reduced to a LOS E. Figures 8 and 9 show the projected traffic volumes for 2026 and 2032 No Build Conditions, respectively. The network signal cycle lengths and splits were optimized for the 2026 and 2032 No Build analyses. Appendix D includes the Synchro reports for the 2026 No Build conditions and Appendix E includes the Synchro reports for the 2032 No Build conditions.



SOURCE: BING, (c) 2015 Microsoft Corporation and its data suppliers.

FIGURE 7

2026 and 2032 Future No Build Lane Configuration

Yeoman Tract Traffic Impact Study
Isle of Wight County, Virginia

LEGEND	
——	Existing Roadway
- -	Future Roadway
STOP	Existing Stop Controlled Approach
⟶	Turning Movement
XX	AM Peak Hour Turning Movement Volume
(XX)	PM Peak Hour Turning Movement Volume

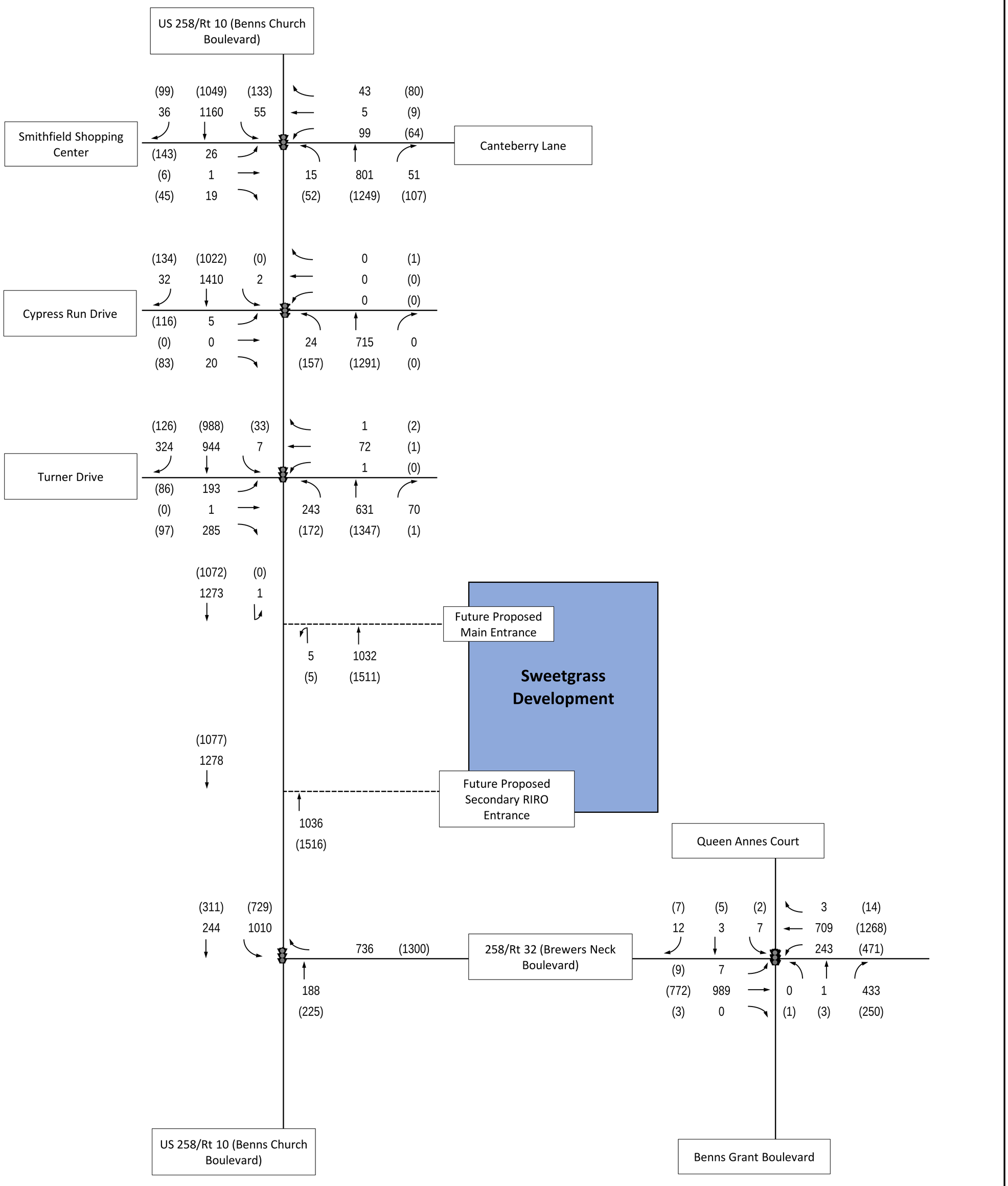


Figure 8
2026 No Build AM and PM Peak Hour Traffic Volumes

Sweetgrass
Isle of Wight County, VA

LEGEND	
——	Existing Roadway
- -	Future Roadway
STOP	Existing Stop Controlled Approach
→	Turning Movement
XX	AM Peak Hour Turning Movement Volume
(XX)	PM Peak Hour Turning Movement Volume

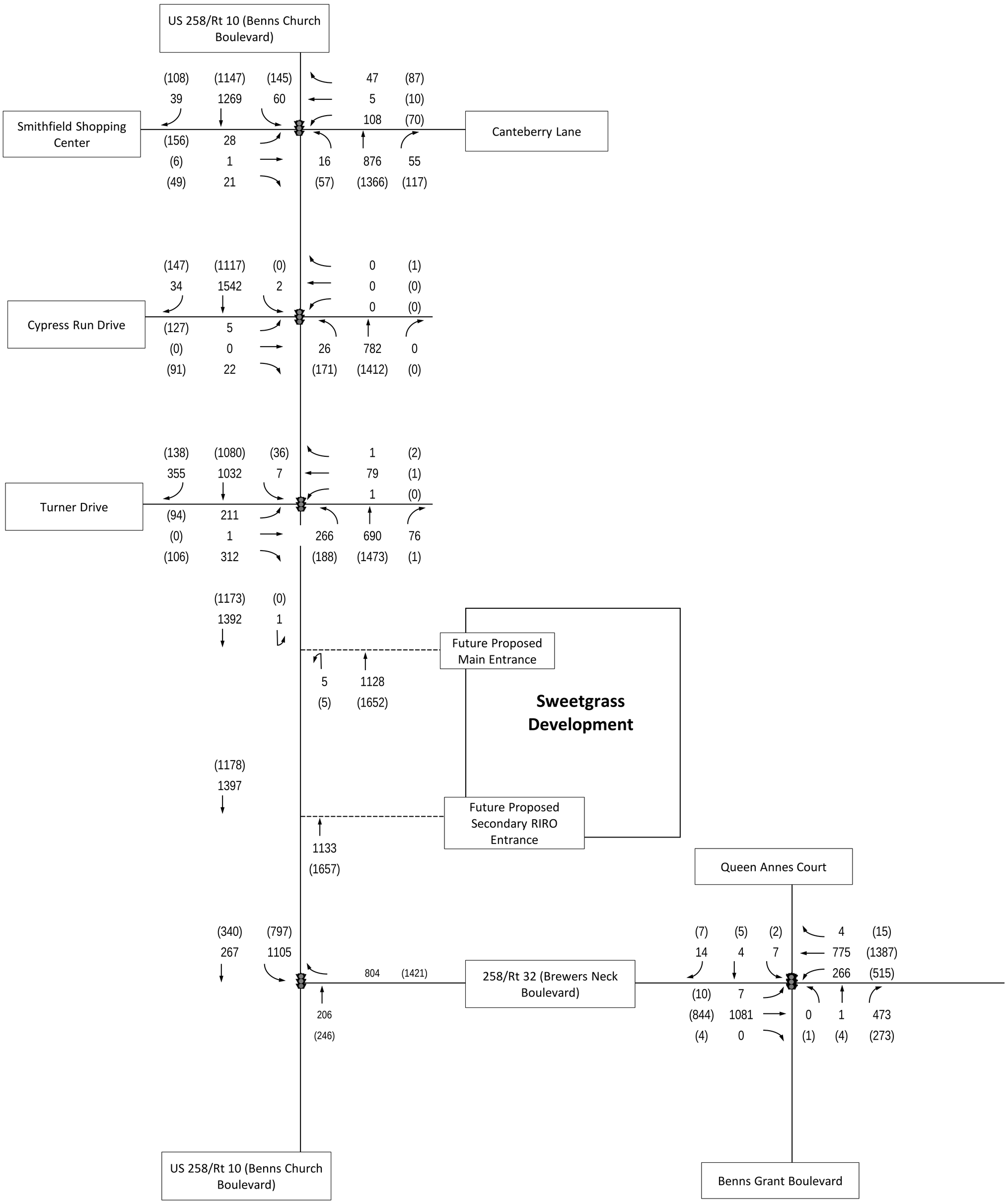


Figure 9
2032 No Build AM and PM Peak Hour Traffic Volumes

Sweetgrass, Isle of Wight County, VA

Table 2. 2026 No-Build Measures of Effectiveness.

Intersection and Approach	Control	2026 No-Build	
		AM	PM
US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane	Signalized	**C (25.3 sec/veh)**	**C (31.3 sec/veh)**
Eastbound		C-28.5	D-43.2
Westbound		E-57	D-35.6
Northbound		B-14.2	C-28
Southbound		C-27.5	C-32.4
US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive	Signalized	**A (4.8 sec/veh)**	**A (9.9 sec/veh)**
Eastbound		B-12.5	C-34.4
Westbound		---	---
Northbound		A-3.1	A-8.9
Southbound		A-5.4	A-5.8
US 258/Rt 10 (Benns Church Boulevard) & Turner Drive	Signalized	**E (58.4 sec/veh)**	**B (18.4 sec/veh)**
Eastbound		F-95.9	C-26.8
Westbound		D-38.6	C-26.7
Northbound		D-47.4	B-17.8
Southbound		D-54.5	B-17.5
US 258/Rt 10 (Benns Church Boulevard) & Proposed Main Entrance	Unsignalized	**-**	**-**
Eastbound		---	---
Westbound		---	---
Northbound		---	---
Southbound		---	---
US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)	Signalized	**A (7.1 sec/veh)**	**A (8.4 sec/veh)**
Eastbound		---	---
Westbound		A-3.4	A-8.5
Northbound		C-24	C-23.7
Southbound		A-7.1	A-4.8
Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)	Signalized	**B (20 sec/veh)**	**B (19.9 sec/veh)**
Eastbound		C-31.1	C-28.6
Westbound		B-15.7	B-18.8
Northbound		A-3.7	A-4.4
Southbound		C-20.7	C-23.2

Table 3. 2032 No Build Measures of Effectiveness.

Intersection and Approach	Control	2032 No-Build	
		AM	PM
US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane	Signalized	**C (26.4 sec/veh)**	**D (36.9 sec/veh)**
Eastbound		D-44.3	D-43
Westbound		E-70.4	D-36.4
Northbound		B-15.3	D-35.2
Southbound		C-26.8	D-37.9
US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive	Signalized	**A (2.8 sec/veh)**	**B (11.1 sec/veh)**
Eastbound		B-16.8	D-35.8
Westbound		---	---
Northbound		A-2.2	B-10.9
Southbound		A-2.7	A-5.8
US 258/Rt 10 (Benns Church Boulevard) & Turner Drive	Signalized	**E (73.9 sec/veh)**	**C (22.2 sec/veh)**
Eastbound		F-88.1	C-28.8
Westbound		D-45.2	C-29.7
Northbound		E-71.5	C-21.4
Southbound		E-73.4	C-21.7
US 258/Rt 10 (Benns Church Boulevard) & Proposed Main Entrance	Unsignalized	**-**	**-**
Eastbound		---	---
Westbound		---	---
Northbound		---	---
Southbound		---	---
US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)	Signalized	**A (9.5 sec/veh)**	**A (9.8 sec/veh)**
Eastbound		---	---
Westbound		A-7.9	B-10.9
Northbound		B-19.2	C-25.8
Southbound		A-9.1	A-4.7
Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)	Signalized	**C (21.6 sec/veh)**	**C (26.6 sec/veh)**
Eastbound		C-29	C-31
Westbound		B-19.5	C-28.6
Northbound		A-8.1	A-4.5
Southbound		C-25.9	C-24.9

Analysis of Build Conditions

Trip Generation

Traffic that may be generated by the proposed development was established using equations and rates available through the Institute of Transportation Engineer's (ITE) Trip Generation Manual, 10th Edition.

Trip generation for the site was prepared for each individual land use. ITE provides information for single-family detached housing (Land Use 210), low-rise multi-family housing (Land Use 220), public park (Land Use 411), shopping center (Land Use Code 820) and fast food with drive-through (Land Use 934).

The types of commercial development are unknown at this time, so shopping center was used. Pass-by trips to/from fast food restaurant were considered at a 49% rate and to/from the shopping center were considered at a 34% rate. Summary of all future site trips are presented in Table 4 below.

Table 4. Trip Generation.

Land Use	ITE Code	Size	Units	Daily	AM Peak Hour			PM Peak Hour		
					Enter	Exit	Total	Enter	Exit	Total
Conceptual Site Plan										
Single-Family Detached Housing	210	400	Dwelling Units	3,776	74	222	296	249	147	396
Multifamily Housing (Low-Rise)	220	285	Dwelling Units	2,144	30	101	131	101	59	160
Public Park	411	4	Acres	91	0	0	0	13	10	23
Shopping Center	820	30	1000 Sq. Ft. GLA	2,651	17	11	28	107	116	223
Fast Food with Drive-Thru	934	5	1000 Sq. Ft. GLA	2,355	102	99	201	85	78	163
Subtotal				**11,017**	**223**	**433**	**656**	**555**	**410**	**965**
Pass-by Trips (Fast Food only)	49%		% Pass-by	1,154	50	49	98	42	38	80
Pass-by Trips (Shopping Center)	34%		% Pass-by	901	6	4	10	36	39	76
Total New Trips				**8,962**	**167**	**380**	**548**	**477**	**333**	**809**

Reference: Trip Generation, 10th Edition, Institute of Transportation Engineers, Washington, DC. 2017.
Note: Used highest total between average rate and fitted curve unless R2<0.75

The site is estimated to generate 8,962 new daily trips with 548 trips in the morning peak hour and 809 trips during the evening peak hour.

Trip Distribution

Trip distribution was based on the existing traffic patterns and the understanding of the land uses within the surrounding area.

The site traffic distribution for the residential uses assumes 70% will enter from and exit to the south during the AM peak and 60% will enter from and exit to the south during the PM peak. For the shopping and fast-food used it is assumed that 55% will enter from and exit to the

south during AM peak hour and 55% will enter from and exit to the south during PM peak hour. Trip distribution percentages and traffic volumes for each land use are shown in Appendix F. Combined AM and PM peak hour site trips for all land uses are shown on Figure 10.

The resulting 2026 Build AM and PM traffic volumes are provided in Figure 11, while the 2032 Build AM and PM traffic volumes are provided in Figure 12.

LEGEND	
——	Existing Roadway
- -	Future Roadway
STOP	Existing Stop Controlled Approach
	Existing Signalized Intersection
⟶	Turning Movement
XX(XX)	Weekday AM (PM) Entering Site Trips
XX(XX)	Weekday AM (PM) Exiting Site Trips
STOP	Future Stop Controlled Approach

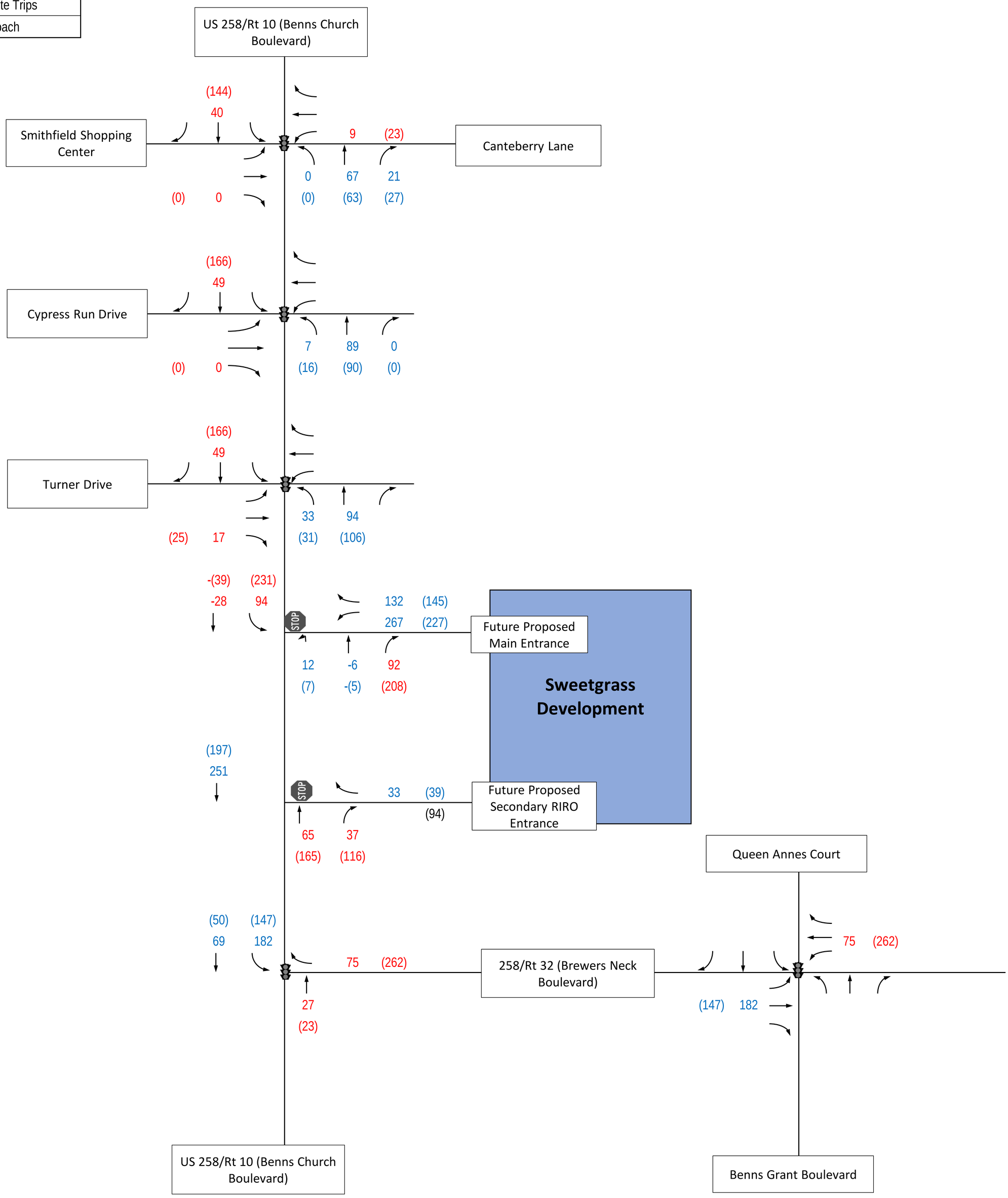


Figure 10
Combined AM and PM Peak Hour Site Trips

Sweetgrass
Isle of Wight County, VA

LEGEND	
——	Existing Roadway
- -	Future Roadway
STOP	Existing Stop Controlled Approach
→	Turning Movement
XX	AM Peak Hour Turning Movement Volume
(XX)	PM Peak Hour Turning Movement Volume

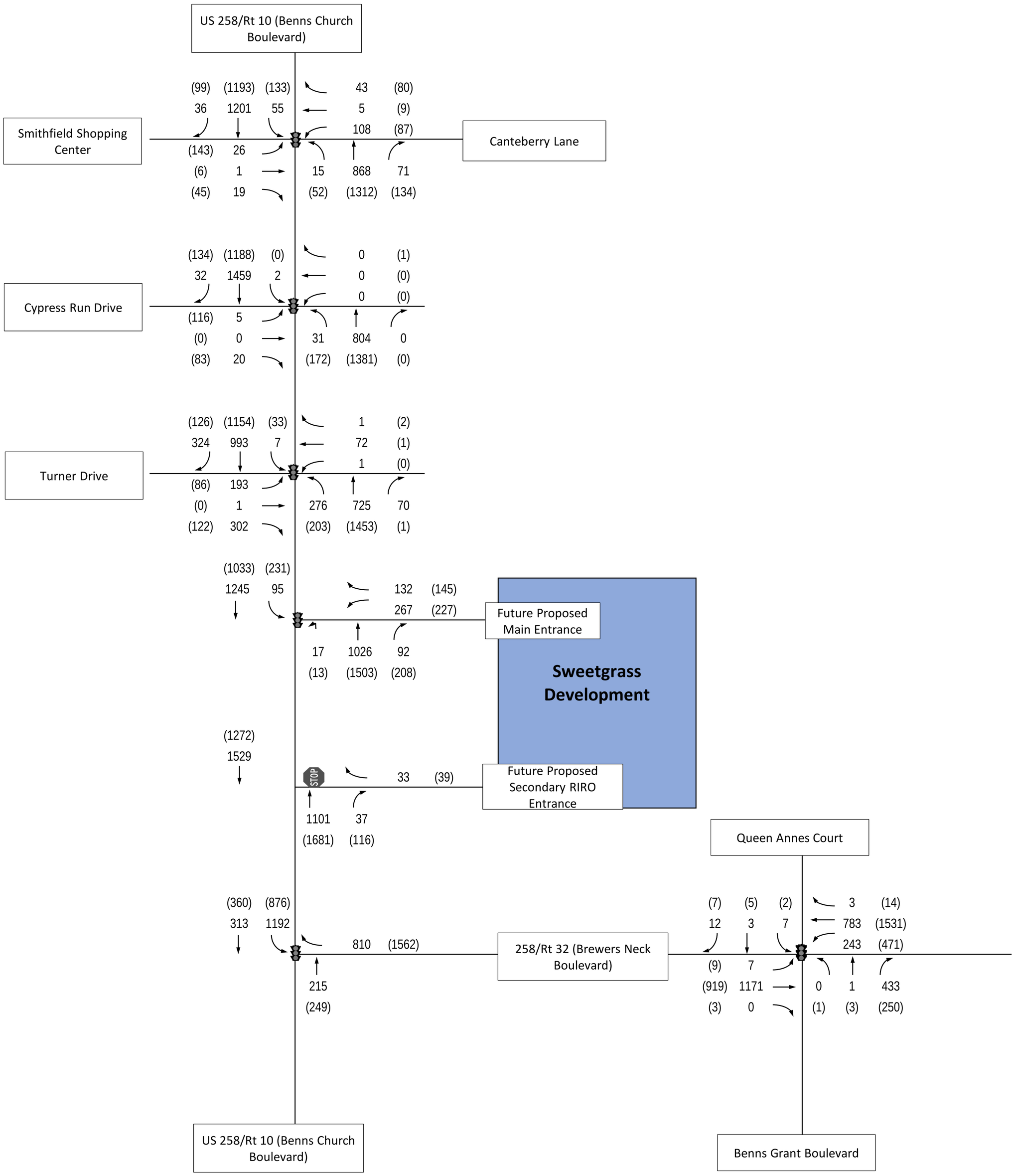


Figure 11
2026 Build AM and PM Peak Hour Traffic Volumes

Sweetgrass, Isle of Wight County, VA

LEGEND	
—	Existing Roadway
- -	Future Roadway
STOP	Existing Stop Controlled Approach
→	Turning Movement
XX	AM Peak Hour Turning Movement Volume
(XX)	PM Peak Hour Turning Movement Volume

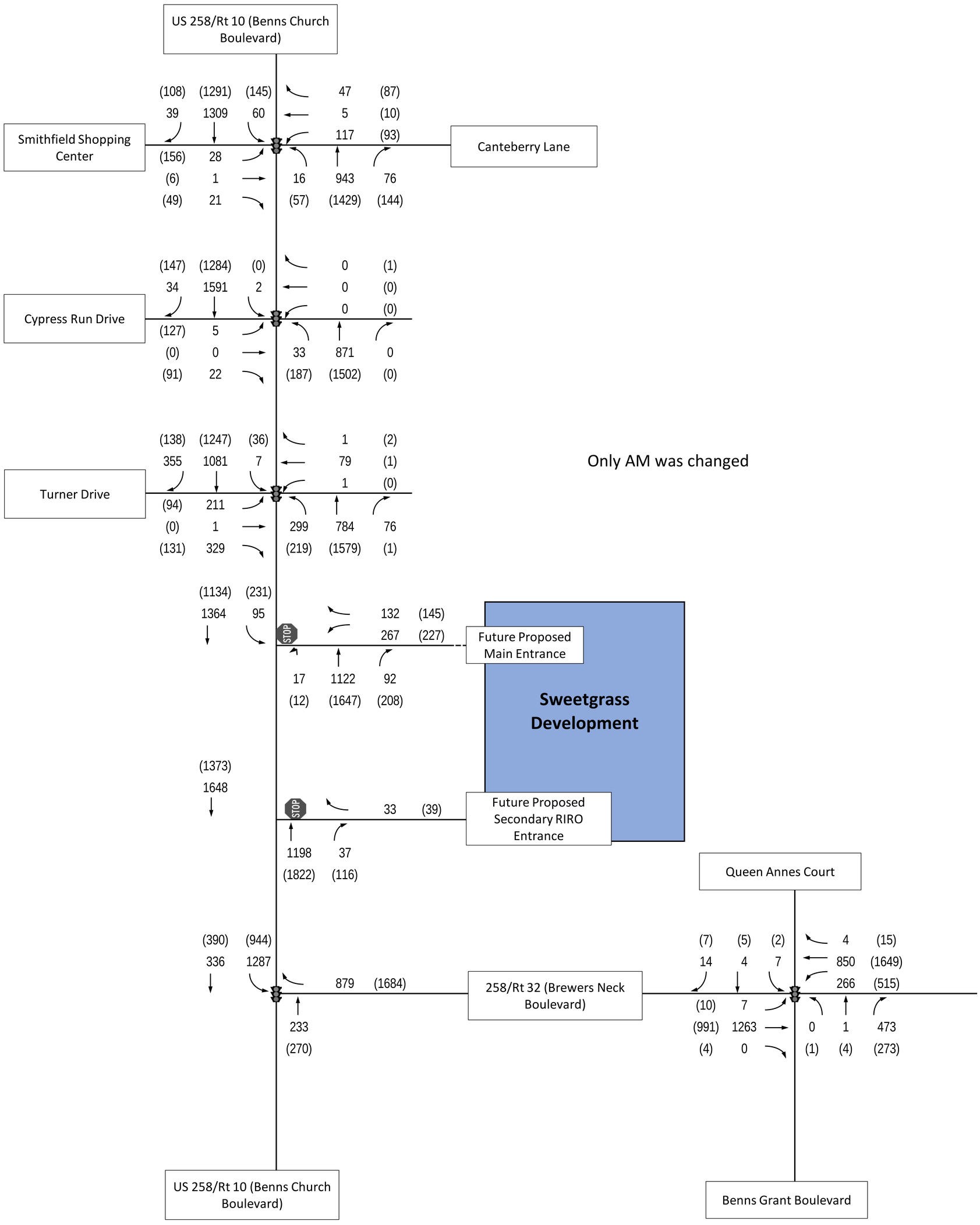


Figure 12
2032 Build AM and PM Peak Hour Traffic Volumes

Sweetgrass,
Isle of Wight County, VA

Auxiliary Lanes

There are two (2) entrances into the proposed site. The future Proposed Main Entrance allows all turning movements on to and off of US 258/Rt.10 (Benns Church Boulevard). The Proposed Secondary Entrance is right-in/right-out and allows limited ingress and egress from the development. Based on VDOT Road Design Manual and forecasted volumes, a 200-foot right turn lane with 200-foot taper is required for the northbound right turn lane at the Proposed Main Entrance. In addition, the southbound left turn lane at this intersection should be lengthened to provide 200' storage and a 200-foot taper. At the Proposed Secondary Entrance, a 200-foot right turn lane with a 200' taper is required. For the purpose of the Build analysis, the proposed left turn and right turn lanes at each entrance were taken into account. More detailed turn lane warrant analysis is shown in Appendix G.

Signal Warrant Analysis

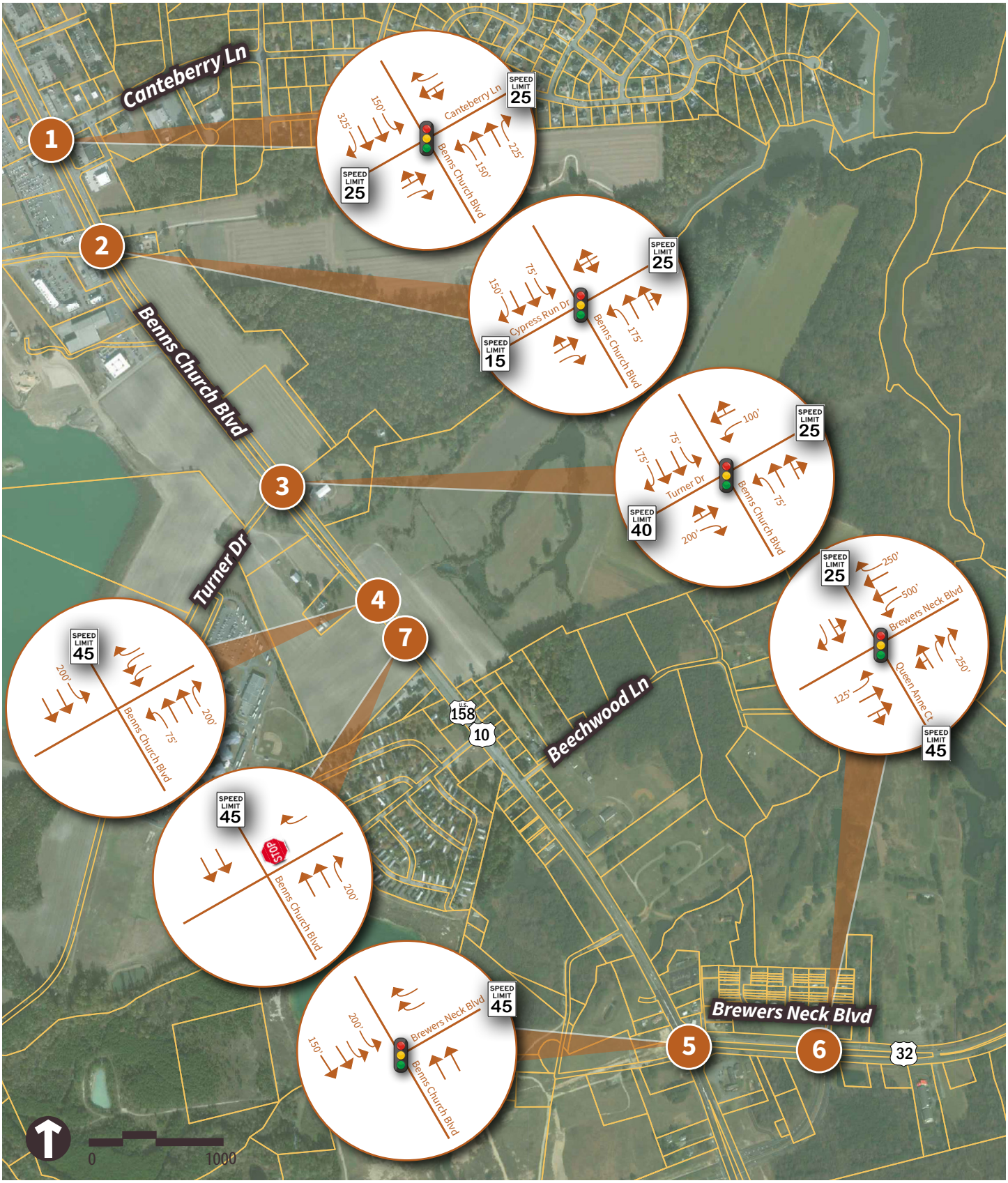
A Manual of Uniform Traffic Control Devices (MUTCD) signal warrant screening was performed based on projected volumes at the intersection of US 258 /Rt.10 (Benns Church Boulevard) and the future proposed main entrance to the development. Chapter 4C (Traffic Control Signal Needs Studies) of the MUTCD identifies nine (9) warrants. All nine warrants were analyzed as a part of this study and detailed results are presented in Appendix H.

The MUTCD allows some, or all, right turns to be combined with the left turns for the purpose of conducting the signal warrants. Engineering judgement should be applied based on the level of conflict and delay expected for the right turning traffic entering the roadway network.

Analysis was conducted based on the projected volumes and current posted speed limit on US 258/Rt 10 (Benns Church Boulevard) of 45 mph. Based on the available data and the signal warrant requirements included in the Virginia Supplement to the MUTCD, the analysis indicates that the eight-hour, four-hour, and peak hour vehicular volume warrants (Warrants 1, 2 and 3) were satisfied.

A signal is recommended at the subject intersection at full build out. A Signal Justification Report (SJR) has been generated and has been submitted to VDOT for review and approval.

For the purpose of this study, a signal at the Proposed Main Entrance and US 258/Rt.10 (Benns Church Boulevard) was assumed and incorporated into all Build scenarios.



SOURCE: BING, (c) 2015 Microsoft Corporation and its data suppliers.

FIGURE 13

2026 and 2032 Future Build Lane Configuration

Yeoman Tract Traffic Impact Study
Isle of Wight County, Virginia

Capacity Analysis

The 2026 and 2032 Build Condition volumes were analyzed using the Synchro 9.1 software. The network signal timings were optimized along with offsets and cycle lengths for the 2026 and 2032 Build analyses. Appendix I includes the Synchro reports for the 2026 Build conditions and Appendix J includes the Synchro reports for the 2032 Build conditions.

There are two (2) entrances into the proposed site. The Proposed Main Entrance is a full entrance on US 258/Rt 10 (Benns Church Boulevard). The Proposed Secondary Entrance is a right-in/right out entrance onto US 258/Rt 10 (Benns Church Boulevard) south of the Proposed Main Entrance.

At the intersection at the Proposed Main Entrance, signal control was assumed for the purpose of this analysis. In addition, the lengthened left turn lane on southbound approach with 200-foot storage and 200-foot taper along as well as the proposed 200-foot right turn storage lane and 200-foot taper on the northbound approach were also included. At the Proposed Secondary Entrance, stop control was assumed on the westbound approach and a 200-foot right turn storage lane with 200-foot taper on the northbound approach was included. Projected LOS and delay results at each intersection for 2026 and 2032 Build scenario are presented in Table 5 and 6 respectively.

Table 5. 2026 Build Measures of Effectiveness.

Intersection and Approach	Control	2026 Build	
		AM	PM
US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane	Signalized	**C (32.1 sec/veh)**	**C (32.1 sec/veh)**
Eastbound		D-45.3	D-45.3
Westbound		D-38.2	D-38.2
Northbound		C-33.3	C-33.3
Southbound		C-28.4	C-28.4
US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive	Signalized	**A (9.3 sec/veh)**	**A (9.3 sec/veh)**
Eastbound		D-36.6	D-36.6
Westbound		---	---
Northbound		A-9.4	A-9.4
Southbound		A-5.1	A-5.1
US 258/Rt 10 (Benns Church Boulevard) & Turner Drive	Signalized	**C (21.1 sec/veh)**	**C (21.1 sec/veh)**
Eastbound		B-19.6	B-19.6
Westbound		C-22.7	C-22.7
Northbound		C-20.3	C-20.3
Southbound		C-22.5	C-22.5
US 258/Rt 10 (Benns Church Boulevard) & Proposed Main Entrance	Signalized	**B (15.1 sec/veh)**	**B (15.1 sec/veh)**
Eastbound		---	---
Westbound		C-29.2	C-29.2
Northbound		B-17.8	B-17.8
Southbound		A-7.4	A-7.4
US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)	Signalized	**B (12.7 sec/veh)**	**B (12.7 sec/veh)**
Eastbound		---	---
Westbound		B-15.5	B-15.5
Northbound		D-36.7	D-36.7
Southbound		A-4.2	A-4.2
Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)	Signalized	**B (19.9 sec/veh)**	**B (19.9 sec/veh)**
Eastbound		C-33.6	C-33.6
Westbound		B-15.5	B-15.5
Northbound		A-3.7	A-3.7
Southbound		C-26.1	C-26.1
US 258/Rt 10 (Benns Church Boulevard) & Proposed Secondary Entrance	Unsignalized	**B (13.8 sec/veh)**	**C (20.5 sec/veh)**
Eastbound		---	---
Westbound		B-13.8	C-20.5
Northbound		A-0	A-0
Southbound		A-0	A-0

Table 6. 2032 Build Measures of Effectiveness.

Intersection and Approach	Control	2032 Build	
		AM	PM
US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane	Signalized	**B (18.5 sec/veh)**	**D (42.5 sec/veh)**
Eastbound		D-38.8	D-49.5
Westbound		D-51.7	D-39.6
Northbound		B-14.7	D-49.6
Southbound		B-16.6	C-34.5
US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive	Signalized	**A (2.4 sec/veh)**	**A (8.1 sec/veh)**
Eastbound		B-11.2	D-45.2
Westbound		---	---
Northbound		A-1.2	A-7.3
Southbound		A-2.9	A-3.5
US 258/Rt 10 (Benns Church Boulevard) & Turner Drive	Signalized	**C (32.1 sec/veh)**	**A (9.1 sec/veh)**
Eastbound		C-30.7	B-19.7
Westbound		D-43.1	C-26.3
Northbound		C-29.8	A-9.4
Southbound		C-33.9	A-7
US 258/Rt 10 (Benns Church Boulevard) & Proposed Main Entrance	Signalized	**B (11.6 sec/veh)**	**B (16.9 sec/veh)**
Eastbound		---	---
Westbound		C-24.4	C-33.6
Northbound		B-13.5	B-19.3
Southbound		A-6.6	A-8.9
US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)	Signalized	**A (9.5 sec/veh)**	**B (19 sec/veh)**
Eastbound		---	---
Westbound		A-8.1	C-28.1
Northbound		C-24	C-33.6
Southbound		A-8.2	A-4.6
Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)	Signalized	**C (21.1 sec/veh)**	**C (21.4 sec/veh)**
Eastbound		B-10.1	D-35.5
Westbound		D-39.8	B-17.1
Northbound		A-5.9	A-3.7
Southbound		C-27.8	C-26.1
US 258/Rt 10 (Benns Church Boulevard) & Proposed Secondary Entrance	Unsignalized	**B (14.6 sec/veh)**	**C (22.8 sec/veh)**
Eastbound		---	---
Westbound		B-14.6	C-22.8
Northbound		A-0	A-0
Southbound		A-0	A-0

All the intersections in the study area are expected to continue to operate under the acceptable LOS D or better under both 2026 and 2032 Build Conditions.

The network signal cycle lengths and splits were optimized for the 2026 and 2032 Build analyses, including a change to provide a protected/permissive eastbound left at the intersection of US 258/Rt 10 (Benns Church Boulevard) & Turner Drive. A flashing yellow arrow was included in the signal design for the northbound and southbound lefts to improve the efficiency of the intersection operation. Additional improvements to this intersection include an eastbound right turn overlap with the northbound left movement in the 2026 build condition and a southbound right turn overlap with the eastbound left movement in 2032 AM condition. With these improvements, the eastbound approach at the intersection of US 258/Rt 10 (Benns Church Boulevard) & Turner Drive is expected to operate at LOS C under 2026 Build Conditions 2032 during the morning peak. A LOS B I anticipated in the eastbound under 2032 Build Conditions during the evening peak hour. This is better than the expected No Build conditions.

Queue Analysis

SimTraffic was used to estimate the queues at the six (6) signalized intersections included in the project area. SimTraffic uses a hot spot, 20 feet in length, at the top of each lane or approach just prior to the adjacent intersection to help to identify possible queuing or spillback issues on adjacent intersections. If a vehicle is in that hot spot and is traveling less than 10 mph, it is assumed to be queued. The queuing and blocking reports are a result of the average of 10 runs.

Table 7 presents the estimated 95th percentile queue lengths for the 2018 Existing, 2026 No Build, 2026 Build, 2032 No Build and 2032 Build PM peak. The full Synchro queue reports can be found in Appendix K. Results and observations of queuing simulations show that most of the intersections are expected to queue within their storage capacities. However, the analysis of 2018 Existing Conditions has shown that at the intersection of US 258/Rt 10 (Benns Church Boulevard) & Turner Drive, the left turn queue on the northbound approach is currently 207 feet during morning peak hour and 148 feet during evening peak hour, exceeding existing storage capacity of 75 feet. Since this queuing issue is an existing condition and not a result of the proposed development, no changes to the existing storage lengths are proposed at this intersection.

The southbound right at the intersection of US 258/Rt 10 (Benns Church Boulevard) & Turner Drive is also anticipated to exceed the existing storage length in the 2032 AM peak hour. However, this movement is anticipated to operate at a LOS B with just over 10 seconds of delay. Therefore, it is anticipated this queue is the result of through vehicles blocking vehicles

from entering the right turn lane and is not an issue of available storage.

Table 7. Queue Analysis

Queuing Analysis - 95th Percentile Queue										
Intersection	Movement	Link Distance	Storage Length	Existing (AM/PM Peak)	2026 No Build (AM/PM Peak)	2032 No Build (AM/PM Peak)	Link Distance	Storage Length	2026 Build (AM/PM Peak)	2032 Build (AM/PM Peak)
US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane	EBLT	277		49/158	51/179	66/181	277		49/152	60/200
	EBR	277		39/59	42/63	46/74	277		37/60	50/64
	WBLT	1172		125/98	145/104	194/107	1172		134/158	173/131
	WBR	1172		59/112	67/113	86/116	1172		68/114	77/110
	NBL		150	31/108	35/167	51/222		150	38/108	53/190
	NBT	663		160/349	181/439	244/555	663		136/325	243/500
	NBT	663		168/364	186/445	249/563	663		145/335	258/509
	NBR		225	36/46	35/51	38/173		225	36/58	62/176
	SBL		150	52/119	59/144	60/176		150	62/141	75/164
	SBT	1895		187/235	209/275	248/330	1895		210/262	247/425
	SBT	1895		190/242	220/288	265/347	1895		230/268	267/341
	SBR		325	22/40	22/39	24/43		325	24/41	45/42
US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive	EBLT	1824		10/131	11/146	9/141	1824		11/126	15/212
	EBR	1824		29/93	34/99	35/116	1824		28/91	28/101
	WBLTR	1402		-/8	-/8	/9	1402		-/9	-/13
	NBL		175	49/111	37/125	43/130		175	48/122	50/156
	NBT	1913		59/143	56/171	63/214	1913		35/142	62/97
	NBTR	1913		1/159	75/185	86/231	1913		51/163	89/110
	SBL		75	47/-	4/-	2/-		75	3/-	2/-
	SBT	663		62/90	62/91	103/92	663		58/90	95/128
	SBT	663		10/108	69/109	123/112	633		78/100	119/134
	SBR		150	9/44	12/44	13/46		150	12/42	12/61
US 258/Rt 10 (Benns Church Boulevard) & Turner Drive	EBLTR	1442		326/121	-	-			-	-
	EBLT	1440		-	195/89	269/100	1442		242/105	277/111
	EBR		200	-	149/68	219/71		200	158/84	231/93
	WBLTR	648		88/22	97/18	119/20	648		102/20	130/22
	NBL		75	207/148	205/139	251/180		75	222/161	135/192
	NBT	1098		238/258	199/212	329/280	1065		200/239	427/234
	NBTR	1098		233/264	178/220	266/295	1065		157/251	351/230
	SBL		75	59/69	39/80	57/81		75	19/88	41/62
	SBT	1913		366/243	302/226	414/319	1913		252/274	344/159
	SBT	1913		383/253	311/241	423/328	1913		257/283	361/162
	SBR		175	140/64	137/58	178/91		175	131/60	269/57
US 258/Rt 10 (Benns Church Boulevard) & Proposed Main Entrance	WBL			-	-	-	816		167/170	154/193
	WBL			-	-	-	816		132/138	114/175
	WBR			-	-	-	816		78/121	120/151
	NBU		75	10/11	13/15	14/12		200	50/61	63/54
	NBT	3868	-	-	-/-	-	470		206/340	197/412
	NBT								202/336	187/405
	NBR							200	42/83	49/129
	SBU		100	5/-	6/-	6/-			-	-
	SBL							200	98/167	87/181
	SBT						1065		181/99	155/151
	SBT	1086		-	-	-/-	1065		204/120	177/165
US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)	WBR	1008		109/222	140/286	172/372	1008		104/451	118/531
	WBR	1008		109/225	141/291	172/373	1008		101/451	109/551
	NBT	2766		67/73	71/81	64/88	2766		66/109	84/104
	NBT	2766		70/80	74/86	72/99	2766		77/111	87/119
	SBL		200	149/116	152/128	169/138		200	150/155	196/146
	SBL	3868		175/135	177/150	193/160	3191		173/155	233/146
	SBT	3868		4/2	8/1	-/7	3191		5/-	-/6
Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)	EBL		125	21/25	27/29	23/25		125	27/27	44/31
	EBT	1008		246/192	259/240	294/251	1008		267/304	308/315
	EBTR	1008		261/208	272/249	302/263	1008		277/314	318/319
	WBL		500	145/244	169/296	215/347		500	188/407	191/406
	WBT	785		236/344	283/406	318/471	785		135/568	147/630
	WBT	785		205/334	246/408	297/481	785		121/588	129/673
	WBR		250	4/12	5/16	4/81		250	4/115	4/152
	NBLT	858		9/14	8/15	12/17	858		9/11	7/21
	NBR		250	162/91	185/108	224/116		250	204/120	208/134
	NBR		250	99/38	137/43	191/45		250	163/56	174/64
	SBLT	565		26/21	32/26	31/22	565		31/25	34/30
	SBR	565		30/26	32/34	39/31	565		40/24	37/30
US 258/Rt 10 (Benns Church Boulevard) & Proposed Secondary Entrance	WBR			-	-	-	1244		43/71	39/72
	SBT			-	-	-	3191		-/-	3/-
	NBT			-	-	-	3191		-/1	-/-
	NBR			-	-	-		100	-/-	-/-

Recommended Improvements

Based on the results of the auxiliary lane, capacity and queuing analyses performed in this study, the following improvements are recommended:

2018 Existing:

- VDOT to construct eastbound right turn lane at US 258/Rt 10 (Benns Church Boulevard) and Turner Lane as planned.

2026 No Build:

- VDOT should review and optimize signal timings along the corridor, if necessary.

2026 Build:

- Construct northbound right turn lane (200' storage plus 200' taper) into right in/right out Proposed Secondary Entrance off of US 258/Rt 10 (Benns Church Boulevard).
- Construct northbound right turn lane (200' storage plus 200' taper) into Proposed Main Entrance off of US 258/Rt 10 (Benns Church Boulevard).
- Lengthen southbound left turn lane to provide 200' storage plus 200' taper into Proposed Main Entrance off of US 258/Rt 10 (Benns Church Boulevard).
- Install traffic signal at intersection of US 258/Rt 10 (Benns Church Boulevard) and Proposed Main Entrance.
- Install signal infrastructure to provide a protected eastbound right-turn overlap at US 258/Rt 10 (Benns Church Boulevard) and Turner Lane.
- Install flashing yellow arrows for the northbound and southbound left turn lanes at the intersection of US 258/Rt 10 (Benns Church Boulevard) at Canterberry Lane, Cypress Run Drive, Turner Drive and the Proposed Main Entrance to allow lead/lag operation.
- Optimize signal timings along the corridor.

2032 No Build:

- No additional improvements required.

2032 Build:

- Install signal infrastructure to provide a protected southbound right-turn overlap at US 258/Rt 10 (Benns Church Boulevard) and Turner Lane.
- Optimize signal timings along the corridor.

Summary and Conclusions

This study performed an evaluation of the 2018 Existing as well as No Build and Build scenarios for the future years of 2026 and 2032 peak hours. The study intersections included in the analyses were:

- US 258/Rt 10 (Benns Church Boulevard) and US 258/Rt 32 (Brewers Neck Boulevard) - signalized;
- US 258/Rt 32 (Brewers Neck Boulevard) and Queen Annes Court - signalized;
- US 258/Rt 10 (Benns Church Boulevard) and Cypress Run Drive - signalize;
- US 258/Rt 10 (Benns Church Boulevard) and Turner Drive - signalized;
- US 258/Rt 10 (Benns Church Boulevard) and Canteberry Lane - signalized;
- US 258/Rt 10 (Benns Church Boulevard) and the Proposed Main Entrance (unsignalized); and,
- US 258/Rt 10 (Benns Church Boulevard) and the Proposed Secondary Entrance (unsignalized).

The site is estimated to generate 8,962 new daily trips with 548 trips in the morning peak hour and 809 trips during the evening peak hour.

Under 2018 Existing Conditions, most of the corridor operates acceptably at LOS C or better, with the exception of the intersection of US 258/Rt 10 (Benns Church Boulevard) & Turner Drive. Currently, during morning peak hour, LOS at this intersection experiences an unacceptable LOS F with over 108 seconds per vehicle (sec/veh) in delay. Improvements are planned to improve operations at this intersection. Current plans were provided to VHB by VDOT and the future lane configuration was taken into the account in the future year No Build and Build analyses. Based on the planned improvements, no interim improvements are recommended.

The 2026 and 2032 No Build analyses showed that most of the intersections in the network are expected to continue to operate at an acceptable LOS D or better with the exception of US 258/Rt 10 (Benns Church Boulevard) & Turner Drive. Even though the overall LOS at this intersection is expected to be E during morning peak hour, the eastbound approach will continue to operate at unacceptable LOS F under 2026 and 2032 No Build conditions.

The Proposed Main Entrance allows all turning movements onto and off of US 258/Rt.10 (Benns Church Boulevard). The Proposed Secondary Entrance is right-in/right-out and allows limited access/exit to/from the development. Turn lane warrant analysis was performed to identify turn

lane storage lengths and tapers. For the purpose of the Build analysis, the proposed left turn and right turn lanes at each entrance were taken into account.

A signal warrant analysis was performed at the Proposed Main Entrance and a signal is recommended at this intersection. Signalized traffic control at this intersection was assumed for all Build Conditions.

The 2026 and 2032 Build analyses show that all intersections in the network are expected to continue to operate at an acceptable LOS D or better.

Results and observations of queuing simulations show that most of the intersections are expected to queue within their storage capacities. However, the analysis of 2018 Existing Conditions has shown that at the intersection of US 258/Rt 10 (Benns Church Boulevard) & Turner Drive, left turn queue on northbound approach is currently longer than the existing storage lane. Since this is an existing condition, no change to the storage length is proposed.

In conclusion, the results of the analyses indicate that the development of the site as proposed will have modest impact on the intersections within the study area.

Table 8. 2018 Existing, 2026 No Build and 2032 No Build LOS Summary

Intersection and Approach	Control	2018 Existing		2026 No-Build		2032 No-Build	
		AM	PM	AM	PM	AM	PM
US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane	Signalized	C (WB-D)	C (EB-D)	C (WB-E)	C (EB-D)	C (WB-E)	D (EB-D)
US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive	Signalized	A (EB-B)	A (EB-C)	A (EB-B)	A (EB-C)	A (EB-B)	B (EB-D)
US 258/Rt 10 (Benns Church Boulevard) & Turner Drive	Signalized	F (SB-F)	B (WB-C)	E (EB-F)	B (EB-C)	E (EB-F)	C (WB-C)
US 258/Rt 10 (Benns Church Boulevard) & Proposed Main Entrance	Unsignalized	N/A	N/A	N/A	N/A	N/A	N/A
US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)	Signalized	A (NB-C)	A (NB-C)	A (NB-C)	A (NB-C)	A (NB-B)	A (NB-C)
Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)	Signalized	B (EB-C)	B (EB-C)	B (EB-C)	B (EB-C)	C (EB-C)	C (EB-C)

Table 9. 2026 Build and 2032 Build LOS Summary

Intersection Name	Control	2026 Build		2032 Build	
		AM	PM	AM	PM
US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane	Signalized	B (WB-D)	C (EB-D)	B (WB-D)	D (NB-D)
US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive	Signalized	A (EB-A)	A (EB-D)	A (EB-B)	A (EB-D)
US 258/Rt 10 (Benns Church Boulevard) & Turner Drive	Signalized	B (EB-C)	C (WB-C)	C (WB-D)	A (WB-C)
US 258/Rt 10 (Benns Church Boulevard) & Proposed Main Entrance	Signalized	A (WB-C)	B (WB-C)	B (WB-C)	B (WB-C)
US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)	Signalized	A (NB-B)	B (NB-D)	A (NB-C)	B (NB-C)
Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)	Signalized	B (SB-C)	B (EB-C)	C (WB-D)	C (EB-D)
US 258/Rt 10 (Benns Church Boulevard) & Proposed Secondary Entrance	Unsignalized	(WB-B)	(WB-C)	(WB-C)	(WB-C)

APPENDIX A

Approved Pre-Scoping Data

PRE-SCOPE OF WORK MEETING FORM

Information on the Project
Traffic Impact Analysis Base Assumptions

The applicant is responsible for entering the relevant information and submitting the form to VDOT and the locality no less than three (3) business days prior to the meeting. If a form is not received by this deadline, the scope of work meeting may be postponed.

Contact Information				
Consultant Name: Tele: E-mail:	VHB 757.233.3223 ktynch@vhb.com			
Developer/Owner Name: Tele: E-mail:	Ryan Homes 757.905.5298 eshirey@nvrinc.com			
Project Information				
Project Name:	Yeoman Tract		Locality/County:	Isle of Wight
Project Location: (Attach regional and site specific location map)	Located off of Rt 10 between Rt 614 and Rt 32 (Brewers Neck Blvd)			
Submission Type	Comp Plan ☐	Rezoning ☒	Site Plan ☐	Subd Plat ☐
Project Description: (Including details on the land use, acreage, phasing, access location, etc. Attach additional sheet if necessary)	343 single family homes, 165 townhomes. 125 attached senior living residences, 20k sf general office, 20k sf shopping center, 5k sf fast food restaurant with drive thru and 4 ac public park.			
Proposed Use(s): (Check all that apply; attach additional pages as necessary)	Residential ☒	Commercial ☒	Mixed Use ☐	Other ☐
	Residential Uses(s) Number of Units: 633 ITE LU Code(s): 210 220 252 **Commercial Use(s)** ITE LU Code(s): 820 710 934 Square Ft or Other Variable:		**Other Use(s)** ITE LU Code(s): 411 Independent Variable(s):	
Total Peak Hour Trip Projection:	Less than 100 ☐	100 – 499 ☐	500 – 999 ☒	1,000 or more ☐

It is important for the applicant to provide sufficient information to county and VDOT staff so that questions regarding geographic scope, alternate methodology, or other issues can be answered at the scoping meeting.

Traffic Impact Analysis Assumptions			
Study Period	Existing Year: 2018	Build-out Year: 2026	Design Year: 2032
Study Area Boundaries (Attach map)	North: Canteberry Lane	South: Brewers Neck Blvd	
	East: N/A	West: Rt 10	
External Factors That Could Affect Project (Planned road improvements, other nearby developments)	New turn lane from high school (200' turn lane + 200' taper)		
Consistency With Comprehensive Plan (Land use, transportation plan)	No		
Available Traffic Data (Historical, forecasts)	2017 VDOT count 25,000 vpd, taking intersection counts with project		
Trip Distribution (Attach sketch)	Road Name: Rt 10 (distribution will be based on counts)	Road Name:	
	Road Name:	Road Name:	
Annual Vehicle Trip Growth Rate:	1.5%	Peak Period for Study (check all that apply)	☒ AM ☒ PM ☐ SAT
		Peak Hour of the Generator	4-5 pm
Study Intersections and/or Road Segments (Attach additional sheets as necessary)	1.Brewers Neck Blvd and Rt 10	6.Benns Neck Blvd and Benns Grant Blvd	
	2.Benns Church Blvd and Main Access to Site	7.	
	3.Benns Church Blvd and Canteberry Lane	8.	
	4.Benns Chuch Blvd and Secondary Access to Site	9.	
	5.Benns Church Blvd and Turner Dr	10.	
Trip Adjustment Factors	Internal allowance: ☐ Yes ☒ No Reduction: _____% trips	Pass-by allowance: ☒ Yes ☐ No Reduction: 49% trips	
Software Methodology	☒ Synchro ☐ HCS (v.2000/+) ☐ aaSIDRA ☐ CORSIM ☐ Other _____		
Traffic Signal Proposed or Affected (Analysis software to be used, progression speed, cycle length)	TBD		

It is important for the applicant to provide sufficient information to county and VDOT staff so that questions regarding geographic scope, alternate methodology, or other issues can be answered at the scoping meeting.

Improvement(s) Assumed or to be Considered	Signal, turn lanes
Background Traffic Studies Considered	None
Plan Submission	☐ Master Development Plan (MDP) ☐ Generalized Development Plan (GDP) ☒ Preliminary/Sketch Plan ☐ Other Plan type (Final Site, Subd. Plan)
Additional Issues to be Addressed	☒ Queuing analysis ☐ Actuation/Coordination ☐ Weaving analysis ☐ Merge analysis ☒ Bike/Ped Accommodations ☒ Intersection(s) ☐ TDM Measures ☐ Other _____

NOTES on ASSUMPTIONS: Developed as 1 phase. Recreational areas and club house serve rsidential community only, and will not generate additional traffic.

SIGNED: Kirsten B. Tynch DATE: 4/23/18
Applicant or Consultant

PRINT NAME: Kirsten B. Tynch
Applicant or Consultant

It is important for the applicant to provide sufficient information to county and VDOT staff so that questions regarding geographic scope, alternate methodology, or other issues can be answered at the scoping meeting.

Rezoning Package Checklist

Traffic Impact Analysis Regulations: 24 VAC 30-155-40

☑ **A COVER SHEET** containing:

- ☑ **Contact Information** for the
  - ☑ Locality,
  - ☑ Developer (or owner), if applicable;
- ☑ **Site Information**
  - ☑ Rezoning location,
  - ☑ Highways adjacent to the site,
  - ☑ Parcel number or numbers;
- ☑ **Proposal Summary** with the
  - ☑ Development's name,
  - ☑ Size (acreage),
  - ☑ Proposed zoning;
  - ☑ Proposed types of land uses, including maximum number of lots or maximum business square feet, and
- ☑ **A Statement** regarding the proposal's compliance with the comprehensive plan.

☑ **A TRAFFIC IMPACT ANALYSIS** prepared in accordance with 24-VAC-30-155-60.

☑ **A CONCEPT PLAN** of the proposed development.

☐ **ANY PROFFERED CONDITIONS** submitted by the applicant.

☑ **FEES** -

- ☑ **For the initial or second review** of a rezoning proposal, a single fee for both reviews will be determined by the number of vehicle trips generated per peak hour of the generator, as follows:
  - ☐ Low volume road submission 24VAC30-155-40 A 3 - $250
  - ☑ All other submissions - $1,000
- ☐ **For a third or subsequent submission** of a rezoning proposal that is requested by VDOT on the basis of the failure of the applicant to address deficiencies previously identified by VDOT, the fee is equal to the initial fee paid.

Site Tabulations

Total Single Family Detached Lots:	400	
Total Townhomes:	285	
	Square Feet	Acres
Total Site Area:	10,866,832 ±	249.47 ±
Total Area Single-Family Detached:	7,627,620 ±	175.11
Open space:	4,307,625 ±	98.89 ±
Total Area Townhomes:	2,931,970 ±	67.31 ±
Open Space:	2,180,576 ±	50.06 ±
Commercial:	307,242 ±	7.05 ±

* Setbacks and Lot Widths Based Upon Rezoning to PD-MX

THIS PROPERTY IS IN FLOOD ZONE "X" AND AE (EL 8) AS SHOWN ON MAP NUMBER 51093C0154E; PANEL 0154E AND 51093C0153E, PANEL 0153E FOR COMMUNITY NUMBERS 510303 & 510081, DATED 12/2/2015 OF THE FLOOD INSURANCE RATE MAPS FOR ISLE OF WIGHT COUNTY, VIRGINIA. ZONE "X" IS DEFINED AS AREAS DETERMINED TO BE OUTSIDE THE 0.2% ANNUAL CHANCE FLOOD PLAIN. ZONE "AE" IS DEFINED AS SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD.

LEGEND

- 100'RPA — 100 FOOT RPA BUFFER
- EX. TREELINE
- FLOOD PLANE ZONE AE
- MULTI-USE PATH
- WATER / POND
- TOWNHOME LOTS

N/F
THOMAS BARBARA F
910 CANTEBERRY LN
PARCEL ID: 22J-02-150
ZONING: SMITHFIELD: N-R

N/F
EVANS ANTHONY
906 CANTEBERRY LN
PARCEL ID: 22J-02-152
ZONING: SMITHFIELD: N-R

N/F
DIPPO LAWRENCE A & ELIZABETH A
TRS L A & E A DIPPO LIVING TRUST
908 CANTEBERRY LN
PARCEL ID: 22J-02-151
ZONING: SMITHFIELD: N-R

N/F
BERLAND EDNA R
916 CANTEBERRY LN
PARCEL ID: 22J-02-147
ZONING: SMITHFIELD: N-R

N/F
HENDRIX THOMAS
912 CANTEBERRY LN
PARCEL ID: 22J-02-149
ZONING: SMITHFIELD: N-R

N/F
FORSYTHE TIMOTHY A & DEBRA K
TRS T A & D K FORSYTHE FAMILY REV TRUST
914 CANTEBERRY LN
PARCEL ID: 22J-02-148
ZONING: SMITHFIELD: N-R

N/F
EDWARDS PHILLIP F JR & CONNIE A
BENNS CHURCH BLVD
PARCEL ID: 32-01-096
ZONING: SMITHFIELD: C-C

N/F
CROWN CASTLE GT COMPANY LLC
14005 BENNS CHURCH BLVD
PARCEL ID: 32-01-096B
ZONING: RAC

N/F
ISLE OF WIGHT COUNTY SCHOOL BOARD
14101 SMITHFIELD CIR, SMITHFIELD
PARCEL ID: 32-01-010A
ZONING: RAC

N/F
WILSON ANGELA B & WILSON JAMES G JR
TRS A B WILCON REVOC LIVING TRUST
14041 BENNS CHURCH BLVD
PARCEL ID: 32-01-095
ZONING: LI

N/F
YEOMAN WILLIAM G III
WILLIAM G YEOMAN III TRUST
BENNS CHURCH BLVD
PARCEL ID: 32-01-007
ZONING: RAC

N/F
CORNETT GEORGE C
14106 BENNS CHURCH BLVD
PARCEL ID: 32-01-008
ZONING: RAC

N/F
WILLIAM G. YEOMAN, TRUSTEE
14096 BENNS CURCH BOULEVARD
PARCEL ID: 32-01-009
ZONING: RAC

N/F
EDWARDS RYLAND B JR &
MARY ANN D &
EDWARDS RYLAND B & ETALS
14202 BENNS CHURCH BLVD
PARCEL ID: 32-01-062
ZONING: RAC

N/F
GIRARD PATRICIA A
14225 BENNS CHURCH BOULEVARD
PARCEL ID: 32A-02-012
ZONING: RAC

N/F
[OWNER]
[ADDRESS]
PARCEL ID: 32-05-B000
ZONING: RAC

N/F
WALLACE JIMMY J & MYRTLE T
14108 HAYLOFT LN
PARCEL ID: 32-01-094A
ZONING: RAC

N/F
WALLACE JIMMY J & MYRTLE T
14111 HAYLOFT LN
PARCEL ID: 32B-01-005
ZONING: RAC

N/F
CARNEY PAMELA D
14125 HAYLOFT LN
PARCEL ID: 32B-01-006
ZONING: RAC

N/F
TOTTEN CHARLES D
BEECHWOOD LN
PARCEL ID: 32-01-094,094C,094D
ZONING: RAC

N/F
BELL LINWOOD E & BARBARA G
19341 BEECHWOOD LN
PARCEL ID: 31-01-094B
ZONING: RAC

N/F
ST LUKES VILLAGES LLC
C/O MCCALE DEV COR
20081 BREWERS NECK BLVD
PARCEL ID: 33-01-012B
ZONING: PD-MX

N/F
BOWDEN RONALD
BREWERS NECK BLVD
PARCEL ID: 33-01-005
ZONING: RAC

N/F
GRAY ROBERTA
C/O GARY LAWRENCE N
CHAPMANS LN
PARCEL ID: 33-03-006
ZONING: RAC

BENNS CHURCH BLVD
(VARIABLE WIDTH PUBLIC R/W)
(SLOPE EASEMENT VARIES WITH TOPOGRAPHY)
1220.51'
696'

SIGNALIZED INTERSECTION
TOWNHOME PARCEL
LIMITS OF ZONE AE FLOOD PLAIN ELEV = 8
APPROX. LIMITS OF EXISTING TREELINE
RECREATION AREA
OPEN AREA
PEDESTRIAN ACCESS
LIMITS OF 100' RPA
LANDSCAPE BERM
COMMERCIAL AREA 7 AC.±
70' BUILDING SETBACK
PUBLIC PARK 3.90± AC
OPEN SPACE
CLUBHOUSE & REC. AREA 1.0 AC.±
OVERLOOK
DOG PARK 1.9 AC.±
POTENTIAL BMP LOCATION
MULTI-USE PATHWAY
BEECHWOOD LANE

GRAPHIC SCALE
200' 0' 200' 400'
SCALE: 1" = 200'

Rev.	Date	Description	Reviewed By
1	11/1/2019	REVISED PER COUNTY COMMENTS	JAG

AES CONSULTING ENGINEERS
5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
Phone: (757) 253-0040
Fax: (757) 220-8994
www.aesva.com
Hampton Roads | Central Virginia | Middle Peninsula

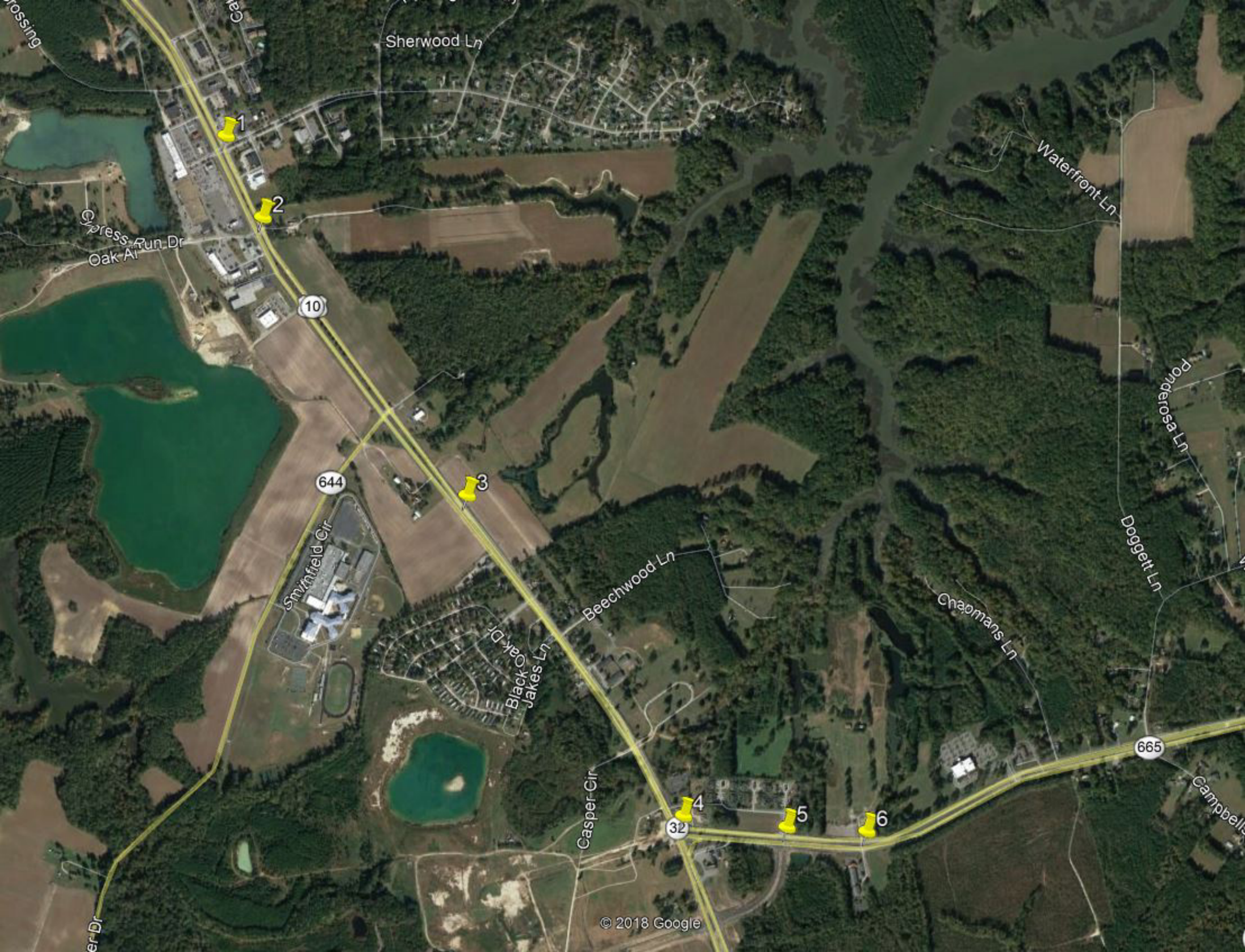
REZONING MASTER PLAN FOR SWEETGRASS

ISLE OF WIGHT COUNTY | WINDSOR DISTRICT | VIRGINIA

Project Contacts:	JAG
Project Number:	W10516-00
Scale: 1"=200'	Date: 06/14/2019

Sheet Title:
CONCEPTUAL MASTER PLAN

Sheet Number
2 OF 4


Sherwood Ln
Waterfront Ln
Cypress Run Dr
Oak Al
10
644
Smithfield Cir
Beechwood Ln
Black Oak Dr
Jakes Ln
Doggett Ln
Chaomans Ln
Ponderosa Ln
Casper Cir
32
665
Campbell
1
2
3
4
5
6
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APPENDIX B

Traffic Data

4500 Main Street
Suite 400
Virginia Beach, VA 23462-3361
757.490.0132

File Name : Benns_Church_and_Brewers_Neck_514974_04-24-2018
Site Code :
Start Date : 4/24/2018
Page No : 1

Groups Printed- Lights - Single Units - TTST - Bicycles on Road

	Benns Church Blvd Southbound			Brewers Neck Blvd Westbound			Benns Church Blvd Northbound			
Start Time	Left	Thru	U-Turn	Left	Right	U-Turn	Thru	Right	U-Turn	Int. Total
06:00 AM	211	34	0	0	103	0	43	0	0	391
06:15 AM	225	32	0	0	117	0	34	0	0	408
06:30 AM	238	34	0	0	121	0	37	0	0	430
06:45 AM	191	39	0	0	140	0	34	0	0	404
Total	865	139	0	0	481	0	148	0	0	1633
07:00 AM	211	33	0	0	227	0	47	0	0	518
07:15 AM	224	42	0	0	181	0	29	0	0	476
07:30 AM	269	86	0	0	125	0	41	0	0	521
07:45 AM	193	56	0	0	120	0	49	1	0	419
Total	897	217	0	0	653	0	166	1	0	1934
02:30 PM	139	43	0	0	155	0	55	0	0	392
02:45 PM	167	35	0	0	185	0	36	0	0	423
Total	306	78	0	0	340	0	91	0	0	815
03:00 PM	182	50	0	2	189	0	44	0	0	467
03:15 PM	151	54	0	0	233	0	48	0	0	486
03:30 PM	109	58	0	0	228	0	49	1	0	445
03:45 PM	175	65	0	0	221	0	45	0	0	506
Total	617	227	0	2	871	0	186	1	0	1904
04:00 PM	163	62	0	0	311	0	51	2	0	589
04:15 PM	164	66	0	0	286	0	42	2	0	560
04:30 PM	162	81	0	0	278	0	47	1	0	569
04:45 PM	158	67	0	0	279	0	55	0	0	559
Total	647	276	0	0	1154	0	195	5	0	2277
05:00 PM	172	62	0	0	241	0	64	1	0	540
05:15 PM	174	76	0	0	260	0	65	0	0	575
Grand Total	3678	1075	0	2	4000	0	915	8	0	9678
Apprch %	77.4	22.6	0	0	100	0	99.1	0.9	0	
Total %	38	11.1	0	0	41.3	0	9.5	0.1	0	
Lights	3554	1024	0	0	3852	0	872	8	0	9310
% Lights	96.6	95.3	0	0	96.3	0	95.3	100	0	96.2
Single Units	92	38	0	0	111	0	30	0	0	271
% Single Units	2.5	3.5	0	0	2.8	0	3.3	0	0	2.8
TTST	32	13	0	2	37	0	13	0	0	97
% TTST	0.9	1.2	0	100	0.9	0	1.4	0	0	1
Bicycles on Road	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0

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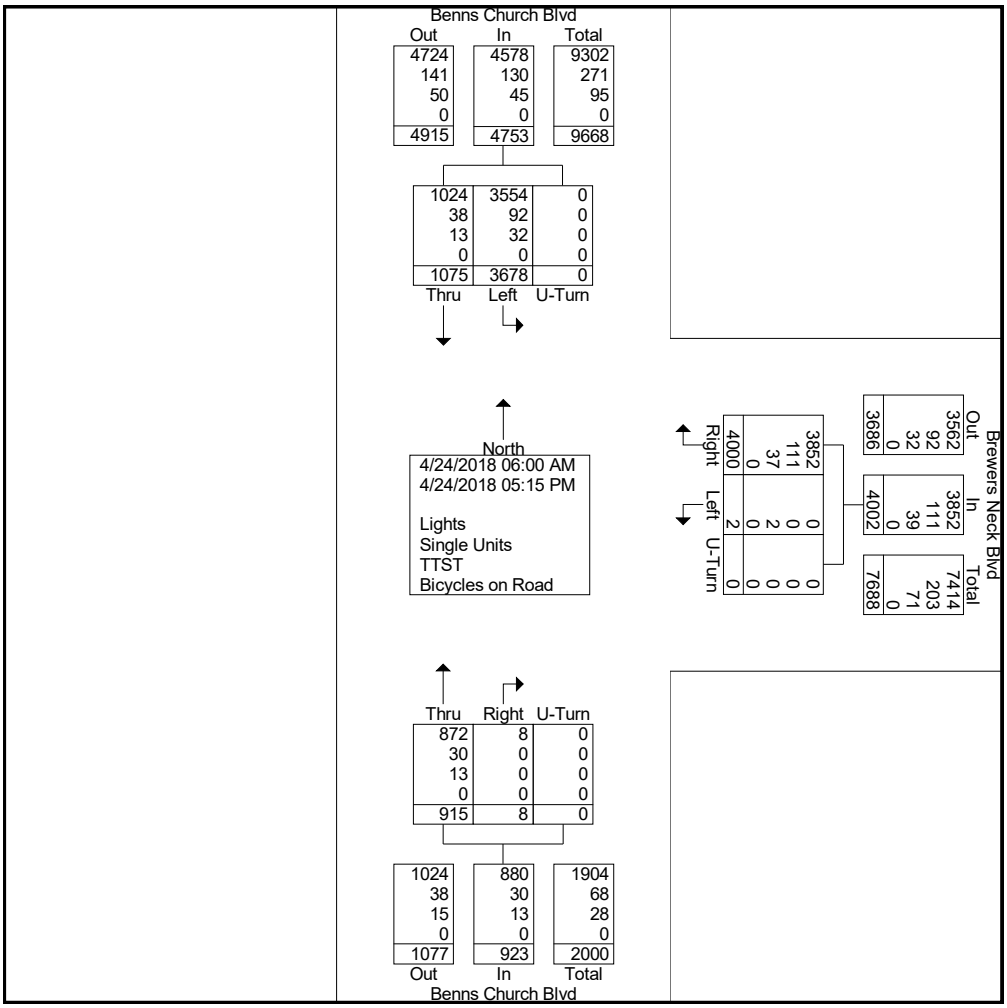

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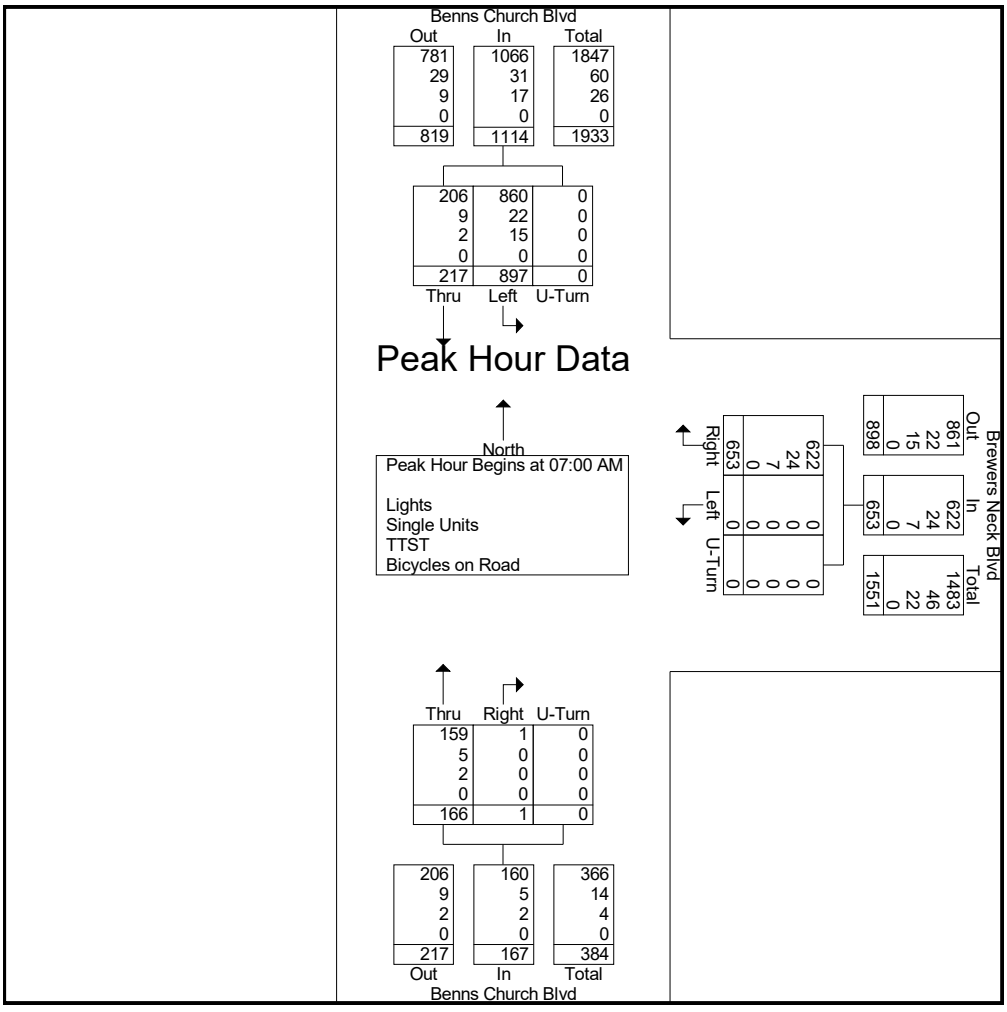
	Benns Church Blvd Southbound				Brewers Neck Blvd Westbound				Benns Church Blvd Northbound				
Start Time	Left	Thru	U-Turn	App. Total	Left	Right	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 07:00 AM													
07:00 AM	211	33	0	244	0	227	0	227	47	0	0	47	518
07:15 AM	224	42	0	266	0	181	0	181	29	0	0	29	476
07:30 AM	269	86	0	355	0	125	0	125	41	0	0	41	521
07:45 AM	193	56	0	249	0	120	0	120	49	1	0	50	419
Total Volume	897	217	0	1114	0	653	0	653	166	1	0	167	1934
% App. Total	80.5	19.5	0		0	100	0		99.4	0.6	0		
PHF	.834	.631	.000	.785	.000	.719	.000	.719	.847	.250	.000	.835	.928
Lights	860	206	0	1066	0	622	0	622	159	1	0	160	1848
% Lights	95.9	94.9	0	95.7	0	95.3	0	95.3	95.8	100	0	95.8	95.6
Single Units	22	9	0	31	0	24	0	24	5	0	0	5	60
% Single Units	2.5	4.1	0	2.8	0	3.7	0	3.7	3.0	0	0	3.0	3.1
TTST	15	2	0	17	0	7	0	7	2	0	0	2	26
% TTST	1.7	0.9	0	1.5	0	1.1	0	1.1	1.2	0	0	1.2	1.3
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0



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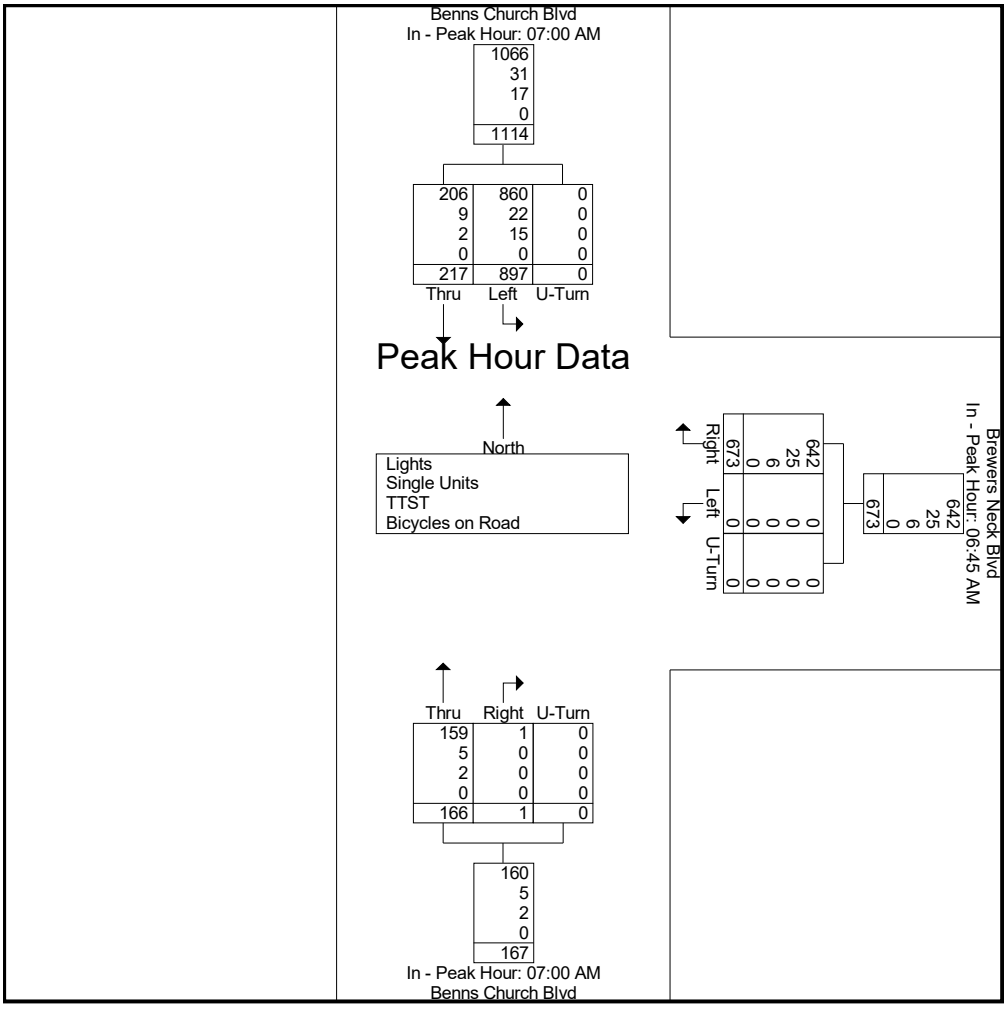
	Benns Church Blvd Southbound				Brewers Neck Blvd Westbound				Benns Church Blvd Northbound				
Start Time	Left	Thru	U-Turn	App. Total	Left	Right	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1													
Peak Hour for Each Approach Begins at:													
	07:00 AM				06:45 AM				07:00 AM				
+0 mins.	211	33	0	244	0	140	0	140	47	0	0	47	
+15 mins.	224	42	0	266	0	227	0	227	29	0	0	29	
+30 mins.	269	86	0	355	0	181	0	181	41	0	0	41	
+45 mins.	193	56	0	249	0	125	0	125	49	1	0	50	
Total Volume	897	217	0	1114	0	673	0	673	166	1	0	167	
% App. Total	80.5	19.5	0		0	100	0		99.4	0.6	0		
PHF	.834	.631	.000	.785	.000	.741	.000	.741	.847	.250	.000	.835	
Lights	860	206	0	1066	0	642	0	642	159	1	0	160	
% Lights	95.9	94.9	0	95.7	0	95.4	0	95.4	95.8	100	0	95.8	
Single Units	22	9	0	31	0	25	0	25	5	0	0	5	
% Single Units	2.5	4.1	0	2.8	0	3.7	0	3.7	3	0	0	3	
TTST	15	2	0	17	0	6	0	6	2	0	0	2	
% TTST	1.7	0.9	0	1.5	0	0.9	0	0.9	1.2	0	0	1.2	
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	



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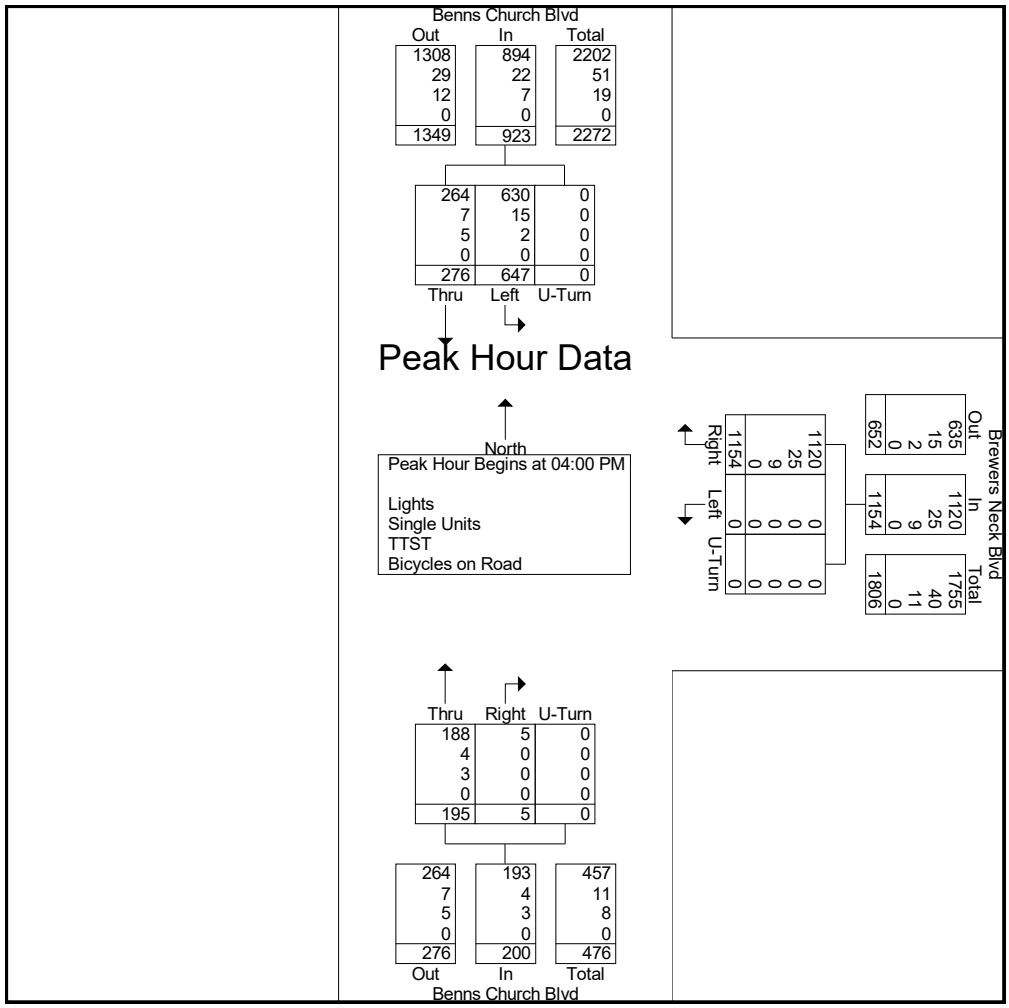
	Benns Church Blvd Southbound				Brewers Neck Blvd Westbound				Benns Church Blvd Northbound				
Start Time	Left	Thru	U-Turn	App. Total	Left	Right	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:15 PM - Peak 1 of 1													
Peak Hour for Entire Intersection Begins at 04:00 PM													
04:00 PM	163	62	0	225	0	311	0	311	51	2	0	53	589
04:15 PM	164	66	0	230	0	286	0	286	42	2	0	44	560
04:30 PM	162	81	0	243	0	278	0	278	47	1	0	48	569
04:45 PM	158	67	0	225	0	279	0	279	55	0	0	55	559
Total Volume	647	276	0	923	0	1154	0	1154	195	5	0	200	2277
% App. Total	70.1	29.9	0		0	100	0		97.5	2.5	0		
PHF	.986	.852	.000	.950	.000	.928	.000	.928	.886	.625	.000	.909	.966
Lights	630	264	0	894	0	1120	0	1120	188	5	0	193	2207
% Lights	97.4	95.7	0	96.9	0	97.1	0	97.1	96.4	100	0	96.5	96.9
Single Units	15	7	0	22	0	25	0	25	4	0	0	4	51
% Single Units	2.3	2.5	0	2.4	0	2.2	0	2.2	2.1	0	0	2.0	2.2
TTST	2	5	0	7	0	9	0	9	3	0	0	3	19
% TTST	0.3	1.8	0	0.8	0	0.8	0	0.8	1.5	0	0	1.5	0.8
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0



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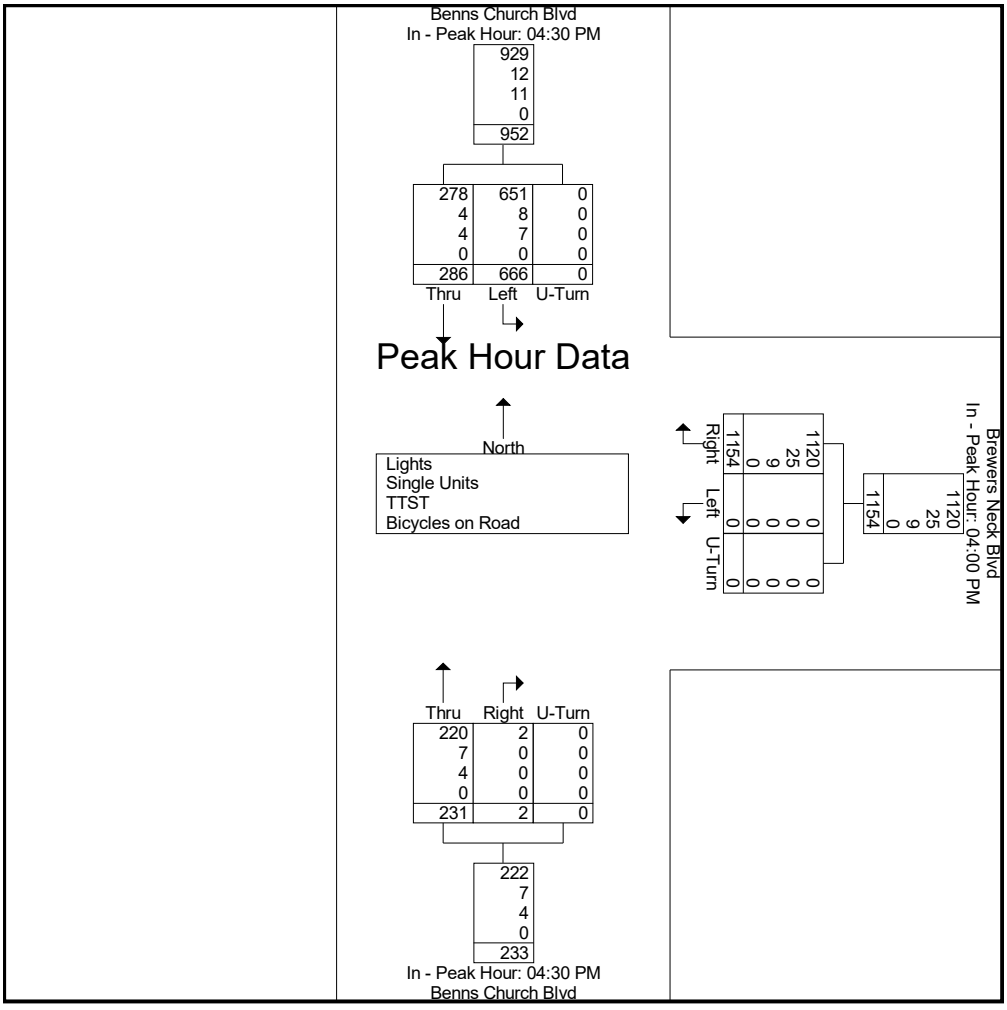
	Benns Church Blvd Southbound				Brewers Neck Blvd Westbound				Benns Church Blvd Northbound				
Start Time	Left	Thru	U-Turn	App. Total	Left	Right	U-Turn	App. Total	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:15 PM - Peak 1 of 1													
Peak Hour for Each Approach Begins at:													
	04:30 PM				04:00 PM				04:30 PM				
+0 mins.	162	81	0	243	0	311	0	311	47	1	0	48	
+15 mins.	158	67	0	225	0	286	0	286	55	0	0	55	
+30 mins.	172	62	0	234	0	278	0	278	64	1	0	65	
+45 mins.	174	76	0	250	0	279	0	279	65	0	0	65	
Total Volume	666	286	0	952	0	1154	0	1154	231	2	0	233	
% App. Total	70	30	0		0	100	0		99.1	0.9	0		
PHF	.957	.883	.000	.952	.000	.928	.000	.928	.888	.500	.000	.896	
Lights	651	278	0	929	0	1120	0	1120	220	2	0	222	
% Lights	97.7	97.2	0	97.6	0	97.1	0	97.1	95.2	100	0	95.3	
Single Units	8	4	0	12	0	25	0	25	7	0	0	7	
% Single Units	1.2	1.4	0	1.3	0	2.2	0	2.2	3	0	0	3	
TTST	7	4	0	11	0	9	0	9	4	0	0	4	
% TTST	1.1	1.4	0	1.2	0	0.8	0	0.8	1.7	0	0	1.7	
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	



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Groups Printed- Lights - Single Units - TTST - Bicycles on Road

	Benns Church Blvd Southbound				Canteberry Lane Westbound				Benns Church Blvd Northbound				Smithfield Shopping Plaza Eastbound				
Start Time	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Int. Total
06:00 AM	1	204	3	4	7	2	5	0	1	146	2	0	0	0	4	0	379
06:15 AM	7	211	2	3	20	1	3	0	0	164	4	0	0	0	1	0	416
06:30 AM	11	260	2	6	20	0	7	0	4	126	8	0	4	0	3	0	451
06:45 AM	9	242	7	3	23	1	10	0	6	105	9	0	5	0	5	0	425
Total	28	917	14	16	70	4	25	0	11	541	23	0	9	0	13	0	1671
07:00 AM	7	408	7	1	29	2	9	0	5	140	9	0	3	0	4	0	624
07:15 AM	12	245	10	6	15	0	12	0	1	194	15	0	6	0	8	0	524
07:30 AM	9	192	7	3	25	1	5	0	0	192	13	0	7	0	4	0	458
07:45 AM	7	185	8	4	19	1	12	0	7	185	8	0	7	1	1	0	445
Total	35	1030	32	14	88	4	38	0	13	711	45	0	23	1	17	0	2051
02:30 PM	9	200	13	4	19	1	8	0	7	197	7	0	37	1	6	0	509
02:45 PM	12	182	10	6	13	4	8	0	5	246	18	2	25	1	12	0	544
Total	21	382	23	10	32	5	16	0	12	443	25	2	62	2	18	0	1053
03:00 PM	7	189	13	7	13	1	5	0	13	278	15	1	24	0	11	0	577
03:15 PM	11	205	13	7	9	0	13	0	8	248	19	0	37	1	8	0	579
03:30 PM	10	170	14	10	18	2	11	0	4	263	12	0	25	4	8	0	551
03:45 PM	22	218	11	6	23	1	11	0	8	264	18	1	32	2	14	0	631
Total	50	782	51	30	63	4	40	0	33	1053	64	2	118	7	41	0	2338
04:00 PM	15	244	31	7	16	3	17	0	11	269	28	2	31	2	6	0	682
04:15 PM	15	206	15	15	13	2	18	0	6	281	19	0	28	3	18	0	639
04:30 PM	21	233	20	7	19	2	19	0	18	265	11	0	35	0	5	0	655
04:45 PM	25	248	22	13	9	1	17	0	8	294	37	1	33	0	11	0	719
Total	76	931	88	42	57	8	71	0	43	1109	95	3	127	5	40	0	2695
05:00 PM	12	223	13	11	20	2	25	0	9	268	20	0	48	1	1	0	653
05:15 PM	15	241	18	12	10	0	14	0	11	283	20	0	33	1	6	0	664
Grand Total	237	4506	239	135	340	27	229	0	132	4408	292	7	420	17	136	0	11125
Apprch %	4.6	88.1	4.7	2.6	57	4.5	38.4	0	2.7	91.1	6	0.1	73.3	3	23.7	0	
Total %	2.1	40.5	2.1	1.2	3.1	0.2	2.1	0	1.2	39.6	2.6	0.1	3.8	0.2	1.2	0	
Lights	229	4351	239	133	332	26	220	0	129	4239	282	7	418	17	136	0	10758
% Lights	96.6	96.6	100	98.5	97.6	96.3	96.1	0	97.7	96.2	96.6	100	99.5	100	100	0	96.7
Single Units	6	101	0	2	5	1	9	0	3	127	10	0	2	0	0	0	266
% Single Units	2.5	2.2	0	1.5	1.5	3.7	3.9	0	2.3	2.9	3.4	0	0.5	0	0	0	2.4
TTST	2	54	0	0	3	0	0	0	0	42	0	0	0	0	0	0	101
% TTST	0.8	1.2	0	0	0.9	0	0	0	0	1	0	0	0	0	0	0	0.9
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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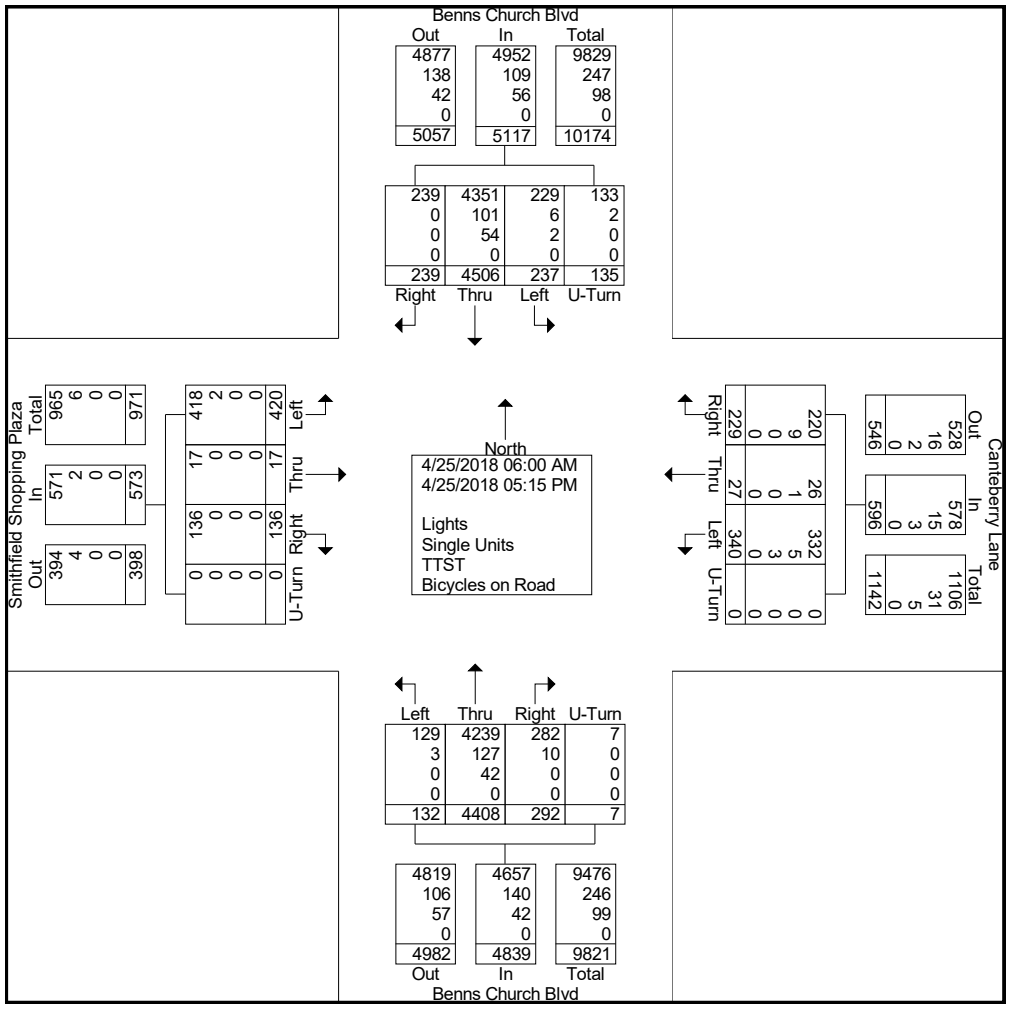

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File Name : Benns_Church_and_Canteberry_Ln_514982_04-25-2018
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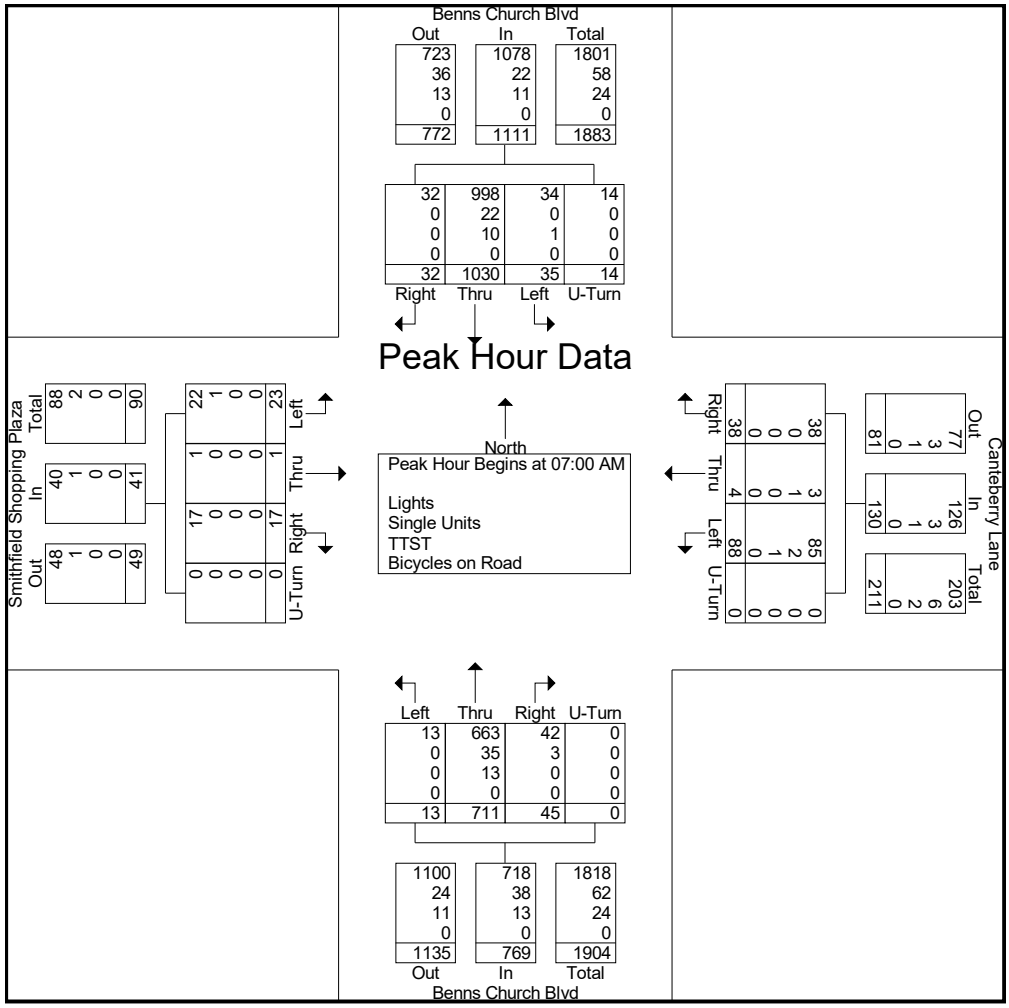
	Benns Church Blvd Southbound					Canteberry Lane Westbound					Benns Church Blvd Northbound					Smithfield Shopping Plaza Eastbound					
Start Time			Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	7	408	7	1	423	29	2	9	0	40	5	140	9	0	154	3	0	4	0	7	624
07:15 AM	12	245	10	6	273	15	0	12	0	27	1	194	15	0	210	6	0	8	0	14	524
07:30 AM	9	192	7	3	211	25	1	5	0	31	0	192	13	0	205	7	0	4	0	11	458
07:45 AM	7	185	8	4	204	19	1	12	0	32	7	185	8	0	200	7	1	1	0	9	445
Total Volume	35	1030	32	14	1111	88	4	38	0	130	13	711	45	0	769	23	1	17	0	41	2051
% App. Total	3.2	92.7	2.9	1.3		67.7	3.1	29.2	0		1.7	92.5	5.9	0		56.1	2.4	41.5	0		
PHF	.729	.631	.800	.583	.657	.759	.500	.792	.000	.813	.464	.916	.750	.000	.915	.821	.250	.531	.000	.732	.822
Lights	34	998	32	14	1078	85	3	38	0	126	13	663	42	0	718	22	1	17	0	40	1962
% Lights	97.1	96.9	100	100	97.0	96.6	75.0	100	0	96.9	100	93.2	93.3	0	93.4	95.7	100	100	0	97.6	95.7
Single Units	0	22	0	0	22	2	1	0	0	3	0	35	3	0	38	1	0	0	0	1	64
% Single Units	0	2.1	0	0	2.0	2.3	25.0	0	0	2.3	0	4.9	6.7	0	4.9	4.3	0	0	0	2.4	3.1
TTST	1	10	0	0	11	1	0	0	0	1	0	13	0	0	13	0	0	0	0	0	25
% TTST	2.9	1.0	0	0	1.0	1.1	0	0	0	0.8	0	1.8	0	0	1.7	0	0	0	0	0	1.2
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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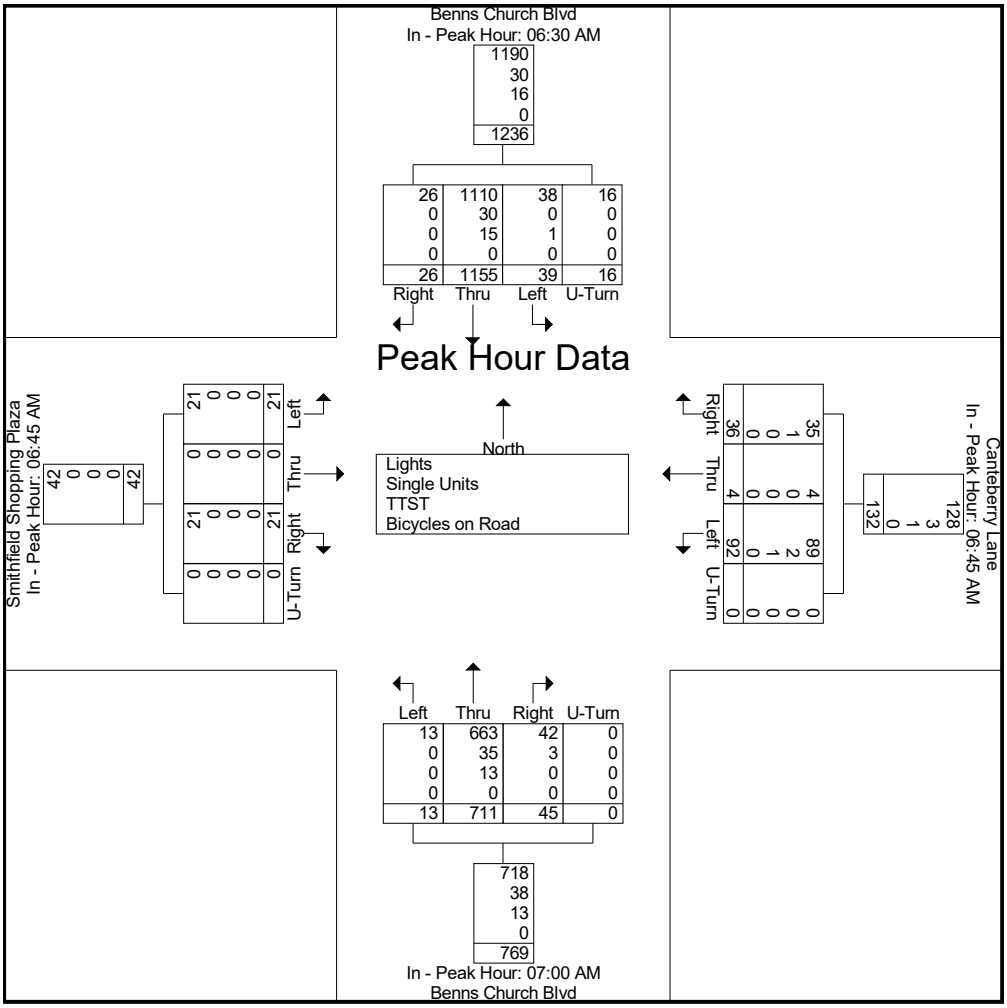
	Benns Church Blvd Southbound					Canteberry Lane Westbound					Benns Church Blvd Northbound					Smithfield Shopping Plaza Eastbound					
Start Time			Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Each Approach Begins at:																					
	06:30 AM					06:45 AM					07:00 AM					06:45 AM					
+0 mins.	11	260	2	6	279	23	1	10	0	34	5	140	9	0	154	5	0	5	0	10	
+15 mins.	9	242	7	3	261	29	2	9	0	40	1	194	15	0	210	3	0	4	0	7	
+30 mins.	7	408	7	1	423	15	0	12	0	27	0	192	13	0	205	6	0	8	0	14	
+45 mins.	12	245	10	6	273	25	1	5	0	31	7	185	8	0	200	7	0	4	0	11	
Total Volume	39	1155	26	16	1236	92	4	36	0	132	13	711	45	0	769	21	0	21	0	42	
% App. Total	3.2	93.4	2.1	1.3		69.7	3	27.3	0		1.7	92.5	5.9	0		50	0	50	0		
PHF	.813	.708	.650	.667	.730	.793	.500	.750	.000	.825	.464	.916	.750	.000	.915	.750	.000	.656	.000	.750	
Lights	38	1110	26	16	1190	89	4	35	0	128	13	663	42	0	718	21	0	21	0	42	
% Lights	97.4	96.1	100	100	96.3	96.7	100	97.2	0	97	100	93.2	93.3	0	93.4	100	0	100	0	100	
Single Units	0	30	0	0	30	2	0	1	0	3	0	35	3	0	38	0	0	0	0	0	
% Single Units	0	2.6	0	0	2.4	2.2	0	2.8	0	2.3	0	4.9	6.7	0	4.9	0	0	0	0	0	
TTST	1	15	0	0	16	1	0	0	0	1	0	13	0	0	13	0	0	0	0	0	
% TTST	2.6	1.3	0	0	1.3	1.1	0	0	0	0.8	0	1.8	0	0	1.7	0	0	0	0	0	
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	



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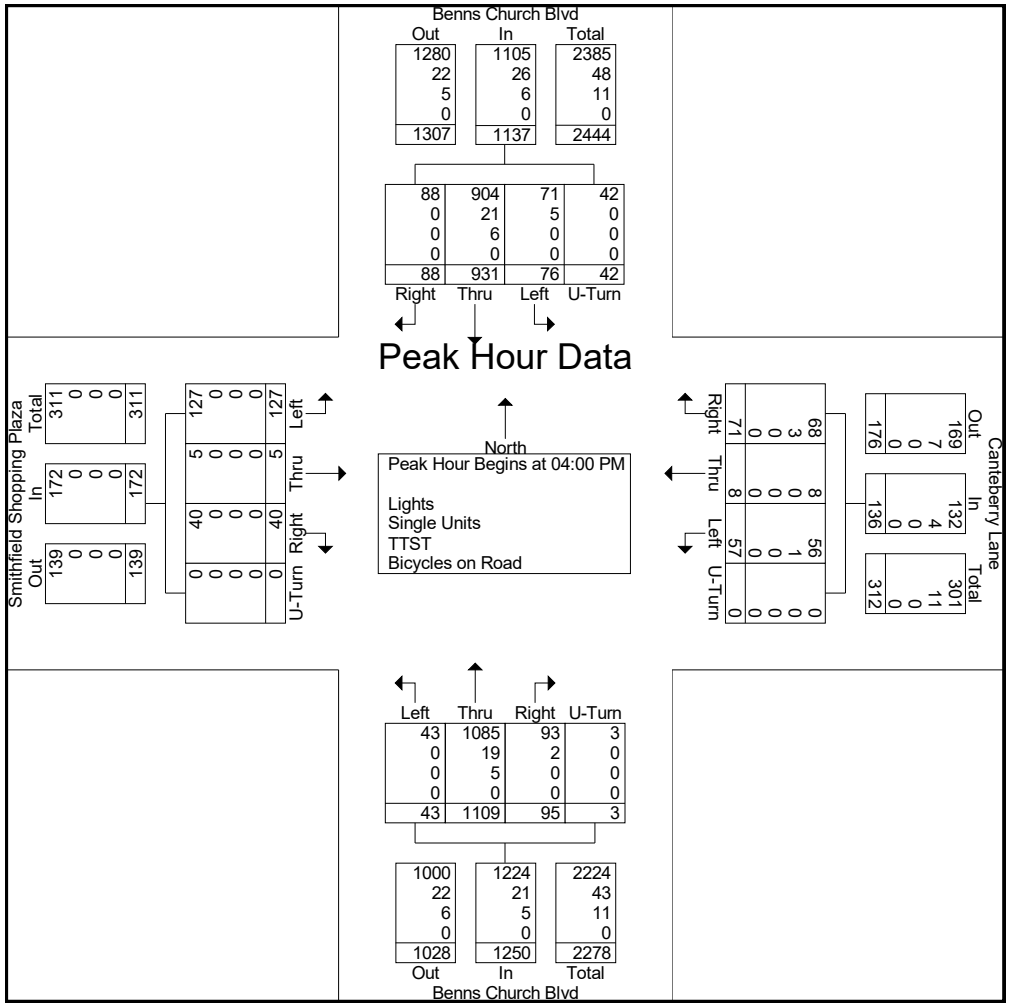
	Benns Church Blvd Southbound					Canteberry Lane Westbound					Benns Church Blvd Northbound					Smithfield Shopping Plaza Eastbound					
Start Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:00 PM																					
04:00 PM	15	244	31	7	297	16	3	17	0	36	11	269	28	2	310	31	2	6	0	39	682
04:15 PM	15	206	15	15	251	13	2	18	0	33	6	281	19	0	306	28	3	18	0	49	639
04:30 PM	21	233	20	7	281	19	2	19	0	40	18	265	11	0	294	35	0	5	0	40	655
04:45 PM	25	248	22	13	308	9	1	17	0	27	8	294	37	1	340	33	0	11	0	44	719
Total Volume	76	931	88	42	1137	57	8	71	0	136	43	1109	95	3	1250	127	5	40	0	172	2695
% App. Total	6.7	81.9	7.7	3.7		41.9	5.9	52.2	0		3.4	88.7	7.6	0.2		73.8	2.9	23.3	0		
PHF	.760	.939	.710	.700	.923	.750	.667	.934	.000	.850	.597	.943	.642	.375	.919	.907	.417	.556	.000	.878	.937
Lights	71	904	88	42	1105	56	8	68	0	132	43	1085	93	3	1224	127	5	40	0	172	2633
% Lights	93.4	97.1	100	100	97.2	98.2	100	95.8	0	97.1	100	97.8	97.9	100	97.9	100	100	100	0	100	97.7
Single Units	5	21	0	0	26	1	0	3	0	4	0	19	2	0	21	0	0	0	0	0	51
% Single Units	6.6	2.3	0	0	2.3	1.8	0	4.2	0	2.9	0	1.7	2.1	0	1.7	0	0	0	0	0	1.9
TTST	0	6	0	0	6	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	11
% TTST	0	0.6	0	0	0.5	0	0	0	0	0	0	0.5	0	0	0.4	0	0	0	0	0	0.4
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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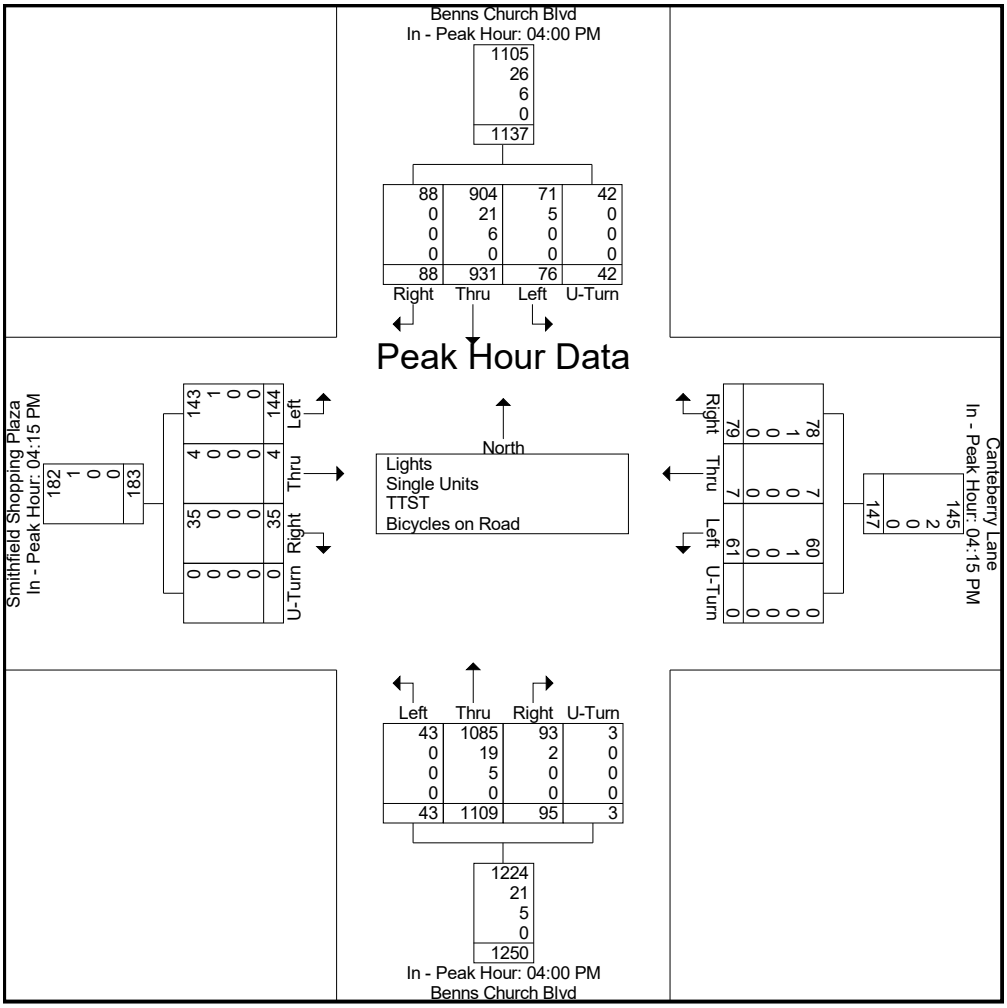
	Benns Church Blvd Southbound					Canteberry Lane Westbound					Benns Church Blvd Northbound					Smithfield Shopping Plaza Eastbound					
Start Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:15 PM - Peak 1 of 1																					
Peak Hour for Each Approach Begins at:																					
	04:00 PM					04:15 PM					04:00 PM					04:15 PM					
+0 mins.	15	244	31	7	297	13	2	18	0	33	11	269	28	2	310	28	3	18	0	49	
+15 mins.	15	206	15	15	251	19	2	19	0	40	6	281	19	0	306	35	0	5	0	40	
+30 mins.	21	233	20	7	281	9	1	17	0	27	18	265	11	0	294	33	0	11	0	44	
+45 mins.	25	248	22	13	308	20	2	25	0	47	8	294	37	1	340	48	1	1	0	50	
Total Volume	76	931	88	42	1137	61	7	79	0	147	43	1109	95	3	1250	144	4	35	0	183	
% App. Total	6.7	81.9	7.7	3.7		41.5	4.8	53.7	0		3.4	88.7	7.6	0.2		78.7	2.2	19.1	0		
PHF	.760	.939	.710	.700	.923	.763	.875	.790	.000	.782	.597	.943	.642	.375	.919	.750	.333	.486	.000	.915	
Lights	71	904	88	42	1105	60	7	78	0	145	43	1085	93	3	1224	143	4	35	0	182	
% Lights	93.4	97.1	100	100	97.2	98.4	100	98.7	0	98.6	100	97.8	97.9	100	97.9	99.3	100	100	0	99.5	
Single Units	5	21	0	0	26	1	0	1	0	2	0	19	2	0	21	1	0	0	0	1	
% Single Units	6.6	2.3	0	0	2.3	1.6	0	1.3	0	1.4	0	1.7	2.1	0	1.7	0.7	0	0	0	0.5	
TTST	0	6	0	0	6	0	0	0	0	0	0	5	0	0	5	0	0	0	0	0	
% TTST	0	0.6	0	0	0.5	0	0	0	0	0	0	0.5	0	0	0.4	0	0	0	0	0	
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	



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Groups Printed- Lights - Single Units - TTST - Bicycles on Road

	Benns Church Blvd Southbound				Private Drive Westbound				Benns Church Blvd Northbound				Cypress Run Drive Eastbound				
Start Time	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Int. Total
06:00 AM	0	205	7	0	0	0	0	0	2	136	0	0	1	0	4	0	355
06:15 AM	0	225	4	1	0	0	0	0	1	171	0	0	0	0	3	0	405
06:30 AM	0	278	9	1	0	0	0	0	2	149	0	4	0	0	3	0	446
06:45 AM	0	270	8	0	0	0	0	0	2	118	0	0	2	0	2	0	402
Total	0	978	28	2	0	0	0	0	7	574	0	4	3	0	12	0	1608
07:00 AM	0	433	4	0	0	0	0	0	2	157	0	2	0	0	5	0	603
07:15 AM	0	271	7	1	0	0	0	0	8	211	0	1	2	0	8	0	509
07:30 AM	0	209	9	1	0	0	0	0	3	191	0	2	4	0	3	0	422
07:45 AM	0	202	7	0	0	0	0	0	1	205	0	1	2	0	4	0	422
Total	0	1115	27	2	0	0	0	0	14	764	0	6	8	0	20	0	1956
02:30 PM	0	192	23	1	0	0	0	0	25	195	0	5	19	0	23	0	483
02:45 PM	0	179	33	0	0	0	1	0	31	256	1	2	21	0	22	0	546
Total	0	371	56	1	0	0	1	0	56	451	1	7	40	0	45	0	1029
03:00 PM	0	176	40	1	0	0	0	0	33	283	0	3	19	0	19	0	574
03:15 PM	0	197	29	0	0	0	1	0	26	244	1	6	28	0	13	0	545
03:30 PM	0	178	16	1	0	0	0	0	33	259	0	6	23	0	15	0	531
03:45 PM	0	234	16	0	0	0	0	0	36	264	0	8	22	0	18	0	598
Total	0	785	101	2	0	0	1	0	128	1050	1	23	92	0	65	0	2248
04:00 PM	0	230	40	0	0	0	0	0	40	284	0	4	26	0	17	0	641
04:15 PM	0	199	27	0	0	0	0	0	22	283	0	4	24	0	13	0	572
04:30 PM	0	240	27	0	0	0	0	0	25	269	0	4	25	0	11	0	601
04:45 PM	0	218	37	0	0	0	0	0	44	308	0	8	24	0	30	0	669
Total	0	887	131	0	0	0	0	0	131	1144	0	20	99	0	71	0	2483
05:00 PM	0	234	21	0	0	0	0	0	25	277	0	5	32	0	14	0	608
05:15 PM	0	215	34	0	0	0	1	0	25	292	0	3	22	0	19	0	611
Grand Total	0	4585	398	7	0	0	3	0	386	4552	2	68	296	0	246	0	10543
Apprch %	0	91.9	8	0.1	0	0	100	0	7.7	90.9	0	1.4	54.6	0	45.4	0	
Total %	0	43.5	3.8	0.1	0	0	0	0	3.7	43.2	0	0.6	2.8	0	2.3	0	
Lights	0	4426	394	7	0	0	3	0	379	4372	2	67	290	0	239	0	10179
% Lights	0	96.5	99	100	0	0	100	0	98.2	96	100	98.5	98	0	97.2	0	96.5
Single Units	0	105	3	0	0	0	0	0	4	137	0	0	5	0	4	0	258
% Single Units	0	2.3	0.8	0	0	0	0	0	1	3	0	0	1.7	0	1.6	0	2.4
TTST	0	54	1	0	0	0	0	0	3	43	0	1	1	0	3	0	106
% TTST	0	1.2	0.3	0	0	0	0	0	0.8	0.9	0	1.5	0.3	0	1.2	0	1
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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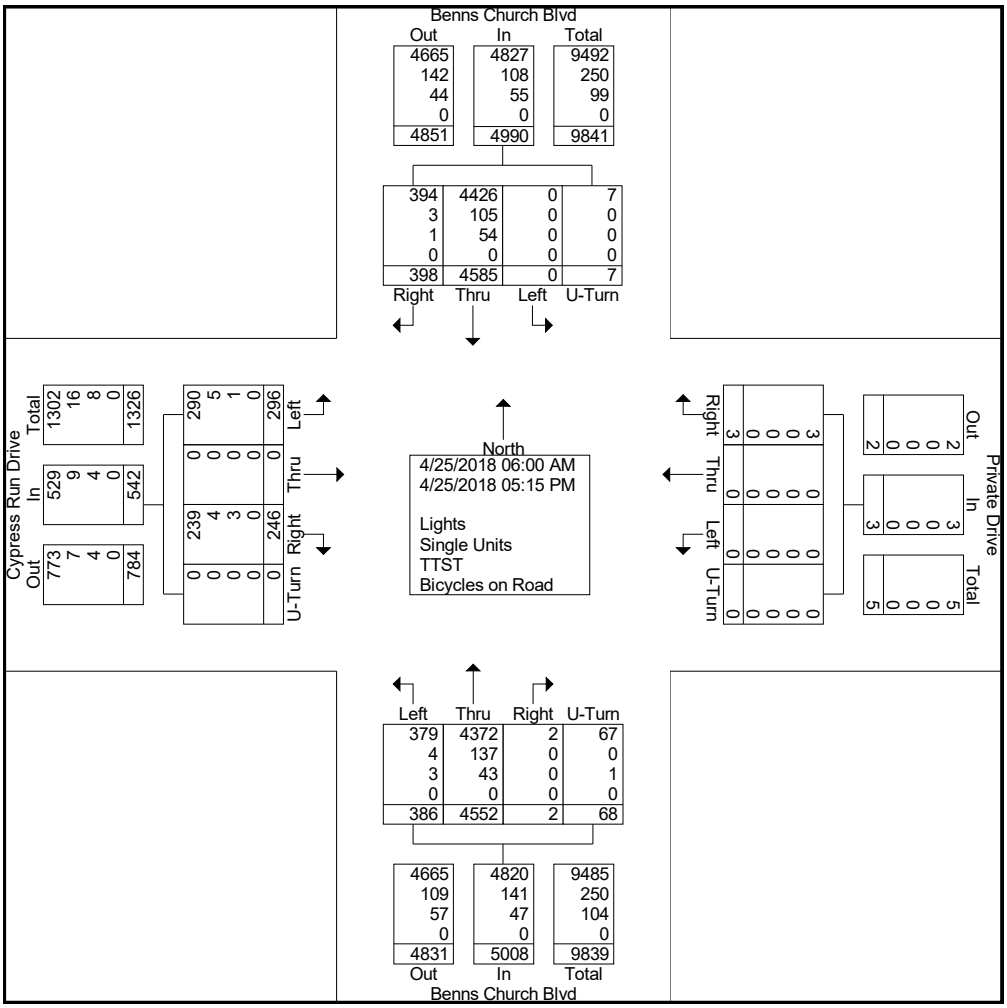

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File Name : Benns_Church_and_Cypress_Run_Dr_514981_04-25-2018
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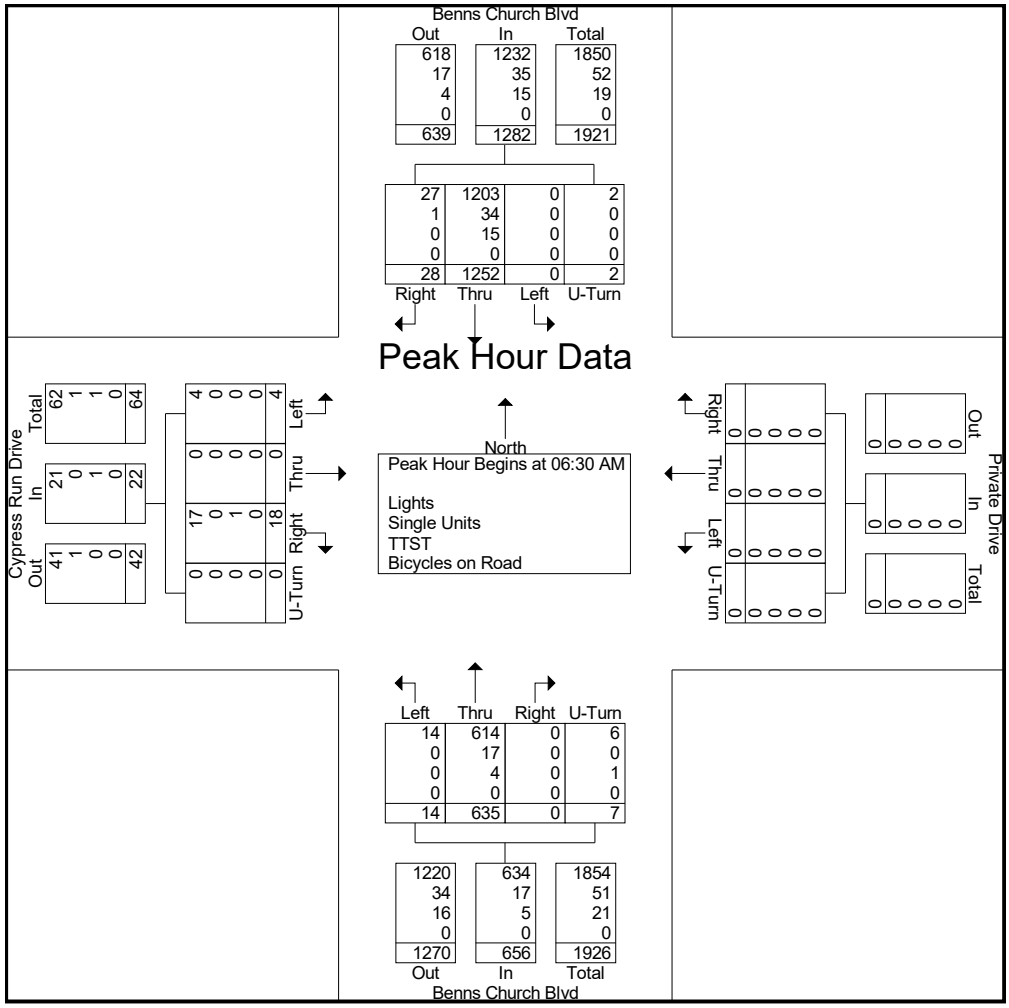
	Benns Church Blvd Southbound					Private Drive Westbound					Benns Church Blvd Northbound					Cypress Run Drive Eastbound					
Start Time			Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 06:30 AM																					
06:30 AM	0	278	9	1	288	0	0	0	0	0	2	149	0	4	155	0	0	3	0	3	446
06:45 AM	0	270	8	0	278	0	0	0	0	0	2	118	0	0	120	2	0	2	0	4	402
07:00 AM	0	433	4	0	437	0	0	0	0	0	2	157	0	2	161	0	0	5	0	5	603
07:15 AM	0	271	7	1	279	0	0	0	0	0	8	211	0	1	220	2	0	8	0	10	509
Total Volume	0	1252	28	2	1282	0	0	0	0	0	14	635	0	7	656	4	0	18	0	22	1960
% App. Total	0	97.7	2.2	0.2		0	0	0	0		2.1	96.8	0	1.1		18.2	0	81.8	0		
PHF	.000	.723	.778	.500	.733	.000	.000	.000	.000	.000	.438	.752	.000	.438	.745	.500	.000	.563	.000	.550	.813
Lights	0	1203	27	2	1232	0	0	0	0	0	14	614	0	6	634	4	0	17	0	21	1887
% Lights	0	96.1	96.4	100	96.1	0	0	0	0	0	100	96.7	0	85.7	96.6	100	0	94.4	0	95.5	96.3
Single Units	0	34	1	0	35	0	0	0	0	0	0	17	0	0	17	0	0	0	0	0	52
% Single Units	0	2.7	3.6	0	2.7	0	0	0	0	0	0	2.7	0	0	2.6	0	0	0	0	0	2.7
TTST	0	15	0	0	15	0	0	0	0	0	0	4	0	1	5	0	0	1	0	1	21
% TTST	0	1.2	0	0	1.2	0	0	0	0	0	0	0.6	0	14.3	0.8	0	0	5.6	0	4.5	1.1
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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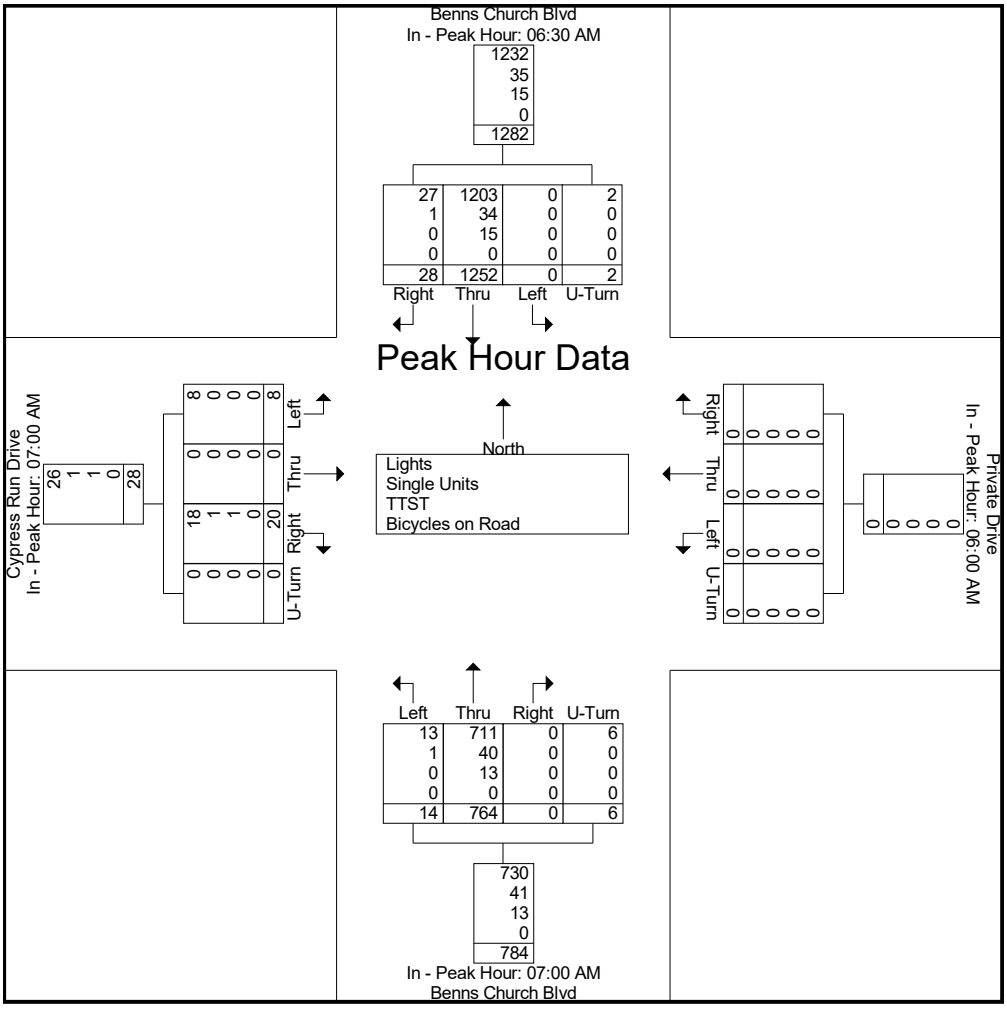
	Benns Church Blvd Southbound					Private Drive Westbound					Benns Church Blvd Northbound					Cypress Run Drive Eastbound					
Start Time			Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Each Approach Begins at:																					
	06:30 AM					06:00 AM					07:00 AM					07:00 AM					
+0 mins.	0	278	9	1	288	0	0	0	0	0	2	157	0	2	161	0	0	5	0	5	
+15 mins.	0	270	8	0	278	0	0	0	0	0	8	211	0	1	220	2	0	8	0	10	
+30 mins.	0	433	4	0	437	0	0	0	0	0	3	191	0	2	196	4	0	3	0	7	
+45 mins.	0	271	7	1	279	0	0	0	0	0	1	205	0	1	207	2	0	4	0	6	
Total Volume	0	1252	28	2	1282	0	0	0	0	0	14	764	0	6	784	8	0	20	0	28	
% App. Total	0	97.7	2.2	0.2		0	0	0	0		1.8	97.4	0	0.8		28.6	0	71.4	0		
PHF	.000	.723	.778	.500	.733	.000	.000	.000	.000	.000	.438	.905	.000	.750	.891	.500	.000	.625	.000	.700	
Lights	0	1203	27	2	1232	0	0	0	0	0	13	711	0	6	730	8	0	18	0	26	
% Lights	0	96.1	96.4	100	96.1	0	0	0	0	0	92.9	93.1	0	100	93.1	100	0	90	0	92.9	
Single Units	0	34	1	0	35	0	0	0	0	0	1	40	0	0	41	0	0	1	0	1	
% Single Units	0	2.7	3.6	0	2.7	0	0	0	0	0	7.1	5.2	0	0	5.2	0	0	5	0	3.6	
TTST	0	15	0	0	15	0	0	0	0	0	0	13	0	0	13	0	0	1	0	1	
% TTST	0	1.2	0	0	1.2	0	0	0	0	0	0	1.7	0	0	1.7	0	0	5	0	3.6	
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	



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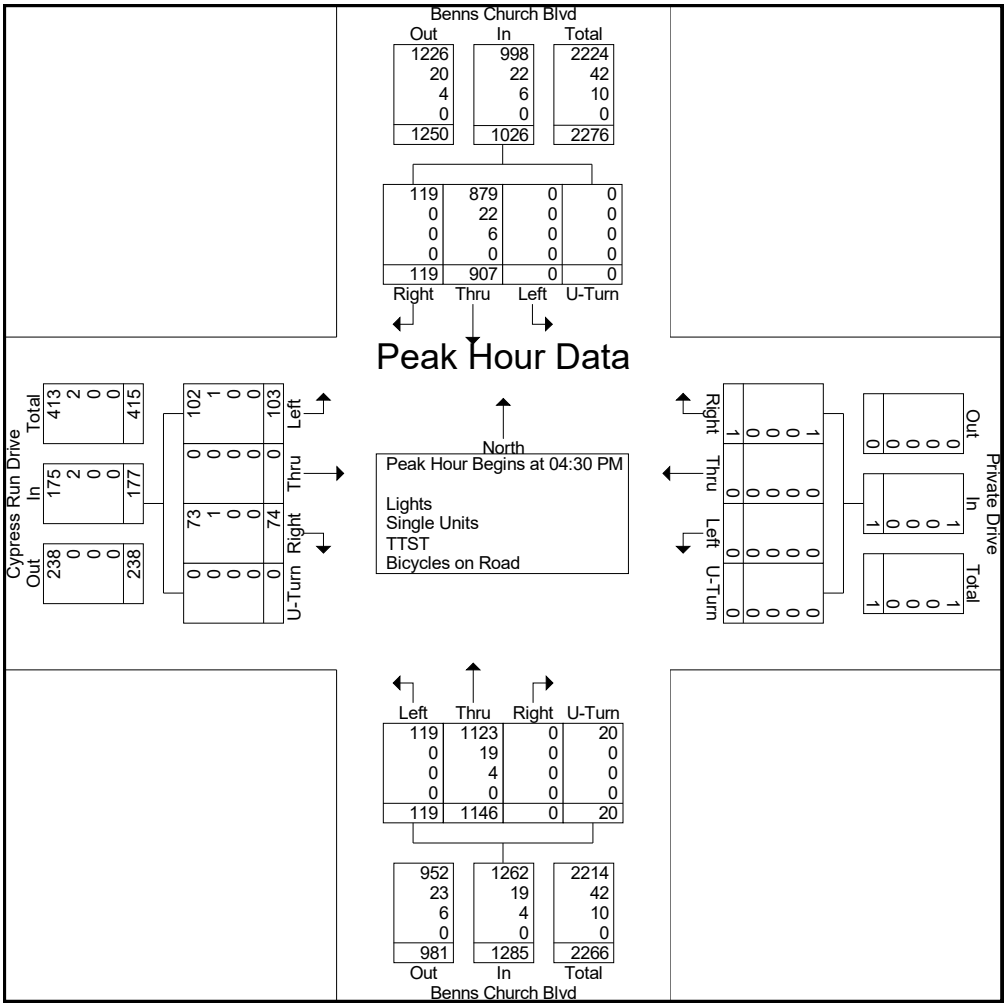
	Benns Church Blvd Southbound					Private Drive Westbound					Benns Church Blvd Northbound					Cypress Run Drive Eastbound					
Start Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	0	240	27	0	267	0	0	0	0	0	25	269	0	4	298	25	0	11	0	36	601
04:45 PM	0	218	37	0	255	0	0	0	0	0	44	308	0	8	360	24	0	30	0	54	669
05:00 PM	0	234	21	0	255	0	0	0	0	0	25	277	0	5	307	32	0	14	0	46	608
05:15 PM	0	215	34	0	249	0	0	1	0	1	25	292	0	3	320	22	0	19	0	41	611
Total Volume	0	907	119	0	1026	0	0	1	0	1	119	1146	0	20	1285	103	0	74	0	177	2489
% App. Total	0	88.4	11.6	0		0	0	100	0		9.3	89.2	0	1.6		58.2	0	41.8	0		
PHF	.000	.945	.804	.000	.961	.000	.000	.250	.000	.250	.676	.930	.000	.625	.892	.805	.000	.617	.000	.819	.930
Lights	0	879	119	0	998	0	0	1	0	1	119	1123	0	20	1262	102	0	73	0	175	2436
% Lights	0	96.9	100	0	97.3	0	0	100	0	100	100	98.0	0	100	98.2	99.0	0	98.6	0	98.9	97.9
Single Units	0	22	0	0	22	0	0	0	0	0	0	19	0	0	19	1	0	1	0	2	43
% Single Units	0	2.4	0	0	2.1	0	0	0	0	0	0	1.7	0	0	1.5	1.0	0	1.4	0	1.1	1.7
TTST	0	6	0	0	6	0	0	0	0	0	0	4	0	0	4	0	0	0	0	0	10
% TTST	0	0.7	0	0	0.6	0	0	0	0	0	0	0.3	0	0	0.3	0	0	0	0	0	0.4
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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File Name : Benns_Church_and_Cypress_Run_Dr_514981_04-25-2018
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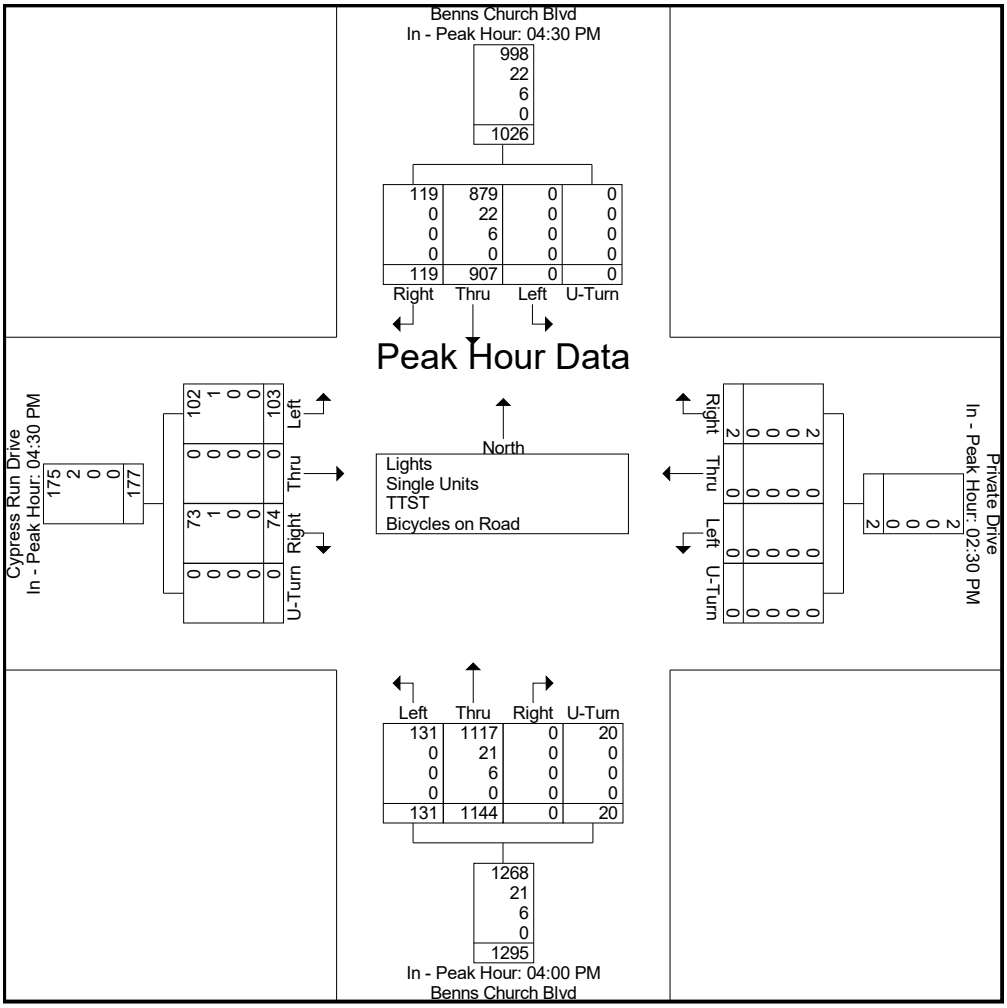
	Benns Church Blvd Southbound					Private Drive Westbound					Benns Church Blvd Northbound					Cypress Run Drive Eastbound					
Start Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:15 PM - Peak 1 of 1																					
Peak Hour for Each Approach Begins at:																					
	04:30 PM					02:30 PM					04:00 PM					04:30 PM					
+0 mins.	0	240	27	0	267	0	0	0	0	0	40	284	0	4	328	25	0	11	0	36	
+15 mins.	0	218	37	0	255	0	0	1	0	1	22	283	0	4	309	24	0	30	0	54	
+30 mins.	0	234	21	0	255	0	0	0	0	0	25	269	0	4	298	32	0	14	0	46	
+45 mins.	0	215	34	0	249	0	0	1	0	1	44	308	0	8	360	22	0	19	0	41	
Total Volume	0	907	119	0	1026	0	0	2	0	2	131	1144	0	20	1295	103	0	74	0	177	
% App. Total	0	88.4	11.6	0		0	0	100	0		10.1	88.3	0	1.5		58.2	0	41.8	0		
PHF	.000	.945	.804	.000	.961	.000	.000	.500	.000	.500	.744	.929	.000	.625	.899	.805	.000	.617	.000	.819	
Lights	0	879	119	0	998	0	0	2	0	2	131	1117	0	20	1268	102	0	73	0	175	
% Lights	0	96.9	100	0	97.3	0	0	100	0	100	100	97.6	0	100	97.9	99	0	98.6	0	98.9	
Single Units	0	22	0	0	22	0	0	0	0	0	0	21	0	0	21	1	0	1	0	2	
% Single Units	0	2.4	0	0	2.1	0	0	0	0	0	0	1.8	0	0	1.6	1	0	1.4	0	1.1	
TTST	0	6	0	0	6	0	0	0	0	0	0	6	0	0	6	0	0	0	0	0	
% TTST	0	0.7	0	0	0.6	0	0	0	0	0	0	0.5	0	0	0.5	0	0	0	0	0	
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	



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File Name : Benns_Church_and_Turner_Drive_514980_04-24-2018
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Groups Printed- Lights - Single Units - TTST - Bicycles on Road

	Benns Church Blvd Southbound				Sherwin Williams Paints Westbound				Benns Church Blvd Northbound				Turner Drive Eastbound				
Start Time	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Int. Total
06:00 AM	0	216	8	0	0	0	0	0	7	134	0	0	3	0	30	0	398
06:15 AM	0	228	10	0	0	0	0	0	7	144	0	0	7	0	30	0	426
06:30 AM	0	233	16	0	0	0	0	0	19	150	1	0	10	0	21	0	450
06:45 AM	0	186	37	0	0	0	0	0	50	130	1	0	5	0	23	0	432
Total	0	863	71	0	0	0	0	0	83	558	2	0	25	0	104	0	1706
07:00 AM	0	192	142	1	0	23	1	0	103	104	34	0	30	0	56	0	686
07:15 AM	0	168	120	2	0	41	0	0	72	148	28	0	60	1	87	0	727
07:30 AM	0	288	13	0	0	0	0	0	18	152	0	1	67	0	74	0	613
07:45 AM	1	190	13	2	1	0	0	0	22	156	0	0	14	0	36	0	435
Total	1	838	288	5	1	64	1	0	215	560	62	1	171	1	253	0	2461
02:30 PM	0	170	44	0	1	0	1	0	32	179	0	1	26	0	23	0	477
02:45 PM	1	119	22	5	1	0	0	0	21	193	0	0	124	0	70	0	556
Total	1	289	66	5	2	0	1	0	53	372	0	1	150	0	93	0	1033
03:00 PM	1	168	18	4	0	0	0	0	18	208	0	1	83	0	70	0	571
03:15 PM	0	165	16	4	0	0	1	0	28	260	1	0	30	0	35	0	540
03:30 PM	0	150	26	4	0	0	0	0	31	258	0	0	19	0	19	0	507
03:45 PM	0	197	23	9	1	0	1	0	31	204	3	0	19	0	39	0	527
Total	1	680	83	21	1	0	2	0	108	930	4	1	151	0	163	0	2145
04:00 PM	0	207	21	5	0	0	0	0	38	330	0	0	21	0	19	0	641
04:15 PM	0	197	15	6	0	0	1	0	54	261	0	0	8	0	24	0	566
04:30 PM	0	223	18	2	0	0	0	0	32	317	1	0	2	0	20	0	615
04:45 PM	0	217	31	2	0	1	0	0	43	292	0	0	23	0	27	0	636
Total	0	844	85	15	0	1	1	0	167	1200	1	0	54	0	90	0	2458
05:00 PM	1	215	30	9	0	0	1	0	40	271	0	0	30	0	14	0	611
05:15 PM	1	222	33	14	0	0	1	0	38	316	0	0	21	0	25	0	671
Grand Total	5	3951	656	69	4	65	7	0	704	4207	69	3	602	1	742	0	11085
Apprch %	0.1	84.4	14	1.5	5.3	85.5	9.2	0	14.1	84.4	1.4	0.1	44.8	0.1	55.2	0	
Total %	0	35.6	5.9	0.6	0	0.6	0.1	0	6.4	38	0.6	0	5.4	0	6.7	0	
Lights	5	3831	624	69	4	65	7	0	668	4066	69	3	563	1	689	0	10664
% Lights	100	97	95.1	100	100	100	100	0	94.9	96.6	100	100	93.5	100	92.9	0	96.2
Single Units	0	81	32	0	0	0	0	0	35	95	0	0	38	0	52	0	333
% Single Units	0	2.1	4.9	0	0	0	0	0	5	2.3	0	0	6.3	0	7	0	3
TTST	0	39	0	0	0	0	0	0	1	46	0	0	1	0	1	0	88
% TTST	0	1	0	0	0	0	0	0	0.1	1.1	0	0	0.2	0	0.1	0	0.8
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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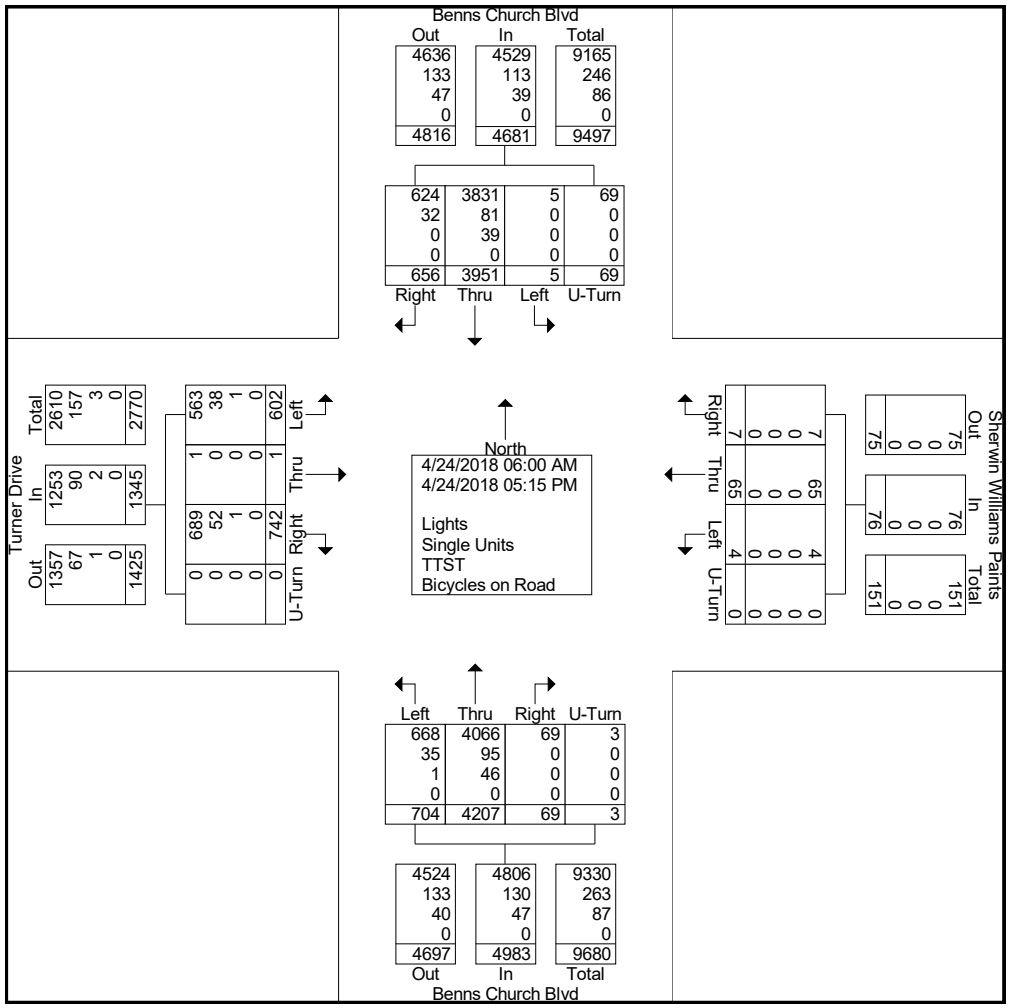

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File Name : Benns_Church_and_Turner_Drive_514980_04-24-2018
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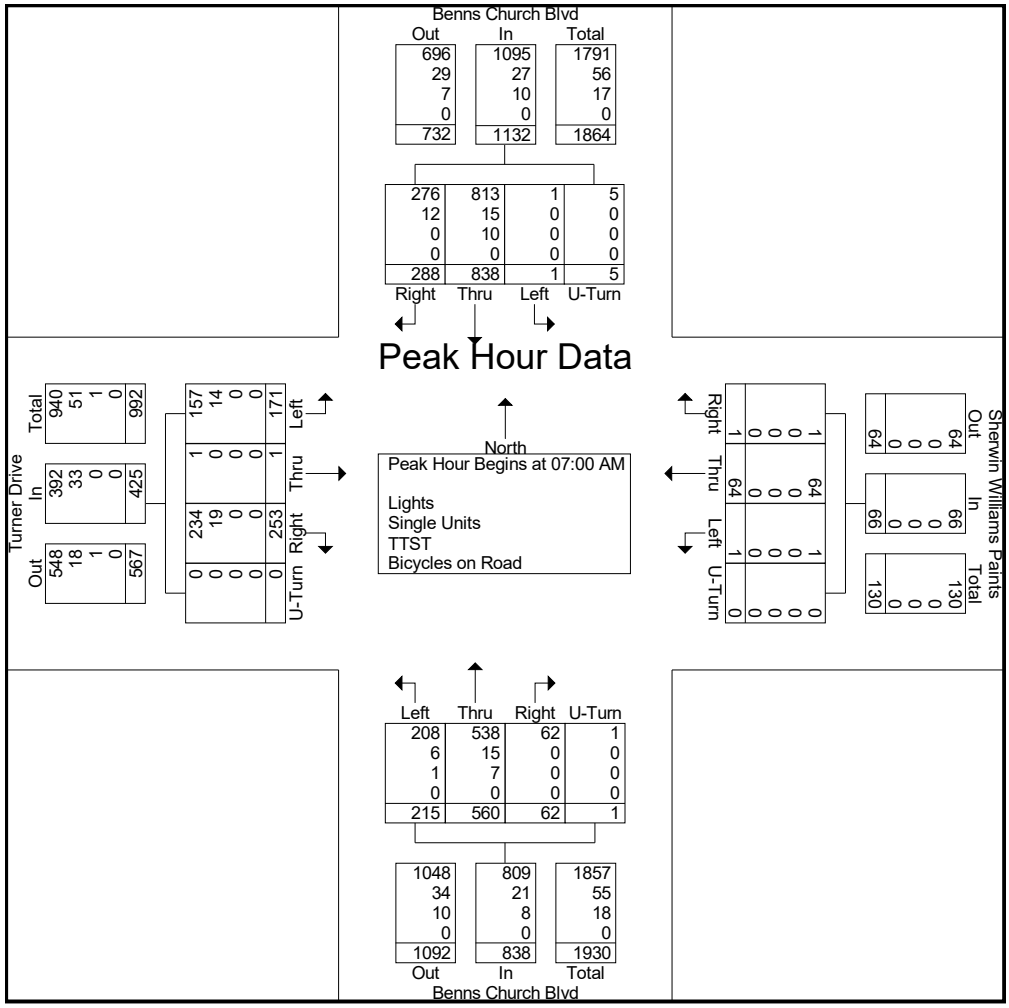
Start Date : 4/24/2018

	Benns Church Blvd Southbound					Sherwin Williams Paints Westbound					Benns Church Blvd Northbound					Turner Drive Eastbound					
Start Time			Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	0	192	142	1	335	0	23	1	0	24	103	104	34	0	241	30	0	56	0	86	686
07:15 AM	0	168	120	2	290	0	41	0	0	41	72	148	28	0	248	60	1	87	0	148	727
07:30 AM	0	288	13	0	301	0	0	0	0	0	18	152	0	1	171	67	0	74	0	141	613
07:45 AM	1	190	13	2	206	1	0	0	0	1	22	156	0	0	178	14	0	36	0	50	435
Total Volume	1	838	288	5	1132	1	64	1	0	66	215	560	62	1	838	171	1	253	0	425	2461
% App. Total	0.1	74	25.4	0.4		1.5	97	1.5	0		25.7	66.8	7.4	0.1		40.2	0.2	59.5	0		
PHF	.250	.727	.507	.625	.845	.250	.390	.250	.000	.402	.522	.897	.456	.250	.845	.638	.250	.727	.000	.718	.846
Lights	1	813	276	5	1095	1	64	1	0	66	208	538	62	1	809	157	1	234	0	392	2362
% Lights	100	97.0	95.8	100	96.7	100	100	100	0	100	96.7	96.1	100	100	96.5	91.8	100	92.5	0	92.2	96.0
Single Units	0	15	12	0	27	0	0	0	0	0	6	15	0	0	21	14	0	19	0	33	81
% Single Units	0	1.8	4.2	0	2.4	0	0	0	0	0	2.8	2.7	0	0	2.5	8.2	0	7.5	0	7.8	3.3
TTST	0	10	0	0	10	0	0	0	0	0	1	7	0	0	8	0	0	0	0	0	18
% TTST	0	1.2	0	0	0.9	0	0	0	0	0	0.5	1.3	0	0	1.0	0	0	0	0	0	0.7
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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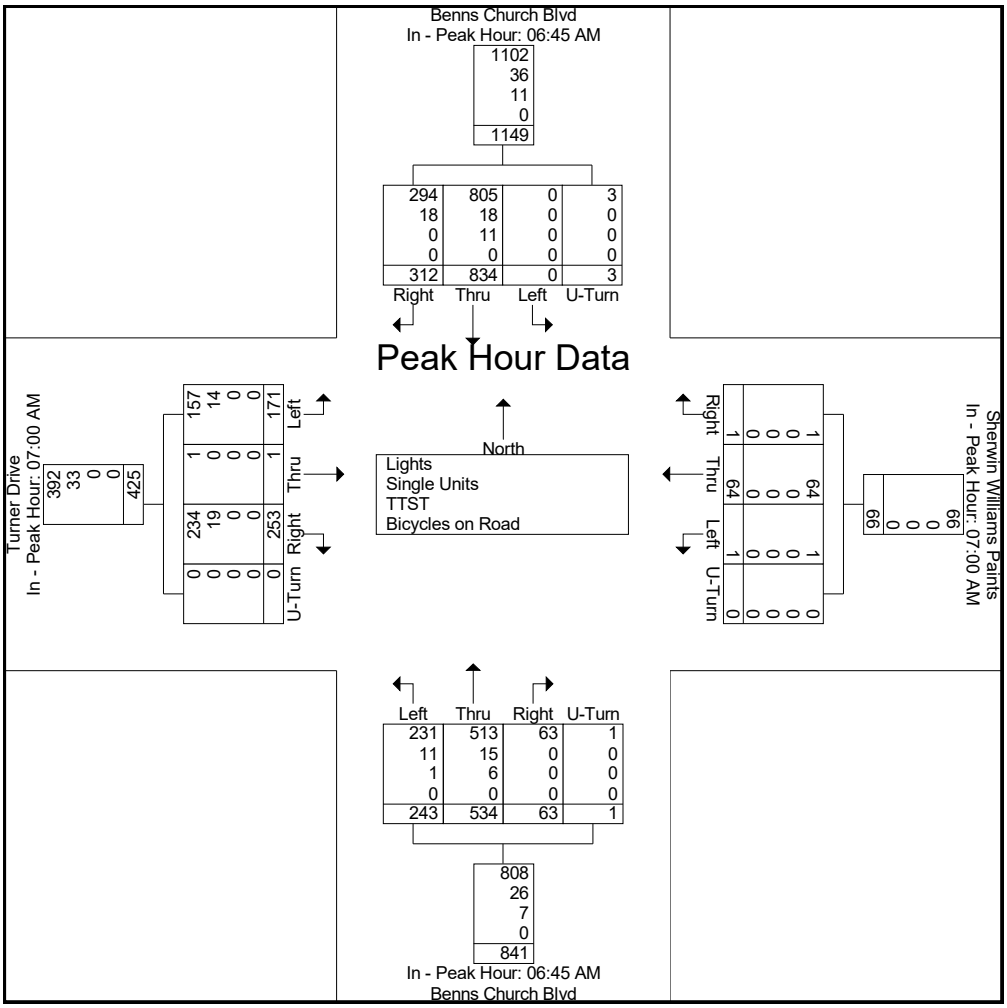
File Name : Benns_Church_and_Turner_Drive_514980_04-24-2018
Site Code :
Start Date : 4/24/2018

	Benns Church Blvd Southbound					Sherwin Williams Paints Westbound					Benns Church Blvd Northbound					Turner Drive Eastbound					
Start Time			Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Each Approach Begins at:																					
	06:45 AM					07:00 AM					06:45 AM					07:00 AM					
+0 mins.	0	186	37	0	223	0	23	1	0	24	50	130	1	0	181	30	0	56	0	86	
+15 mins.	0	192	142	1	335	0	41	0	0	41	103	104	34	0	241	60	1	87	0	148	
+30 mins.	0	168	120	2	290	0	0	0	0	0	72	148	28	0	248	67	0	74	0	141	
+45 mins.	0	288	13	0	301	1	0	0	0	1	18	152	0	1	171	14	0	36	0	50	
Total Volume	0	834	312	3	1149	1	64	1	0	66	243	534	63	1	841	171	1	253	0	425	
% App. Total	0	72.6	27.2	0.3		1.5	97	1.5	0		28.9	63.5	7.5	0.1		40.2	0.2	59.5	0		
PHF	.000	.724	.549	.375	.857	.250	.390	.250	.000	.402	.590	.878	.463	.250	.848	.638	.250	.727	.000	.718	
Lights	0	805	294	3	1102	1	64	1	0	66	231	513	63	1	808	157	1	234	0	392	
% Lights	0	96.5	94.2	100	95.9	100	100	100	0	100	95.1	96.1	100	100	96.1	91.8	100	92.5	0	92.2	
Single Units	0	18	18	0	36	0	0	0	0	0	11	15	0	0	26	14	0	19	0	33	
% Single Units	0	2.2	5.8	0	3.1	0	0	0	0	0	4.5	2.8	0	0	3.1	8.2	0	7.5	0	7.8	
TTST	0	11	0	0	11	0	0	0	0	0	1	6	0	0	7	0	0	0	0	0	
% TTST	0	1.3	0	0	1	0	0	0	0	0	0.4	1.1	0	0	0.8	0	0	0	0	0	
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	



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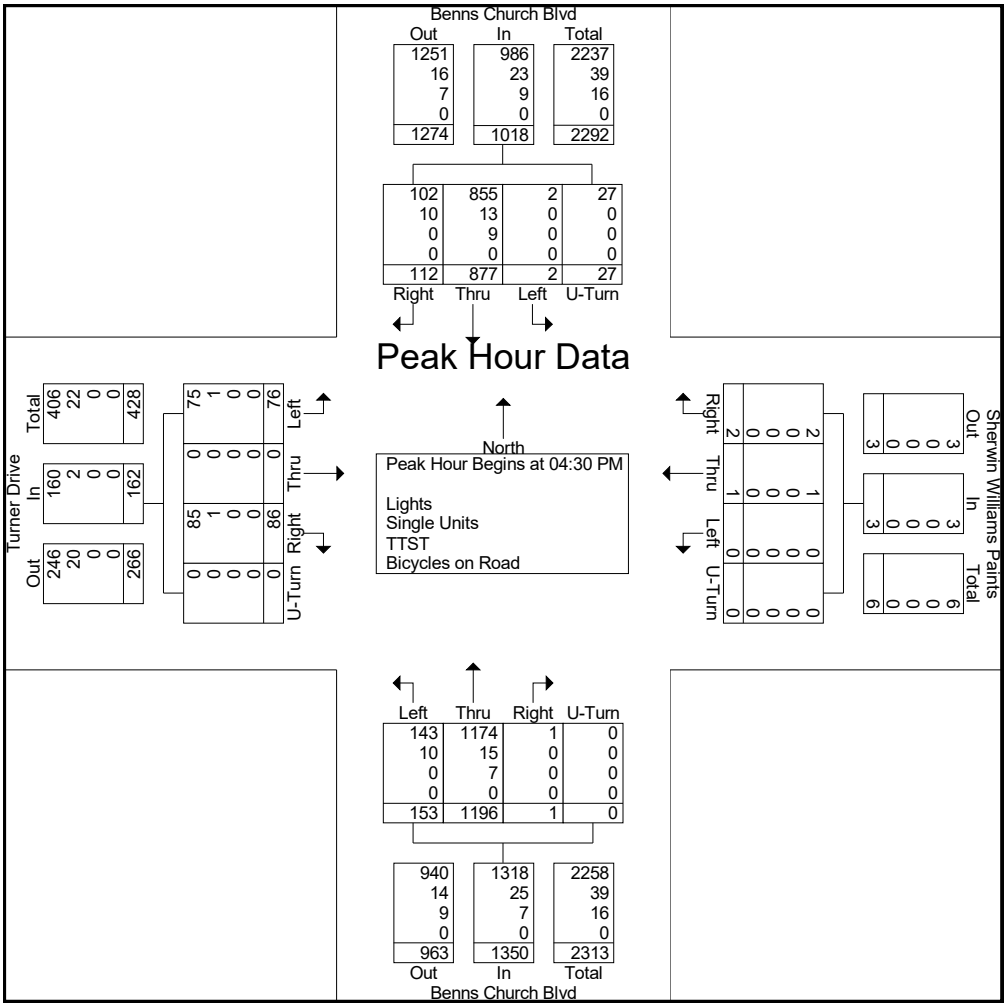
	Benns Church Blvd Southbound					Sherwin Williams Paints Westbound					Benns Church Blvd Northbound					Turner Drive Eastbound					
Start Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	0	223	18	2	243	0	0	0	0	0	32	317	1	0	350	2	0	20	0	22	615
04:45 PM	0	217	31	2	250	0	1	0	0	1	43	292	0	0	335	23	0	27	0	50	636
05:00 PM	1	215	30	9	255	0	0	1	0	1	40	271	0	0	311	30	0	14	0	44	611
05:15 PM	1	222	33	14	270	0	0	1	0	1	38	316	0	0	354	21	0	25	0	46	671
Total Volume	2	877	112	27	1018	0	1	2	0	3	153	1196	1	0	1350	76	0	86	0	162	2533
% App. Total	0.2	86.1	11	2.7		0	33.3	66.7	0		11.3	88.6	0.1	0		46.9	0	53.1	0		
PHF	.500	.983	.848	.482	.943	.000	.250	.500	.000	.750	.890	.943	.250	.000	.953	.633	.000	.796	.000	.810	.944
Lights	2	855	102	27	986	0	1	2	0	3	143	1174	1	0	1318	75	0	85	0	160	2467
% Lights	100	97.5	91.1	100	96.9	0	100	100	0	100	93.5	98.2	100	0	97.6	98.7	0	98.8	0	98.8	97.4
Single Units	0	13	10	0	23	0	0	0	0	0	10	15	0	0	25	1	0	1	0	2	50
% Single Units	0	1.5	8.9	0	2.3	0	0	0	0	0	6.5	1.3	0	0	1.9	1.3	0	1.2	0	1.2	2.0
TTST	0	9	0	0	9	0	0	0	0	0	0	7	0	0	7	0	0	0	0	0	16
% TTST	0	1.0	0	0	0.9	0	0	0	0	0	0	0.6	0	0	0.5	0	0	0	0	0	0.6
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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File Name : Benns_Church_and_Turner_Drive_514980_04-24-2018
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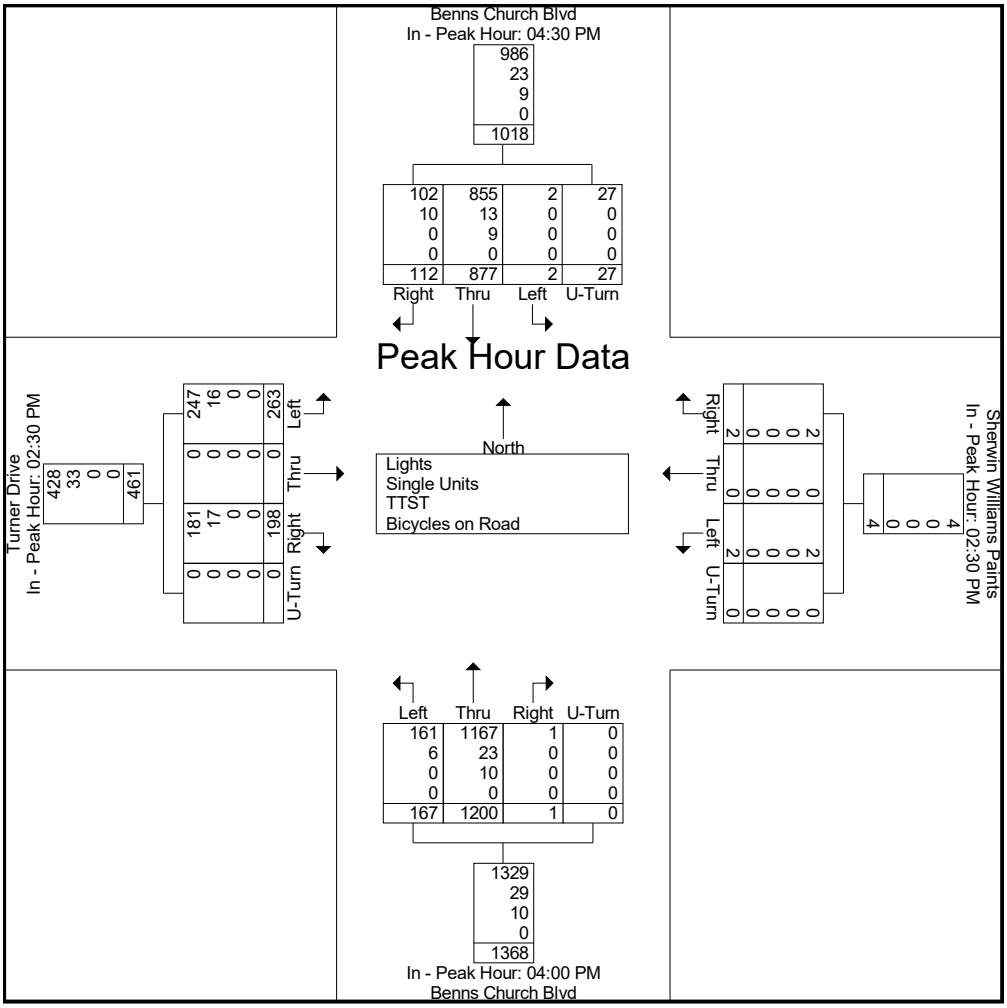
	Benns Church Blvd Southbound					Sherwin Williams Paints Westbound					Benns Church Blvd Northbound					Turner Drive Eastbound					
Start Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:15 PM - Peak 1 of 1																					
Peak Hour for Each Approach Begins at:																					
	04:30 PM					02:30 PM					04:00 PM					02:30 PM					
+0 mins.	0	223	18	2	243	1	0	1	0	2	38	330	0	0	368	26	0	23	0	49	
+15 mins.	0	217	31	2	250	1	0	0	0	1	54	261	0	0	315	124	0	70	0	194	
+30 mins.	1	215	30	9	255	0	0	0	0	0	32	317	1	0	350	83	0	70	0	153	
+45 mins.	1	222	33	14	270	0	0	1	0	1	43	292	0	0	335	30	0	35	0	65	
Total Volume	2	877	112	27	1018	2	0	2	0	4	167	1200	1	0	1368	263	0	198	0	461	
% App. Total	0.2	86.1	11	2.7		50	0	50	0		12.2	87.7	0.1	0		57	0	43	0		
PHF	.500	.983	.848	.482	.943	.500	.000	.500	.000	.500	.773	.909	.250	.000	.929	.530	.000	.707	.000	.594	
Lights	2	855	102	27	986	2	0	2	0	4	161	1167	1	0	1329	247	0	181	0	428	
% Lights	100	97.5	91.1	100	96.9	100	0	100	0	100	96.4	97.2	100	0	97.1	93.9	0	91.4	0	92.8	
Single Units	0	13	10	0	23	0	0	0	0	0	6	23	0	0	29	16	0	17	0	33	
% Single Units	0	1.5	8.9	0	2.3	0	0	0	0	0	3.6	1.9	0	0	2.1	6.1	0	8.6	0	7.2	
TTST	0	9	0	0	9	0	0	0	0	0	0	10	0	0	10	0	0	0	0	0	
% TTST	0	1	0	0	0.9	0	0	0	0	0	0	0.8	0	0	0.7	0	0	0	0	0	
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	



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File Name : Benns Church with Median Break Combined
Site Code :
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Groups Printed- Lights - Single Units - TTST

	Benns Church Blvd Southbound		Benns Church Blvd Northbound		
Start Time	Thru	U-Turn	Thru	U-Turn	Int. Total
06:00 AM	255	0	135	0	390
06:15 AM	263	0	174	0	437
06:30 AM	283	0	164	0	447
06:45 AM	265	0	167	0	432
Total	1066	0	640	0	1706
07:00 AM	246	0	268	0	514
07:15 AM	322	0	241	1	564
07:30 AM	314	1	213	3	531
07:45 AM	248	0	194	0	442
Total	1130	1	916	4	2051
08:00 AM	221	0	176	3	400
08:15 AM	187	0	190	1	378
08:30 AM	227	0	199	0	426
08:45 AM	194	0	194	0	388
Total	829	0	759	4	1592
09:00 AM	227	0	143	1	371
09:15 AM	188	0	159	2	349
09:30 AM	159	0	148	0	307
09:45 AM	160	0	140	3	303
Total	734	0	590	6	1330
10:00 AM	153	3	149	1	306
10:15 AM	174	0	155	0	329
10:30 AM	170	0	175	0	345
10:45 AM	152	0	171	2	325
Total	649	3	650	3	1305
11:00 AM	138	0	129	2	269
11:15 AM	175	0	179	0	354
11:30 AM	174	0	163	1	338
11:45 AM	167	0	182	0	349
Total	654	0	653	3	1310
12:00 PM	165	0	159	0	324
12:15 PM	194	1	195	2	392
12:30 PM	195	0	214	0	409
12:45 PM	181	0	200	2	383
Total	735	1	768	4	1508
01:00 PM	176	1	172	1	350
01:15 PM	211	0	195	1	407
01:30 PM	165	0	189	1	355
01:45 PM	185	1	210	3	399
Total	737	2	766	6	1511
02:00 PM	165	0	195	1	361
02:15 PM	170	0	210	0	380
02:30 PM	186	0	223	1	410
02:45 PM	230	1	241	0	472
Total	751	1	869	2	1623
03:00 PM	264	0	245	2	511
03:15 PM	229	1	294	3	527

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Groups Printed- Lights - Single Units - TTST

	Benns Church Blvd Southbound		Benns Church Blvd Northbound		
Start Time	Thru	U-Turn	Thru	U-Turn	Int. Total
03:30 PM	234	0	280	0	514
03:45 PM	218	2	298	0	518
Total	945	3	1117	5	2070
04:00 PM	245	1	408	2	656
04:15 PM	239	2	338	1	580
04:30 PM	272	0	364	3	639
04:45 PM	282	1	376	0	659
Total	1038	4	1486	6	2534
05:00 PM	267	0	391	2	660
05:15 PM	270	0	361	1	632
05:30 PM	204	2	370	0	576
05:45 PM	213	1	403	0	617
Total	954	3	1525	3	2485
06:00 PM	219	0	342	0	561
06:15 PM	261	1	243	1	506
06:30 PM	251	0	236	1	488
06:45 PM	186	0	206	1	393
Total	917	1	1027	3	1948
Grand Total	11139	19	11766	49	22973
Apprch %	99.8	0.2	99.6	0.4	
Total %	48.5	0.1	51.2	0.2	
Lights	10594	19	11202	48	21863
% Lights	95.1	100	95.2	98	95.2
Single Units	383	0	360	1	744
% Single Units	3.4	0	3.1	2	3.2
TTST	162	0	204	0	366
% TTST	1.5	0	1.7	0	1.6

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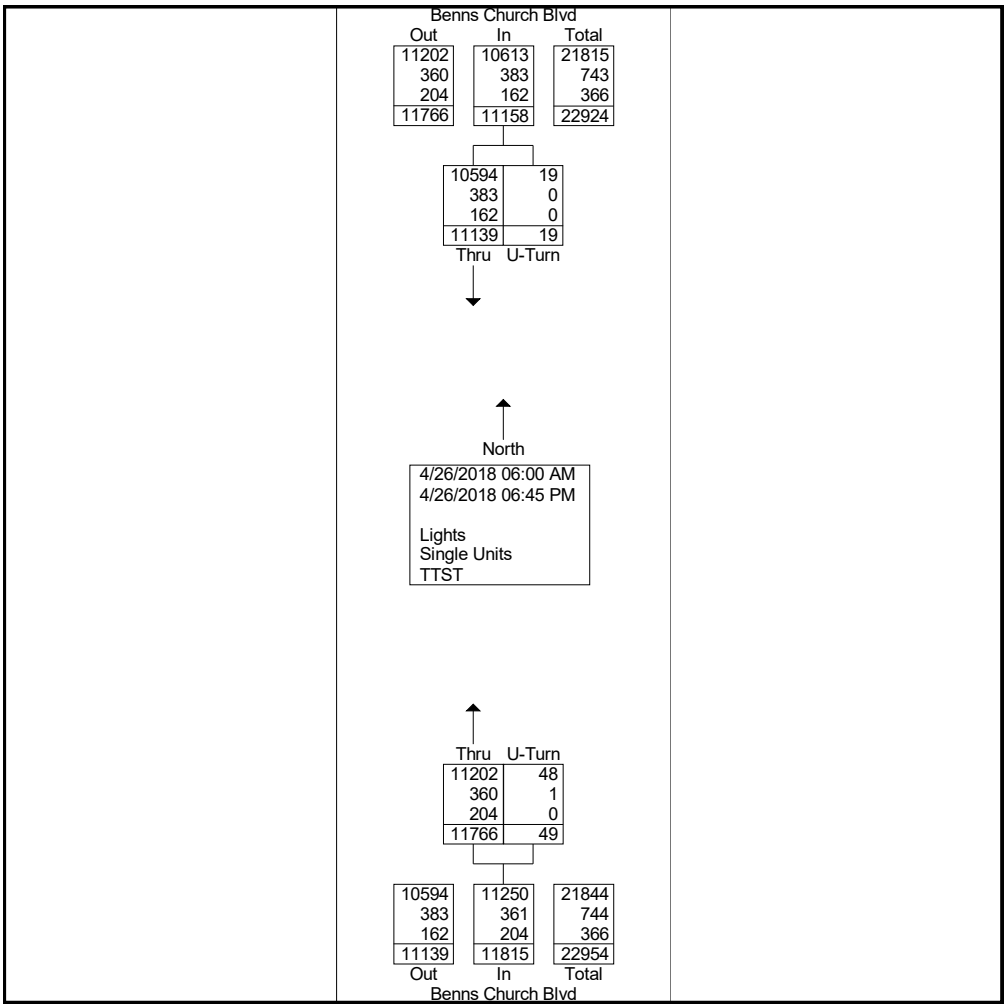

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File Name : Benns Church with Median Break Combined
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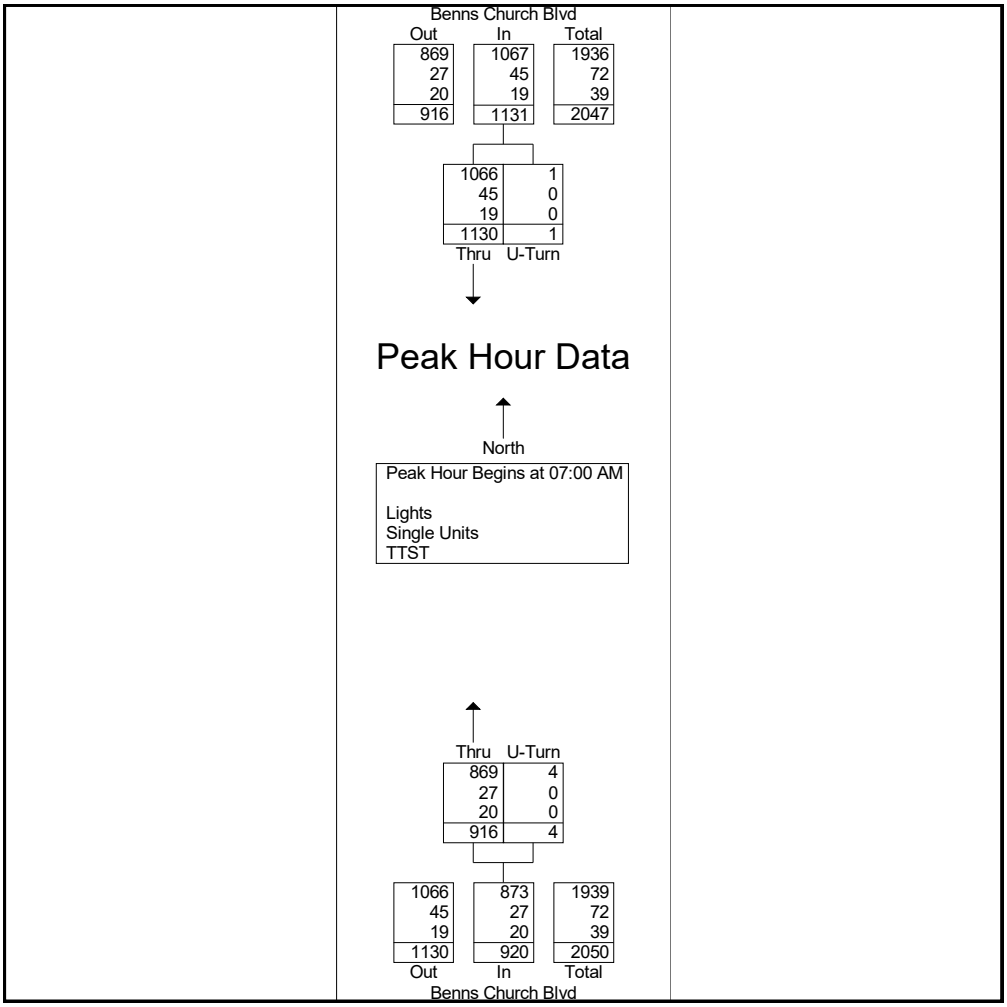
	Benns Church Blvd Southbound			Benns Church Blvd Northbound			
Start Time	Thru	U-Turn	App. Total	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 09:45 AM - Peak 1 of 1							
Peak Hour for Entire Intersection Begins at 07:00 AM							
07:00 AM	246	0	246	268	0	268	514
07:15 AM	322	0	322	241	1	242	564
07:30 AM	314	1	315	213	3	216	531
07:45 AM	248	0	248	194	0	194	442
Total Volume	1130	1	1131	916	4	920	2051
% App. Total	99.9	0.1		99.6	0.4		
PHF	.877	.250	.878	.854	.333	.858	.909
Lights	1066	1	1067	869	4	873	1940
% Lights	94.3	100	94.3	94.9	100	94.9	94.6
Single Units	45	0	45	27	0	27	72
% Single Units	4.0	0	4.0	2.9	0	2.9	3.5
TTST	19	0	19	20	0	20	39
% TTST	1.7	0	1.7	2.2	0	2.2	1.9



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File Name : Benns Church with Median Break Combined
Site Code :
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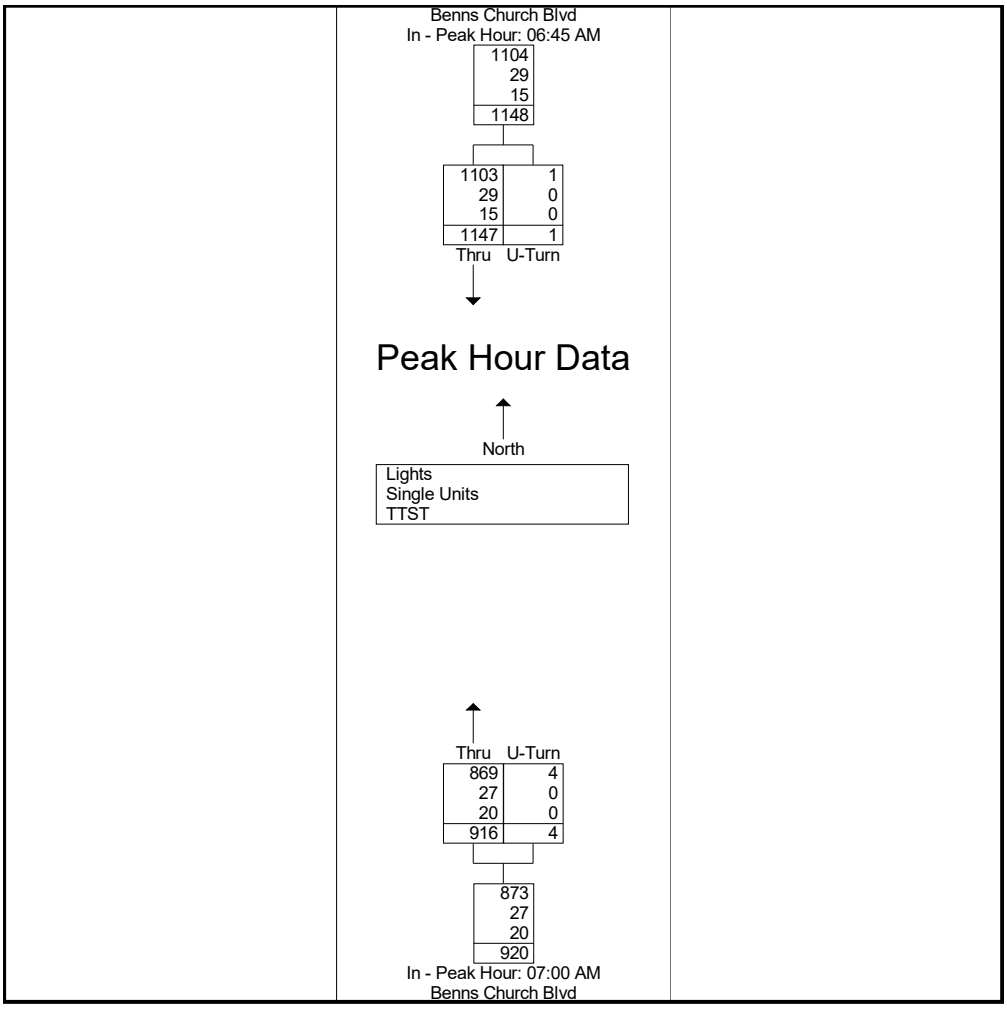
	Benns Church Blvd Southbound			Benns Church Blvd Northbound			
Start Time	Thru	U-Turn	App. Total	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 09:45 AM - Peak 1 of 1							
Peak Hour for Each Approach Begins at:							
	06:45 AM			07:00 AM			
+0 mins.	265	0	265	268	0	268	
+15 mins.	246	0	246	241	1	242	
+30 mins.	322	0	322	213	3	216	
+45 mins.	314	1	315	194	0	194	
Total Volume	1147	1	1148	916	4	920	
% App. Total	99.9	0.1		99.6	0.4		
PHF	.891	.250	.891	.854	.333	.858	
Lights	1103	1	1104	869	4	873	
% Lights	96.2	100	96.2	94.9	100	94.9	
Single Units	29	0	29	27	0	27	
% Single Units	2.5	0	2.5	2.9	0	2.9	
TTST	15	0	15	20	0	20	
% TTST	1.3	0	1.3	2.2	0	2.2	



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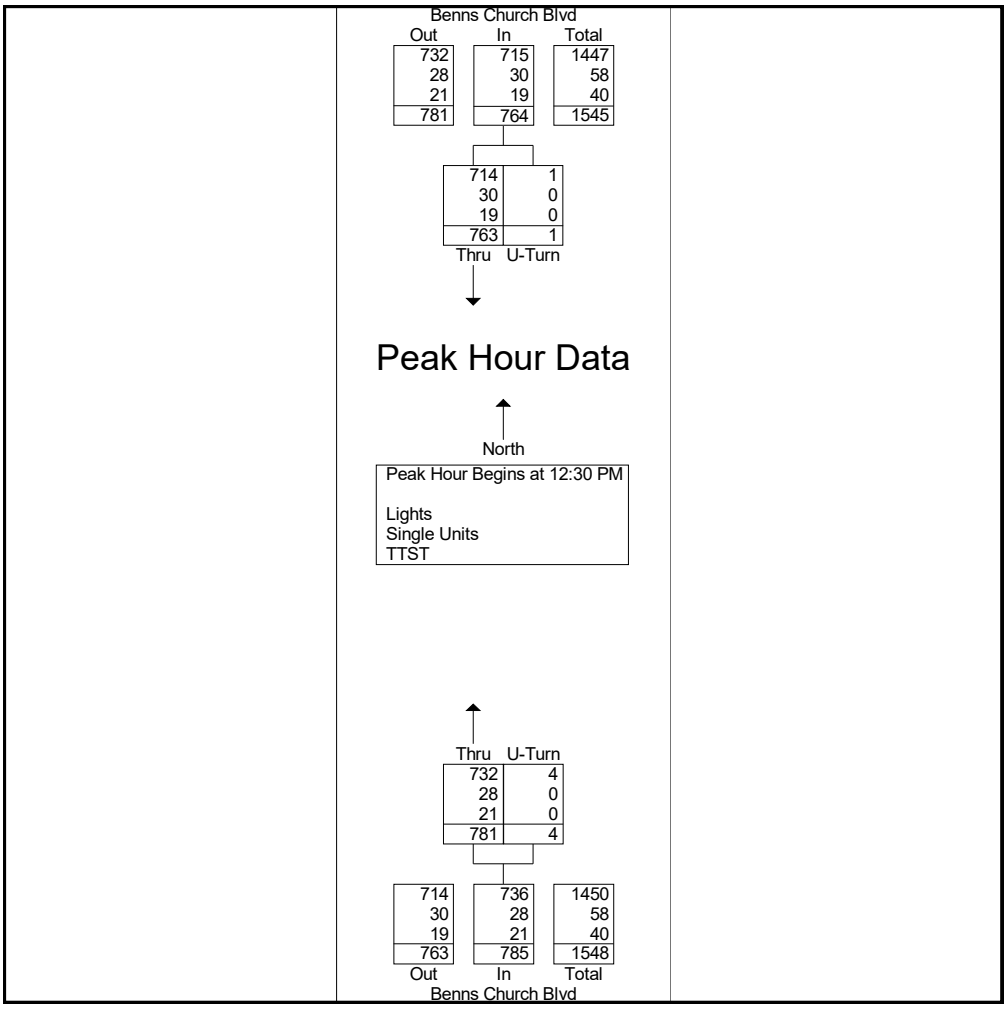
Site Code :
Start Date : 4/26/2018

	Benns Church Blvd Southbound			Benns Church Blvd Northbound			
Start Time	Thru	U-Turn	App. Total	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1							
Peak Hour for Entire Intersection Begins at 12:30 PM							
12:30 PM	195	0	195	214	0	214	409
12:45 PM	181	0	181	200	2	202	383
01:00 PM	176	1	177	172	1	173	350
01:15 PM	211	0	211	195	1	196	407
Total Volume	763	1	764	781	4	785	1549
% App. Total	99.9	0.1		99.5	0.5		
PHF	.904	.250	.905	.912	.500	.917	.947
Lights	714	1	715	732	4	736	1451
% Lights	93.6	100	93.6	93.7	100	93.8	93.7
Single Units	30	0	30	28	0	28	58
% Single Units	3.9	0	3.9	3.6	0	3.6	3.7
TTST	19	0	19	21	0	21	40
% TTST	2.5	0	2.5	2.7	0	2.7	2.6



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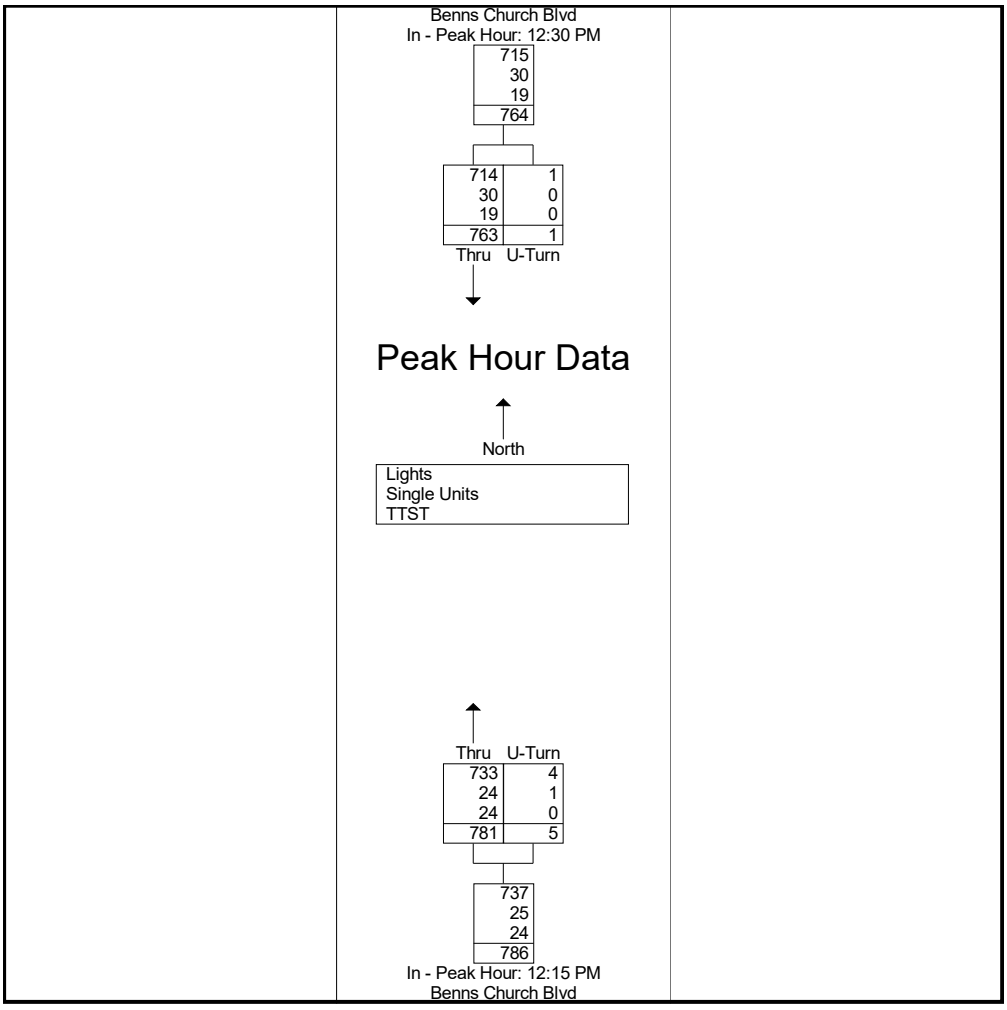
	Benns Church Blvd Southbound			Benns Church Blvd Northbound			
Start Time	Thru	U-Turn	App. Total	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 10:00 AM to 01:45 PM - Peak 1 of 1							
Peak Hour for Each Approach Begins at:							
	12:30 PM			12:15 PM			
+0 mins.	195	0	195	195	2	197	
+15 mins.	181	0	181	214	0	214	
+30 mins.	176	1	177	200	2	202	
+45 mins.	211	0	211	172	1	173	
Total Volume	763	1	764	781	5	786	
% App. Total	99.9	0.1		99.4	0.6		
PHF	.904	.250	.905	.912	.625	.918	
Lights	714	1	715	733	4	737	
% Lights	93.6	100	93.6	93.9	80	93.8	
Single Units	30	0	30	24	1	25	
% Single Units	3.9	0	3.9	3.1	20	3.2	
TTST	19	0	19	24	0	24	
% TTST	2.5	0	2.5	3.1	0	3.1	



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File Name : Benns Church with Median Break Combined
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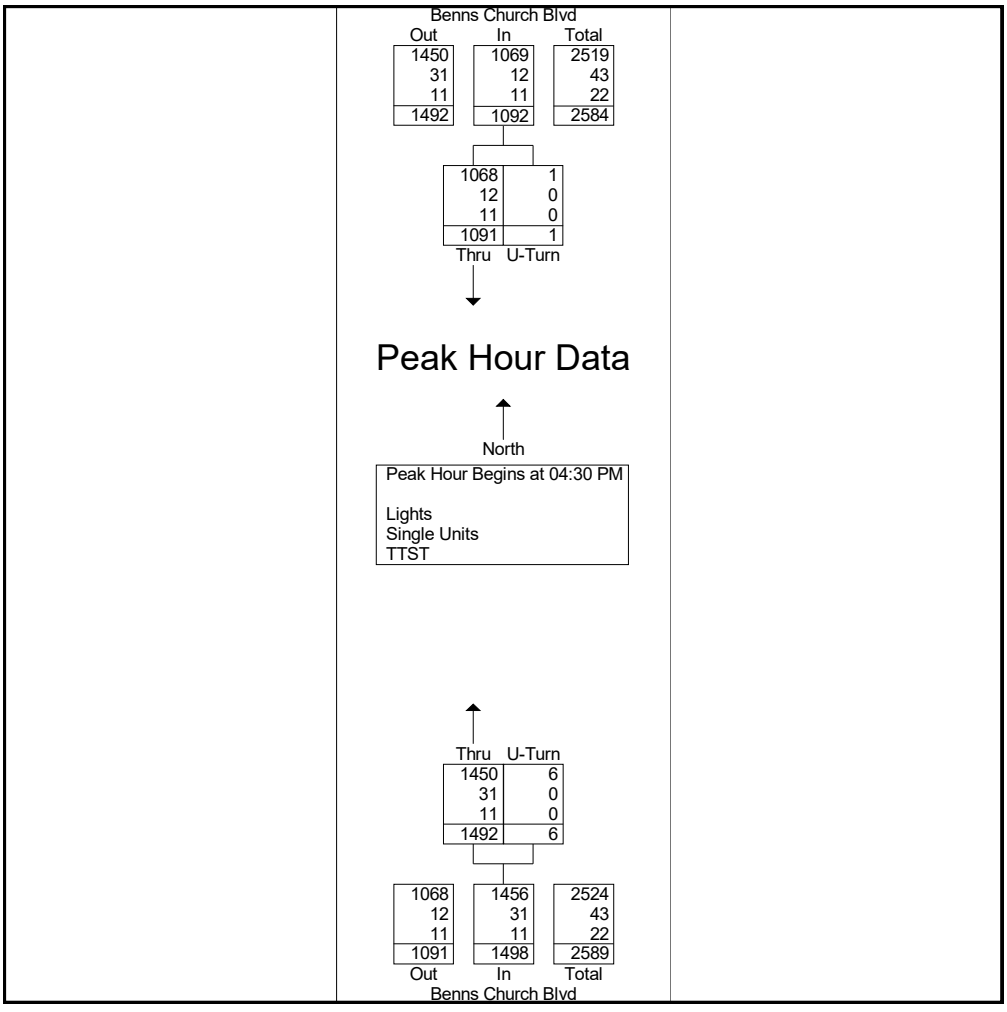
Start Date : 4/26/2018

	Benns Church Blvd Southbound			Benns Church Blvd Northbound			
Start Time	Thru	U-Turn	App. Total	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 06:45 PM - Peak 1 of 1							
Peak Hour for Entire Intersection Begins at 04:30 PM							
04:30 PM	272	0	272	364	3	367	639
04:45 PM	282	1	283	376	0	376	659
05:00 PM	267	0	267	391	2	393	660
05:15 PM	270	0	270	361	1	362	632
Total Volume	1091	1	1092	1492	6	1498	2590
% App. Total	99.9	0.1		99.6	0.4		
PHF	.967	.250	.965	.954	.500	.953	.981
Lights	1068	1	1069	1450	6	1456	2525
% Lights	97.9	100	97.9	97.2	100	97.2	97.5
Single Units	12	0	12	31	0	31	43
% Single Units	1.1	0	1.1	2.1	0	2.1	1.7
TTST	11	0	11	11	0	11	22
% TTST	1.0	0	1.0	0.7	0	0.7	0.8



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File Name : Benns Church with Median Break Combined
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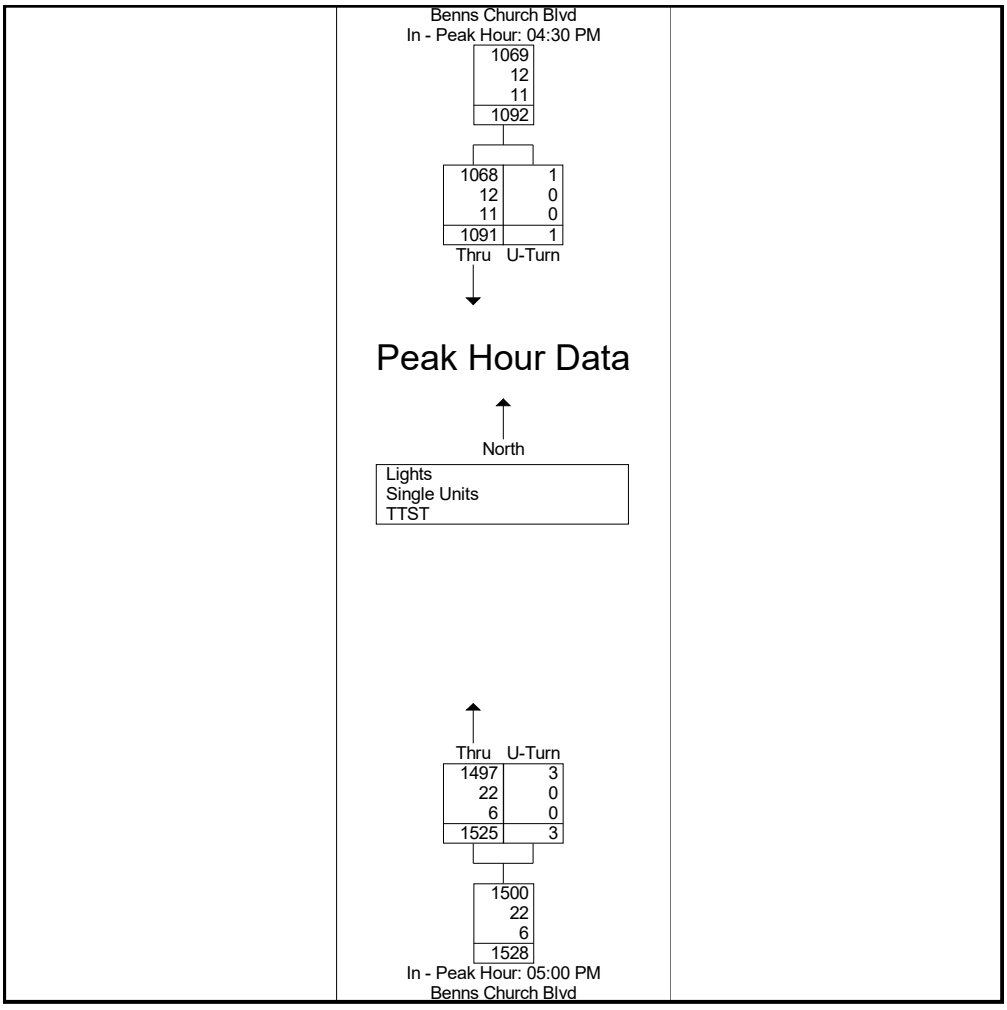
	Benns Church Blvd Southbound			Benns Church Blvd Northbound			
Start Time	Thru	U-Turn	App. Total	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 02:00 PM to 06:45 PM - Peak 1 of 1							
Peak Hour for Each Approach Begins at:							
	04:30 PM			05:00 PM			
+0 mins.	272	0	272	391	2	393	
+15 mins.	282	1	283	361	1	362	
+30 mins.	267	0	267	370	0	370	
+45 mins.	270	0	270	403	0	403	
Total Volume	1091	1	1092	1525	3	1528	
% App. Total	99.9	0.1		99.8	0.2		
PHF	.967	.250	.965	.946	.375	.948	
Lights	1068	1	1069	1497	3	1500	
% Lights	97.9	100	97.9	98.2	100	98.2	
Single Units	12	0	12	22	0	22	
% Single Units	1.1	0	1.1	1.4	0	1.4	
TTST	11	0	11	6	0	6	
% TTST	1	0	1	0.4	0	0.4	



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File Name : Benns Church with Median Break Day 1
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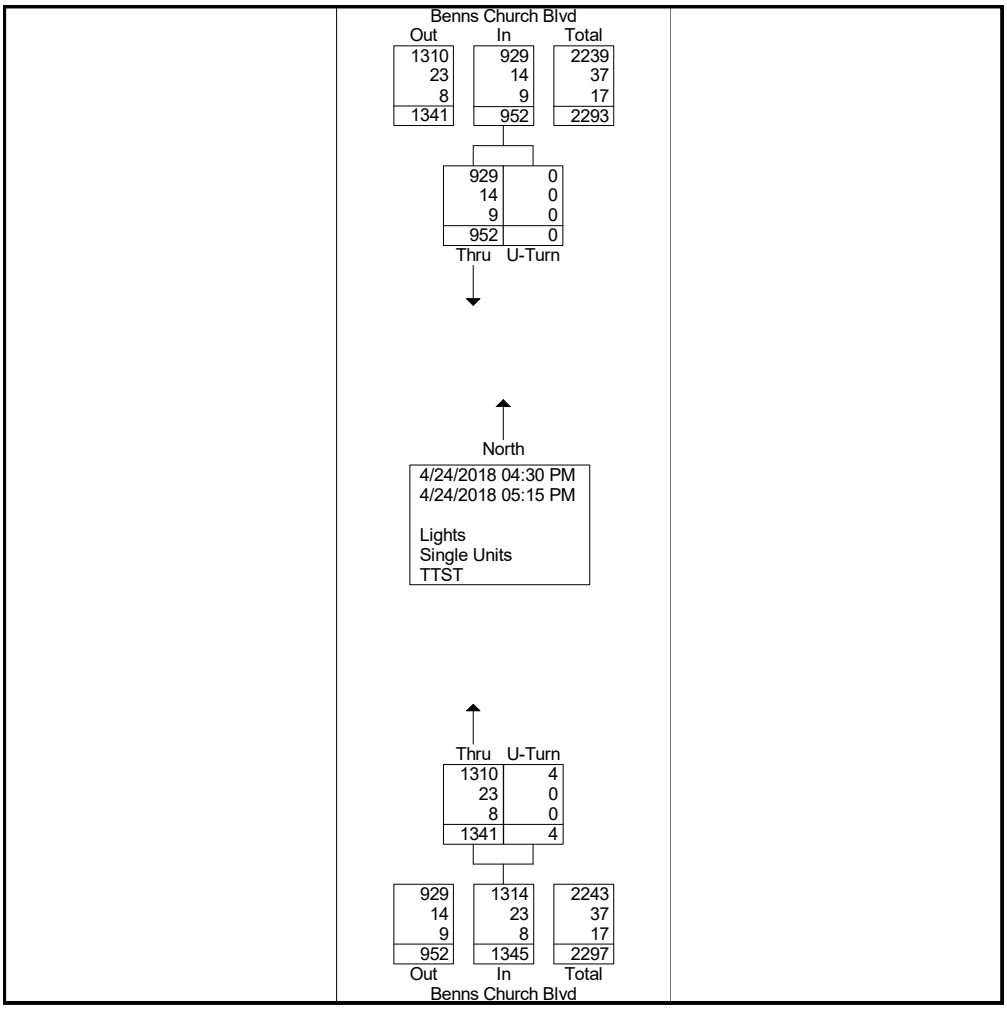
Groups Printed- Lights - Single Units - TTST

	Benns Church Blvd Southbound		Benns Church Blvd Northbound		
Start Time	Thru	U-Turn	Thru	U-Turn	Int. Total
04:30 PM	241	0	347	0	588
04:45 PM	236	0	347	1	584
Total	477	0	694	1	1172
05:00 PM	235	0	312	1	548
05:15 PM	240	0	335	2	577
Grand Total	952	0	1341	4	2297
Apprch %	100	0	99.7	0.3	
Total %	41.4	0	58.4	0.2	
Lights	929	0	1310	4	2243
% Lights	97.6	0	97.7	100	97.6
Single Units	14	0	23	0	37
% Single Units	1.5	0	1.7	0	1.6
TTST	9	0	8	0	17
% TTST	0.9	0	0.6	0	0.7



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File Name : Benns Church with Median Break Day 1
Site Code :
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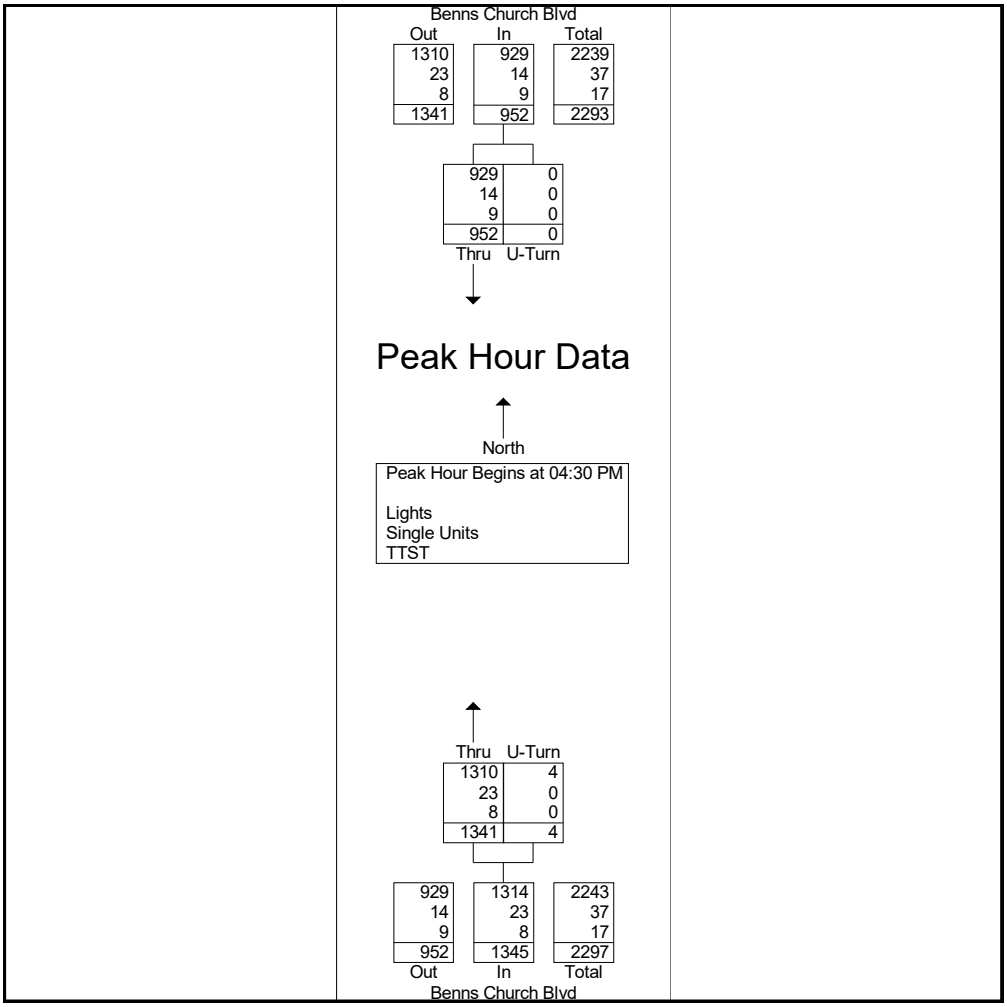
	Benns Church Blvd Southbound			Benns Church Blvd Northbound			
Start Time	Thru	U-Turn	App. Total	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 05:15 PM - Peak 1 of 1							
Peak Hour for Entire Intersection Begins at 04:30 PM							
04:30 PM	241	0	241	347	0	347	588
04:45 PM	236	0	236	347	1	348	584
05:00 PM	235	0	235	312	1	313	548
05:15 PM	240	0	240	335	2	337	577
Total Volume	952	0	952	1341	4	1345	2297
% App. Total	100	0		99.7	0.3		
PHF	.988	.000	.988	.966	.500	.966	.977
Lights	929	0	929	1310	4	1314	2243
% Lights	97.6	0	97.6	97.7	100	97.7	97.6
Single Units	14	0	14	23	0	23	37
% Single Units	1.5	0	1.5	1.7	0	1.7	1.6
TTST	9	0	9	8	0	8	17
% TTST	0.9	0	0.9	0.6	0	0.6	0.7



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File Name : Benns Church with Median Break Day 1
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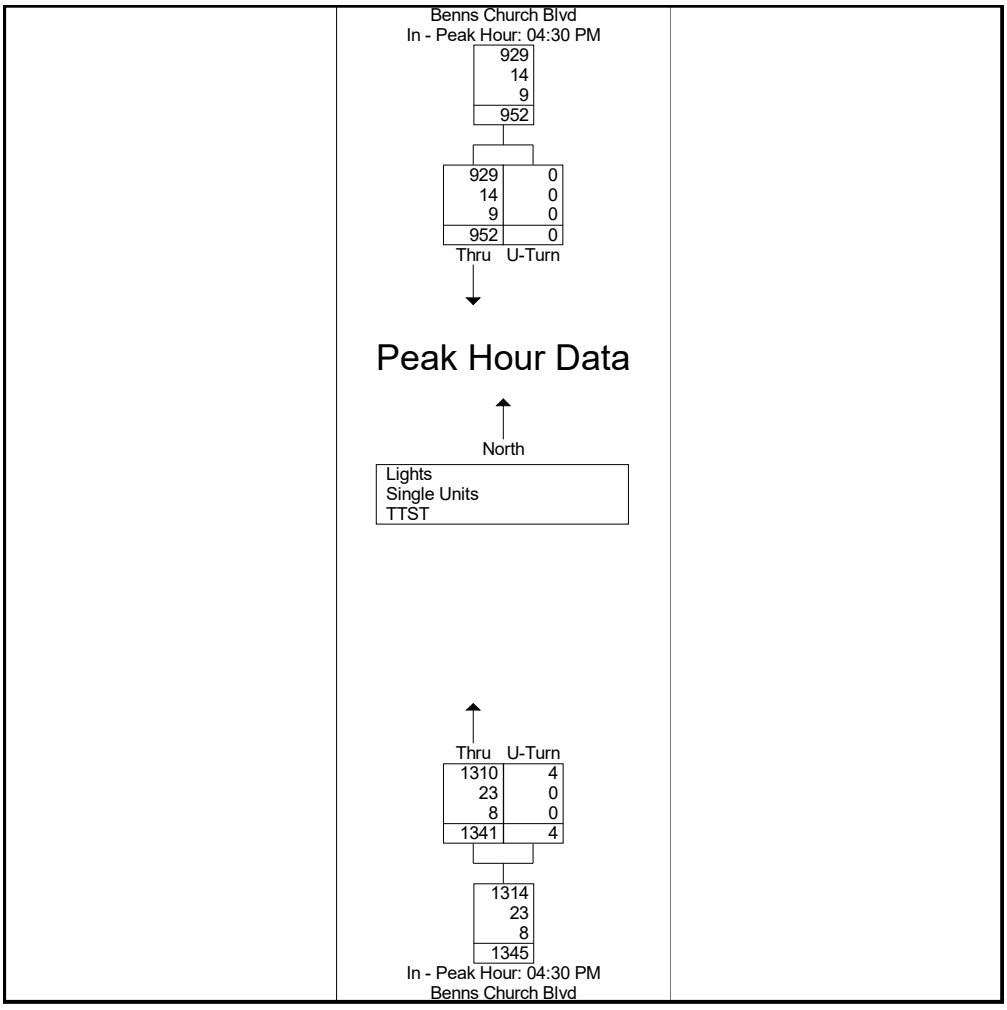
	Benns Church Blvd Southbound			Benns Church Blvd Northbound			
Start Time	Thru	U-Turn	App. Total	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 04:30 PM to 05:15 PM - Peak 1 of 1							
Peak Hour for Each Approach Begins at:							
	04:30 PM			04:30 PM			
+0 mins.	241	0	241	347	0	347	
+15 mins.	236	0	236	347	1	348	
+30 mins.	235	0	235	312	1	313	
+45 mins.	240	0	240	335	2	337	
Total Volume	952	0	952	1341	4	1345	
% App. Total	100	0		99.7	0.3		
PHF	.988	.000	.988	.966	.500	.966	
Lights	929	0	929	1310	4	1314	
% Lights	97.6	0	97.6	97.7	100	97.7	
Single Units	14	0	14	23	0	23	
% Single Units	1.5	0	1.5	1.7	0	1.7	
TTST	9	0	9	8	0	8	
% TTST	0.9	0	0.9	0.6	0	0.6	



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File Name : Benns Church with Median Break
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Groups Printed- Lights - Single Unit - TTST

	Benns Church Blvd Southbound		Benns Church Blvd Northbound		
Start Time	Thru	U-Turn	Thru	U-Turn	Int. Total
06:00 AM	255	0	135	0	390
06:15 AM	263	0	174	0	437
06:30 AM	283	0	164	0	447
06:45 AM	265	0	167	0	432
Total	1066	0	640	0	1706
07:00 AM	246	0	268	0	514
07:15 AM	322	0	241	1	564
07:30 AM	314	1	213	3	531
07:45 AM	248	0	194	0	442
Total	1130	1	916	4	2051
02:30 PM	186	0	223	1	410
02:45 PM	230	1	241	0	472
Total	416	1	464	1	882
03:00 PM	264	0	245	2	511
03:15 PM	229	1	294	3	527
03:30 PM	234	0	280	0	514
03:45 PM	218	2	298	0	518
Total	945	3	1117	5	2070
04:00 PM	245	1	408	2	656
04:15 PM	239	2	338	1	580
04:30 PM	272	0	364	3	639
04:45 PM	282	1	376	0	659
Total	1038	4	1486	6	2534
05:00 PM	267	0	391	2	660
05:15 PM	270	0	361	1	632
Grand Total	5132	9	5375	19	10535
Apprch %	99.8	0.2	99.6	0.4	
Total %	48.7	0.1	51	0.2	
Lights	4914	9	5173	19	10115
% Lights	95.8	100	96.2	100	96
Single Unit	163	0	136	0	299
% Single Unit	3.2	0	2.5	0	2.8
TTST	55	0	66	0	121
% TTST	1.1	0	1.2	0	1.1

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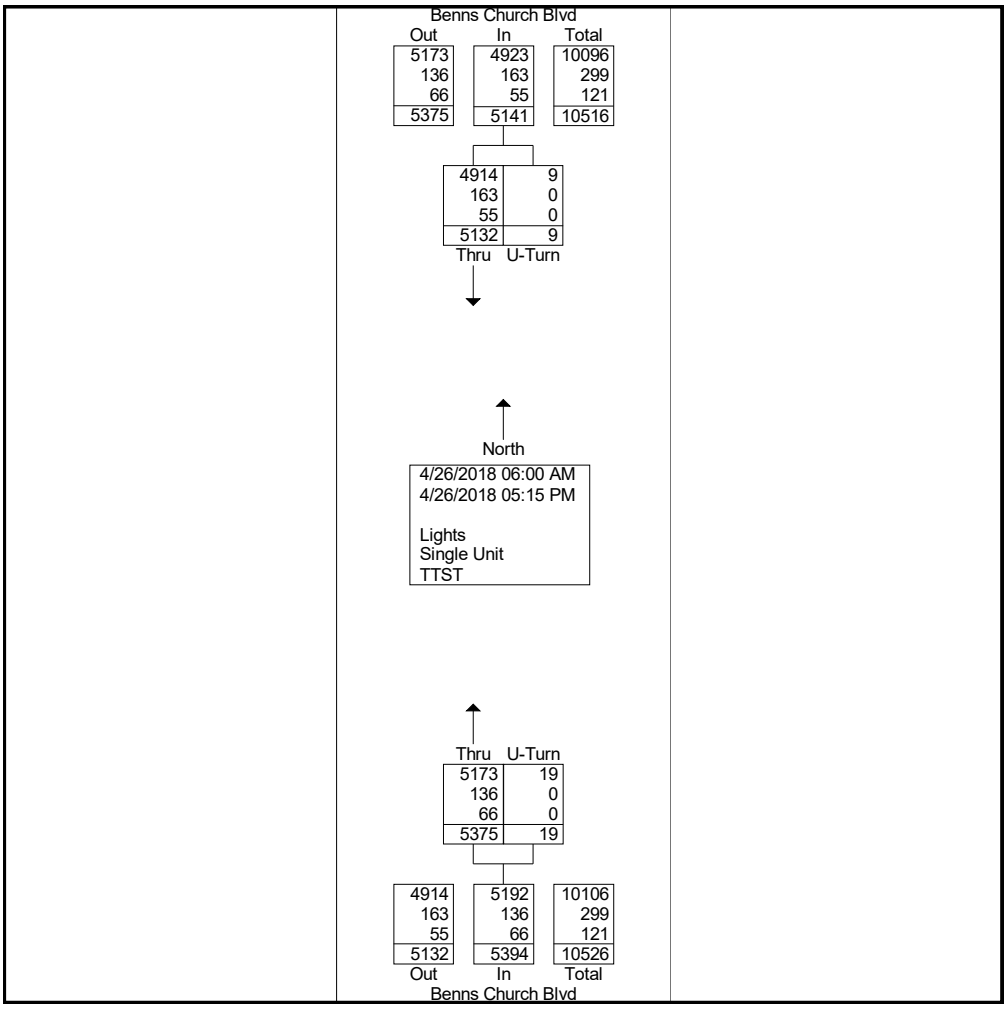

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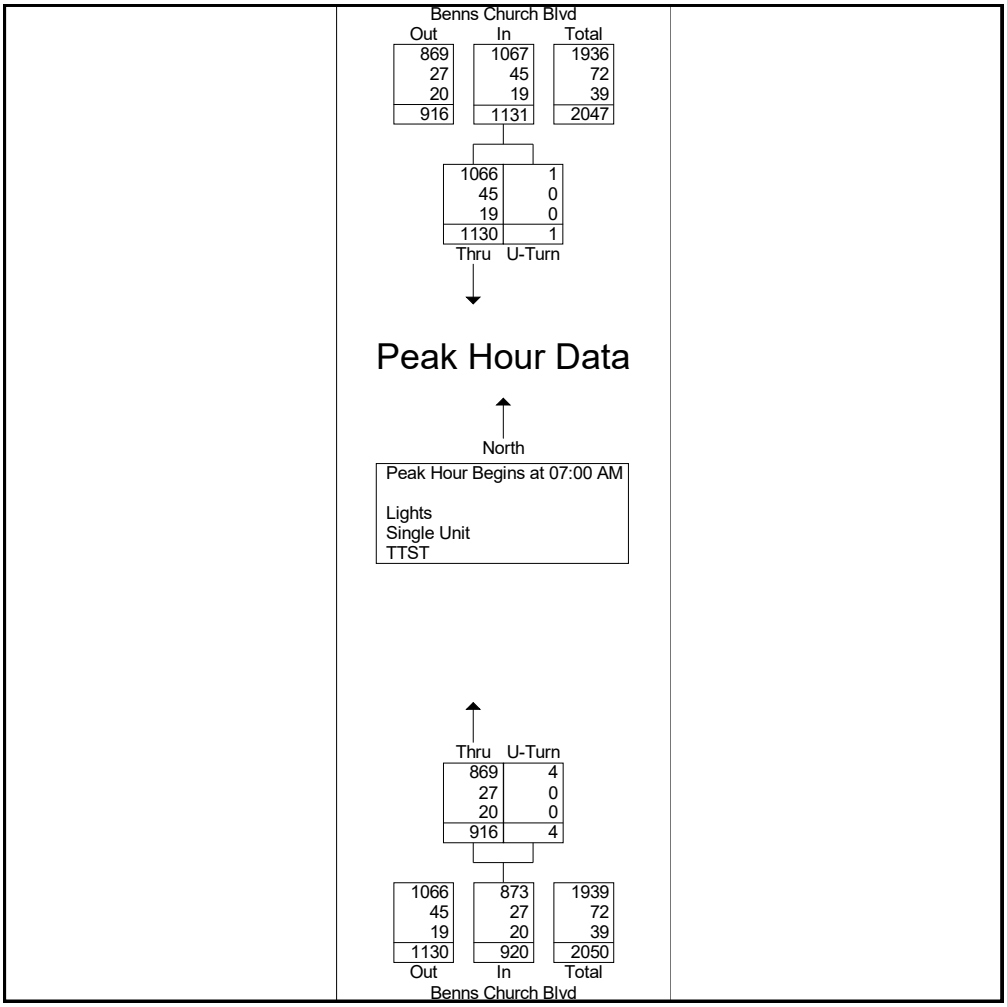
File Name : Benns Church with Median Break
Site Code :
Start Date : 4/26/2018

	Benns Church Blvd Southbound			Benns Church Blvd Northbound			
Start Time	Thru	U-Turn	App. Total	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1							
Peak Hour for Entire Intersection Begins at 07:00 AM							
07:00 AM	246	0	246	268	0	268	514
07:15 AM	322	0	322	241	1	242	564
07:30 AM	314	1	315	213	3	216	531
07:45 AM	248	0	248	194	0	194	442
Total Volume	1130	1	1131	916	4	920	2051
% App. Total	99.9	0.1		99.6	0.4		
PHF	.877	.250	.878	.854	.333	.858	.909
Lights	1066	1	1067	869	4	873	1940
% Lights	94.3	100	94.3	94.9	100	94.9	94.6
Single Unit	45	0	45	27	0	27	72
% Single Unit	4.0	0	4.0	2.9	0	2.9	3.5
TTST	19	0	19	20	0	20	39
% TTST	1.7	0	1.7	2.2	0	2.2	1.9



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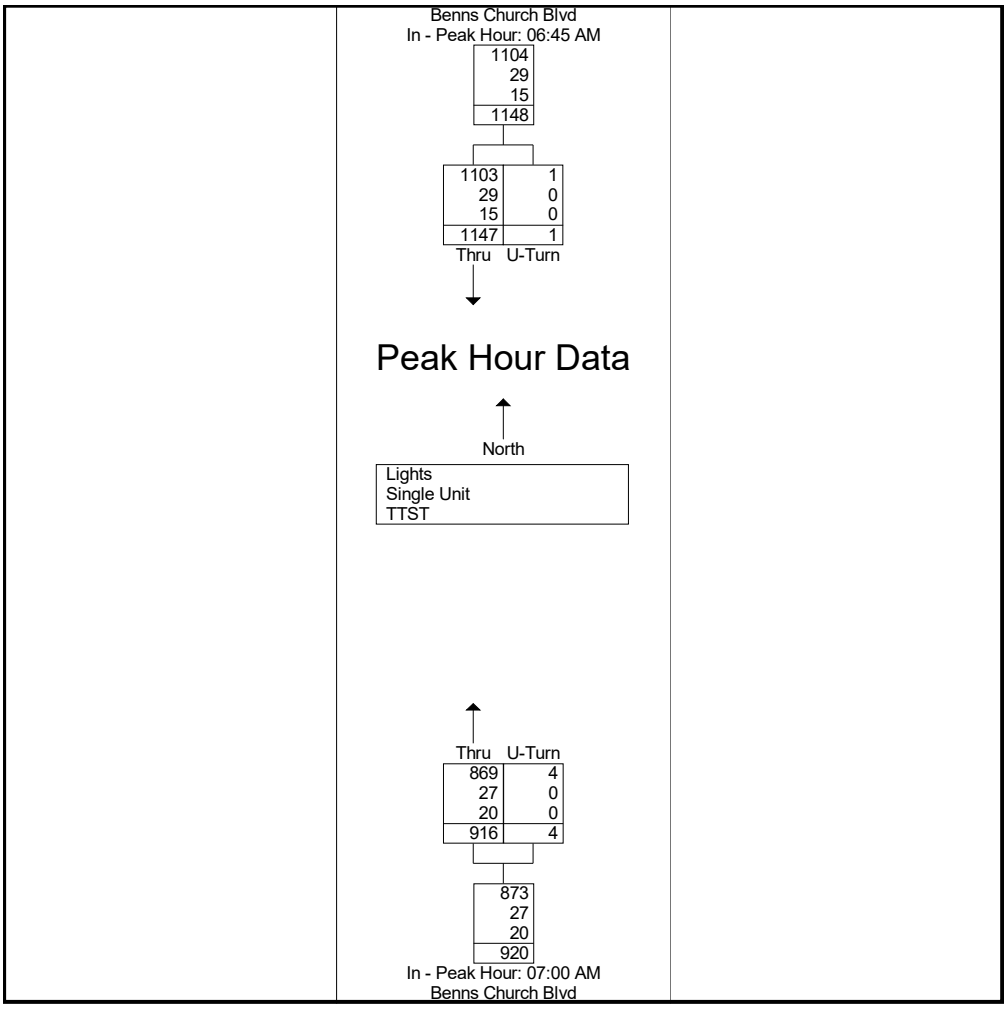
File Name : Benns Church with Median Break
Site Code :
Start Date : 4/26/2018

	Benns Church Blvd Southbound			Benns Church Blvd Northbound			
Start Time	Thru	U-Turn	App. Total	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1							
Peak Hour for Each Approach Begins at:							
	06:45 AM			07:00 AM			
+0 mins.	265	0	265	268	0	268	
+15 mins.	246	0	246	241	1	242	
+30 mins.	322	0	322	213	3	216	
+45 mins.	314	1	315	194	0	194	
Total Volume	1147	1	1148	916	4	920	
% App. Total	99.9	0.1		99.6	0.4		
PHF	.891	.250	.891	.854	.333	.858	
Lights	1103	1	1104	869	4	873	
% Lights	96.2	100	96.2	94.9	100	94.9	
Single Unit	29	0	29	27	0	27	
% Single Unit	2.5	0	2.5	2.9	0	2.9	
TTST	15	0	15	20	0	20	
% TTST	1.3	0	1.3	2.2	0	2.2	



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File Name : Benns Church with Median Break
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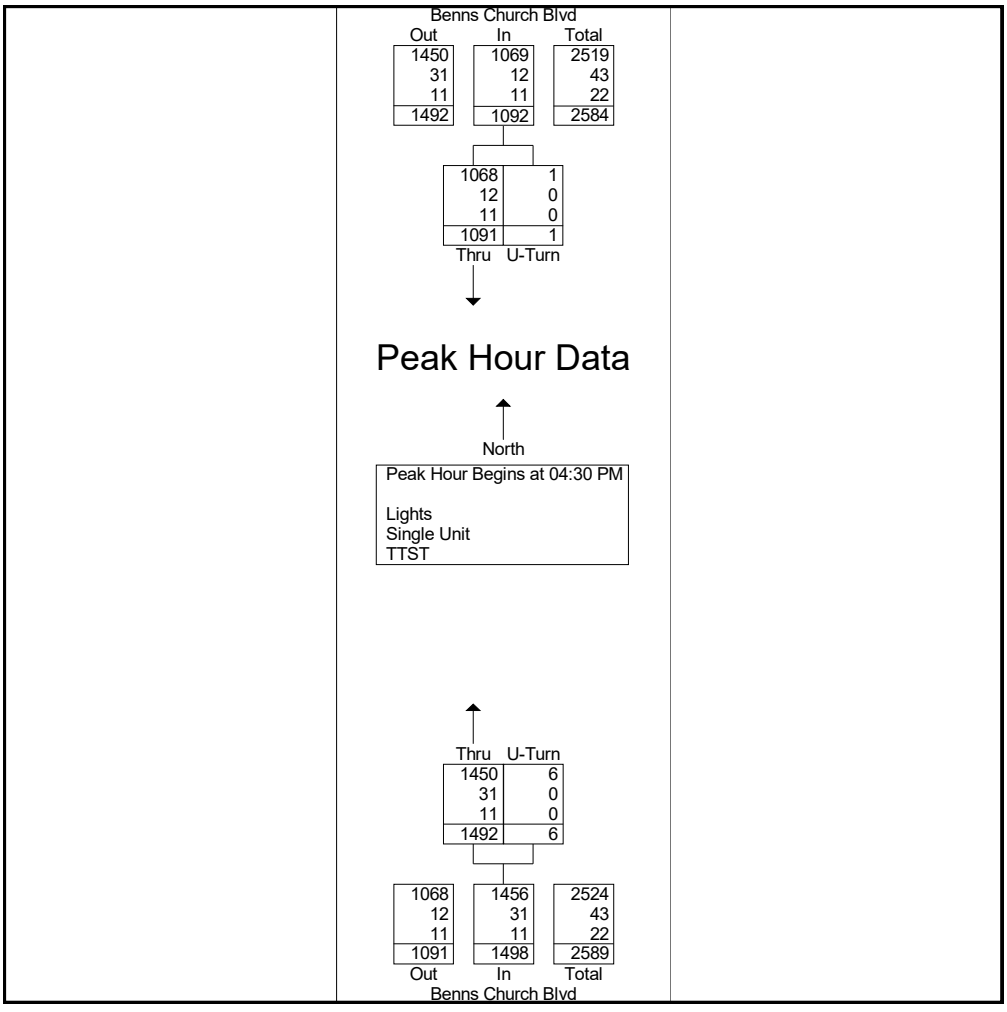
	Benns Church Blvd Southbound			Benns Church Blvd Northbound			
Start Time	Thru	U-Turn	App. Total	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:15 PM - Peak 1 of 1							
Peak Hour for Entire Intersection Begins at 04:30 PM							
04:30 PM	272	0	272	364	3	367	639
04:45 PM	282	1	283	376	0	376	659
05:00 PM	267	0	267	391	2	393	660
05:15 PM	270	0	270	361	1	362	632
Total Volume	1091	1	1092	1492	6	1498	2590
% App. Total	99.9	0.1		99.6	0.4		
PHF	.967	.250	.965	.954	.500	.953	.981
Lights	1068	1	1069	1450	6	1456	2525
% Lights	97.9	100	97.9	97.2	100	97.2	97.5
Single Unit	12	0	12	31	0	31	43
% Single Unit	1.1	0	1.1	2.1	0	2.1	1.7
TTST	11	0	11	11	0	11	22
% TTST	1.0	0	1.0	0.7	0	0.7	0.8



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File Name : Benns Church with Median Break
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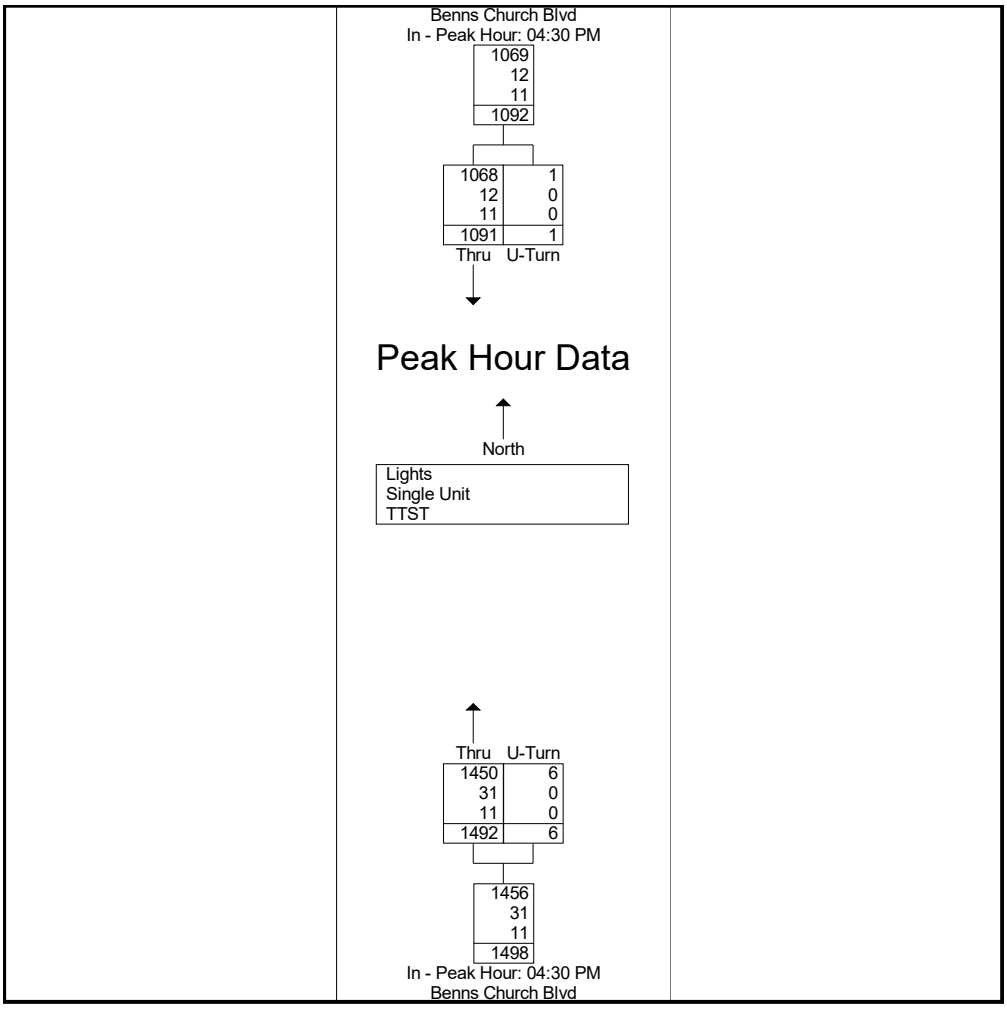
	Benns Church Blvd Southbound			Benns Church Blvd Northbound			
Start Time	Thru	U-Turn	App. Total	Thru	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:15 PM - Peak 1 of 1							
Peak Hour for Each Approach Begins at:							
	04:30 PM			04:30 PM			
+0 mins.	272	0	272	364	3	367	
+15 mins.	282	1	283	376	0	376	
+30 mins.	267	0	267	391	2	393	
+45 mins.	270	0	270	361	1	362	
Total Volume	1091	1	1092	1492	6	1498	
% App. Total	99.9	0.1		99.6	0.4		
PHF	.967	.250	.965	.954	.500	.953	
Lights	1068	1	1069	1450	6	1456	
% Lights	97.9	100	97.9	97.2	100	97.2	
Single Unit	12	0	12	31	0	31	
% Single Unit	1.1	0	1.1	2.1	0	2.1	
TTST	11	0	11	11	0	11	
% TTST	1	0	1	0.7	0	0.7	



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File Name : Brewers Neck and Benns Grant Blvd
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Groups Printed- Lights - Single Units - TTST - Bicycles on Road

	Queen Annes Ct Southbound				Brewers Neck Blvd Westbound				Benns Grant Blvd Northbound				Brewers Neck Blvd Eastbound				
Start Time	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Left	Thru	Right	U-Turn	Int. Total
06:00 AM	2	1	0	0	25	108	0	0	0	0	74	0	0	211	0	0	421
06:15 AM	1	0	1	0	30	122	0	0	0	0	90	0	1	224	0	0	469
06:30 AM	0	1	1	0	32	120	0	0	0	0	100	0	0	236	0	0	490
06:45 AM	1	0	3	0	33	132	3	0	0	0	95	0	0	190	0	0	457
Total	4	2	5	0	120	482	3	0	0	0	359	0	1	861	0	0	1837
07:00 AM	1	0	5	0	35	219	0	0	0	1	96	0	1	209	0	0	567
07:15 AM	2	0	3	0	59	161	1	0	0	0	108	0	0	203	0	0	537
07:30 AM	1	1	2	0	69	124	0	0	0	0	94	0	2	268	0	1	562
07:45 AM	2	2	1	0	53	125	2	0	0	0	86	0	1	198	0	1	471
Total	6	3	11	0	216	629	3	0	0	1	384	0	4	878	0	2	2137
02:30 PM	3	2	1	0	46	165	1	0	0	0	33	0	0	140	0	0	391
02:45 PM	2	1	2	0	57	179	1	0	0	0	33	0	5	153	0	0	433
Total	5	3	3	0	103	344	2	0	0	0	66	0	5	293	0	0	824
03:00 PM	1	0	0	0	51	196	0	0	0	0	55	0	2	193	0	0	498
03:15 PM	1	2	2	0	61	225	4	0	0	0	43	0	2	145	0	0	485
03:30 PM	0	0	1	0	75	241	2	0	0	0	51	0	0	110	1	0	481
03:45 PM	0	0	0	0	100	212	1	0	0	0	50	0	2	167	0	0	532
Total	2	2	3	0	287	874	7	0	0	0	199	0	6	615	1	0	1996
04:00 PM	3	0	4	0	109	303	4	0	0	0	48	0	1	160	1	0	633
04:15 PM	1	0	1	0	109	273	5	0	0	0	50	0	1	155	0	0	595
04:30 PM	0	1	2	0	94	294	2	0	0	0	41	0	1	172	2	0	609
04:45 PM	0	1	2	0	121	293	3	0	0	0	48	0	1	168	0	0	637
Total	4	2	9	0	433	1163	14	0	0	0	187	0	4	655	3	0	2474
05:00 PM	1	1	1	0	103	255	2	0	0	1	62	0	5	171	0	1	603
05:15 PM	1	1	1	0	100	284	5	0	1	2	71	0	0	174	1	0	641
Grand Total	23	14	33	0	1362	4031	36	0	1	4	1328	0	25	3647	5	3	10512
Apprch %	32.9	20	47.1	0	25.1	74.2	0.7	0	0.1	0.3	99.6	0	0.7	99.1	0.1	0.1	
Total %	0.2	0.1	0.3	0	13	38.3	0.3	0	0	0	12.6	0	0.2	34.7	0	0	
Lights	22	13	27	0	1323	3901	30	0	1	3	1272	0	24	3525	5	3	10149
% Lights	95.7	92.9	81.8	0	97.1	96.8	83.3	0	100	75	95.8	0	96	96.7	100	100	96.5
Single Units	1	1	6	0	20	88	6	0	0	1	38	0	1	91	0	0	253
% Single Units	4.3	7.1	18.2	0	1.5	2.2	16.7	0	0	25	2.9	0	4	2.5	0	0	2.4
TTST	0	0	0	0	19	42	0	0	0	0	18	0	0	31	0	0	110
% TTST	0	0	0	0	1.4	1	0	0	0	0	1.4	0	0	0.9	0	0	1
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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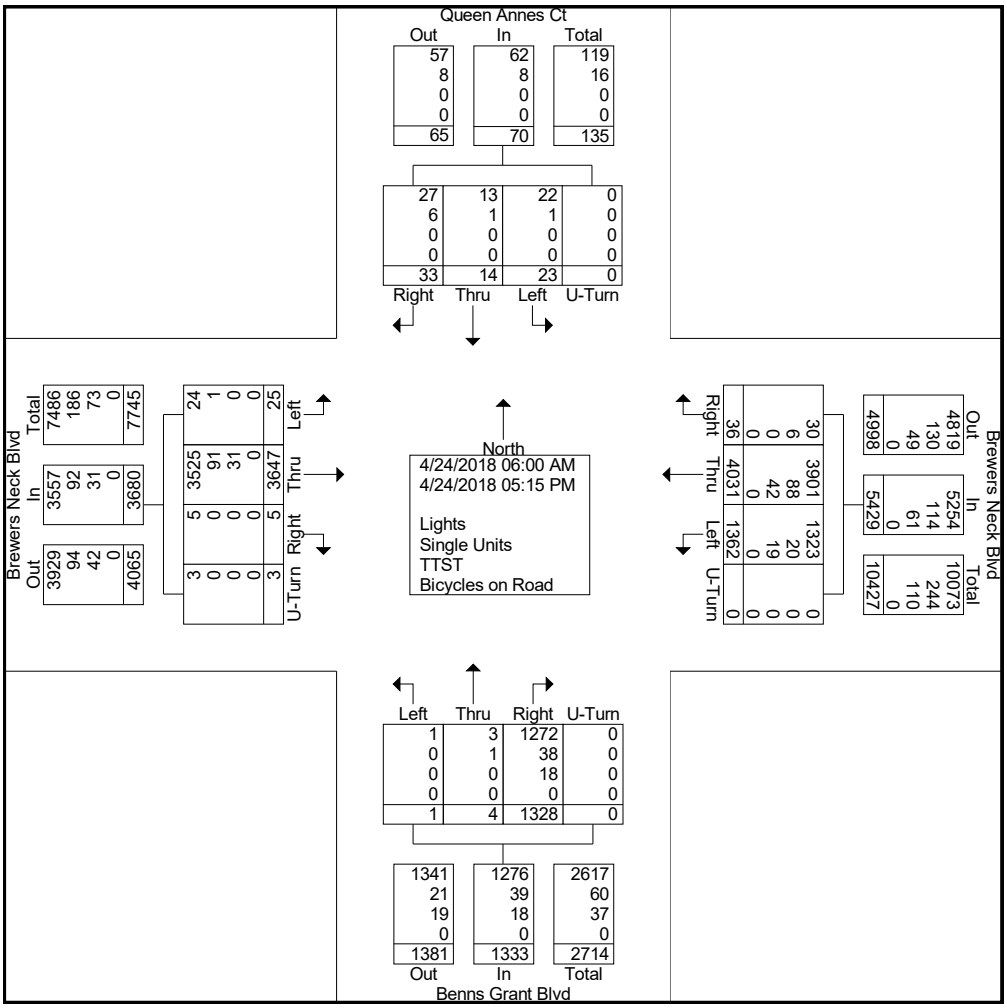

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	Queen Annes Ct Southbound					Brewers Neck Blvd Westbound					Benns Grant Blvd Northbound					Brewers Neck Blvd Eastbound					
Start Time			Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 07:00 AM																					
07:00 AM	1	0	5	0	6	35	219	0	0	254	0	1	96	0	97	1	209	0	0	210	567
07:15 AM	2	0	3	0	5	59	161	1	0	221	0	0	108	0	108	0	203	0	0	203	537
07:30 AM	1	1	2	0	4	69	124	0	0	193	0	0	94	0	94	2	268	0	1	271	562
07:45 AM	2	2	1	0	5	53	125	2	0	180	0	0	86	0	86	1	198	0	1	200	471
Total Volume	6	3	11	0	20	216	629	3	0	848	0	1	384	0	385	4	878	0	2	884	2137
% App. Total	30	15	55	0		25.5	74.2	0.4	0		0	0.3	99.7	0		0.5	99.3	0	0.2		
PHF	.750	.375	.550	.000	.833	.783	.718	.375	.000	.835	.000	.250	.889	.000	.891	.500	.819	.000	.500	.815	.942
Lights	6	3	9	0	18	206	610	3	0	819	0	0	361	0	361	4	844	0	2	850	2048
% Lights	100	100	81.8	0	90.0	95.4	97.0	100	0	96.6	0	0	94.0	0	93.8	100	96.1	0	100	96.2	95.8
Single Units	0	0	2	0	2	4	12	0	0	16	0	1	19	0	20	0	19	0	0	19	57
% Single Units	0	0	18.2	0	10.0	1.9	1.9	0	0	1.9	0	100	4.9	0	5.2	0	2.2	0	0	2.1	2.7
TTST	0	0	0	0	0	6	7	0	0	13	0	0	4	0	4	0	15	0	0	15	32
% TTST	0	0	0	0	0	2.8	1.1	0	0	1.5	0	0	1.0	0	1.0	0	1.7	0	0	1.7	1.5
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

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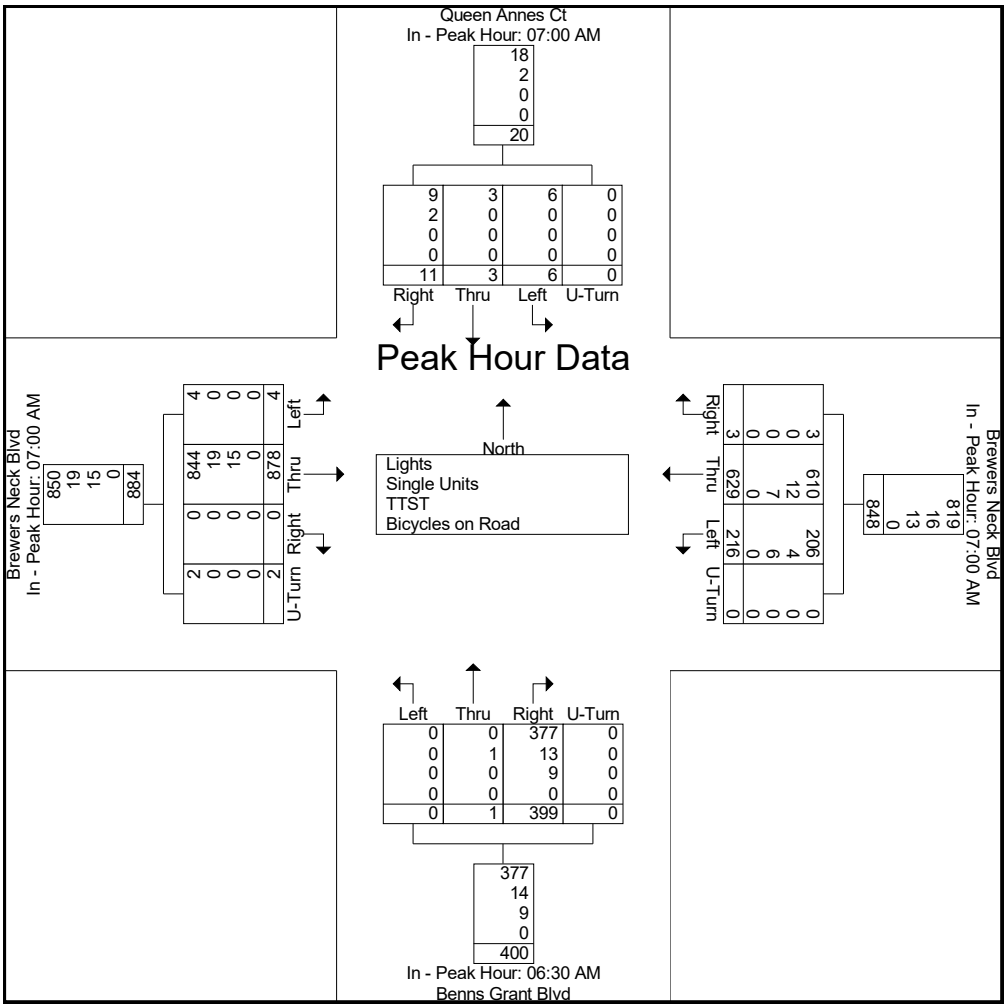
	Queen Annes Ct Southbound					Brewers Neck Blvd Westbound					Benns Grant Blvd Northbound					Brewers Neck Blvd Eastbound					
Start Time			Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 06:00 AM to 11:45 AM - Peak 1 of 1																					
Peak Hour for Each Approach Begins at:																					
	07:00 AM					07:00 AM					06:30 AM					07:00 AM					
+0 mins.	1	0	5	0	6	35	219	0	0	254	0	0	100	0	100	1	209	0	0	210	
+15 mins.	2	0	3	0	5	59	161	1	0	221	0	0	95	0	95	0	203	0	0	203	
+30 mins.	1	1	2	0	4	69	124	0	0	193	0	1	96	0	97	2	268	0	1	271	
+45 mins.	2	2	1	0	5	53	125	2	0	180	0	0	108	0	108	1	198	0	1	200	
Total Volume	6	3	11	0	20	216	629	3	0	848	0	1	399	0	400	4	878	0	2	884	
% App. Total	30	15	55	0		25.5	74.2	0.4	0		0	0.2	99.8	0		0.5	99.3	0	0.2		
PHF	.750	.375	.550	.000	.833	.783	.718	.375	.000	.835	.000	.250	.924	.000	.926	.500	.819	.000	.500	.815	
Lights	6	3	9	0	18	206	610	3	0	819	0	0	377	0	377	4	844	0	2	850	
% Lights	100	100	81.8	0	90	95.4	97	100	0	96.6	0	0	94.5	0	94.2	100	96.1	0	100	96.2	
Single Units	0	0	2	0	2	4	12	0	0	16	0	1	13	0	14	0	19	0	0	19	
% Single Units	0	0	18.2	0	10	1.9	1.9	0	0	1.9	0	100	3.3	0	3.5	0	2.2	0	0	2.1	
TTST	0	0	0	0	0	6	7	0	0	13	0	0	9	0	9	0	15	0	0	15	
% TTST	0	0	0	0	0	2.8	1.1	0	0	1.5	0	0	2.3	0	2.2	0	1.7	0	0	1.7	
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	



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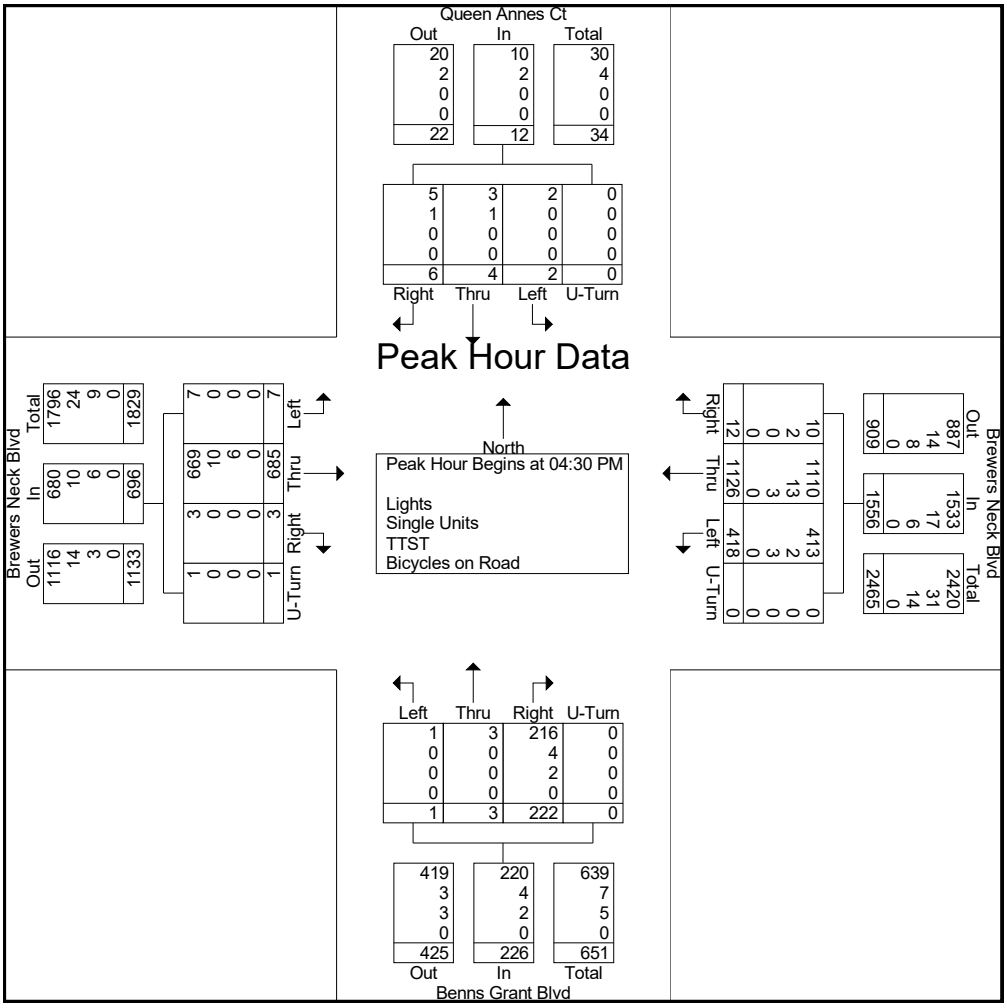
	Queen Annes Ct Southbound					Brewers Neck Blvd Westbound					Benns Grant Blvd Northbound					Brewers Neck Blvd Eastbound					
Start Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:15 PM - Peak 1 of 1																					
Peak Hour for Entire Intersection Begins at 04:30 PM																					
04:30 PM	0	1	2	0	3	94	294	2	0	390	0	0	41	0	41	1	172	2	0	175	609
04:45 PM	0	1	2	0	3	121	293	3	0	417	0	0	48	0	48	1	168	0	0	169	637
05:00 PM	1	1	1	0	3	103	255	2	0	360	0	1	62	0	63	5	171	0	1	177	603
05:15 PM	1	1	1	0	3	100	284	5	0	389	1	2	71	0	74	0	174	1	0	175	641
Total Volume	2	4	6	0	12	418	1126	12	0	1556	1	3	222	0	226	7	685	3	1	696	2490
% App. Total	16.7	33.3	50	0		26.9	72.4	0.8	0		0.4	1.3	98.2	0		1	98.4	0.4	0.1		
PHF	.500	1.00	.750	.000	1.00	.864	.957	.600	.000	.933	.250	.375	.782	.000	.764	.350	.984	.375	.250	.983	.971
Lights	2	3	5	0	10	413	1110	10	0	1533	1	3	216	0	220	7	669	3	1	680	2443
% Lights	100	75.0	83.3	0	83.3	98.8	98.6	83.3	0	98.5	100	100	97.3	0	97.3	100	97.7	100	100	97.7	98.1
Single Units	0	1	1	0	2	2	13	2	0	17	0	0	4	0	4	0	10	0	0	10	33
% Single Units	0	25.0	16.7	0	16.7	0.5	1.2	16.7	0	1.1	0	0	1.8	0	1.8	0	1.5	0	0	1.4	1.3
TTST	0	0	0	0	0	3	3	0	0	6	0	0	2	0	2	0	6	0	0	6	14
% TTST	0	0	0	0	0	0.7	0.3	0	0	0.4	0	0	0.9	0	0.9	0	0.9	0	0	0.9	0.6
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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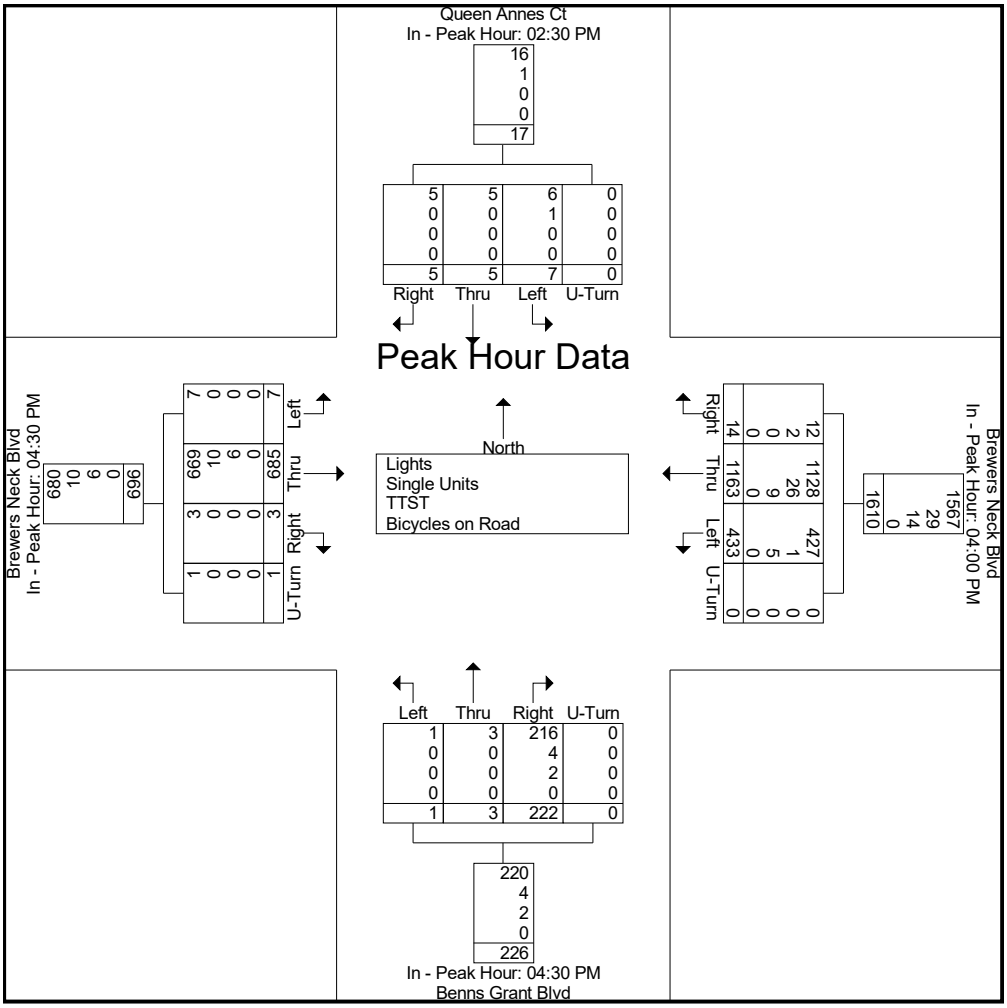
	Queen Annes Ct Southbound					Brewers Neck Blvd Westbound					Benns Grant Blvd Northbound					Brewers Neck Blvd Eastbound					
Start Time	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Left	Thru	Right	U-Turn	App. Total	Int. Total
Peak Hour Analysis From 12:00 PM to 05:15 PM - Peak 1 of 1																					
Peak Hour for Each Approach Begins at:																					
	02:30 PM					04:00 PM					04:30 PM					04:30 PM					
+0 mins.	3	2	1	0	6	109	303	4	0	416	0	0	41	0	41	1	172	2	0	175	
+15 mins.	2	1	2	0	5	109	273	5	0	387	0	0	48	0	48	1	168	0	0	169	
+30 mins.	1	0	0	0	1	94	294	2	0	390	0	1	62	0	63	5	171	0	1	177	
+45 mins.	1	2	2	0	5	121	293	3	0	417	1	2	71	0	74	0	174	1	0	175	
Total Volume	7	5	5	0	17	433	1163	14	0	1610	1	3	222	0	226	7	685	3	1	696	
% App. Total	41.2	29.4	29.4	0		26.9	72.2	0.9	0		0.4	1.3	98.2	0		1	98.4	0.4	0.1		
PHF	.583	.625	.625	.000	.708	.895	.960	.700	.000	.965	.250	.375	.782	.000	.764	.350	.984	.375	.250	.983	
Lights	6	5	5	0	16	427	1128	12	0	1567	1	3	216	0	220	7	669	3	1	680	
% Lights	85.7	100	100	0	94.1	98.6	97	85.7	0	97.3	100	100	97.3	0	97.3	100	97.7	100	100	97.7	
Single Units	1	0	0	0	1	1	26	2	0	29	0	0	4	0	4	0	10	0	0	10	
% Single Units	14.3	0	0	0	5.9	0.2	2.2	14.3	0	1.8	0	0	1.8	0	1.8	0	1.5	0	0	1.4	
TTST	0	0	0	0	0	5	9	0	0	14	0	0	2	0	2	0	6	0	0	6	
% TTST	0	0	0	0	0	1.2	0.8	0	0	0.9	0	0	0.9	0	0.9	0	0.9	0	0	0.9	
Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
% Bicycles on Road	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	



APPENDIX C

2018 Existing Synchro Reports

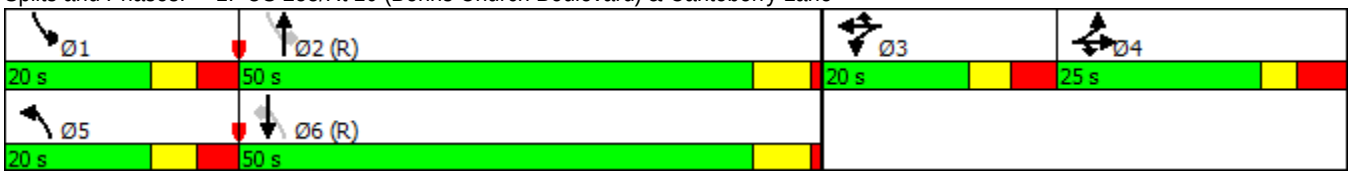
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	23	1	17	88	4	38	13	711	45	49	1030	32
Future Volume (vph)	23	1	17	88	4	38	13	711	45	49	1030	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	200		350	275		325
Storage Lanes	0		1	0		1	1		1	1		1
Taper Length (ft)	25			25			125			225		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected		0.958			0.955		0.950			0.950		
Satd. Flow (prot)	0	1759	1615	0	1738	1615	1805	3374	1509	1752	3505	1615
Flt Permitted		0.958			0.955		0.062			0.307		
Satd. Flow (perm)	0	1759	1615	0	1738	1615	118	3374	1509	566	3505	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			171			171			185			185
Link Speed (mph)		25			25			45			45	
Link Distance (ft)		335			1232			773			1937	
Travel Time (s)		9.1			33.6			11.7			29.3	
Peak Hour Factor	0.82	0.25	0.53	0.76	0.50	0.79	0.46	0.92	0.75	0.73	0.63	0.80
Heavy Vehicles (%)	4%	0%	0%	3%	25%	0%	0%	7%	7%	3%	3%	0%
Adj. Flow (vph)	28	4	32	116	8	48	28	773	60	67	1635	40
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	32	32	0	124	48	28	773	60	67	1635	40
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA	Prot	Split	NA	Prot	D.P+P	NA	Perm	D.P+P	NA	Perm
Protected Phases	4	4	4	3	3	3	5	2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases							6		2	2		6
Detector Phase	4	4	4	3	3	3	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	5.0	15.0	15.0	5.0	15.0	15.0
Minimum Split (s)	14.5	14.5	14.5	14.5	14.5	14.5	12.5	21.0	21.0	12.5	21.0	21.0
Total Split (s)	25.0	25.0	25.0	20.0	20.0	20.0	20.0	50.0	50.0	20.0	50.0	50.0
Total Split (%)	21.7%	21.7%	21.7%	17.4%	17.4%	17.4%	17.4%	43.5%	43.5%	17.4%	43.5%	43.5%
Maximum Green (s)	17.5	17.5	17.5	12.5	12.5	12.5	12.5	44.0	44.0	12.5	44.0	44.0
Yellow Time (s)	3.0	3.0	3.0	3.5	3.5	3.5	4.0	5.0	5.0	4.0	5.0	5.0
All-Red Time (s)	4.5	4.5	4.5	4.0	4.0	4.0	3.5	1.0	1.0	3.5	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.5	7.5		7.5	7.5	7.5	6.0	6.0	7.5	6.0	6.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	2.0	6.0	6.0	2.0	6.0	6.0
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	3.5	3.5	0.2	3.5	3.5
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	20.0	0.0	20.0	20.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0	15.0	0.0	15.0	15.0
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	C-Min
Act Effct Green (s)		8.0	8.0		11.5	11.5	71.3	66.1	66.1	69.8	69.5	69.5
Actuated g/C Ratio		0.07	0.07		0.10	0.10	0.62	0.57	0.57	0.61	0.60	0.60
v/c Ratio		0.26	0.12		0.71	0.15	0.19	0.40	0.06	0.16	0.77	0.04
Control Delay		55.5	0.9		72.5	1.0	12.5	14.0	0.4	9.8	23.3	0.1
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		55.5	0.9		72.5	1.0	12.5	14.0	0.4	9.8	23.3	0.1
LOS		E	A		E	A	B	B	A	A	C	A
Approach Delay		28.2			52.6			13.0			22.3	
Approach LOS		C			D			B			C	

Intersection Summary

Area Type: Other
Cycle Length: 115
Actuated Cycle Length: 115
Offset: 0 (0%), Referenced to phase 2:NBSB and 6:NBSB, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.77
Intersection Signal Delay: 21.4 Intersection LOS: C
Intersection Capacity Utilization 61.9% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane



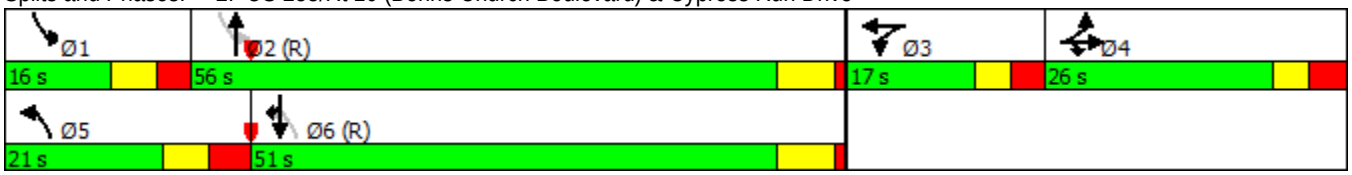
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	4	0	18	0	0	0	21	635	0	2	1252	28
Future Volume (vph)	4	0	18	0	0	0	21	635	0	2	1252	28
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	150		235
Storage Lanes	0		1	0		0	1		0	1		1
Taper Length (ft)	25			25			150			125		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850									0.850
Flt Protected		0.950					0.950			0.950		
Satd. Flow (prot)	0	1805	1524	0	1900	0	1805	3505	0	1805	3471	1553
Flt Permitted		0.950					0.099			0.326		
Satd. Flow (perm)	0	1805	1524	0	1900	0	188	3505	0	619	3471	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			152									157
Link Speed (mph)		15			25			45			45	
Link Distance (ft)		1905			1451			1986			773	
Travel Time (s)		86.6			39.6			30.1			11.7	
Peak Hour Factor	0.50	0.25	0.56	0.25	0.25	0.25	0.44	0.75	0.44	0.50	0.72	0.78
Heavy Vehicles (%)	0%	0%	6%	0%	0%	0%	0%	3%	14%	0%	4%	4%
Adj. Flow (vph)	8	0	32	0	0	0	48	847	0	4	1739	36
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	8	32	0	0	0	48	847	0	4	1739	36
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA	Prot				D.P+P	NA		D.P+P	NA	Prot
Protected Phases	4	4	4	3	3		5	2		1	6	6

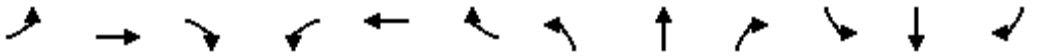
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases							6			2		
Detector Phase	4	4	4	3	3		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		5.0	14.0		5.0	14.0	14.0
Minimum Split (s)	13.5	13.5	13.5	13.0	13.0		12.5	20.0		12.0	20.0	20.0
Total Split (s)	26.0	26.0	26.0	17.0	17.0		21.0	56.0		16.0	51.0	51.0
Total Split (%)	22.6%	22.6%	22.6%	14.8%	14.8%		18.3%	48.7%		13.9%	44.3%	44.3%
Maximum Green (s)	19.5	19.5	19.5	11.0	11.0		13.5	50.0		9.0	45.0	45.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		4.0	5.0		4.0	5.0	5.0
All-Red Time (s)	3.5	3.5	3.5	3.0	3.0		3.5	1.0		3.0	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		6.5	6.5		6.0		7.5	6.0		7.0	6.0	6.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		2.0	5.0		2.0	5.0	5.0
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2		0.2	3.5		0.2	3.5	3.5
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	18.0		0.0	18.0	18.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	15.0		0.0	15.0	15.0
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	C-Min
Act Effct Green (s)		7.0	7.0				93.4	100.9		98.5	91.7	91.7
Actuated g/C Ratio		0.06	0.06				0.81	0.88		0.86	0.80	0.80
v/c Ratio		0.07	0.14				0.21	0.28		0.01	0.63	0.03
Control Delay		52.5	1.2				4.3	2.7		0.5	2.9	0.0
Queue Delay		0.0	0.0				0.0	0.0		0.0	0.0	0.0
Total Delay		52.5	1.2				4.3	2.7		0.5	2.9	0.0
LOS		D	A				A	A		A	A	A
Approach Delay		11.5						2.8			2.8	
Approach LOS		B						A			A	

Intersection Summary

Area Type: Other
Cycle Length: 115
Actuated Cycle Length: 115
Offset: 13 (11%), Referenced to phase 2:NBSB and 6:NBSB, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.63
Intersection Signal Delay: 3.0 Intersection LOS: A
Intersection Capacity Utilization 50.9% ICU Level of Service A
Analysis Period (min) 15

Splits and Phases: 2: US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	171	1	253	1	64	1	216	560	62	6	838	288
Future Volume (vph)	171	1	253	1	64	1	216	560	62	6	838	288
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	125		0	125		275
Storage Lanes	0		0	0		0	1		0	1		1
Taper Length (ft)	25			25			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt		0.924			0.997			0.973				0.850
Flt Protected		0.979			0.999		0.950			0.950		
Satd. Flow (prot)	0	1719	0	0	1892	0	1752	3401	0	1805	3505	1553
Flt Permitted		0.755			0.987		0.105			0.277		
Satd. Flow (perm)	0	1325	0	0	1870	0	194	3401	0	526	3505	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		48			1			19				348
Link Speed (mph)		40			25			45			45	
Link Distance (ft)		1498			695			1153			1986	
Travel Time (s)		25.5			19.0			17.5			30.1	
Peak Hour Factor	0.64	0.25	0.73	0.25	0.39	0.25	0.52	0.90	0.46	0.25	0.73	0.51
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	3%	4%	0%	0%	3%	4%
Adj. Flow (vph)	267	4	347	4	164	4	415	622	135	24	1148	565
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	618	0	0	172	0	415	757	0	24	1148	565
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA		Perm	NA		D.P+P	NA		D.P+P	NA	Perm
Protected Phases		4			8		1	6		5	2	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		2
Detector Phase	4	4		8	8		1	6		5	2	2
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		5.0	15.0		5.0	15.0	15.0
Minimum Split (s)	15.0	15.0		14.5	14.5		12.5	21.0		12.5	21.0	21.0
Total Split (s)	62.5	62.5		62.5	62.5		47.5	61.0		27.5	41.0	41.0
Total Split (%)	41.4%	41.4%		41.4%	41.4%		31.5%	40.4%		18.2%	27.2%	27.2%
Maximum Green (s)	55.0	55.0		55.0	55.0		40.0	55.0		20.0	35.0	35.0
Yellow Time (s)	3.5	3.5		3.5	3.5		4.0	5.0		4.0	5.0	5.0
All-Red Time (s)	4.0	4.0		4.0	4.0		3.5	1.0		3.5	1.0	1.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		7.5			7.5		7.5	6.0		7.5	6.0	6.0
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	5.0	5.0		3.0	3.0		4.0	6.0		2.0	6.0	6.0
Minimum Gap (s)	3.5	3.5		0.2	0.2		0.2	3.5		0.2	3.5	3.5
Time Before Reduce (s)	20.0	20.0		0.0	0.0		0.0	20.0		0.0	20.0	20.0
Time To Reduce (s)	10.0	10.0		0.0	0.0		0.0	15.0		0.0	15.0	15.0
Recall Mode	None	None		None	None		None	Min		None	Min	Min
Act Effct Green (s)		55.1			55.1		68.2	69.3		71.3	35.1	35.1
Actuated g/C Ratio		0.38			0.38		0.47	0.48		0.49	0.24	0.24
v/c Ratio		1.17			0.24		0.90	0.47		0.08	1.36	0.89
Control Delay		131.1			33.1		66.2	26.9		17.3	212.2	37.4
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		131.1			33.1		66.2	26.9		17.3	212.2	37.4
LOS		F			C		E	C		B	F	D
Approach Delay		131.1			33.1			40.8			152.7	
Approach LOS		F			C			D			F	

Intersection Summary

Area Type: Other
Cycle Length: 151
Actuated Cycle Length: 145.8
Natural Cycle: 120
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 1.36
Intersection Signal Delay: 108.1 Intersection LOS: F
Intersection Capacity Utilization 84.4% ICU Level of Service E
Analysis Period (min) 15

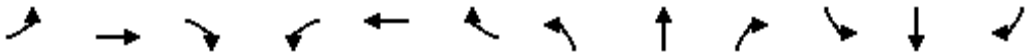
Splits and Phases: 3: US 258/Rt 10 (Benns Church Boulevard) & Turner Drive

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	0	0	4	0	916	0	1	0
Future Volume (vph)	0	0	0	0	0	0	4	0	916	0	1	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0		125		0		140
Storage Lanes	0		0	0		0		1		0		1
Taper Length (ft)	25			25				25				75
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00
Frt												
Flt Protected							0.950				0.950	
Satd. Flow (prot)	0	0	0	0	0	0	1805	0	3438	0	1805	0
Flt Permitted							0.950				0.950	
Satd. Flow (perm)	0	0	0	0	0	0	1805	0	3438	0	1805	0
Link Speed (mph)		30			30				45			
Link Distance (ft)		810			872				3921			
Travel Time (s)		18.4			19.8				59.4			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.33	0.25	0.85	0.25	0.25	0.25
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	5%	0%	0%	0%
Adj. Flow (vph)	0	0	0	0	0	0	12	0	1078	0	4	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	0	0	12	0	1078	0	4	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	R NA	Left	Left	Right	R NA	Left
Median Width(ft)		0			0				12			
Link Offset(ft)		0			0				0			
Crosswalk Width(ft)		16			16				16			
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	9	15		9	9	15
Sign Control		Stop			Stop				Free			

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 34.6%		ICU Level of Service A	
Analysis Period (min) 15			

Lane Group	SBT	SBR
Lane Configurations		
Traffic Volume (vph)	1130	0
Future Volume (vph)	1130	0
Ideal Flow (vphpl)	1900	1900
Storage Length (ft)		0
Storage Lanes		0
Taper Length (ft)		
Lane Util. Factor	0.95	1.00
Frt		
Flt Protected		
Satd. Flow (prot)	3406	0
Flt Permitted		
Satd. Flow (perm)	3406	0
Link Speed (mph)	45	
Link Distance (ft)	1153	
Travel Time (s)	17.5	
Peak Hour Factor	0.88	0.25
Heavy Vehicles (%)	6%	0%
Adj. Flow (vph)	1284	0
Shared Lane Traffic (%)		
Lane Group Flow (vph)	1284	0
Enter Blocked Intersection	No	No
Lane Alignment	Left	Right
Median Width(ft)	12	
Link Offset(ft)	0	
Crosswalk Width(ft)	16	
Two way Left Turn Lane		
Headway Factor	1.00	1.00
Turning Speed (mph)		9
Sign Control	Free	

Intersection Summary

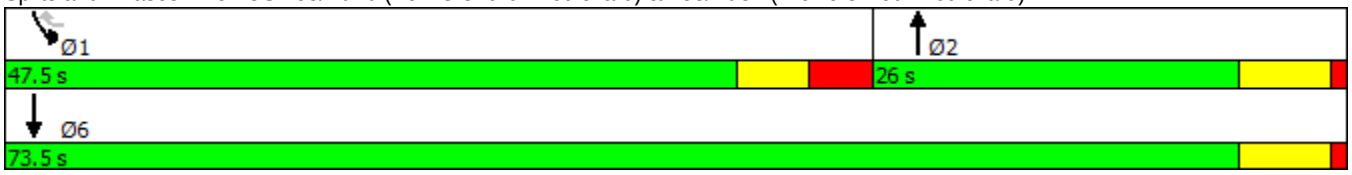


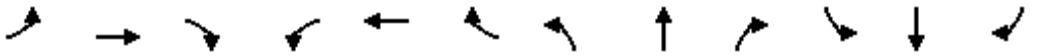
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	0	653	0	167	0	897	217	0
Future Volume (vph)	0	0	0	0	0	653	0	167	0	897	217	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	300		0
Storage Lanes	0		0	0		2	0		0	1		0
Taper Length (ft)	25			25			100			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.95	1.00	0.97	0.95	1.00
Frt						0.850						
Flt Protected										0.950		
Satd. Flow (prot)	0	0	0	0	0	2707	0	3471	0	3367	3438	0
Flt Permitted										0.950		
Satd. Flow (perm)	0	0	0	0	0	2707	0	3471	0	3367	3438	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						747						
Link Speed (mph)		30			45			45			45	
Link Distance (ft)		963			1126			2837			3921	
Travel Time (s)		21.9			17.1			43.0			59.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.72	0.92	0.84	0.25	0.83	0.63	0.25
Heavy Vehicles (%)	0%	0%	0%	0%	0%	5%	0%	4%	0%	4%	5%	0%
Adj. Flow (vph)	0	0	0	0	0	907	0	199	0	1081	344	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	0	907	0	199	0	1081	344	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors						1		2		1	2	
Detector Template						Right		Thru		Left	Thru	
Leading Detector (ft)						20		100		20	100	
Trailing Detector (ft)						0		0		0	0	
Detector 1 Position(ft)						0		0		0	0	
Detector 1 Size(ft)						20		6		20	6	
Detector 1 Type						Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)						0.0		0.0		0.0	0.0	
Detector 1 Queue (s)						0.0		0.0		0.0	0.0	
Detector 1 Delay (s)						0.0		0.0		0.0	0.0	
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type						Perm		NA		Prot	NA	
Protected Phases								2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases						1						
Detector Phase						1		2		1	6	
Switch Phase												
Minimum Initial (s)						15.0		10.0		15.0	15.0	
Minimum Split (s)						22.5		16.0		22.5	21.0	
Total Split (s)						47.5		26.0		47.5	73.5	
Total Split (%)						64.6%		35.4%		64.6%	100.0%	
Maximum Green (s)						40.0		20.0		40.0	67.5	
Yellow Time (s)						4.0		5.0		4.0	5.0	
All-Red Time (s)						3.5		1.0		3.5	1.0	
Lost Time Adjust (s)						0.0		0.0		0.0	0.0	
Total Lost Time (s)						7.5		6.0		7.5	6.0	
Lead/Lag						Lead		Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)						3.5		2.5		3.5	5.0	
Recall Mode						Min		None		Min	Min	
Act Effct Green (s)						30.7		10.2		30.7	54.6	
Actuated g/C Ratio						0.56		0.19		0.56	1.00	
v/c Ratio						0.49		0.31		0.57	0.10	
Control Delay						2.1		21.8		8.9	0.1	
Queue Delay						0.0		0.0		0.0	0.0	
Total Delay						2.1		21.8		8.9	0.1	
LOS						A		C		A	A	
Approach Delay					2.1			21.8			6.8	
Approach LOS					A			C			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 73.5			
Actuated Cycle Length: 54.6			
Natural Cycle: 45			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.57			
Intersection Signal Delay: 6.3		Intersection LOS: A	
Intersection Capacity Utilization 43.9%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)



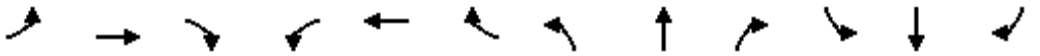


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	6	878	0	216	629	3	0	1	384	6	3	11
Future Volume (vph)	6	878	0	216	629	3	0	1	384	6	3	11
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	225		0	600		325	0		350	0		0
Storage Lanes	1		0	1		1	0		2	0		1
Taper Length (ft)	200			200			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	0.88	1.00	1.00	1.00
Frt						0.850			0.850			0.850
Flt Protected	0.950			0.950							0.976	
Satd. Flow (prot)	1805	3471	0	1719	3505	1615	0	950	2682	0	1854	1369
Flt Permitted	0.950			0.950							0.976	
Satd. Flow (perm)	1805	3471	0	1719	3505	1615	0	950	2682	0	1854	1369
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						171			431			160
Link Speed (mph)		45			45			45			25	
Link Distance (ft)		1126			846			914			623	
Travel Time (s)		17.1			12.8			13.8			17.0	
Peak Hour Factor	0.50	0.82	0.25	0.78	0.72	0.38	0.25	0.25	0.89	0.75	0.38	0.55
Heavy Vehicles (%)	0%	4%	0%	5%	3%	0%	0%	100%	6%	0%	0%	18%
Adj. Flow (vph)	12	1071	0	277	874	8	0	4	431	8	8	20
Shared Lane Traffic (%)												
Lane Group Flow (vph)	12	1071	0	277	874	8	0	4	431	0	16	20
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		Prot	NA	Perm		NA	pm+ov	Split	NA	Perm
Protected Phases	1	6		5	2		4	4	5	3	3	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases						2			4			3
Detector Phase	1	6		5	2	2	4	4	5	3	3	3
Switch Phase												
Minimum Initial (s)	10.0	15.0		10.0	15.0	15.0	10.0	10.0	10.0	5.0	5.0	5.0
Minimum Split (s)	19.0	24.5		19.5	24.5	24.5	26.0	26.0	19.5	26.0	26.0	26.0
Total Split (s)	34.0	41.5		39.5	47.0	47.0	26.0	26.0	39.5	33.0	33.0	33.0
Total Split (%)	24.3%	29.6%		28.2%	33.6%	33.6%	18.6%	18.6%	28.2%	23.6%	23.6%	23.6%
Maximum Green (s)	25.0	35.0		30.0	40.5	40.5	18.0	18.0	30.0	25.0	25.0	25.0
Yellow Time (s)	5.0	5.5		5.0	5.5	5.5	4.0	4.0	5.0	3.5	3.5	3.5
All-Red Time (s)	4.0	1.0		4.5	1.0	1.0	4.0	4.0	4.5	4.5	4.5	4.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Lost Time (s)	9.0	6.5		9.5	6.5	6.5		8.0	9.5		8.0	8.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	5.0		3.0	5.0	5.0	3.5	3.5	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	None	None	None	None	None
Act Effct Green (s)	10.5	36.7		19.1	66.4	66.4		10.5	21.7		6.5	6.5
Actuated g/C Ratio	0.13	0.44		0.23	0.80	0.80		0.13	0.26		0.08	0.08
v/c Ratio	0.05	0.70		0.70	0.31	0.01		0.03	0.42		0.11	0.08
Control Delay	42.2	26.1		41.6	7.4	0.0		43.0	3.6		45.8	0.6
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Delay	42.2	26.1		41.6	7.4	0.0		43.0	3.6		45.8	0.6
LOS	D	C		D	A	A		D	A		D	A
Approach Delay		26.3			15.6			4.0			20.7	
Approach LOS		C			B			A			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 83.1			
Natural Cycle: 130			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.70			
Intersection Signal Delay: 18.1		Intersection LOS: B	
Intersection Capacity Utilization 64.6%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 6: Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)



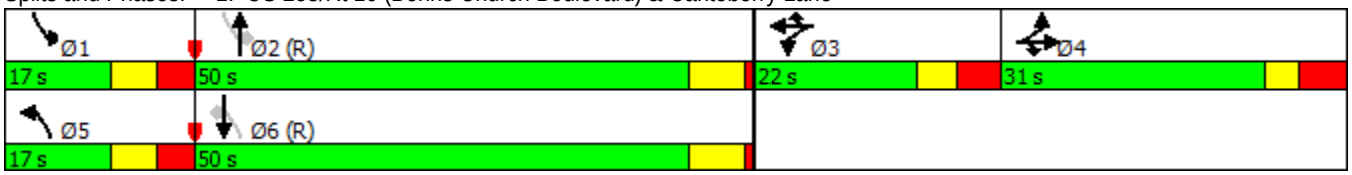
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	127	5	40	57	8	71	46	1109	95	118	931	88
Future Volume (vph)	127	5	40	57	8	71	46	1109	95	118	931	88
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	200		350	275		325
Storage Lanes	0		1	0		1	1		1	1		1
Taper Length (ft)	25			25			125			225		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected		0.956			0.959		0.950			0.950		
Satd. Flow (prot)	0	1816	1615	0	1791	1553	1805	3539	1583	1687	3505	1615
Flt Permitted		0.956			0.959		0.198			0.121		
Satd. Flow (perm)	0	1816	1615	0	1791	1553	376	3539	1583	215	3505	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			164			164			177			177
Link Speed (mph)		25			25			45			45	
Link Distance (ft)		335			1232			773			1937	
Travel Time (s)		9.1			33.6			11.7			29.3	
Peak Hour Factor	0.91	0.42	0.56	0.75	0.67	0.93	0.60	0.94	0.64	0.76	0.94	0.71
Heavy Vehicles (%)	0%	0%	0%	2%	0%	4%	0%	2%	2%	7%	3%	0%
Adj. Flow (vph)	140	12	71	76	12	76	77	1180	148	155	990	124
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	152	71	0	88	76	77	1180	148	155	990	124
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA	Prot	Split	NA	Prot	D.P+P	NA	Perm	D.P+P	NA	Perm
Protected Phases	4	4	4	3	3	3	5	2		1	6	

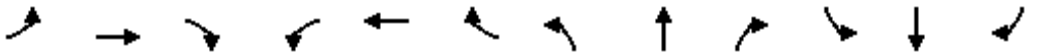
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases							6		2	2		6
Detector Phase	4	4	4	3	3	3	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	5.0	15.0	15.0	5.0	15.0	15.0
Minimum Split (s)	14.5	14.5	14.5	14.5	14.5	14.5	12.5	21.0	21.0	12.5	21.0	21.0
Total Split (s)	31.0	31.0	31.0	22.0	22.0	22.0	17.0	50.0	50.0	17.0	50.0	50.0
Total Split (%)	25.8%	25.8%	25.8%	18.3%	18.3%	18.3%	14.2%	41.7%	41.7%	14.2%	41.7%	41.7%
Maximum Green (s)	23.5	23.5	23.5	14.5	14.5	14.5	9.5	44.0	44.0	9.5	44.0	44.0
Yellow Time (s)	3.0	3.0	3.0	3.5	3.5	3.5	4.0	5.0	5.0	4.0	5.0	5.0
All-Red Time (s)	4.5	4.5	4.5	4.0	4.0	4.0	3.5	1.0	1.0	3.5	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.5	7.5		7.5	7.5	7.5	6.0	6.0	7.5	6.0	6.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	2.0	6.0	6.0	2.0	6.0	6.0
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	3.5	3.5	0.2	3.5	3.5
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	20.0	0.0	20.0	20.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0	15.0	0.0	15.0	15.0
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	C-Min
Act Effct Green (s)		15.3	15.3		11.0	11.0	65.2	56.1	56.1	63.7	60.8	60.8
Actuated g/C Ratio		0.13	0.13		0.09	0.09	0.54	0.47	0.47	0.53	0.51	0.51
v/c Ratio		0.66	0.20		0.54	0.26	0.27	0.71	0.18	0.69	0.56	0.14
Control Delay		62.9	1.3		63.4	2.2	11.6	26.8	2.6	32.8	24.3	1.2
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		62.9	1.3		63.4	2.2	11.6	26.8	2.6	32.8	24.3	1.2
LOS		E	A		E	A	B	C	A	C	C	A
Approach Delay		43.3			35.0			23.4			23.1	
Approach LOS		D			D			C			C	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBSB and 6:NBSB, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.71
Intersection Signal Delay: 25.4 Intersection LOS: C
Intersection Capacity Utilization 68.7% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane





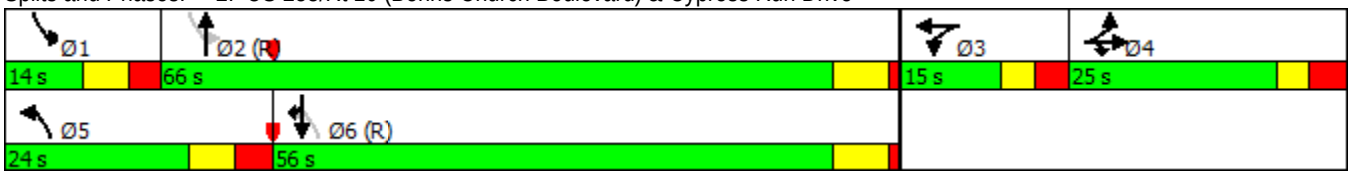
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	103	0	74	0	0	1	139	1146	0	0	907	119
Future Volume (vph)	103	0	74	0	0	1	139	1146	0	0	907	119
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	150		235
Storage Lanes	0		1	0		0	1		0	1		1
Taper Length (ft)	25			25			150			125		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850		0.865							0.850
Flt Protected		0.950					0.950					
Satd. Flow (prot)	0	1787	1599	0	1644	0	1805	3539	0	1900	3505	1615
Flt Permitted		0.950					0.232					
Satd. Flow (perm)	0	1787	1599	0	1644	0	441	3539	0	1900	3505	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			214		218							218
Link Speed (mph)		15			25			45			45	
Link Distance (ft)		1905			1451			1986			773	
Travel Time (s)		86.6			39.6			30.1			11.7	
Peak Hour Factor	0.81	0.25	0.62	0.25	0.25	0.25	0.67	0.93	0.25	0.25	0.95	0.80
Heavy Vehicles (%)	1%	0%	1%	0%	0%	0%	0%	2%	0%	0%	3%	0%
Adj. Flow (vph)	127	0	119	0	0	4	207	1232	0	0	955	149
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	127	119	0	4	0	207	1232	0	0	955	149
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA	Prot		NA		D.P+P	NA		D.P+P	NA	Prot
Protected Phases	4	4	4	3	3		5	2		1	6	6

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases							6			2		
Detector Phase	4	4	4	3	3		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		5.0	14.0		5.0	14.0	14.0
Minimum Split (s)	13.5	13.5	13.5	13.0	13.0		12.5	20.0		12.0	20.0	20.0
Total Split (s)	25.0	25.0	25.0	15.0	15.0		24.0	66.0		14.0	56.0	56.0
Total Split (%)	20.8%	20.8%	20.8%	12.5%	12.5%		20.0%	55.0%		11.7%	46.7%	46.7%
Maximum Green (s)	18.5	18.5	18.5	9.0	9.0		16.5	60.0		7.0	50.0	50.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		4.0	5.0		4.0	5.0	5.0
All-Red Time (s)	3.5	3.5	3.5	3.0	3.0		3.5	1.0		3.0	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		6.5	6.5		6.0		7.5	6.0		7.0	6.0	6.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		2.0	5.0		2.0	5.0	5.0
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2		0.2	3.5		0.2	3.5	3.5
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	18.0		0.0	18.0	18.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	15.0		0.0	15.0	15.0
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	C-Min
Act Effct Green (s)		13.7	13.7		7.0		82.2	91.2			70.9	70.9
Actuated g/C Ratio		0.11	0.11		0.06		0.68	0.76			0.59	0.59
v/c Ratio		0.62	0.32		0.01		0.46	0.46			0.46	0.14
Control Delay		63.6	2.3		0.0		9.5	7.0			7.1	0.3
Queue Delay		0.0	0.0		0.0		0.0	0.0			0.0	0.0
Total Delay		63.6	2.3		0.0		9.5	7.0			7.1	0.3
LOS		E	A		A		A	A			A	A
Approach Delay		33.9						7.4			6.1	
Approach LOS		C						A			A	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 12 (10%), Referenced to phase 2:NBSB and 6:NBSB, Start of Green
Natural Cycle: 75
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.62
Intersection Signal Delay: 9.2 Intersection LOS: A
Intersection Capacity Utilization 64.5% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 2: US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive



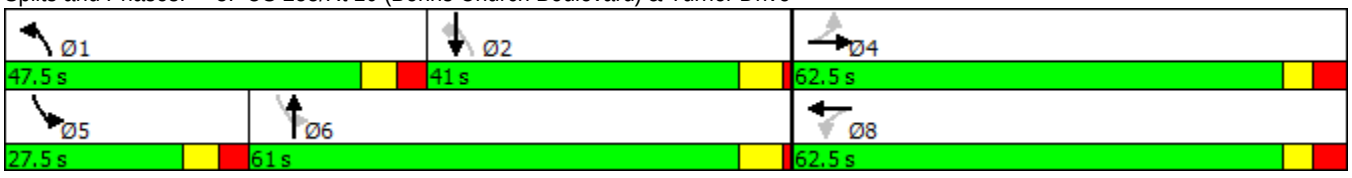
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	76	0	86	0	1	2	153	1196	1	29	877	112
Future Volume (vph)	76	0	86	0	1	2	153	1196	1	29	877	112
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	125		0	125		275
Storage Lanes	0		0	0		0	1		0	1		1
Taper Length (ft)	25			25			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt		0.936			0.932							0.850
Flt Protected		0.974					0.950			0.950		
Satd. Flow (prot)	0	1715	0	0	1771	0	1687	3539	0	1805	3505	1482
Flt Permitted		0.830					0.243			0.141		
Satd. Flow (perm)	0	1461	0	0	1771	0	431	3539	0	268	3505	1482
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)		130			4							141
Link Speed (mph)		40			25			45			45	
Link Distance (ft)		1501			695			1153			1986	
Travel Time (s)		25.6			19.0			17.5			30.1	
Peak Hour Factor	0.63	0.25	0.80	0.25	0.25	0.50	0.90	0.94	0.25	0.50	0.98	0.85
Heavy Vehicles (%)	1%	0%	1%	0%	0%	0%	7%	2%	0%	0%	3%	9%
Adj. Flow (vph)	121	0	108	0	4	4	170	1272	4	58	895	132
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	229	0	0	8	0	170	1276	0	58	895	132
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2		1	2		1	2	1
Detector Template	Left	Thru		Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100		20	100		20	100		20	100	20
Trailing Detector (ft)	0	0		0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0		0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6		20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA			NA		D.P+P	NA		D.P+P	NA	Perm
Protected Phases		4			8		1	6		5	2	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4			8			2			6		2
Detector Phase	4	4		8	8		1	6		5	2	2
Switch Phase												
Minimum Initial (s)	7.0	7.0		7.0	7.0		5.0	15.0		5.0	15.0	15.0
Minimum Split (s)	14.5	14.5		14.5	14.5		12.5	21.0		12.5	21.0	21.0
Total Split (s)	62.5	62.5		62.5	62.5		47.5	61.0		27.5	41.0	41.0
Total Split (%)	41.4%	41.4%		41.4%	41.4%		31.5%	40.4%		18.2%	27.2%	27.2%
Maximum Green (s)	55.0	55.0		55.0	55.0		40.0	55.0		20.0	35.0	35.0
Yellow Time (s)	3.5	3.5		3.5	3.5		4.0	5.0		4.0	5.0	5.0
All-Red Time (s)	4.0	4.0		4.0	4.0		3.5	1.0		3.5	1.0	1.0
Lost Time Adjust (s)		0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		7.5			7.5		7.5	6.0		7.5	6.0	6.0
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	5.0	5.0		3.0	3.0		4.0	6.0		2.0	6.0	6.0
Minimum Gap (s)	3.5	3.5		0.2	0.2		0.2	3.5		0.2	3.5	3.5
Time Before Reduce (s)	20.0	20.0		0.0	0.0		0.0	20.0		0.0	20.0	20.0
Time To Reduce (s)	10.0	10.0		0.0	0.0		0.0	15.0		0.0	15.0	15.0
Recall Mode	None	None		None	None		None	Min		None	Min	Min
Act Effct Green (s)		14.2			9.7		51.4	50.3		53.3	42.0	42.0
Actuated g/C Ratio		0.16			0.11		0.58	0.57		0.60	0.47	0.47
v/c Ratio		0.67			0.04		0.42	0.63		0.22	0.54	0.17
Control Delay		26.3			28.3		10.0	16.4		8.4	18.9	3.2
Queue Delay		0.0			0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		26.3			28.3		10.0	16.4		8.4	18.9	3.2
LOS		C			C		A	B		A	B	A
Approach Delay		26.3			28.3			15.6			16.5	
Approach LOS		C			C			B			B	

Intersection Summary

Area Type: Other
Cycle Length: 151
Actuated Cycle Length: 88.5
Natural Cycle: 60
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.67
Intersection Signal Delay: 16.9 Intersection LOS: B
Intersection Capacity Utilization 70.9% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 3: US 258/Rt 10 (Benns Church Boulevard) & Turner Drive

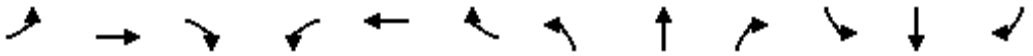


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	0	0	4	0	1341	0	0	0
Future Volume (vph)	0	0	0	0	0	0	4	0	1341	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0		125		0		140
Storage Lanes	0		0	0		0		1		0		1
Taper Length (ft)	25			25				25				75
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00
Frt												
Flt Protected							0.950					
Satd. Flow (prot)	0	0	0	0	0	0	1805	0	3505	0	1900	0
Flt Permitted							0.950					
Satd. Flow (perm)	0	0	0	0	0	0	1805	0	3505	0	1900	0
Link Speed (mph)		30			30				45			
Link Distance (ft)		810			872				3921			
Travel Time (s)		18.4			19.8				59.4			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.25	0.97	0.25	0.50	0.25
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%
Adj. Flow (vph)	0	0	0	0	0	0	16	0	1382	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	0	0	16	0	1382	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	R NA	Left	Left	Right	R NA	Left
Median Width(ft)		0			0				12			
Link Offset(ft)		0			0				0			
Crosswalk Width(ft)		16			16				16			
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	9	15		9	9	15
Sign Control		Stop			Stop				Free			

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 40.4%		ICU Level of Service A	
Analysis Period (min) 15			

Lane Group	SBT	SBR
Lane Configurations		
Traffic Volume (vph)	952	0
Future Volume (vph)	952	0
Ideal Flow (vphpl)	1900	1900
Storage Length (ft)		0
Storage Lanes		0
Taper Length (ft)		
Lane Util. Factor	0.95	1.00
Frt		
Flt Protected		
Satd. Flow (prot)	3539	0
Flt Permitted		
Satd. Flow (perm)	3539	0
Link Speed (mph)	45	
Link Distance (ft)	1153	
Travel Time (s)	17.5	
Peak Hour Factor	0.95	0.25
Heavy Vehicles (%)	2%	0%
Adj. Flow (vph)	1002	0
Shared Lane Traffic (%)		
Lane Group Flow (vph)	1002	0
Enter Blocked Intersection	No	No
Lane Alignment	Left	Right
Median Width(ft)	12	
Link Offset(ft)	0	
Crosswalk Width(ft)	16	
Two way Left Turn Lane		
Headway Factor	1.00	1.00
Turning Speed (mph)		9
Sign Control	Free	

Intersection Summary

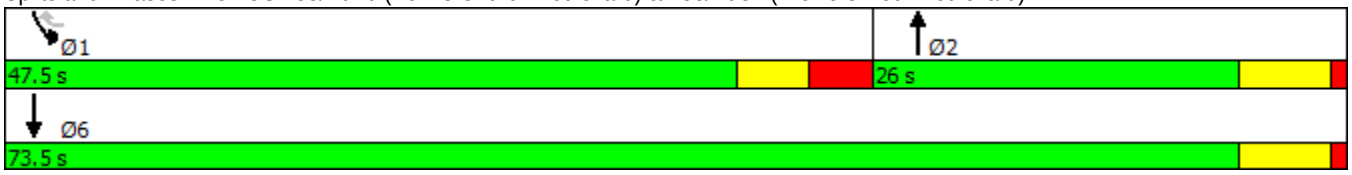


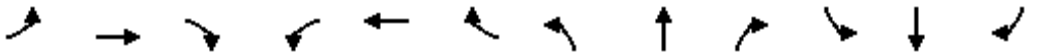
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	0	1154	0	200	0	647	276	0
Future Volume (vph)	0	0	0	0	0	1154	0	200	0	647	276	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	300		0
Storage Lanes	0		0	0		2	0		0	1		0
Taper Length (ft)	25			25			100			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.95	1.00	0.97	0.95	1.00
Frt						0.850						
Flt Protected										0.950		
Satd. Flow (prot)	0	0	0	0	0	2760	0	3471	0	3400	3471	0
Flt Permitted										0.950		
Satd. Flow (perm)	0	0	0	0	0	2760	0	3471	0	3400	3471	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						659						
Link Speed (mph)		30			45			45			45	
Link Distance (ft)		963			1126			2837			3921	
Travel Time (s)		21.9			17.1			43.0			59.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.93	0.25	0.89	0.25	0.99	0.85	0.25
Heavy Vehicles (%)	0%	0%	0%	0%	0%	3%	0%	4%	0%	3%	4%	0%
Adj. Flow (vph)	0	0	0	0	0	1241	0	225	0	654	325	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	0	1241	0	225	0	654	325	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors						1		2		1	2	
Detector Template						Right		Thru		Left	Thru	
Leading Detector (ft)						20		100		20	100	
Trailing Detector (ft)						0		0		0	0	
Detector 1 Position(ft)						0		0		0	0	
Detector 1 Size(ft)						20		6		20	6	
Detector 1 Type						Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)						0.0		0.0		0.0	0.0	
Detector 1 Queue (s)						0.0		0.0		0.0	0.0	
Detector 1 Delay (s)						0.0		0.0		0.0	0.0	
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type						Perm		NA		Prot	NA	
Protected Phases								2		1	6	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases						1						
Detector Phase						1		2		1	6	
Switch Phase												
Minimum Initial (s)						15.0		10.0		15.0	15.0	
Minimum Split (s)						22.5		16.0		22.5	21.0	
Total Split (s)						47.5		26.0		47.5	73.5	
Total Split (%)						64.6%		35.4%		64.6%	100.0%	
Maximum Green (s)						40.0		20.0		40.0	67.5	
Yellow Time (s)						4.0		5.0		4.0	5.0	
All-Red Time (s)						3.5		1.0		3.5	1.0	
Lost Time Adjust (s)						0.0		0.0		0.0	0.0	
Total Lost Time (s)						7.5		6.0		7.5	6.0	
Lead/Lag						Lead		Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)						3.5		2.5		3.5	5.0	
Recall Mode						Min		None		Min	Min	
Act Effct Green (s)						26.5		10.5		26.5	50.8	
Actuated g/C Ratio						0.52		0.21		0.52	1.00	
v/c Ratio						0.71		0.32		0.37	0.09	
Control Delay						6.1		20.6		7.5	0.1	
Queue Delay						0.0		0.0		0.0	0.0	
Total Delay						6.1		20.6		7.5	0.1	
LOS						A		C		A	A	
Approach Delay					6.1			20.6			5.0	
Approach LOS					A			C			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 73.5			
Actuated Cycle Length: 50.8			
Natural Cycle: 50			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.71			
Intersection Signal Delay: 7.0		Intersection LOS: A	
Intersection Capacity Utilization 60.0%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	8	685	3	418	1126	12	1	3	222	2	4	6
Future Volume (vph)	8	685	3	418	1126	12	1	3	222	2	4	6
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	225		0	600		325	0		350	0		0
Storage Lanes	1		0	1		1	0		2	0		1
Taper Length (ft)	200			200			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	0.88	1.00	1.00	1.00
Frt		0.999				0.850			0.850			0.850
Flt Protected	0.950			0.950				0.984			0.976	
Satd. Flow (prot)	1805	3536	0	1787	3539	1380	0	1870	2787	0	1648	1380
Flt Permitted	0.950			0.950				0.984			0.976	
Satd. Flow (perm)	1805	3536	0	1787	3539	1380	0	1870	2787	0	1648	1380
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						171			285			160
Link Speed (mph)		45			45			45			25	
Link Distance (ft)		1126			846			914			623	
Travel Time (s)		17.1			12.8			13.8			17.0	
Peak Hour Factor	0.35	0.98	1.00	0.86	0.96	0.60	0.25	0.38	0.78	0.50	1.00	0.75
Heavy Vehicles (%)	0%	2%	0%	1%	2%	17%	0%	0%	2%	0%	25%	17%
Adj. Flow (vph)	23	699	3	486	1173	20	4	8	285	4	4	8
Shared Lane Traffic (%)												
Lane Group Flow (vph)	23	702	0	486	1173	20	0	12	285	0	8	8
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	1	6		5	2		4	4	5	3	3	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases						2			4			3
Detector Phase	1	6		5	2	2	4	4	5	3	3	3
Switch Phase												
Minimum Initial (s)	10.0	15.0		10.0	15.0	15.0	10.0	10.0	10.0	5.0	5.0	5.0
Minimum Split (s)	19.0	24.5		19.5	24.5	24.5	26.0	26.0	19.5	26.0	26.0	26.0
Total Split (s)	34.0	41.5		39.5	47.0	47.0	26.0	26.0	39.5	33.0	33.0	33.0
Total Split (%)	24.3%	29.6%		28.2%	33.6%	33.6%	18.6%	18.6%	28.2%	23.6%	23.6%	23.6%
Maximum Green (s)	25.0	35.0		30.0	40.5	40.5	18.0	18.0	30.0	25.0	25.0	25.0
Yellow Time (s)	5.0	5.5		5.0	5.5	5.5	4.0	4.0	5.0	3.5	3.5	3.5
All-Red Time (s)	4.0	1.0		4.5	1.0	1.0	4.0	4.0	4.5	4.5	4.5	4.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Lost Time (s)	9.0	6.5		9.5	6.5	6.5		8.0	9.5		8.0	8.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	5.0		3.0	5.0	5.0	3.5	3.5	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	None	None	None	None	None
Act Effct Green (s)	10.5	26.0		31.6	66.4	66.4		10.5	34.2		6.3	6.3
Actuated g/C Ratio	0.13	0.32		0.39	0.81	0.81		0.13	0.42		0.08	0.08
v/c Ratio	0.10	0.62		0.70	0.41	0.02		0.05	0.21		0.06	0.03
Control Delay	41.2	27.6		32.8	9.6	0.0		41.8	3.1		45.5	0.2
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Delay	41.2	27.6		32.8	9.6	0.0		41.8	3.1		45.5	0.2
LOS	D	C		C	A	A		D	A		D	A
Approach Delay		28.1			16.2			4.6			22.8	
Approach LOS		C			B			A			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 81.7			
Natural Cycle: 130			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.70			
Intersection Signal Delay: 18.1		Intersection LOS: B	
Intersection Capacity Utilization 70.5%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 6: Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)

APPENDIX D

2026 No Build Synchro Reports

1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	1	19	99	5	43	15	801	51	55	1160	36
Future Volume (vph)	26	1	19	99	5	43	15	801	51	55	1160	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	200		350	275		325
Storage Lanes	0		1	0		1	1		1	1		1
Taper Length (ft)	25			25			125			225		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected		0.957			0.956		0.950			0.950		
Satd. Flow (prot)	0	1756	1615	0	1737	1615	1805	3374	1509	1752	3505	1615
Flt Permitted		0.957			0.956		0.062			0.263		
Satd. Flow (perm)	0	1756	1615	0	1737	1615	118	3374	1509	485	3505	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			171			171			185			185
Link Speed (mph)		25			25			45			45	
Link Distance (ft)		335			1232			773			1937	
Travel Time (s)		9.1			33.6			11.7			29.3	
Peak Hour Factor	0.82	0.25	0.53	0.76	0.50	0.79	0.46	0.92	0.75	0.73	0.63	0.80
Heavy Vehicles (%)	4%	0%	0%	3%	25%	0%	0%	7%	7%	3%	3%	0%
Adj. Flow (vph)	32	4	36	130	10	54	33	871	68	75	1841	45
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	36	36	0	140	54	33	871	68	75	1841	45
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA	Prot	Split	NA	Prot	D.P+P	NA	Perm	D.P+P	NA	Perm
Protected Phases	4	4	4	3	3	3	5	2		1	6	

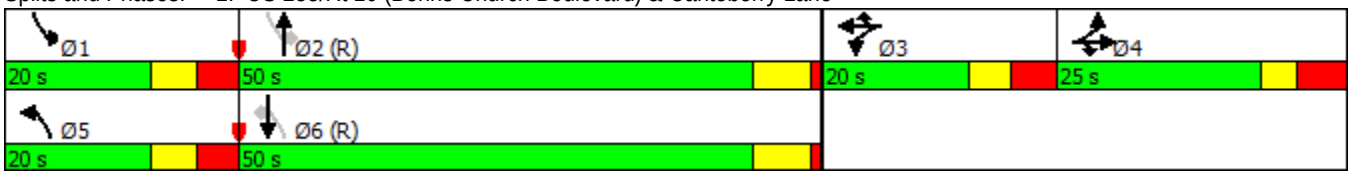
1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane

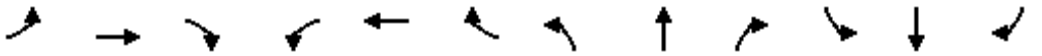
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases							6		2	2		6
Detector Phase	4	4	4	3	3	3	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	5.0	15.0	15.0	5.0	15.0	15.0
Minimum Split (s)	14.5	14.5	14.5	14.5	14.5	14.5	12.5	21.0	21.0	12.5	21.0	21.0
Total Split (s)	25.0	25.0	25.0	20.0	20.0	20.0	20.0	50.0	50.0	20.0	50.0	50.0
Total Split (%)	21.7%	21.7%	21.7%	17.4%	17.4%	17.4%	17.4%	43.5%	43.5%	17.4%	43.5%	43.5%
Maximum Green (s)	17.5	17.5	17.5	12.5	12.5	12.5	12.5	44.0	44.0	12.5	44.0	44.0
Yellow Time (s)	3.0	3.0	3.0	3.5	3.5	3.5	4.0	5.0	5.0	4.0	5.0	5.0
All-Red Time (s)	4.5	4.5	4.5	4.0	4.0	4.0	3.5	1.0	1.0	3.5	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.5	7.5		7.5	7.5	7.5	6.0	6.0	7.5	6.0	6.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	2.0	6.0	6.0	2.0	6.0	6.0
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	3.5	3.5	0.2	3.5	3.5
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	20.0	0.0	20.0	20.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0	15.0	0.0	15.0	15.0
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	C-Min
Act Effct Green (s)		8.2	8.2		11.9	11.9	70.7	65.2	65.2	69.2	68.8	68.8
Actuated g/C Ratio		0.07	0.07		0.10	0.10	0.61	0.57	0.57	0.60	0.60	0.60
v/c Ratio		0.29	0.13		0.78	0.17	0.22	0.46	0.07	0.21	0.88	0.04
Control Delay		56.0	1.0		78.6	1.1	13.8	15.3	0.4	10.3	28.9	0.1
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		56.0	1.0		78.6	1.1	13.8	15.3	0.4	10.3	28.9	0.1
LOS		E	A		E	A	B	B	A	B	C	A
Approach Delay		28.5			57.0			14.2			27.5	
Approach LOS		C			E			B			C	

Intersection Summary

Area Type: Other
Cycle Length: 115
Actuated Cycle Length: 115
Offset: 0 (0%), Referenced to phase 2:NBSB and 6:NBSB, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.88
Intersection Signal Delay: 25.3 Intersection LOS: C
Intersection Capacity Utilization 66.1% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	0	20	0	0	0	24	715	0	2	1410	32
Future Volume (vph)	5	0	20	0	0	0	24	715	0	2	1410	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	150		235
Storage Lanes	0		1	0		0	1		0	1		1
Taper Length (ft)	25			25			150			125		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850									0.850
Flt Protected		0.950					0.950			0.950		
Satd. Flow (prot)	0	1805	1524	0	1900	0	1805	3505	0	1805	3471	1553
Flt Permitted		0.950					0.067			0.288		
Satd. Flow (perm)	0	1805	1524	0	1900	0	127	3505	0	547	3471	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			152									157
Link Speed (mph)		15			25			45			45	
Link Distance (ft)		1905			1451			1986			773	
Travel Time (s)		86.6			39.6			30.1			11.7	
Peak Hour Factor	0.50	0.25	0.56	0.25	0.25	0.25	0.44	0.75	0.44	0.50	0.72	0.78
Heavy Vehicles (%)	0%	0%	6%	0%	0%	0%	0%	3%	14%	0%	4%	4%
Adj. Flow (vph)	10	0	36	0	0	0	55	953	0	4	1958	41
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	10	36	0	0	0	55	953	0	4	1958	41
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA	Prot				D.P+P	NA		D.P+P	NA	Prot
Protected Phases	4	4	4	3	3		5	2		1	6	6

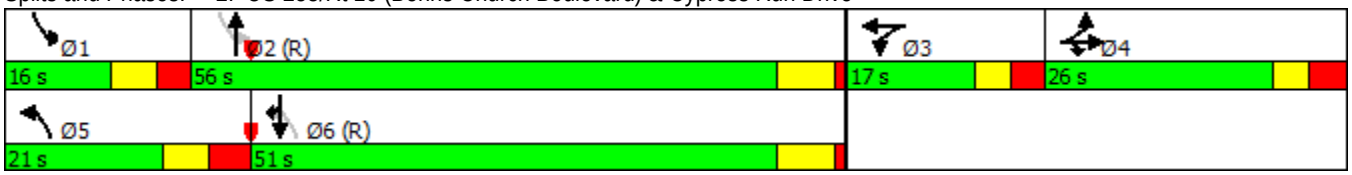
2: US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive

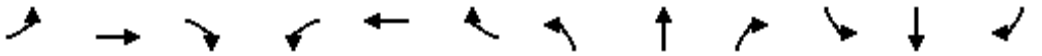
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases							6			2		
Detector Phase	4	4	4	3	3		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		5.0	14.0		5.0	14.0	14.0
Minimum Split (s)	13.5	13.5	13.5	13.0	13.0		12.5	20.0		12.0	20.0	20.0
Total Split (s)	26.0	26.0	26.0	17.0	17.0		21.0	56.0		16.0	51.0	51.0
Total Split (%)	22.6%	22.6%	22.6%	14.8%	14.8%		18.3%	48.7%		13.9%	44.3%	44.3%
Maximum Green (s)	19.5	19.5	19.5	11.0	11.0		13.5	50.0		9.0	45.0	45.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		4.0	5.0		4.0	5.0	5.0
All-Red Time (s)	3.5	3.5	3.5	3.0	3.0		3.5	1.0		3.0	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		6.5	6.5		6.0		7.5	6.0		7.0	6.0	6.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		2.0	5.0		2.0	5.0	5.0
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2		0.2	3.5		0.2	3.5	3.5
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	18.0		0.0	18.0	18.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	15.0		0.0	15.0	15.0
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	C-Min
Act Effct Green (s)		7.1	7.1				93.3	100.8		98.4	91.5	91.5
Actuated g/C Ratio		0.06	0.06				0.81	0.88		0.86	0.80	0.80
v/c Ratio		0.09	0.15				0.30	0.31		0.01	0.71	0.03
Control Delay		52.8	1.4				6.9	2.9		1.0	5.5	0.0
Queue Delay		0.0	0.0				0.0	0.0		0.0	0.0	0.0
Total Delay		52.8	1.4				6.9	2.9		1.0	5.5	0.0
LOS		D	A				A	A		A	A	A
Approach Delay		12.5						3.1			5.4	
Approach LOS		B						A			A	

Intersection Summary

Area Type: Other
Cycle Length: 115
Actuated Cycle Length: 115
Offset: 13 (11%), Referenced to phase 2:NBSB and 6:NBSB, Start of Green
Natural Cycle: 100
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.71
Intersection Signal Delay: 4.8 Intersection LOS: A
Intersection Capacity Utilization 55.2% ICU Level of Service B
Analysis Period (min) 15

Splits and Phases: 2: US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive





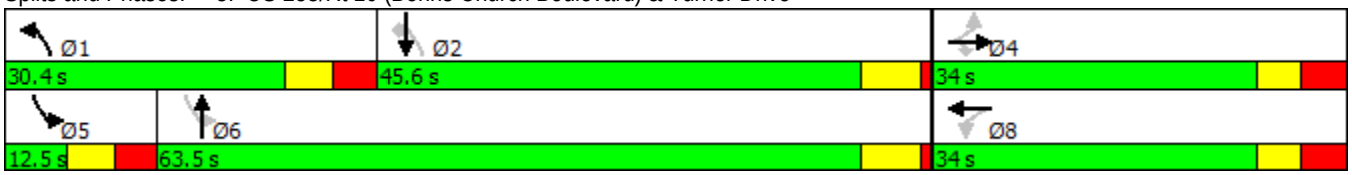
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	193	1	285	1	72	1	243	631	70	7	944	324
Future Volume (vph)	193	1	285	1	72	1	243	631	70	7	944	324
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		300	0		0	125		0	125		275
Storage Lanes	0		1	0		0	1		0	1		1
Taper Length (ft)	200			25			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850		0.997			0.973				0.850
Flt Protected		0.953			0.999		0.950			0.950		
Satd. Flow (prot)	0	1811	1615	0	1892	0	1752	3401	0	1805	3505	1553
Flt Permitted		0.513			0.991		0.094			0.274		
Satd. Flow (perm)	0	975	1615	0	1877	0	173	3401	0	521	3505	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			311		1			35				287
Link Speed (mph)		40			25			45			45	
Link Distance (ft)		1497			695			1153			1986	
Travel Time (s)		25.5			19.0			17.5			30.1	
Peak Hour Factor	0.64	0.25	0.73	0.25	0.39	0.25	0.52	0.90	0.46	0.25	0.73	0.51
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	3%	4%	0%	0%	3%	4%
Adj. Flow (vph)	302	4	390	4	185	4	467	701	152	28	1293	635
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	306	390	0	193	0	467	853	0	28	1293	635
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		D.P+P	NA		D.P+P	NA	Perm
Protected Phases		4			8		1	6		5	2	

3: US 258/Rt 10 (Benns Church Boulevard) & Turner Drive

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4		4	8			2			6		2
Detector Phase	4	4	4	8	8		1	6		5	2	2
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		5.0	15.0		5.0	15.0	15.0
Minimum Split (s)	15.0	15.0	15.0	14.5	14.5		12.5	21.0		12.5	21.0	21.0
Total Split (s)	34.0	34.0	34.0	34.0	34.0		30.4	63.5		12.5	45.6	45.6
Total Split (%)	30.9%	30.9%	30.9%	30.9%	30.9%		27.6%	57.7%		11.4%	41.5%	41.5%
Maximum Green (s)	26.5	26.5	26.5	26.5	26.5		22.9	57.5		5.0	39.6	39.6
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		4.0	5.0		4.0	5.0	5.0
All-Red Time (s)	4.0	4.0	4.0	4.0	4.0		3.5	1.0		3.5	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		7.5	7.5		7.5		7.5	6.0		7.5	6.0	6.0
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	5.0	5.0	5.0	3.0	3.0		4.0	6.0		2.0	6.0	6.0
Minimum Gap (s)	3.5	3.5	3.5	0.2	0.2		0.2	3.5		0.2	3.5	3.5
Time Before Reduce (s)	20.0	20.0	20.0	0.0	0.0		0.0	20.0		0.0	20.0	20.0
Time To Reduce (s)	10.0	10.0	10.0	0.0	0.0		0.0	15.0		0.0	15.0	15.0
Recall Mode	None	None	None	None	None		None	Min		None	Min	Min
Act Effct Green (s)		26.5	26.5		26.5		61.0	62.5		64.0	39.6	39.6
Actuated g/C Ratio		0.24	0.24		0.24		0.55	0.57		0.58	0.36	0.36
v/c Ratio		1.31	0.62		0.43		1.10	0.44		0.08	1.03	0.86
Control Delay		201.2	13.2		38.6		107.0	14.7		8.7	67.3	30.3
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		201.2	13.2		38.6		107.0	14.7		8.7	67.3	30.3
LOS		F	B		D		F	B		A	E	C
Approach Delay		95.9			38.6			47.4			54.5	
Approach LOS		F			D			D			D	

Intersection Summary			
Area Type:	Other		
Cycle Length: 110			
Actuated Cycle Length: 110			
Natural Cycle: 100			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 1.31			
Intersection Signal Delay: 58.4		Intersection LOS: E	
Intersection Capacity Utilization 74.5%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 3: US 258/Rt 10 (Benns Church Boulevard) & Turner Drive



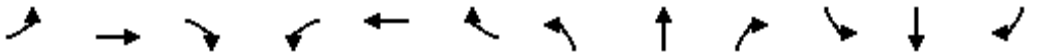
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	0	0	5	0	1032	0	1	0
Future Volume (vph)	0	0	0	0	0	0	5	0	1032	0	1	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0		125		0		140
Storage Lanes	0		0	0		0		1		0		1
Taper Length (ft)	25			25				25				75
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00
Frt												
Flt Protected							0.950				0.950	
Satd. Flow (prot)	0	0	0	0	0	0	1805	0	3438	0	1805	0
Flt Permitted							0.950				0.950	
Satd. Flow (perm)	0	0	0	0	0	0	1805	0	3438	0	1805	0
Link Speed (mph)		30			30				45			
Link Distance (ft)		810			872				3921			
Travel Time (s)		18.4			19.8				59.4			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.33	0.25	0.85	0.25	0.25	0.25
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	5%	0%	0%	0%
Adj. Flow (vph)	0	0	0	0	0	0	15	0	1214	0	4	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	0	0	15	0	1214	0	4	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	R NA	Left	Left	Right	R NA	Left
Median Width(ft)		0			0				12			
Link Offset(ft)		0			0				0			
Crosswalk Width(ft)		16			16				16			
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	9	15		9	9	15
Sign Control		Stop			Stop				Free			

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 38.5%		ICU Level of Service A	
Analysis Period (min) 15			

Lane Group	SBT	SBR
Lane Configurations		
Traffic Volume (vph)	1273	0
Future Volume (vph)	1273	0
Ideal Flow (vphpl)	1900	1900
Storage Length (ft)		0
Storage Lanes		0
Taper Length (ft)		
Lane Util. Factor	0.95	1.00
Frt		
Flt Protected		
Satd. Flow (prot)	3406	0
Flt Permitted		
Satd. Flow (perm)	3406	0
Link Speed (mph)	45	
Link Distance (ft)	1153	
Travel Time (s)	17.5	
Peak Hour Factor	0.88	0.25
Heavy Vehicles (%)	6%	0%
Adj. Flow (vph)	1447	0
Shared Lane Traffic (%)		
Lane Group Flow (vph)	1447	0
Enter Blocked Intersection	No	No
Lane Alignment	Left	Right
Median Width(ft)	12	
Link Offset(ft)	0	
Crosswalk Width(ft)	16	
Two way Left Turn Lane		
Headway Factor	1.00	1.00
Turning Speed (mph)		9
Sign Control	Free	

Intersection Summary

5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)



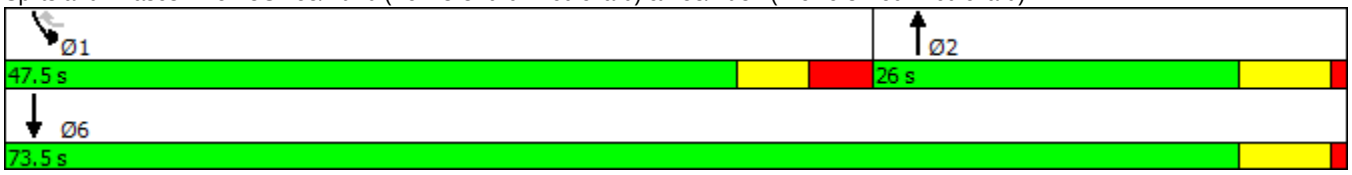
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	0	736	0	188	0	1010	244	0
Future Volume (vph)	0	0	0	0	0	736	0	188	0	1010	244	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	300		0
Storage Lanes	0		0	0		2	0		0	1		0
Taper Length (ft)	25			25			100			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.95	1.00	0.97	0.95	1.00
Frt						0.850						
Flt Protected										0.950		
Satd. Flow (prot)	0	0	0	0	0	2707	0	3471	0	3367	3438	0
Flt Permitted										0.950		
Satd. Flow (perm)	0	0	0	0	0	2707	0	3471	0	3367	3438	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						662						
Link Speed (mph)		30			45			45			45	
Link Distance (ft)		963			1126			2837			3921	
Travel Time (s)		21.9			17.1			43.0			59.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.72	0.92	0.84	0.25	0.83	0.63	0.25
Heavy Vehicles (%)	0%	0%	0%	0%	0%	5%	0%	4%	0%	4%	5%	0%
Adj. Flow (vph)	0	0	0	0	0	1022	0	224	0	1217	387	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	0	1022	0	224	0	1217	387	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors						1		2		1	2	
Detector Template						Right		Thru		Left	Thru	
Leading Detector (ft)						20		100		20	100	
Trailing Detector (ft)						0		0		0	0	
Detector 1 Position(ft)						0		0		0	0	
Detector 1 Size(ft)						20		6		20	6	
Detector 1 Type						Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)						0.0		0.0		0.0	0.0	
Detector 1 Queue (s)						0.0		0.0		0.0	0.0	
Detector 1 Delay (s)						0.0		0.0		0.0	0.0	
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type						Perm		NA		Prot	NA	
Protected Phases								2		1	6	

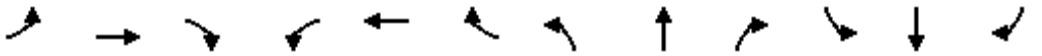
5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases						1						
Detector Phase						1		2		1	6	
Switch Phase												
Minimum Initial (s)						15.0		10.0		15.0	15.0	
Minimum Split (s)						22.5		16.0		22.5	21.0	
Total Split (s)						47.5		26.0		47.5	73.5	
Total Split (%)						64.6%		35.4%		64.6%	100.0%	
Maximum Green (s)						40.0		20.0		40.0	67.5	
Yellow Time (s)						4.0		5.0		4.0	5.0	
All-Red Time (s)						3.5		1.0		3.5	1.0	
Lost Time Adjust (s)						0.0		0.0		0.0	0.0	
Total Lost Time (s)						7.5		6.0		7.5	6.0	
Lead/Lag						Lead		Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)						3.5		2.5		3.5	5.0	
Recall Mode						Min		None		Min	Min	
Act Effct Green (s)						33.5		10.4		33.5	57.5	
Actuated g/C Ratio						0.58		0.18		0.58	1.00	
v/c Ratio						0.55		0.36		0.62	0.11	
Control Delay						3.4		24.0		9.3	0.1	
Queue Delay						0.0		0.0		0.0	0.0	
Total Delay						3.4		24.0		9.3	0.1	
LOS						A		C		A	A	
Approach Delay					3.4			24.0			7.1	
Approach LOS					A			C			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 73.5			
Actuated Cycle Length: 57.5			
Natural Cycle: 45			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.62			
Intersection Signal Delay: 7.1		Intersection LOS: A	
Intersection Capacity Utilization 47.1%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	989	0	243	709	3	0	1	433	7	3	12
Future Volume (vph)	7	989	0	243	709	3	0	1	433	7	3	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	225		0	600		325	0		350	0		0
Storage Lanes	1		0	1		1	0		2	0		1
Taper Length (ft)	200			200			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	0.88	1.00	1.00	1.00
Frt						0.850			0.850			0.850
Flt Protected	0.950			0.950							0.974	
Satd. Flow (prot)	1805	3471	0	1719	3505	1615	0	950	2682	0	1851	1369
Flt Permitted	0.950			0.950							0.974	
Satd. Flow (perm)	1805	3471	0	1719	3505	1615	0	950	2682	0	1851	1369
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						171			487			160
Link Speed (mph)		45			45			45			25	
Link Distance (ft)		1126			846			914			623	
Travel Time (s)		17.1			12.8			13.8			17.0	
Peak Hour Factor	0.50	0.82	0.25	0.78	0.72	0.38	0.25	0.25	0.89	0.75	0.38	0.55
Heavy Vehicles (%)	0%	4%	0%	5%	3%	0%	0%	100%	6%	0%	0%	18%
Adj. Flow (vph)	14	1206	0	312	985	8	0	4	487	9	8	22
Shared Lane Traffic (%)												
Lane Group Flow (vph)	14	1206	0	312	985	8	0	4	487	0	17	22
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		Prot	NA	Perm		NA	pm+ov	Split	NA	Perm
Protected Phases	1	6		5	2		4	4	5	3	3	

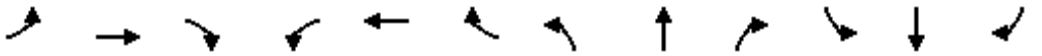
6: Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases						2			4			3
Detector Phase	1	6		5	2	2	4	4	5	3	3	3
Switch Phase												
Minimum Initial (s)	10.0	15.0		10.0	15.0	15.0	10.0	10.0	10.0	5.0	5.0	5.0
Minimum Split (s)	19.0	24.5		19.5	24.5	24.5	26.0	26.0	19.5	26.0	26.0	26.0
Total Split (s)	34.0	41.5		39.5	47.0	47.0	26.0	26.0	39.5	33.0	33.0	33.0
Total Split (%)	24.3%	29.6%		28.2%	33.6%	33.6%	18.6%	18.6%	28.2%	23.6%	23.6%	23.6%
Maximum Green (s)	25.0	35.0		30.0	40.5	40.5	18.0	18.0	30.0	25.0	25.0	25.0
Yellow Time (s)	5.0	5.5		5.0	5.5	5.5	4.0	4.0	5.0	3.5	3.5	3.5
All-Red Time (s)	4.0	1.0		4.5	1.0	1.0	4.0	4.0	4.5	4.5	4.5	4.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Lost Time (s)	9.0	6.5		9.5	6.5	6.5		8.0	9.5		8.0	8.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	5.0		3.0	5.0	5.0	3.5	3.5	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	None	None	None	None	None
Act Effct Green (s)	10.5	36.6		21.7	68.8	68.8		10.5	24.4		6.6	6.6
Actuated g/C Ratio	0.12	0.43		0.25	0.80	0.80		0.12	0.28		0.08	0.08
v/c Ratio	0.06	0.81		0.72	0.35	0.01		0.03	0.44		0.12	0.09
Control Delay	43.3	31.0		41.1	7.7	0.0		44.0	3.4		46.7	0.7
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Delay	43.3	31.0		41.1	7.7	0.0		44.0	3.4		46.7	0.7
LOS	D	C		D	A	A		D	A		D	A
Approach Delay		31.1			15.7			3.7			20.7	
Approach LOS		C			B			A			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 85.7			
Natural Cycle: 140			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.81			
Intersection Signal Delay: 20.0		Intersection LOS: B	
Intersection Capacity Utilization 69.1%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 6: Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)

1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	143	6	45	64	9	80	52	1249	107	133	1049	99
Future Volume (vph)	143	6	45	64	9	80	52	1249	107	133	1049	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	200		350	275		325
Storage Lanes	0		1	0		1	1		1	1		1
Taper Length (ft)	25			25			125			225		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected		0.956			0.958		0.950			0.950		
Satd. Flow (prot)	0	1816	1615	0	1789	1553	1805	3539	1583	1687	3505	1615
Flt Permitted		0.956			0.958		0.143			0.074		
Satd. Flow (perm)	0	1816	1615	0	1789	1553	272	3539	1583	131	3505	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			164			164			177			177
Link Speed (mph)		25			25			45			45	
Link Distance (ft)		335			1232			773			1937	
Travel Time (s)		9.1			33.6			11.7			29.3	
Peak Hour Factor	0.91	0.42	0.56	0.75	0.67	0.93	0.60	0.94	0.64	0.76	0.94	0.71
Heavy Vehicles (%)	0%	0%	0%	2%	0%	4%	0%	2%	2%	7%	3%	0%
Adj. Flow (vph)	157	14	80	85	13	86	87	1329	167	175	1116	139
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	171	80	0	98	86	87	1329	167	175	1116	139
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA	Prot	Split	NA	Prot	D.P+P	NA	Perm	D.P+P	NA	Perm
Protected Phases	4	4	4	3	3	3	5	2		1	6	

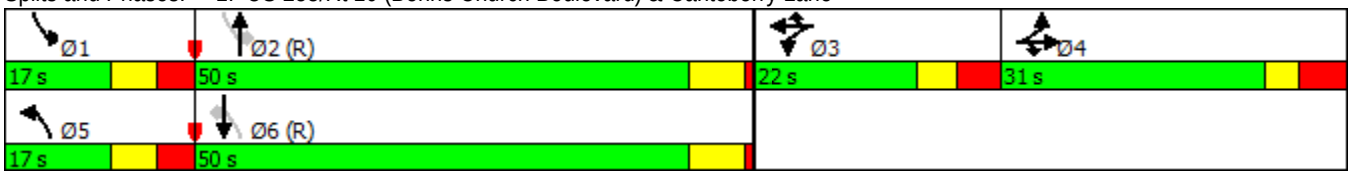
1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane

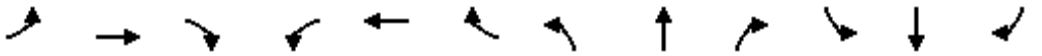
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases							6		2	2		6
Detector Phase	4	4	4	3	3	3	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	5.0	15.0	15.0	5.0	15.0	15.0
Minimum Split (s)	14.5	14.5	14.5	14.5	14.5	14.5	12.5	21.0	21.0	12.5	21.0	21.0
Total Split (s)	31.0	31.0	31.0	22.0	22.0	22.0	17.0	50.0	50.0	17.0	50.0	50.0
Total Split (%)	25.8%	25.8%	25.8%	18.3%	18.3%	18.3%	14.2%	41.7%	41.7%	14.2%	41.7%	41.7%
Maximum Green (s)	23.5	23.5	23.5	14.5	14.5	14.5	9.5	44.0	44.0	9.5	44.0	44.0
Yellow Time (s)	3.0	3.0	3.0	3.5	3.5	3.5	4.0	5.0	5.0	4.0	5.0	5.0
All-Red Time (s)	4.5	4.5	4.5	4.0	4.0	4.0	3.5	1.0	1.0	3.5	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.5	7.5		7.5	7.5	7.5	6.0	6.0	7.5	6.0	6.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	2.0	6.0	6.0	2.0	6.0	6.0
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	3.5	3.5	0.2	3.5	3.5
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	20.0	0.0	20.0	20.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0	15.0	0.0	15.0	15.0
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	C-Min
Act Effct Green (s)		16.5	16.5		11.5	11.5	62.0	54.0	54.0	62.0	56.3	56.3
Actuated g/C Ratio		0.14	0.14		0.10	0.10	0.52	0.45	0.45	0.52	0.47	0.47
v/c Ratio		0.68	0.22		0.57	0.29	0.38	0.84	0.21	0.92	0.68	0.16
Control Delay		62.7	1.4		64.7	2.5	15.3	32.0	2.3	77.5	29.2	2.0
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		62.7	1.4		64.7	2.5	15.3	32.0	2.3	77.5	29.2	2.0
LOS		E	A		E	A	B	C	A	E	C	A
Approach Delay		43.2			35.6			28.0			32.4	
Approach LOS		D			D			C			C	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBSB and 6:NBSB, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.92
Intersection Signal Delay: 31.3 Intersection LOS: C
Intersection Capacity Utilization 74.3% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	116	0	83	0	0	1	157	1291	0	0	1022	134
Future Volume (vph)	116	0	83	0	0	1	157	1291	0	0	1022	134
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	150		235
Storage Lanes	0		1	0		0	1		0	1		1
Taper Length (ft)	25			25			150			125		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850		0.865							0.850
Flt Protected		0.950					0.950					
Satd. Flow (prot)	0	1787	1599	0	1644	0	1805	3539	0	1900	3505	1615
Flt Permitted		0.950					0.183					
Satd. Flow (perm)	0	1787	1599	0	1644	0	348	3539	0	1900	3505	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			214		218							218
Link Speed (mph)		15			25			45			45	
Link Distance (ft)		1905			1451			1986			773	
Travel Time (s)		86.6			39.6			30.1			11.7	
Peak Hour Factor	0.81	0.25	0.62	0.25	0.25	0.25	0.67	0.93	0.25	0.25	0.95	0.80
Heavy Vehicles (%)	1%	0%	1%	0%	0%	0%	0%	2%	0%	0%	3%	0%
Adj. Flow (vph)	143	0	134	0	0	4	234	1388	0	0	1076	168
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	143	134	0	4	0	234	1388	0	0	1076	168
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA	Prot		NA		D.P+P	NA		D.P+P	NA	Prot
Protected Phases	4	4	4	3	3		5	2		1	6	6

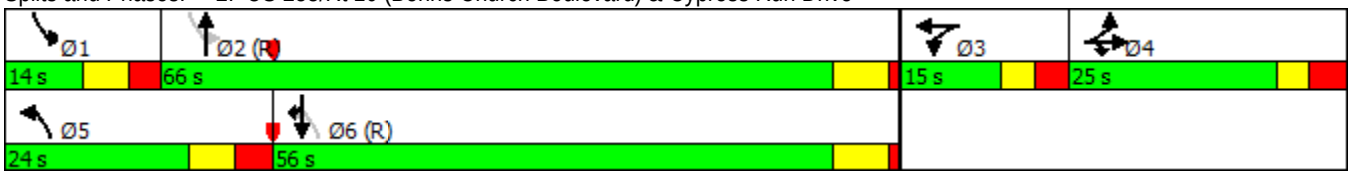
2: US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive

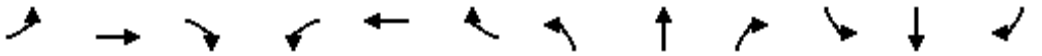
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases							6			2		
Detector Phase	4	4	4	3	3		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		5.0	14.0		5.0	14.0	14.0
Minimum Split (s)	13.5	13.5	13.5	13.0	13.0		12.5	20.0		12.0	20.0	20.0
Total Split (s)	25.0	25.0	25.0	15.0	15.0		24.0	66.0		14.0	56.0	56.0
Total Split (%)	20.8%	20.8%	20.8%	12.5%	12.5%		20.0%	55.0%		11.7%	46.7%	46.7%
Maximum Green (s)	18.5	18.5	18.5	9.0	9.0		16.5	60.0		7.0	50.0	50.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		4.0	5.0		4.0	5.0	5.0
All-Red Time (s)	3.5	3.5	3.5	3.0	3.0		3.5	1.0		3.0	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		6.5	6.5		6.0		7.5	6.0		7.0	6.0	6.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		2.0	5.0		2.0	5.0	5.0
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2		0.2	3.5		0.2	3.5	3.5
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	18.0		0.0	18.0	18.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	15.0		0.0	15.0	15.0
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	C-Min
Act Effct Green (s)		14.6	14.6		7.0		81.3	90.3			68.4	68.4
Actuated g/C Ratio		0.12	0.12		0.06		0.68	0.75			0.57	0.57
v/c Ratio		0.66	0.35		0.01		0.57	0.52			0.54	0.17
Control Delay		64.3	2.6		0.0		13.9	8.0			6.7	0.3
Queue Delay		0.0	0.0		0.0		0.0	0.0			0.0	0.0
Total Delay		64.3	2.6		0.0		13.9	8.0			6.7	0.3
LOS		E	A		A		B	A			A	A
Approach Delay		34.4						8.9			5.8	
Approach LOS		C						A			A	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 12 (10%), Referenced to phase 2:NBSB and 6:NBSB, Start of Green
Natural Cycle: 80
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.66
Intersection Signal Delay: 9.9 Intersection LOS: A
Intersection Capacity Utilization 69.2% ICU Level of Service C
Analysis Period (min) 15

Splits and Phases: 2: US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	86	0	97	0	1	2	172	1347	1	33	988	126
Future Volume (vph)	86	0	97	0	1	2	172	1347	1	33	988	126
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		300	100		0	125		0	125		275
Storage Lanes	0		1	1		0	1		0	1		1
Taper Length (ft)	200			25			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850		0.925							0.850
Flt Protected		0.950					0.950			0.950		
Satd. Flow (prot)	0	1787	1599	1900	1758	0	1687	3539	0	1805	3505	1482
Flt Permitted		0.752					0.191			0.094		
Satd. Flow (perm)	0	1415	1599	1900	1758	0	339	3539	0	179	3505	1482
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			127		4							148
Link Speed (mph)		40			25			45			45	
Link Distance (ft)		1500			695			1153			1986	
Travel Time (s)		25.6			19.0			17.5			30.1	
Peak Hour Factor	0.63	0.25	0.80	0.25	0.25	0.50	0.90	0.94	0.25	0.50	0.98	0.85
Heavy Vehicles (%)	1%	0%	1%	0%	0%	0%	7%	2%	0%	0%	3%	9%
Adj. Flow (vph)	137	0	121	0	4	4	191	1433	4	66	1008	148
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	137	121	0	8	0	191	1437	0	66	1008	148
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		D.P+P	NA		D.P+P	NA	Perm
Protected Phases		4			8		1	6		5	2	

3: US 258/Rt 10 (Benns Church Boulevard) & Turner Drive

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4		4	8			2			6		2
Detector Phase	4	4	4	8	8		1	6		5	2	2
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		5.0	15.0		5.0	15.0	15.0
Minimum Split (s)	14.5	14.5	14.5	14.5	14.5		12.5	21.0		12.5	21.0	21.0
Total Split (s)	24.0	24.0	24.0	14.5	14.5		19.0	53.5		12.5	47.0	47.0
Total Split (%)	26.7%	26.7%	26.7%	16.1%	16.1%		21.1%	59.4%		13.9%	52.2%	52.2%
Maximum Green (s)	16.5	16.5	16.5	7.0	7.0		11.5	47.5		5.0	41.0	41.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		4.0	5.0		4.0	5.0	5.0
All-Red Time (s)	4.0	4.0	4.0	4.0	4.0		3.5	1.0		3.5	1.0	1.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		7.5	7.5	7.5	7.5		7.5	6.0		7.5	6.0	6.0
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	5.0	5.0	5.0	3.0	3.0		4.0	6.0		2.0	6.0	6.0
Minimum Gap (s)	3.5	3.5	3.5	0.2	0.2		0.2	3.5		0.2	3.5	3.5
Time Before Reduce (s)	20.0	20.0	20.0	0.0	0.0		0.0	20.0		0.0	20.0	20.0
Time To Reduce (s)	10.0	10.0	10.0	0.0	0.0		0.0	15.0		0.0	15.0	15.0
Recall Mode	None	None	None	None	None		None	Min		None	Min	Min
Act Effct Green (s)		14.0	14.0		8.9		45.4	45.1		47.3	36.9	36.9
Actuated g/C Ratio		0.17	0.17		0.11		0.55	0.55		0.57	0.45	0.45
v/c Ratio		0.57	0.32		0.04		0.54	0.74		0.33	0.64	0.20
Control Delay		43.2	8.4		26.7		13.9	18.3		10.7	20.0	3.3
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		43.2	8.4		26.7		13.9	18.3		10.7	20.0	3.3
LOS		D	A		C		B	B		B	B	A
Approach Delay		26.8			26.7			17.8			17.5	
Approach LOS		C			C			B			B	

Intersection Summary

Area Type: Other
Cycle Length: 90
Actuated Cycle Length: 82.3
Natural Cycle: 65
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.74
Intersection Signal Delay: 18.4 Intersection LOS: B
Intersection Capacity Utilization 70.4% ICU Level of Service C
Analysis Period (min) 15

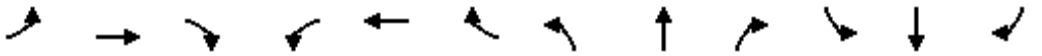
Splits and Phases: 3: US 258/Rt 10 (Benns Church Boulevard) & Turner Drive

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	0	0	5	0	1511	0	0	0
Future Volume (vph)	0	0	0	0	0	0	5	0	1511	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0		125		0		140
Storage Lanes	0		0	0		0		1		0		1
Taper Length (ft)	25			25				25				75
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00
Frt												
Flt Protected							0.950					
Satd. Flow (prot)	0	0	0	0	0	0	1805	0	3505	0	1900	0
Flt Permitted							0.950					
Satd. Flow (perm)	0	0	0	0	0	0	1805	0	3505	0	1900	0
Link Speed (mph)		30			30				45			
Link Distance (ft)		810			872				3921			
Travel Time (s)		18.4			19.8				59.4			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.25	0.97	0.25	0.50	0.25
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%
Adj. Flow (vph)	0	0	0	0	0	0	20	0	1558	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	0	0	20	0	1558	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	R NA	Left	Left	Right	R NA	Left
Median Width(ft)		0			0				12			
Link Offset(ft)		0			0				0			
Crosswalk Width(ft)		16			16				16			
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	9	15		9	9	15
Sign Control		Stop			Stop				Free			

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 45.1%		ICU Level of Service A	
Analysis Period (min) 15			

Lane Group	SBT	SBR
Lane Configurations		
Traffic Volume (vph)	1072	0
Future Volume (vph)	1072	0
Ideal Flow (vphpl)	1900	1900
Storage Length (ft)		0
Storage Lanes		0
Taper Length (ft)		
Lane Util. Factor	0.95	1.00
Frt		
Flt Protected		
Satd. Flow (prot)	3539	0
Flt Permitted		
Satd. Flow (perm)	3539	0
Link Speed (mph)	45	
Link Distance (ft)	1153	
Travel Time (s)	17.5	
Peak Hour Factor	0.95	0.25
Heavy Vehicles (%)	2%	0%
Adj. Flow (vph)	1128	0
Shared Lane Traffic (%)		
Lane Group Flow (vph)	1128	0
Enter Blocked Intersection	No	No
Lane Alignment	Left	Right
Median Width(ft)	12	
Link Offset(ft)	0	
Crosswalk Width(ft)	16	
Two way Left Turn Lane		
Headway Factor	1.00	1.00
Turning Speed (mph)		9
Sign Control	Free	

Intersection Summary



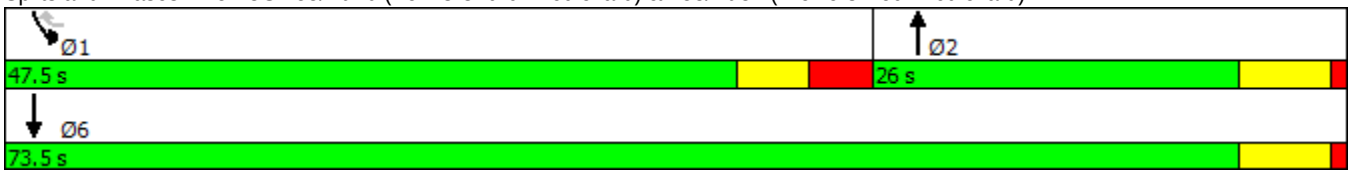
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	0	1300	0	225	0	729	311	0
Future Volume (vph)	0	0	0	0	0	1300	0	225	0	729	311	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	300		0
Storage Lanes	0		0	0		2	0		0	1		0
Taper Length (ft)	25			25			100			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.95	1.00	0.97	0.95	1.00
Frt						0.850						
Flt Protected										0.950		
Satd. Flow (prot)	0	0	0	0	0	2760	0	3471	0	3400	3471	0
Flt Permitted										0.950		
Satd. Flow (perm)	0	0	0	0	0	2760	0	3471	0	3400	3471	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						575						
Link Speed (mph)		30			45			45			45	
Link Distance (ft)		963			1126			2837			3921	
Travel Time (s)		21.9			17.1			43.0			59.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.93	0.25	0.89	0.25	0.99	0.85	0.25
Heavy Vehicles (%)	0%	0%	0%	0%	0%	3%	0%	4%	0%	3%	4%	0%
Adj. Flow (vph)	0	0	0	0	0	1398	0	253	0	736	366	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	0	1398	0	253	0	736	366	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors						1		2		1	2	
Detector Template						Right		Thru		Left	Thru	
Leading Detector (ft)						20		100		20	100	
Trailing Detector (ft)						0		0		0	0	
Detector 1 Position(ft)						0		0		0	0	
Detector 1 Size(ft)						20		6		20	6	
Detector 1 Type						Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)						0.0		0.0		0.0	0.0	
Detector 1 Queue (s)						0.0		0.0		0.0	0.0	
Detector 1 Delay (s)						0.0		0.0		0.0	0.0	
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type						Perm		NA		Prot	NA	
Protected Phases								2		1	6	

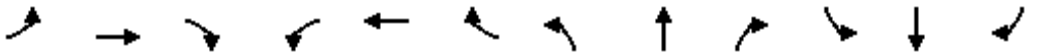
5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases						1						
Detector Phase						1		2		1	6	
Switch Phase												
Minimum Initial (s)						15.0		10.0		15.0	15.0	
Minimum Split (s)						22.5		16.0		22.5	21.0	
Total Split (s)						47.5		26.0		47.5	73.5	
Total Split (%)						64.6%		35.4%		64.6%	100.0%	
Maximum Green (s)						40.0		20.0		40.0	67.5	
Yellow Time (s)						4.0		5.0		4.0	5.0	
All-Red Time (s)						3.5		1.0		3.5	1.0	
Lost Time Adjust (s)						0.0		0.0		0.0	0.0	
Total Lost Time (s)						7.5		6.0		7.5	6.0	
Lead/Lag						Lead		Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)						3.5		2.5		3.5	5.0	
Recall Mode						Min		None		Min	Min	
Act Effct Green (s)						31.2		10.7		31.2	55.8	
Actuated g/C Ratio						0.56		0.19		0.56	1.00	
v/c Ratio						0.78		0.38		0.39	0.11	
Control Delay						8.5		23.7		7.2	0.1	
Queue Delay						0.0		0.0		0.0	0.0	
Total Delay						8.5		23.7		7.2	0.1	
LOS						A		C		A	A	
Approach Delay					8.5			23.7			4.8	
Approach LOS					A			C			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 73.5			
Actuated Cycle Length: 55.8			
Natural Cycle: 60			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.78			
Intersection Signal Delay: 8.4		Intersection LOS: A	
Intersection Capacity Utilization 65.1%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	772	3	471	1268	14	1	3	250	2	5	7
Future Volume (vph)	9	772	3	471	1268	14	1	3	250	2	5	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	225		0	600		325	0		350	0		0
Storage Lanes	1		0	1		1	0		2	0		1
Taper Length (ft)	200			200			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	0.88	1.00	1.00	1.00
Frt		0.999				0.850			0.850			0.850
Flt Protected	0.950			0.950				0.984			0.978	
Satd. Flow (prot)	1805	3536	0	1787	3539	1380	0	1870	2787	0	1632	1380
Flt Permitted	0.950			0.950				0.984			0.978	
Satd. Flow (perm)	1805	3536	0	1787	3539	1380	0	1870	2787	0	1632	1380
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						171			321			160
Link Speed (mph)		45			45			45			25	
Link Distance (ft)		1126			846			914			623	
Travel Time (s)		17.1			12.8			13.8			17.0	
Peak Hour Factor	0.35	0.98	1.00	0.86	0.96	0.60	0.25	0.38	0.78	0.50	1.00	0.75
Heavy Vehicles (%)	0%	2%	0%	1%	2%	17%	0%	0%	2%	0%	25%	17%
Adj. Flow (vph)	26	788	3	548	1321	23	4	8	321	4	5	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	26	791	0	548	1321	23	0	12	321	0	9	9
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	1	6		5	2		4	4	5	3	3	

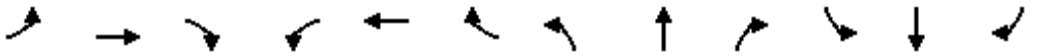
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases						2			4			3
Detector Phase	1	6		5	2	2	4	4	5	3	3	3
Switch Phase												
Minimum Initial (s)	10.0	15.0		10.0	15.0	15.0	10.0	10.0	10.0	5.0	5.0	5.0
Minimum Split (s)	19.0	24.5		19.5	24.5	24.5	26.0	26.0	19.5	26.0	26.0	26.0
Total Split (s)	34.0	41.5		39.5	47.0	47.0	26.0	26.0	39.5	33.0	33.0	33.0
Total Split (%)	24.3%	29.6%		28.2%	33.6%	33.6%	18.6%	18.6%	28.2%	23.6%	23.6%	23.6%
Maximum Green (s)	25.0	35.0		30.0	40.5	40.5	18.0	18.0	30.0	25.0	25.0	25.0
Yellow Time (s)	5.0	5.5		5.0	5.5	5.5	4.0	4.0	5.0	3.5	3.5	3.5
All-Red Time (s)	4.0	1.0		4.5	1.0	1.0	4.0	4.0	4.5	4.5	4.5	4.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Lost Time (s)	9.0	6.5		9.5	6.5	6.5		8.0	9.5		8.0	8.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	5.0		3.0	5.0	5.0	3.5	3.5	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	None	None	None	None	None
Act Effct Green (s)	10.4	28.4		31.3	68.2	68.2		10.4	34.0		6.3	6.3
Actuated g/C Ratio	0.12	0.34		0.37	0.81	0.81		0.12	0.41		0.08	0.08
v/c Ratio	0.12	0.66		0.82	0.46	0.02		0.05	0.24		0.07	0.04
Control Delay	42.0	28.2		40.0	10.3	0.0		42.2	3.0		46.1	0.3
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Delay	42.0	28.2		40.0	10.3	0.0		42.2	3.0		46.1	0.3
LOS	D	C		D	B	A		D	A		D	A
Approach Delay		28.6			18.8			4.4			23.2	
Approach LOS		C			B			A			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 83.9			
Natural Cycle: 140			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.82			
Intersection Signal Delay: 19.9		Intersection LOS: B	
Intersection Capacity Utilization 75.9%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 6: Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)

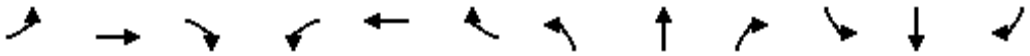
APPENDIX E

2032 No Build Synchro Reports



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	1	21	108	5	47	16	876	55	60	1269	39
Future Volume (vph)	28	1	21	108	5	47	16	876	55	60	1269	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	200		350	275		325
Storage Lanes	0		1	0		1	1		1	1		1
Taper Length (ft)	25			25			125			225		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected		0.957			0.955		0.950			0.950		
Satd. Flow (prot)	0	1755	1615	0	1737	1615	1805	3374	1509	1752	3505	1615
Flt Permitted		0.957			0.955		0.042			0.251		
Satd. Flow (perm)	0	1755	1615	0	1737	1615	80	3374	1509	463	3505	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			131			131			142			142
Link Speed (mph)		25			25			45			45	
Link Distance (ft)		335			1232			773			1937	
Travel Time (s)		9.1			33.6			11.7			29.3	
Peak Hour Factor	0.82	0.25	0.53	0.76	0.50	0.79	0.46	0.92	0.75	0.73	0.63	0.80
Heavy Vehicles (%)	4%	0%	0%	3%	25%	0%	0%	7%	7%	3%	3%	0%
Adj. Flow (vph)	34	4	40	142	10	59	35	952	73	82	2014	49
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	38	40	0	152	59	35	952	73	82	2014	49
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA	Prot	Split	NA	Prot	D.P+P	NA	Perm	D.P+P	NA	Perm
Protected Phases	4	4	4	3	3	3	5	2		1	6	

1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane

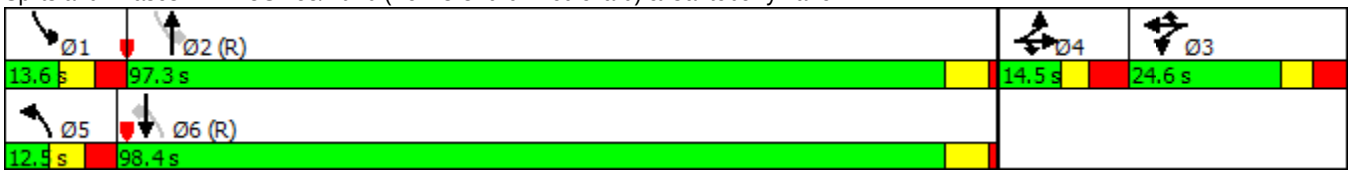


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases							6		2	2		6
Detector Phase	4	4	4	3	3	3	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	5.0	15.0	15.0	5.0	15.0	15.0
Minimum Split (s)	14.5	14.5	14.5	14.5	14.5	14.5	12.5	21.0	21.0	12.5	21.0	21.0
Total Split (s)	14.5	14.5	14.5	24.6	24.6	24.6	12.5	97.3	97.3	13.6	98.4	98.4
Total Split (%)	9.7%	9.7%	9.7%	16.4%	16.4%	16.4%	8.3%	64.9%	64.9%	9.1%	65.6%	65.6%
Maximum Green (s)	7.0	7.0	7.0	17.1	17.1	17.1	5.0	91.3	91.3	6.1	92.4	92.4
Yellow Time (s)	3.0	3.0	3.0	3.5	3.5	3.5	4.0	5.0	5.0	4.0	5.0	5.0
All-Red Time (s)	4.5	4.5	4.5	4.0	4.0	4.0	3.5	1.0	1.0	3.5	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.5	7.5		7.5	7.5	7.5	6.0	6.0	7.5	6.0	6.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	2.0	6.0	6.0	2.0	6.0	6.0
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	3.5	3.5	0.2	3.5	3.5
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	20.0	0.0	20.0	20.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0	15.0	0.0	15.0	15.0
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	C-Min
Act Effct Green (s)		7.0	7.0		16.0	16.0	101.4	95.5	95.5	99.9	98.9	98.9
Actuated g/C Ratio		0.05	0.05		0.11	0.11	0.68	0.64	0.64	0.67	0.66	0.66
v/c Ratio		0.47	0.20		0.82	0.20	0.32	0.44	0.07	0.23	0.87	0.04
Control Delay		88.7	2.2		97.1	1.6	23.3	16.1	1.5	9.1	28.2	0.1
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		88.7	2.2		97.1	1.6	23.3	16.1	1.5	9.1	28.2	0.1
LOS		F	A		F	A	C	B	A	A	C	A
Approach Delay		44.3			70.4			15.3			26.8	
Approach LOS		D			E			B			C	
Queue Length 50th (ft)		37	0		147	0	10	219	1	24	894	0
Queue Length 95th (ft)		21	0		120	0	14	306	7	34	493	0
Internal Link Dist (ft)		255			1152			693			1857	
Turn Bay Length (ft)							200		350	275		325
Base Capacity (vph)		81	200		198	300	111	2148	1012	361	2310	1113
Starvation Cap Reductn		0	0		0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0		0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0		0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.47	0.20		0.77	0.20	0.32	0.44	0.07	0.23	0.87	0.04

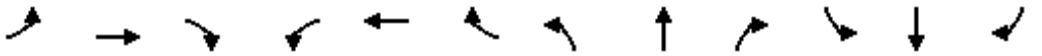
Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 120 (80%), Referenced to phase 2:NBSB and 6:NBSB, Start of Green			
Natural Cycle: 120			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.87			
Intersection Signal Delay: 26.4		Intersection LOS: C	
Intersection Capacity Utilization 69.7%		ICU Level of Service C	
Analysis Period (min) 15			

1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane

Splits and Phases: 1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane

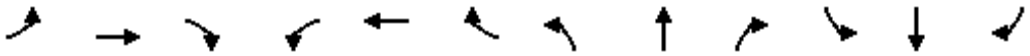


HCM 2010 analysis expects strict NEMA phasing.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	0	22	0	0	0	26	782	0	2	1542	34
Future Volume (vph)	5	0	22	0	0	0	26	782	0	2	1542	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	150		235
Storage Lanes	0		1	0		0	1		0	1		1
Taper Length (ft)	25			25			150			125		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850									0.850
Flt Protected		0.950					0.950			0.950		
Satd. Flow (prot)	0	1805	1524	0	1900	0	1805	3505	0	1805	3471	1553
Flt Permitted		0.950					0.057			0.263		
Satd. Flow (perm)	0	1805	1524	0	1900	0	108	3505	0	500	3471	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			116									120
Link Speed (mph)		15			25			45			45	
Link Distance (ft)		1905			1451			1986			773	
Travel Time (s)		86.6			39.6			30.1			11.7	
Peak Hour Factor	0.50	0.25	0.56	0.25	0.25	0.25	0.44	0.75	0.44	0.50	0.72	0.78
Heavy Vehicles (%)	0%	0%	6%	0%	0%	0%	0%	3%	14%	0%	4%	4%
Adj. Flow (vph)	10	0	39	0	0	0	59	1043	0	4	2142	44
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	10	39	0	0	0	59	1043	0	4	2142	44
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA	Prot				D.P+P	NA		D.P+P	NA	Prot
Protected Phases	4	4	4	3	3		5	2		1	6	6

2: US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive

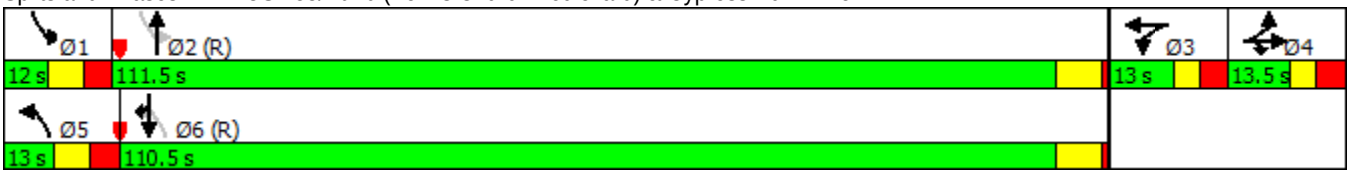


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases							6			2		
Detector Phase	4	4	4	3	3		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		5.0	14.0		5.0	14.0	14.0
Minimum Split (s)	13.5	13.5	13.5	13.0	13.0		12.5	20.0		12.0	20.0	20.0
Total Split (s)	13.5	13.5	13.5	13.0	13.0		13.0	111.5		12.0	110.5	110.5
Total Split (%)	9.0%	9.0%	9.0%	8.7%	8.7%		8.7%	74.3%		8.0%	73.7%	73.7%
Maximum Green (s)	7.0	7.0	7.0	7.0	7.0		5.5	105.5		5.0	104.5	104.5
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		4.0	5.0		4.0	5.0	5.0
All-Red Time (s)	3.5	3.5	3.5	3.0	3.0		3.5	1.0		3.0	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		6.5	6.5		6.0		7.5	6.0		7.0	6.0	6.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		2.0	5.0		2.0	5.0	5.0
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2		0.2	3.5		0.2	3.5	3.5
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	18.0		0.0	18.0	18.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	15.0		0.0	15.0	15.0
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	C-Min
Act Effct Green (s)		7.0	7.0				125.7	132.0		130.8	124.1	124.1
Actuated g/C Ratio		0.05	0.05				0.84	0.88		0.87	0.83	0.83
v/c Ratio		0.12	0.22				0.39	0.34		0.01	0.75	0.03
Control Delay		71.8	2.7				13.9	1.6		0.0	2.7	0.0
Queue Delay		0.0	0.0				0.0	0.0		0.0	0.1	0.0
Total Delay		71.8	2.7				13.9	1.6		0.0	2.8	0.0
LOS		E	A				B	A		A	A	A
Approach Delay		16.8						2.2			2.7	
Approach LOS		B						A			A	
Queue Length 50th (ft)		10	0				6	45		0	76	0
Queue Length 95th (ft)		9	0				m4	m75		m0	68	m0
Internal Link Dist (ft)		1825			1371			1906			693	
Turn Bay Length (ft)							250			150		235
Base Capacity (vph)		84	181				152	3084		479	2871	1305
Starvation Cap Reductn		0	0				0	0		0	75	0
Spillback Cap Reductn		0	0				0	0		0	0	0
Storage Cap Reductn		0	0				0	0		0	0	0
Reduced v/c Ratio		0.12	0.22				0.39	0.34		0.01	0.77	0.03

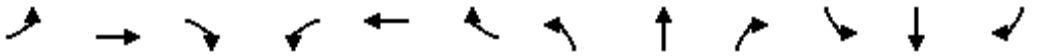
Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 128 (85%), Referenced to phase 2:NBSB and 6:NBSB, Start of Green			
Natural Cycle: 110			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.75			
Intersection Signal Delay: 2.8		Intersection LOS: A	
Intersection Capacity Utilization 58.9%		ICU Level of Service B	
Analysis Period (min) 15			

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive

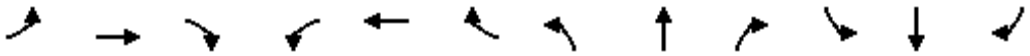


HCM 2010 analysis expects strict NEMA phasing.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	211	1	312	1	79	1	266	690	76	7	1032	355
Future Volume (vph)	211	1	312	1	79	1	266	690	76	7	1032	355
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		300	100		0	125		0	125		275
Storage Lanes	0		1	1		0	1		0	1		1
Taper Length (ft)	200			25			100			100		
Lane Util. Factor	1.00	1.00	1.00	0.95	0.95	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850		0.997			0.973				0.850
Flt Protected		0.953		0.950			0.950			0.950		
Satd. Flow (prot)	0	1811	1615	1715	1800	0	1752	3401	0	1805	3505	1553
Flt Permitted		0.485		0.344			0.074			0.235		
Satd. Flow (perm)	0	922	1615	621	1800	0	137	3401	0	446	3505	1553
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			339		1			26				307
Link Speed (mph)		40			25			45			45	
Link Distance (ft)		1496			695			1155			1986	
Travel Time (s)		25.5			19.0			17.5			30.1	
Peak Hour Factor	0.64	0.25	0.73	0.25	0.39	0.25	0.52	0.90	0.46	0.25	0.73	0.51
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	3%	4%	0%	0%	3%	4%
Adj. Flow (vph)	330	4	427	4	203	4	512	767	165	28	1414	696
Shared Lane Traffic (%)				10%								
Lane Group Flow (vph)	0	334	427	4	207	0	512	932	0	28	1414	696
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		D.P+P	NA		D.P+P	NA	Perm
Protected Phases		4			8		1	6		5	2	

3: US 258/Rt 10 (Benns Church Boulevard) & Turner Drive

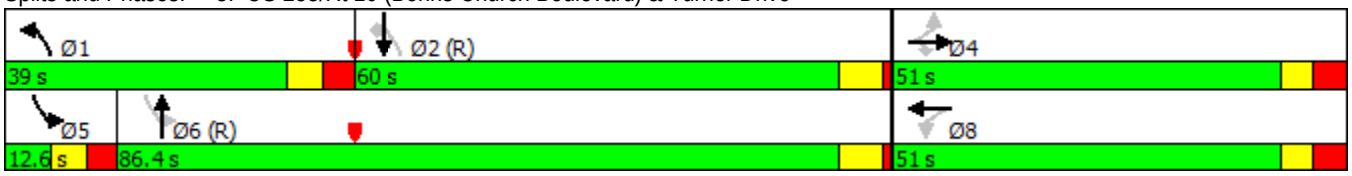


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4		4	8			2			6		2
Detector Phase	4	4	4	8	8		1	6		5	2	2
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		5.0	15.0		5.0	15.0	15.0
Minimum Split (s)	15.0	15.0	15.0	14.5	14.5		12.5	21.0		12.5	21.0	21.0
Total Split (s)	51.0	51.0	51.0	51.0	51.0		39.0	86.4		12.6	60.0	60.0
Total Split (%)	34.0%	34.0%	34.0%	34.0%	34.0%		26.0%	57.6%		8.4%	40.0%	40.0%
Maximum Green (s)	43.5	43.5	43.5	43.5	43.5		31.5	80.4		5.1	54.0	54.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		4.0	5.0		4.0	5.0	5.0
All-Red Time (s)	4.0	4.0	4.0	4.0	4.0		3.5	1.0		3.5	1.0	1.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		7.5	7.5	7.5	7.5		7.5	6.0		7.5	6.0	6.0
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	5.0	5.0	5.0	3.0	3.0		4.0	6.0		2.0	6.0	6.0
Minimum Gap (s)	3.5	3.5	3.5	0.2	0.2		0.2	3.5		0.2	3.5	3.5
Time Before Reduce (s)	20.0	20.0	20.0	0.0	0.0		0.0	20.0		0.0	20.0	20.0
Time To Reduce (s)	10.0	10.0	10.0	0.0	0.0		0.0	15.0		0.0	15.0	15.0
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	C-Min
Act Effct Green (s)		43.5	43.5	43.5	43.5		84.0	85.4		87.0	54.0	54.0
Actuated g/C Ratio		0.29	0.29	0.29	0.29		0.56	0.57		0.58	0.36	0.36
v/c Ratio		1.25	0.60	0.02	0.40		1.23	0.48		0.09	1.12	0.92
Control Delay		183.4	13.5	39.0	45.3		164.8	20.2		10.3	96.5	29.0
Queue Delay		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		183.4	13.5	39.0	45.3		164.8	20.2		10.3	96.5	29.0
LOS		F	B	D	D		F	C		B	F	C
Approach Delay		88.1			45.2			71.5			73.4	
Approach LOS		F			D			E			E	
Queue Length 50th (ft)		~406	65	3	170		~569	289		5	~826	230
Queue Length 95th (ft)		96	71	4	98		292	348		4	602	58
Internal Link Dist (ft)		1416			615			1075			1906	
Turn Bay Length (ft)			300	100			125			125		275
Base Capacity (vph)		267	709	180	522		415	1948		304	1261	755
Starvation Cap Reductn		0	0	0	0		0	0		0	0	0
Spillback Cap Reductn		0	0	0	0		0	0		0	0	0
Storage Cap Reductn		0	0	0	0		0	0		0	0	0
Reduced v/c Ratio		1.25	0.60	0.02	0.40		1.23	0.48		0.09	1.12	0.92

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 150			
Offset: 30 (20%), Referenced to phase 2:NBSB and 6:NBSB, Start of Green			
Natural Cycle: 110			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.25			
Intersection Signal Delay: 73.9		Intersection LOS: E	
Intersection Capacity Utilization 79.2%		ICU Level of Service D	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

Splits and Phases: 3: US 258/Rt 10 (Benns Church Boulevard) & Turner Drive



HCM 2010 Computation does not support turning movement with Shared and Exclusive lanes.

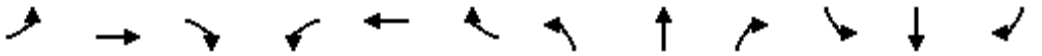
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	0	0	5	0	1128	0	1	0
Future Volume (vph)	0	0	0	0	0	0	5	0	1128	0	1	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0		125		0		140
Storage Lanes	0		0	0		0		1		0		1
Taper Length (ft)	25			25				25				75
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00
Frt												
Flt Protected							0.950				0.950	
Satd. Flow (prot)	0	0	0	0	0	0	1805	0	3438	0	1805	0
Flt Permitted							0.950				0.950	
Satd. Flow (perm)	0	0	0	0	0	0	1805	0	3438	0	1805	0
Link Speed (mph)		30			30				45			
Link Distance (ft)		810			872				3921			
Travel Time (s)		18.4			19.8				59.4			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.33	0.25	0.85	0.25	0.25	0.25
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	5%	0%	0%	0%
Adj. Flow (vph)	0	0	0	0	0	0	15	0	1327	0	4	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	0	0	15	0	1327	0	4	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	R NA	Left	Left	Right	R NA	Left
Median Width(ft)		0			0				12			
Link Offset(ft)		0			0				0			
Crosswalk Width(ft)		16			16				16			
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	9	15		9	9	15
Sign Control		Stop			Stop				Free			

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 41.8%		ICU Level of Service A	
Analysis Period (min) 15			

Lane Group	SBT	SBR
Lane Configurations		
Traffic Volume (vph)	1392	0
Future Volume (vph)	1392	0
Ideal Flow (vphpl)	1900	1900
Storage Length (ft)		0
Storage Lanes		0
Taper Length (ft)		
Lane Util. Factor	0.95	1.00
Frt		
Flt Protected		
Satd. Flow (prot)	3406	0
Flt Permitted		
Satd. Flow (perm)	3406	0
Link Speed (mph)	45	
Link Distance (ft)	1155	
Travel Time (s)	17.5	
Peak Hour Factor	0.88	0.25
Heavy Vehicles (%)	6%	0%
Adj. Flow (vph)	1582	0
Shared Lane Traffic (%)		
Lane Group Flow (vph)	1582	0
Enter Blocked Intersection	No	No
Lane Alignment	Left	Right
Median Width(ft)	12	
Link Offset(ft)	0	
Crosswalk Width(ft)	16	
Two way Left Turn Lane		
Headway Factor	1.00	1.00
Turning Speed (mph)		9
Sign Control	Free	

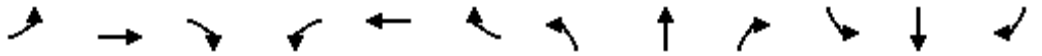
Intersection Summary

5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	0	804	0	206	0	1105	267	0
Future Volume (vph)	0	0	0	0	0	804	0	206	0	1105	267	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	300		0
Storage Lanes	0		0	0		2	0		0	1		0
Taper Length (ft)	25			25			100			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.95	1.00	0.97	0.95	1.00
Frt						0.850						
Flt Protected										0.950		
Satd. Flow (prot)	0	0	0	0	0	2707	0	3471	0	3367	3438	0
Flt Permitted										0.950		
Satd. Flow (perm)	0	0	0	0	0	2707	0	3471	0	3367	3438	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						388						
Link Speed (mph)		30			45			45			45	
Link Distance (ft)		963			1126			2837			3921	
Travel Time (s)		21.9			17.1			43.0			59.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.72	0.92	0.84	0.25	0.83	0.63	0.25
Heavy Vehicles (%)	0%	0%	0%	0%	0%	5%	0%	4%	0%	4%	5%	0%
Adj. Flow (vph)	0	0	0	0	0	1117	0	245	0	1331	424	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	0	1117	0	245	0	1331	424	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors						1		2		1	2	
Detector Template						Right		Thru		Left	Thru	
Leading Detector (ft)						20		100		20	100	
Trailing Detector (ft)						0		0		0	0	
Detector 1 Position(ft)						0		0		0	0	
Detector 1 Size(ft)						20		6		20	6	
Detector 1 Type						Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)						0.0		0.0		0.0	0.0	
Detector 1 Queue (s)						0.0		0.0		0.0	0.0	
Detector 1 Delay (s)						0.0		0.0		0.0	0.0	
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type						Perm		NA		Prot	NA	
Protected Phases								2		1	6	

5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)

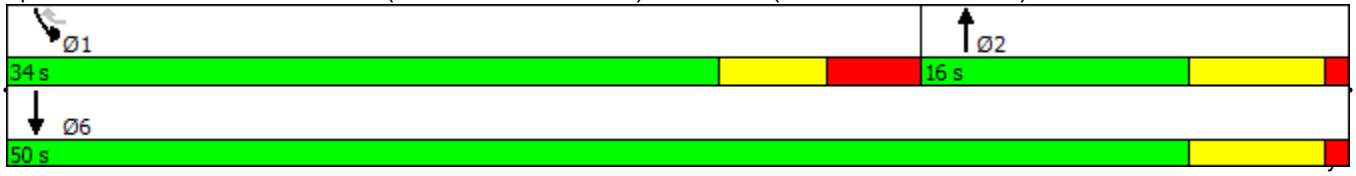


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases						1						
Detector Phase						1		2		1	6	
Switch Phase												
Minimum Initial (s)						15.0		10.0		15.0	15.0	
Minimum Split (s)						22.5		16.0		22.5	21.0	
Total Split (s)						34.0		16.0		34.0	50.0	
Total Split (%)						68.0%		32.0%		68.0%	100.0%	
Maximum Green (s)						26.5		10.0		26.5	44.0	
Yellow Time (s)						4.0		5.0		4.0	5.0	
All-Red Time (s)						3.5		1.0		3.5	1.0	
Lost Time Adjust (s)						0.0		0.0		0.0	0.0	
Total Lost Time (s)						7.5		6.0		7.5	6.0	
Lead/Lag						Lead		Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)						3.5		2.5		3.5	5.0	
Recall Mode						Min		None		Min	Min	
Act Effct Green (s)						27.8		10.0		27.8	51.4	
Actuated g/C Ratio						0.54		0.19		0.54	1.00	
v/c Ratio						0.68		0.36		0.73	0.12	
Control Delay						7.9		19.2		12.0	0.1	
Queue Delay						0.0		0.0		0.0	0.0	
Total Delay						7.9		19.2		12.0	0.1	
LOS						A		B		B	A	
Approach Delay					7.9			19.2			9.1	
Approach LOS					A			B			A	
Queue Length 50th (ft)						70		32		138	0	
Queue Length 95th (ft)						73		54		175	0	
Internal Link Dist (ft)		883			1046			2757			3841	
Turn Bay Length (ft)										300		
Base Capacity (vph)						1644		677		1823	3438	
Starvation Cap Reductn						0		0		0	0	
Spillback Cap Reductn						0		0		0	0	
Storage Cap Reductn						0		0		0	0	
Reduced v/c Ratio						0.68		0.36		0.73	0.12	

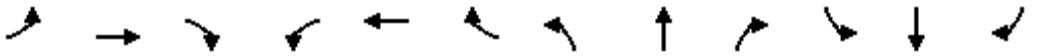
Intersection Summary

Area Type:	Other		
Cycle Length: 50			
Actuated Cycle Length: 51.4			
Natural Cycle: 50			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.73			
Intersection Signal Delay: 9.5		Intersection LOS: A	
Intersection Capacity Utilization 49.9%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)

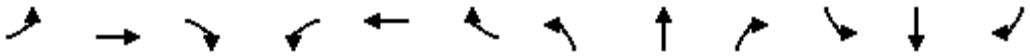


HCM 2010 Research does not support Non-NEMA phasing.



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	1081	0	266	775	4	0	1	473	7	4	14
Future Volume (vph)	7	1081	0	266	775	4	0	1	473	7	4	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	225		0	600		325	0		350	0		0
Storage Lanes	1		0	1		1	0		2	0		1
Taper Length (ft)	200			200			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	0.88	1.00	1.00	1.00
Frt						0.850			0.850			0.850
Flt Protected	0.950			0.950							0.978	
Satd. Flow (prot)	1805	3471	0	1719	3505	1615	0	950	2682	0	1858	1369
Flt Permitted	0.950			0.950							0.978	
Satd. Flow (perm)	1805	3471	0	1719	3505	1615	0	950	2682	0	1858	1369
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						160			445			218
Link Speed (mph)		45			45			45			25	
Link Distance (ft)		1126			846			914			623	
Travel Time (s)		17.1			12.8			13.8			17.0	
Peak Hour Factor	0.50	0.82	0.25	0.78	0.72	0.38	0.25	0.25	0.89	0.75	0.38	0.55
Heavy Vehicles (%)	0%	4%	0%	5%	3%	0%	0%	100%	6%	0%	0%	18%
Adj. Flow (vph)	14	1318	0	341	1076	11	0	4	531	9	11	25
Shared Lane Traffic (%)												
Lane Group Flow (vph)	14	1318	0	341	1076	11	0	4	531	0	20	25
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		Prot	NA	Perm		NA	pm+ov	Split	NA	Perm
Protected Phases	1	6		5	2		4	4	5	3	3	

6: Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)

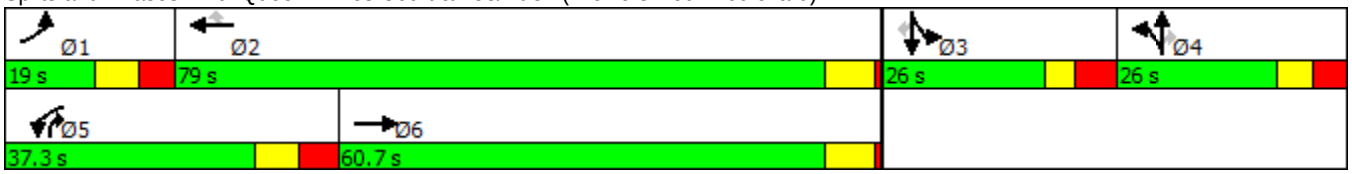


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases						2			4			3
Detector Phase	1	6		5	2	2	4	4	5	3	3	3
Switch Phase												
Minimum Initial (s)	10.0	15.0		10.0	15.0	15.0	10.0	10.0	10.0	5.0	5.0	5.0
Minimum Split (s)	19.0	24.5		19.5	24.5	24.5	26.0	26.0	19.5	26.0	26.0	26.0
Total Split (s)	19.0	60.7		37.3	79.0	79.0	26.0	26.0	37.3	26.0	26.0	26.0
Total Split (%)	12.7%	40.5%		24.9%	52.7%	52.7%	17.3%	17.3%	24.9%	17.3%	17.3%	17.3%
Maximum Green (s)	10.0	54.2		27.8	72.5	72.5	18.0	18.0	27.8	18.0	18.0	18.0
Yellow Time (s)	5.0	5.5		5.0	5.5	5.5	4.0	4.0	5.0	3.5	3.5	3.5
All-Red Time (s)	4.0	1.0		4.5	1.0	1.0	4.0	4.0	4.5	4.5	4.5	4.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Lost Time (s)	9.0	6.5		9.5	6.5	6.5		8.0	9.5		8.0	8.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	5.0		3.0	5.0	5.0	3.5	3.5	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	None	None	None	None	None
Act Effct Green (s)	10.1	54.9		28.2	88.8	88.8		10.1	31.2		6.8	6.8
Actuated g/C Ratio	0.09	0.49		0.25	0.80	0.80		0.09	0.28		0.06	0.06
v/c Ratio	0.09	0.77		0.78	0.38	0.01		0.05	0.49		0.18	0.09
Control Delay	53.4	28.8		54.4	8.7	0.0		54.0	7.8		57.5	0.6
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Delay	53.4	28.8		54.4	8.7	0.0		54.0	7.8		57.5	0.6
LOS	D	C		D	A	A		D	A		E	A
Approach Delay		29.0			19.5			8.1			25.9	
Approach LOS		C			B			A			C	
Queue Length 50th (ft)	9	407		233	85	0		3	27		14	0
Queue Length 95th (ft)	19	576		#374	268	0		4	71		18	0
Internal Link Dist (ft)		1046			766			834			543	
Turn Bay Length (ft)	225			600		325			350			
Base Capacity (vph)	164	1716		436	2802	1323		155	1073		305	407
Starvation Cap Reductn	0	0		0	0	0		0	0		0	0
Spillback Cap Reductn	0	0		0	0	0		0	0		0	0
Storage Cap Reductn	0	0		0	0	0		0	0		0	0
Reduced v/c Ratio	0.09	0.77		0.78	0.38	0.01		0.03	0.49		0.07	0.06

Intersection Summary

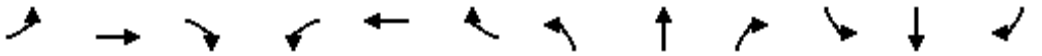
Area Type: Other
Cycle Length: 150
Actuated Cycle Length: 111
Natural Cycle: 150
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 21.6 Intersection LOS: C
Intersection Capacity Utilization 73.0% ICU Level of Service C
Analysis Period (min) 15
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)



HCM 2010 analysis expects strict NEMA phasing.

1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	156	6	49	70	10	87	57	1366	117	145	1147	108
Future Volume (vph)	156	6	49	70	10	87	57	1366	117	145	1147	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	200		350	275		325
Storage Lanes	0		1	0		1	1		1	1		1
Taper Length (ft)	25			25			125			225		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected		0.956			0.959		0.950			0.950		
Satd. Flow (prot)	0	1816	1615	0	1791	1553	1805	3539	1583	1687	3505	1615
Flt Permitted		0.956			0.959		0.103			0.076		
Satd. Flow (perm)	0	1816	1615	0	1791	1553	196	3539	1583	135	3505	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			164			164			177			177
Link Speed (mph)		25			25			45			45	
Link Distance (ft)		335			1232			773			1937	
Travel Time (s)		9.1			33.6			11.7			29.3	
Peak Hour Factor	0.91	0.42	0.56	0.75	0.67	0.93	0.60	0.94	0.64	0.76	0.94	0.71
Heavy Vehicles (%)	0%	0%	0%	2%	0%	4%	0%	2%	2%	7%	3%	0%
Adj. Flow (vph)	171	14	88	93	15	94	95	1453	183	191	1220	152
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	185	88	0	108	94	95	1453	183	191	1220	152
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA	Prot	Split	NA	Prot	D.P+P	NA	Perm	D.P+P	NA	Perm
Protected Phases	4	4	4	3	3	3	5	2		1	6	

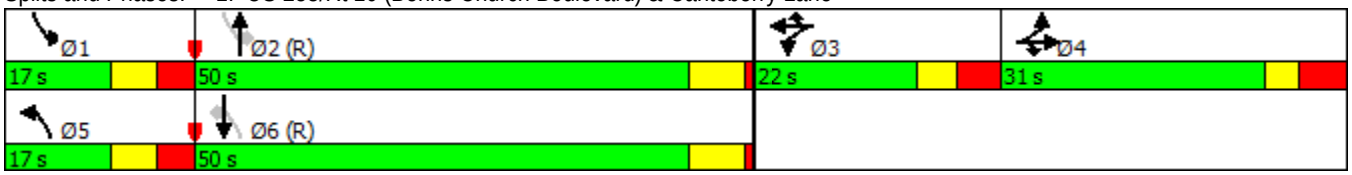
1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases							6		2	2		6
Detector Phase	4	4	4	3	3	3	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	5.0	15.0	15.0	5.0	15.0	15.0
Minimum Split (s)	14.5	14.5	14.5	14.5	14.5	14.5	12.5	21.0	21.0	12.5	21.0	21.0
Total Split (s)	31.0	31.0	31.0	22.0	22.0	22.0	17.0	50.0	50.0	17.0	50.0	50.0
Total Split (%)	25.8%	25.8%	25.8%	18.3%	18.3%	18.3%	14.2%	41.7%	41.7%	14.2%	41.7%	41.7%
Maximum Green (s)	23.5	23.5	23.5	14.5	14.5	14.5	9.5	44.0	44.0	9.5	44.0	44.0
Yellow Time (s)	3.0	3.0	3.0	3.5	3.5	3.5	4.0	5.0	5.0	4.0	5.0	5.0
All-Red Time (s)	4.5	4.5	4.5	4.0	4.0	4.0	3.5	1.0	1.0	3.5	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.5	7.5		7.5	7.5	7.5	6.0	6.0	7.5	6.0	6.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	2.0	6.0	6.0	2.0	6.0	6.0
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	3.5	3.5	0.2	3.5	3.5
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	20.0	0.0	20.0	20.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0	15.0	0.0	15.0	15.0
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	C-Min
Act Effct Green (s)		17.4	17.4		12.0	12.0	60.6	52.6	52.6	60.6	54.7	54.7
Actuated g/C Ratio		0.14	0.14		0.10	0.10	0.50	0.44	0.44	0.50	0.46	0.46
v/c Ratio		0.70	0.24		0.61	0.31	0.48	0.94	0.23	1.00	0.76	0.18
Control Delay		62.7	1.5		65.8	2.7	26.4	39.9	2.1	97.9	32.9	2.8
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		62.7	1.5		65.8	2.7	26.4	39.9	2.1	97.9	32.9	2.8
LOS		E	A		E	A	C	D	A	F	C	A
Approach Delay		43.0			36.4			35.2			37.9	
Approach LOS		D			D			D			D	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBSB and 6:NBSB, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.00
Intersection Signal Delay: 36.9 Intersection LOS: D
Intersection Capacity Utilization 78.9% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	127	0	91	0	0	1	171	1412	0	0	1117	147
Future Volume (vph)	127	0	91	0	0	1	171	1412	0	0	1117	147
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	150		235
Storage Lanes	0		1	0		0	1		0	1		1
Taper Length (ft)	25			25			150			125		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850		0.865							0.850
Flt Protected		0.950					0.950					
Satd. Flow (prot)	0	1787	1599	0	1644	0	1805	3539	0	1900	3505	1615
Flt Permitted		0.950					0.145					
Satd. Flow (perm)	0	1787	1599	0	1644	0	276	3539	0	1900	3505	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			214		218							218
Link Speed (mph)		15			25			45			45	
Link Distance (ft)		1905			1451			1986			773	
Travel Time (s)		86.6			39.6			30.1			11.7	
Peak Hour Factor	0.81	0.25	0.62	0.25	0.25	0.25	0.67	0.93	0.25	0.25	0.95	0.80
Heavy Vehicles (%)	1%	0%	1%	0%	0%	0%	0%	2%	0%	0%	3%	0%
Adj. Flow (vph)	157	0	147	0	0	4	255	1518	0	0	1176	184
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	157	147	0	4	0	255	1518	0	0	1176	184
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA	Prot		NA		D.P+P	NA		D.P+P	NA	Prot
Protected Phases	4	4	4	3	3		5	2		1	6	6

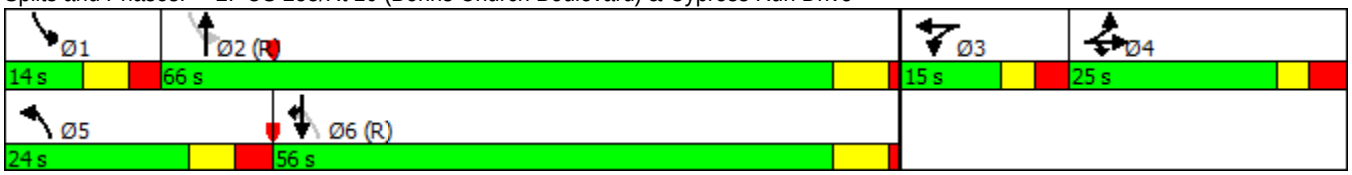
2: US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases							6			2		
Detector Phase	4	4	4	3	3		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		5.0	14.0		5.0	14.0	14.0
Minimum Split (s)	13.5	13.5	13.5	13.0	13.0		12.5	20.0		12.0	20.0	20.0
Total Split (s)	25.0	25.0	25.0	15.0	15.0		24.0	66.0		14.0	56.0	56.0
Total Split (%)	20.8%	20.8%	20.8%	12.5%	12.5%		20.0%	55.0%		11.7%	46.7%	46.7%
Maximum Green (s)	18.5	18.5	18.5	9.0	9.0		16.5	60.0		7.0	50.0	50.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		4.0	5.0		4.0	5.0	5.0
All-Red Time (s)	3.5	3.5	3.5	3.0	3.0		3.5	1.0		3.0	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		6.5	6.5		6.0		7.5	6.0		7.0	6.0	6.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		2.0	5.0		2.0	5.0	5.0
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2		0.2	3.5		0.2	3.5	3.5
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	18.0		0.0	18.0	18.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	15.0		0.0	15.0	15.0
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	C-Min
Act Effct Green (s)		15.2	15.2		7.0		80.7	89.7			66.7	66.7
Actuated g/C Ratio		0.13	0.13		0.06		0.67	0.75			0.56	0.56
v/c Ratio		0.69	0.38		0.01		0.67	0.57			0.60	0.19
Control Delay		65.8	3.8		0.0		22.8	8.9			6.7	0.3
Queue Delay		0.0	0.0		0.0		0.0	0.0			0.0	0.0
Total Delay		65.8	3.8		0.0		22.8	8.9			6.7	0.3
LOS		E	A		A		C	A			A	A
Approach Delay		35.8						10.9			5.8	
Approach LOS		D						B			A	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 12 (10%), Referenced to phase 2:NBSB and 6:NBSB, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 11.1 Intersection LOS: B
Intersection Capacity Utilization 73.2% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 2: US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	94	0	106	0	1	2	188	1473	1	36	1080	138
Future Volume (vph)	94	0	106	0	1	2	188	1473	1	36	1080	138
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		300	100		0	125		0	125		275
Storage Lanes	0		1	1		0	1		0	1		1
Taper Length (ft)	200			25			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850		0.925							0.850
Flt Protected		0.950					0.950			0.950		
Satd. Flow (prot)	0	1787	1599	1900	1758	0	1687	3539	0	1805	3505	1482
Flt Permitted		0.752					0.156			0.072		
Satd. Flow (perm)	0	1415	1599	1900	1758	0	277	3539	0	137	3505	1482
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			133		4							141
Link Speed (mph)		40			25			45			45	
Link Distance (ft)		1493			695			1153			1986	
Travel Time (s)		25.4			19.0			17.5			30.1	
Peak Hour Factor	0.63	0.25	0.80	0.25	0.25	0.50	0.90	0.94	0.25	0.50	0.98	0.85
Heavy Vehicles (%)	1%	0%	1%	0%	0%	0%	7%	2%	0%	0%	3%	9%
Adj. Flow (vph)	149	0	133	0	4	4	209	1567	4	72	1102	162
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	149	133	0	8	0	209	1571	0	72	1102	162
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		D.P+P	NA		D.P+P	NA	Perm
Protected Phases		4			8		1	6		5	2	

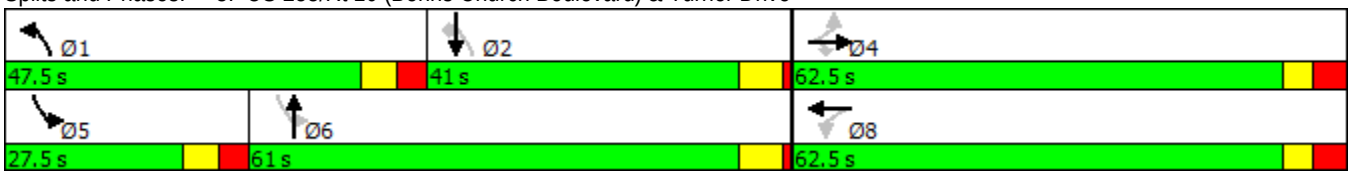
3: US 258/Rt 10 (Benns Church Boulevard) & Turner Drive

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4		4	8			2			6		2
Detector Phase	4	4	4	8	8		1	6		5	2	2
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		5.0	15.0		5.0	15.0	15.0
Minimum Split (s)	14.5	14.5	14.5	14.5	14.5		12.5	21.0		12.5	21.0	21.0
Total Split (s)	62.5	62.5	62.5	62.5	62.5		47.5	61.0		27.5	41.0	41.0
Total Split (%)	41.4%	41.4%	41.4%	41.4%	41.4%		31.5%	40.4%		18.2%	27.2%	27.2%
Maximum Green (s)	55.0	55.0	55.0	55.0	55.0		40.0	55.0		20.0	35.0	35.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		4.0	5.0		4.0	5.0	5.0
All-Red Time (s)	4.0	4.0	4.0	4.0	4.0		3.5	1.0		3.5	1.0	1.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		7.5	7.5	7.5	7.5		7.5	6.0		7.5	6.0	6.0
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	5.0	5.0	5.0	3.0	3.0		4.0	6.0		2.0	6.0	6.0
Minimum Gap (s)	3.5	3.5	3.5	0.2	0.2		0.2	3.5		0.2	3.5	3.5
Time Before Reduce (s)	20.0	20.0	20.0	0.0	0.0		0.0	20.0		0.0	20.0	20.0
Time To Reduce (s)	10.0	10.0	10.0	0.0	0.0		0.0	15.0		0.0	15.0	15.0
Recall Mode	None	None	None	None	None		None	Min		None	Min	Min
Act Effct Green (s)		17.8	17.8		10.3		57.1	55.6		58.9	45.3	45.3
Actuated g/C Ratio		0.18	0.18		0.11		0.59	0.57		0.60	0.46	0.46
v/c Ratio		0.58	0.33		0.04		0.59	0.78		0.39	0.68	0.21
Control Delay		46.8	8.6		29.7		18.6	21.8		15.5	24.5	5.4
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		46.8	8.6		29.7		18.6	21.8		15.5	24.5	5.4
LOS		D	A		C		B	C		B	C	A
Approach Delay		28.8			29.7			21.4			21.7	
Approach LOS		C			C			C			C	

Intersection Summary

Area Type: Other
Cycle Length: 151
Actuated Cycle Length: 97.6
Natural Cycle: 70
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 22.2 Intersection LOS: C
Intersection Capacity Utilization 74.3% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 3: US 258/Rt 10 (Benns Church Boulevard) & Turner Drive



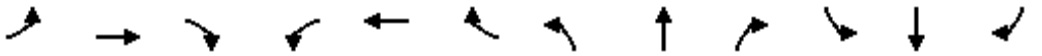
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	0	0	5	0	1652	0	0	0
Future Volume (vph)	0	0	0	0	0	0	5	0	1652	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0		125		0		140
Storage Lanes	0		0	0		0		1		0		1
Taper Length (ft)	25			25				25				75
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00
Frt												
Flt Protected							0.950					
Satd. Flow (prot)	0	0	0	0	0	0	1805	0	3505	0	1900	0
Flt Permitted							0.950					
Satd. Flow (perm)	0	0	0	0	0	0	1805	0	3505	0	1900	0
Link Speed (mph)		30			30				45			
Link Distance (ft)		810			872				3921			
Travel Time (s)		18.4			19.8				59.4			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.25	0.97	0.25	0.50	0.25
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%
Adj. Flow (vph)	0	0	0	0	0	0	20	0	1703	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	0	0	20	0	1703	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	R NA	Left	Left	Right	R NA	Left
Median Width(ft)		0			0				12			
Link Offset(ft)		0			0				0			
Crosswalk Width(ft)		16			16				16			
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	9	15		9	9	15
Sign Control		Stop			Stop				Free			

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 49.0%		ICU Level of Service A	
Analysis Period (min) 15			

Lane Group	SBT	SBR
Lane Configurations		
Traffic Volume (vph)	1173	0
Future Volume (vph)	1173	0
Ideal Flow (vphpl)	1900	1900
Storage Length (ft)		0
Storage Lanes		0
Taper Length (ft)		
Lane Util. Factor	0.95	1.00
Frt		
Flt Protected		
Satd. Flow (prot)	3539	0
Flt Permitted		
Satd. Flow (perm)	3539	0
Link Speed (mph)	45	
Link Distance (ft)	1153	
Travel Time (s)	17.5	
Peak Hour Factor	0.95	0.25
Heavy Vehicles (%)	2%	0%
Adj. Flow (vph)	1235	0
Shared Lane Traffic (%)		
Lane Group Flow (vph)	1235	0
Enter Blocked Intersection	No	No
Lane Alignment	Left	Right
Median Width(ft)	12	
Link Offset(ft)	0	
Crosswalk Width(ft)	16	
Two way Left Turn Lane		
Headway Factor	1.00	1.00
Turning Speed (mph)		9
Sign Control	Free	

Intersection Summary

5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)



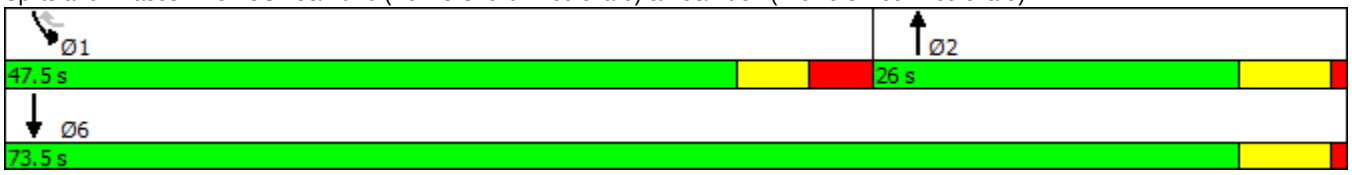
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	0	1421	0	246	0	797	340	0
Future Volume (vph)	0	0	0	0	0	1421	0	246	0	797	340	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	300		0
Storage Lanes	0		0	0		2	0		0	1		0
Taper Length (ft)	25			25			100			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.95	1.00	0.97	0.95	1.00
Frt						0.850						
Flt Protected										0.950		
Satd. Flow (prot)	0	0	0	0	0	2760	0	3471	0	3400	3471	0
Flt Permitted										0.950		
Satd. Flow (perm)	0	0	0	0	0	2760	0	3471	0	3400	3471	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						514						
Link Speed (mph)		30			45			45			45	
Link Distance (ft)		963			1126			2837			3921	
Travel Time (s)		21.9			17.1			43.0			59.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.93	0.25	0.89	0.25	0.99	0.85	0.25
Heavy Vehicles (%)	0%	0%	0%	0%	0%	3%	0%	4%	0%	3%	4%	0%
Adj. Flow (vph)	0	0	0	0	0	1528	0	276	0	805	400	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	0	1528	0	276	0	805	400	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors						1		2		1	2	
Detector Template						Right		Thru		Left	Thru	
Leading Detector (ft)						20		100		20	100	
Trailing Detector (ft)						0		0		0	0	
Detector 1 Position(ft)						0		0		0	0	
Detector 1 Size(ft)						20		6		20	6	
Detector 1 Type						Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)						0.0		0.0		0.0	0.0	
Detector 1 Queue (s)						0.0		0.0		0.0	0.0	
Detector 1 Delay (s)						0.0		0.0		0.0	0.0	
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type						Perm		NA		Prot	NA	
Protected Phases								2		1	6	

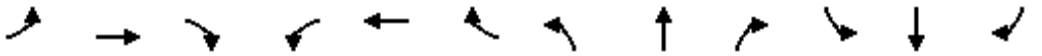
5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases						1						
Detector Phase						1		2		1	6	
Switch Phase												
Minimum Initial (s)						15.0		10.0		15.0	15.0	
Minimum Split (s)						22.5		16.0		22.5	21.0	
Total Split (s)						47.5		26.0		47.5	73.5	
Total Split (%)						64.6%		35.4%		64.6%	100.0%	
Maximum Green (s)						40.0		20.0		40.0	67.5	
Yellow Time (s)						4.0		5.0		4.0	5.0	
All-Red Time (s)						3.5		1.0		3.5	1.0	
Lost Time Adjust (s)						0.0		0.0		0.0	0.0	
Total Lost Time (s)						7.5		6.0		7.5	6.0	
Lead/Lag						Lead		Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)						3.5		2.5		3.5	5.0	
Recall Mode						Min		None		Min	Min	
Act Effct Green (s)						35.9		10.8		35.9	60.4	
Actuated g/C Ratio						0.59		0.18		0.59	1.00	
v/c Ratio						0.83		0.44		0.40	0.12	
Control Delay						10.9		25.8		7.1	0.1	
Queue Delay						0.0		0.0		0.0	0.0	
Total Delay						10.9		25.8		7.1	0.1	
LOS						B		C		A	A	
Approach Delay					10.9			25.8			4.7	
Approach LOS					B			C			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 73.5			
Actuated Cycle Length: 60.4			
Natural Cycle: 60			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 9.8		Intersection LOS: A	
Intersection Capacity Utilization 69.3%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	844	4	515	1387	15	1	4	273	2	5	7
Future Volume (vph)	10	844	4	515	1387	15	1	4	273	2	5	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	225		0	600		325	0		350	0		0
Storage Lanes	1		0	1		1	0		2	0		1
Taper Length (ft)	200			200			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	0.88	1.00	1.00	1.00
Frt		0.999				0.850			0.850			0.850
Flt Protected	0.950			0.950				0.987			0.978	
Satd. Flow (prot)	1805	3536	0	1787	3539	1380	0	1875	2787	0	1632	1380
Flt Permitted	0.950			0.950				0.987			0.978	
Satd. Flow (perm)	1805	3536	0	1787	3539	1380	0	1875	2787	0	1632	1380
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						171			350			160
Link Speed (mph)		45			45			45			25	
Link Distance (ft)		1126			846			914			623	
Travel Time (s)		17.1			12.8			13.8			17.0	
Peak Hour Factor	0.35	0.98	1.00	0.86	0.96	0.60	0.25	0.38	0.78	0.50	1.00	0.75
Heavy Vehicles (%)	0%	2%	0%	1%	2%	17%	0%	0%	2%	0%	25%	17%
Adj. Flow (vph)	29	861	4	599	1445	25	4	11	350	4	5	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	29	865	0	599	1445	25	0	15	350	0	9	9
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	1	6		5	2		4	4	5	3	3	

6: Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases						2			4			3
Detector Phase	1	6		5	2	2	4	4	5	3	3	3
Switch Phase												
Minimum Initial (s)	10.0	15.0		10.0	15.0	15.0	10.0	10.0	10.0	5.0	5.0	5.0
Minimum Split (s)	19.0	24.5		19.5	24.5	24.5	26.0	26.0	19.5	26.0	26.0	26.0
Total Split (s)	34.0	41.5		39.5	47.0	47.0	26.0	26.0	39.5	33.0	33.0	33.0
Total Split (%)	24.3%	29.6%		28.2%	33.6%	33.6%	18.6%	18.6%	28.2%	23.6%	23.6%	23.6%
Maximum Green (s)	25.0	35.0		30.0	40.5	40.5	18.0	18.0	30.0	25.0	25.0	25.0
Yellow Time (s)	5.0	5.5		5.0	5.5	5.5	4.0	4.0	5.0	3.5	3.5	3.5
All-Red Time (s)	4.0	1.0		4.5	1.0	1.0	4.0	4.0	4.5	4.5	4.5	4.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Lost Time (s)	9.0	6.5		9.5	6.5	6.5		8.0	9.5		8.0	8.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	5.0		3.0	5.0	5.0	3.5	3.5	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	None	None	None	None	None
Act Effct Green (s)	10.4	32.9		31.2	72.6	72.6		10.4	37.0		6.3	6.3
Actuated g/C Ratio	0.11	0.36		0.34	0.80	0.80		0.11	0.41		0.07	0.07
v/c Ratio	0.14	0.68		0.98	0.51	0.02		0.07	0.26		0.08	0.04
Control Delay	45.6	30.5		66.1	13.6	0.1		45.6	2.7		49.6	0.3
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Delay	45.6	30.5		66.1	13.6	0.1		45.6	2.7		49.6	0.3
LOS	D	C		E	B	A		D	A		D	A
Approach Delay		31.0			28.6			4.5			24.9	
Approach LOS		C			C			A			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 91.3			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.98			
Intersection Signal Delay: 26.6		Intersection LOS: C	
Intersection Capacity Utilization 80.3%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 6: Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)

APPENDIX F

Trip Distribution Percentages and Volumes

Land Use	ITE Code	Size	Units	Daily	AM Peak Hour			PM Peak Hour		
					Enter	Exit	Total	Enter	Exit	Total
Conceptual Site Plan										
Single-Family Detached Housing	210	400	Dwelling Units	3,776	74	222	296	249	147	396
Multifamily Housing (Low-Rise)	220	285	Dwelling Units	2,144	30	101	131	101	59	160
Public Park	411	4	Acres	91	0	0	0	13	10	23
Shopping Center	820	30	1000 Sq. Ft. GLA	2,651	17	11	28	107	116	223
Fast Food with Drive-Thru	934	5	1000 Sq. Ft. GLA	2,355	102	99	201	85	78	163
Subtotal				**11,017**	**223**	**433**	**656**	**555**	**410**	**965**
Pass-by Trips (Fast Food only)	49%		% Pass-by	1,154	50	49	98	42	38	80
Pass-by Trips (Shopping Center)	34%		% Pass-by	901	6	4	10	36	39	76
Total New Trips				**8,962**	**167**	**380**	**548**	**477**	**333**	**809**

Reference: Trip Generation, 10th Edition, Institute of Transportation Engineers, Washington, DC. 2017.
Note: Used highest total between average rate and fitted curve unless R2<0.75

Fast Food with Drive-Thru	934	5	1000 Sq. Ft. GLA	2,355	103	98	201	85	78	163
Pass-by Trips (Fast Food only)	49%		% Pass-by	1,154	50	48	98	42	38	80
				1,201	53	50	103	43	40	83

Shopping Center	820	30	1000 Sq. Ft. GLA	2,651	17	11	28	107	116	223
Pass-by Trips (Shopping Center Only))	34%		% Pass-by	901	6	4	10	36	39	76
				1,750	11	7	18	71	77	147

LEGEND	
—	Existing Roadway
- -	Future Roadway
STOP	Existing Stop Controlled Approach
	Existing Signalized Intersection
→	Turning Movement
XX%(XX%)	AM (PM) Entering Percentage of Site Trips
XX%(XX%)	AM (PM) Exiting Percentage of Site Trips
STOP	Future Stop Controlled Approach

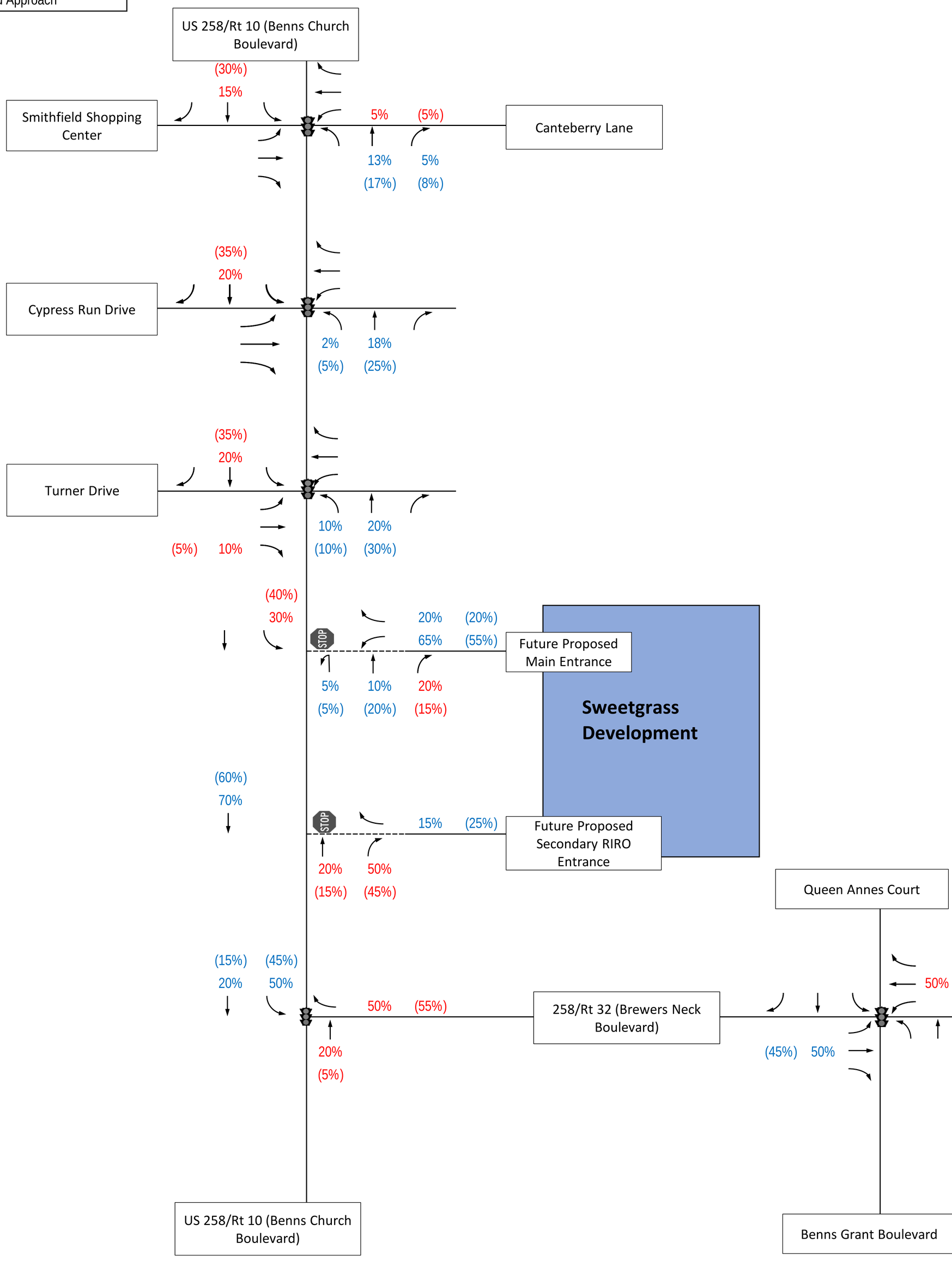


Figure F-1
Single-Family Detached Housing AM and PM Peak Hour Directional Distribution Percentages

Sweetgrass
Isle of Wight County, VA

LEGEND	
——	Existing Roadway
- - -	Future Roadway
STOP	Existing Stop Controlled Approach
	Existing Signalized Intersection
⟶	Turning Movement
XX(XX)	Weekday AM (PM) Entering Site Trips
XX(XX)	Weekday AM (PM) Exiting Site Trips
STOP	Future Stop Controlled Approach

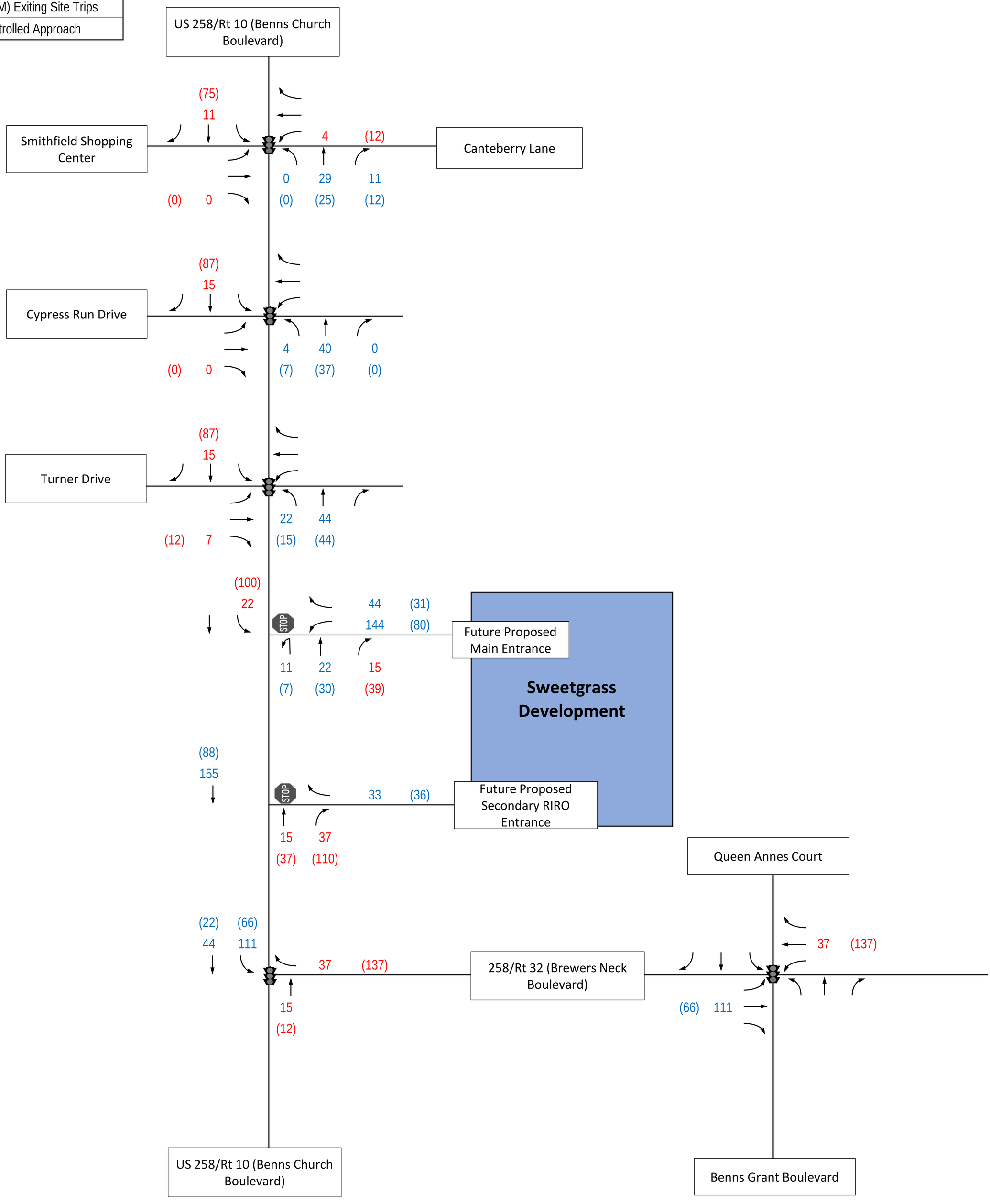


Figure F-2
Single-Family Detached Housing AM and PM Peak Hour Site Trips

Sweetgrass
Isle of Wight County, VA

LEGEND	
——	Existing Roadway
- -	Future Roadway
STOP	Existing Stop Controlled Approach
	Existing Signalized Intersection
⟶	Turning Movement
XX%(XX%)	AM (PM) Entering Percentage of Site Trips
XX%(XX%)	AM (PM) Exiting Percentage of Site Trips
STOP	Future Stop Controlled Approach

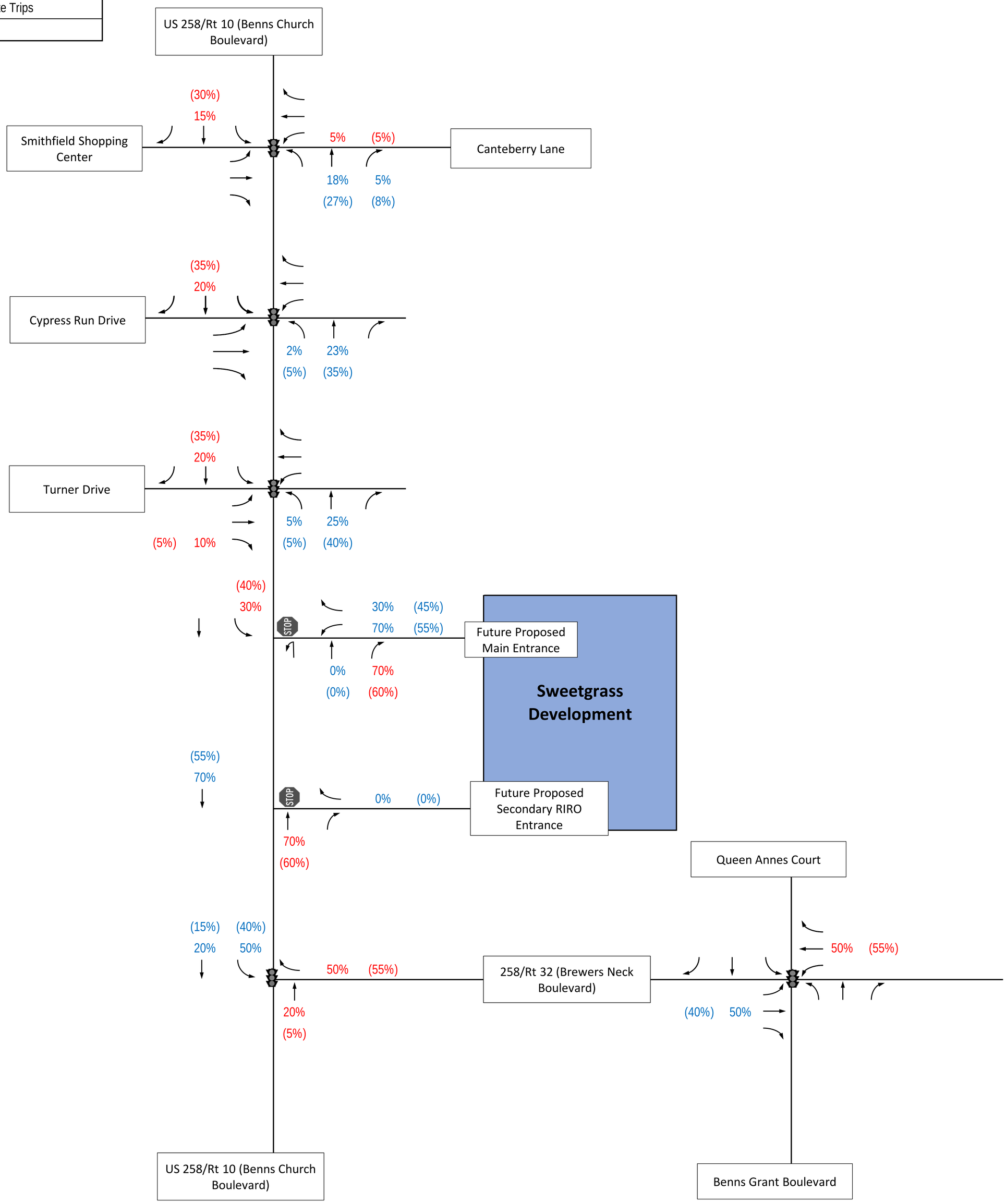


Figure F-3
Multifamily Housing (Low-Rise) AM and PM Peak Hour Directional Distribution Percentages

Sweetgrass
Isle of Wight County, VA

LEGEND	
——	Existing Roadway
- - -	Future Roadway
STOP	Existing Stop Controlled Approach
	Existing Signalized Intersection
——►	Turning Movement
XX(XX)	Weekday AM (PM) Entering Site Trips
XX(XX)	Weekday AM (PM) Exiting Site Trips
STOP	Future Stop Controlled Approach

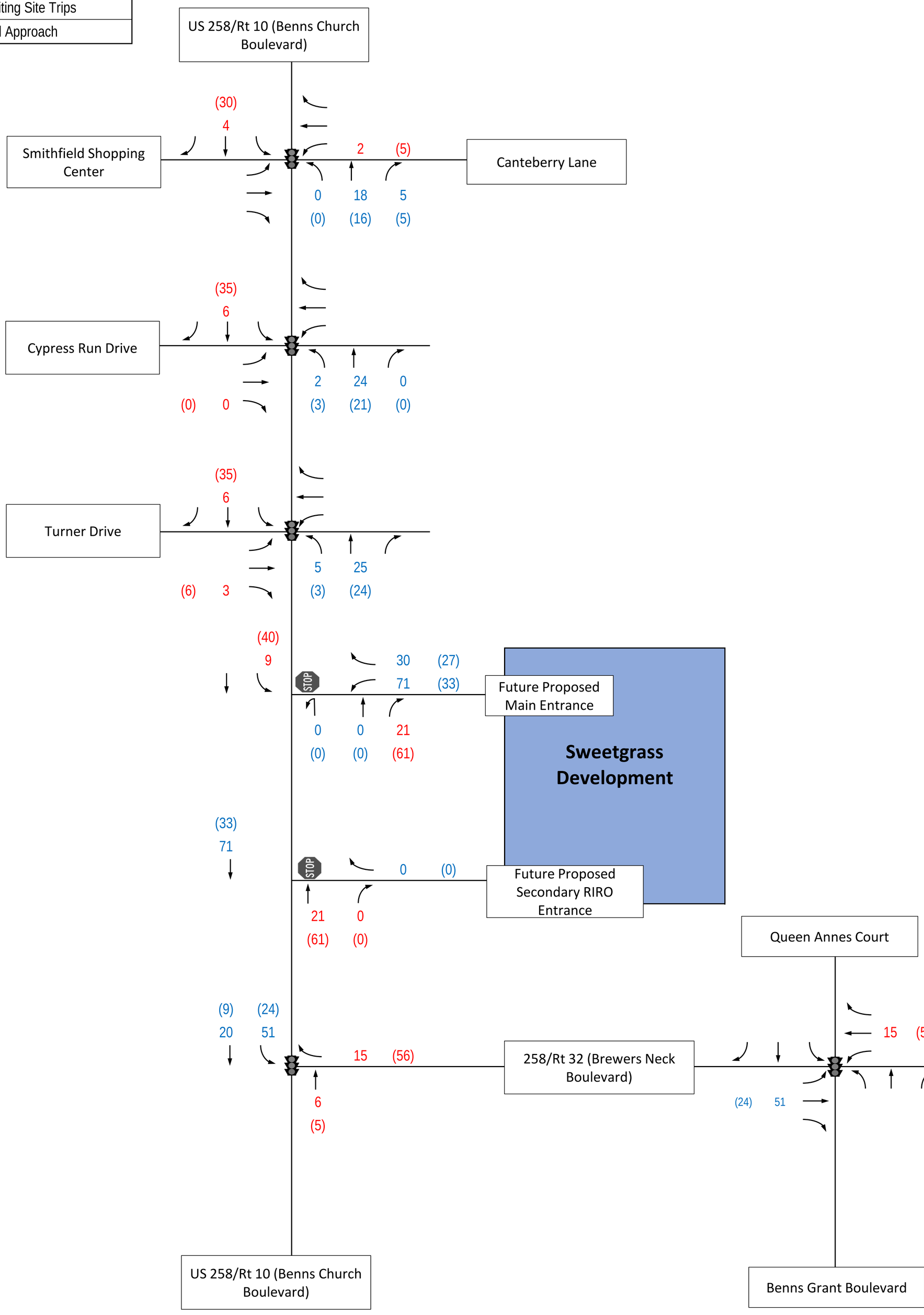


Figure F-4
Multifamily Housing (Low-Rise) AM and PM Peak Hour Site Trips

Sweetgrass
Isle of Wight County, VA

LEGEND	
——	Existing Roadway
- -	Future Roadway
STOP	Existing Stop Controlled Approach
	Existing Signalized Intersection
⟶	Turning Movement
XX%(XX%)	AM (PM) Entering Percentage of Site Trips
XX%(XX%)	AM (PM) Exiting Percentage of Site Trips
STOP	Future Stop Controlled Approach

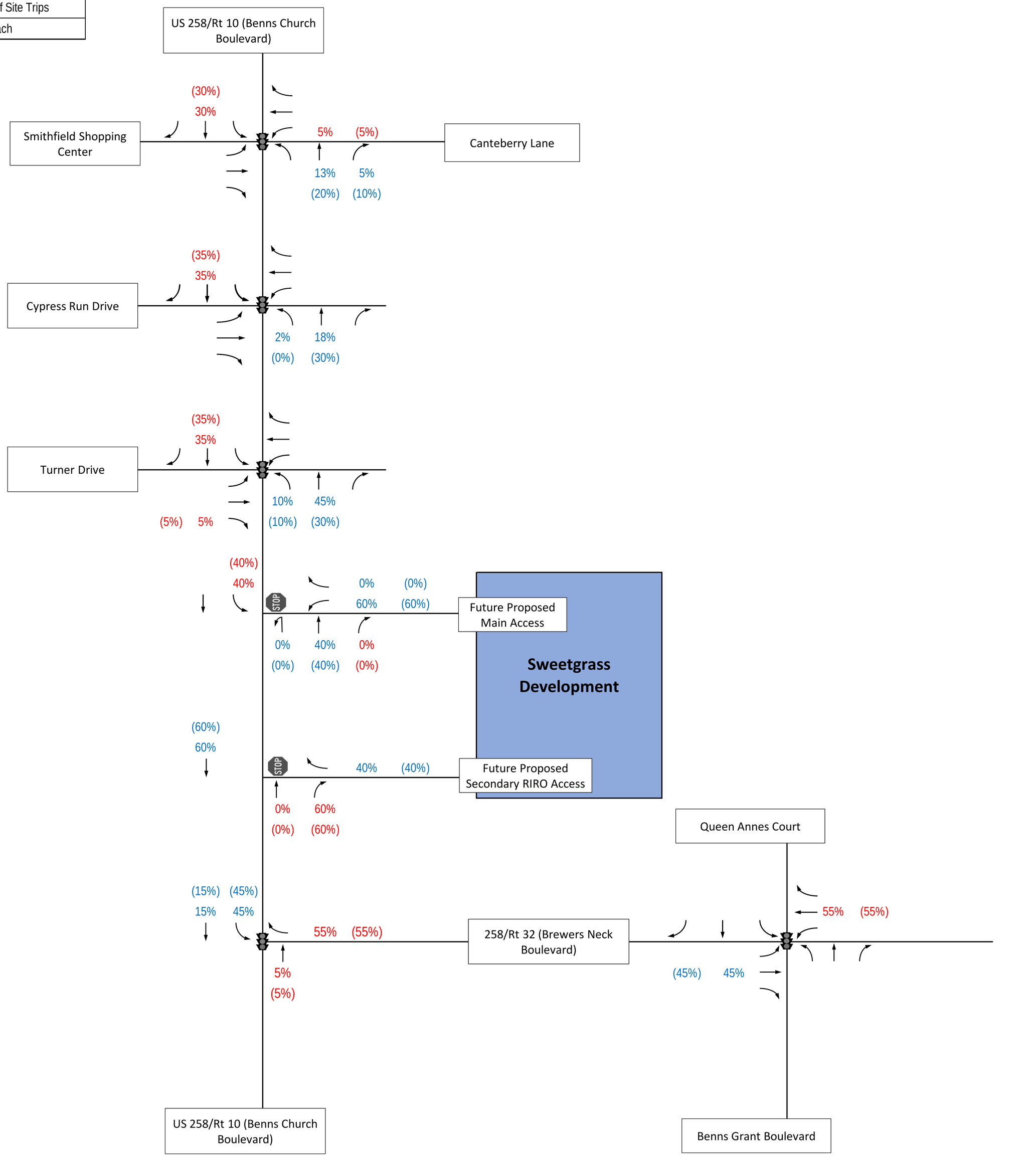


Figure F-5
Public Park AM and PM Peak Hour Directional Distribution Percentages

Sweetgrass,
Isle of Wight County, VA

LEGEND	
——	Existing Roadway
- - -	Future Roadway
STOP	Existing Stop Controlled Approach
	Existing Signalized Intersection
——►	Turning Movement
XX(XX)	Weekday AM (PM) Entering Site Trips
XX(XX)	Weekday AM (PM) Exiting Site Trips
STOP	Future Stop Controlled Approach

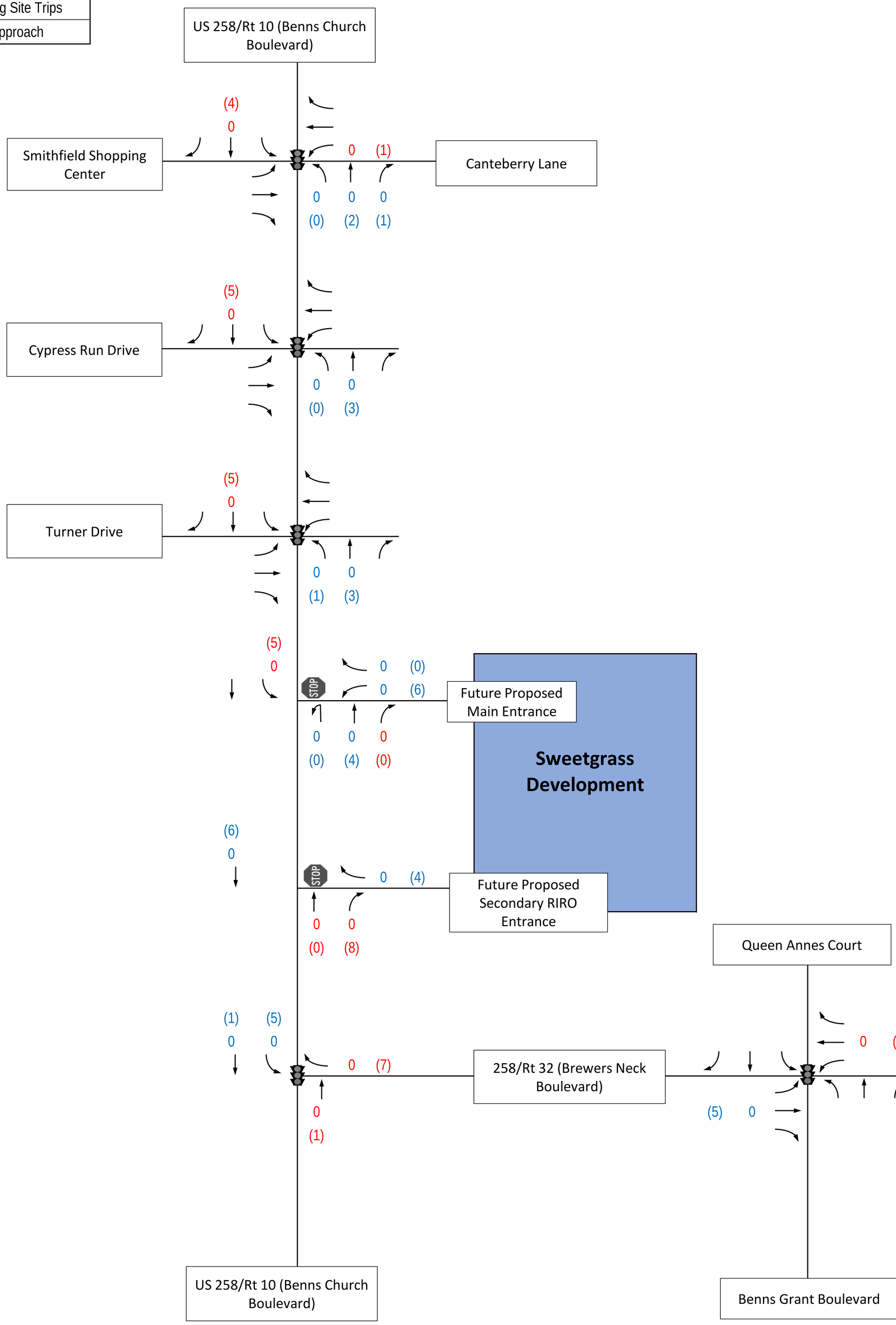


Figure F-6
Public Park AM and PM Peak Hour Site Trips

Sweetgrass
Isle of Wight County, VA

LEGEND	
——	Existing Roadway
- -	Future Roadway
STOP	Existing Stop Controlled Approach
	Existing Signalized Intersection
⟶	Turning Movement
XX%(XX%)	AM (PM) Entering Percentage of Site Trips
XX%(XX%)	AM (PM) Exiting Percentage of Site Trips
STOP	Future Stop Controlled Approach

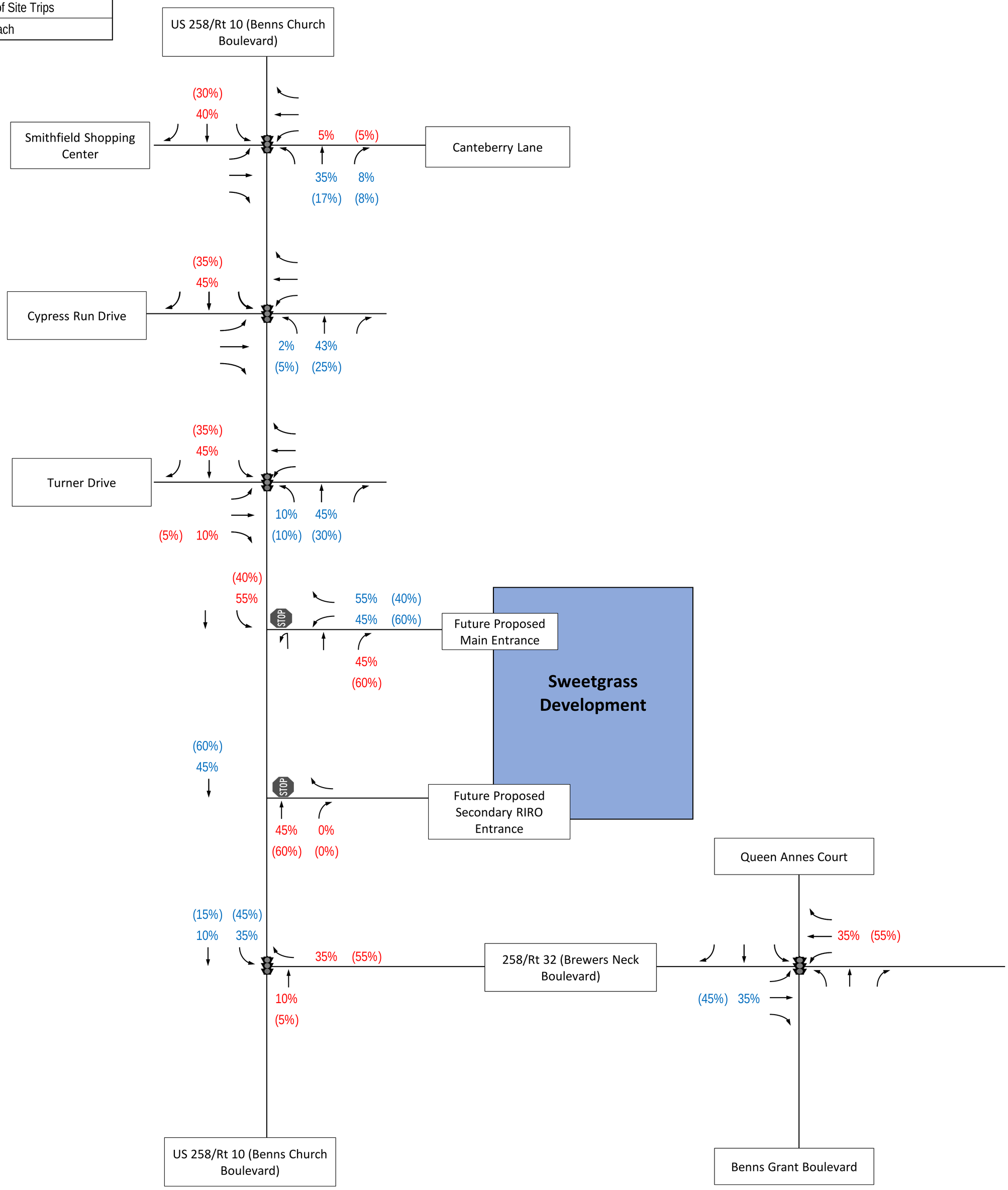


Figure F-7
Shopping Center AM and PM Peak Hour Directional Distribution Percentages

Sweetgrass
Isle of Wight County, VA

LEGEND	
——	Existing Roadway
- -	Future Roadway
STOP	Existing Stop Controlled Approach
	Existing Signalized Intersection
⟶	Turning Movement
XX(XX)	Weekday AM (PM) Entering Site Trips
XX(XX)	Weekday AM (PM) Exiting Site Trips
STOP	Future Stop Controlled Approach

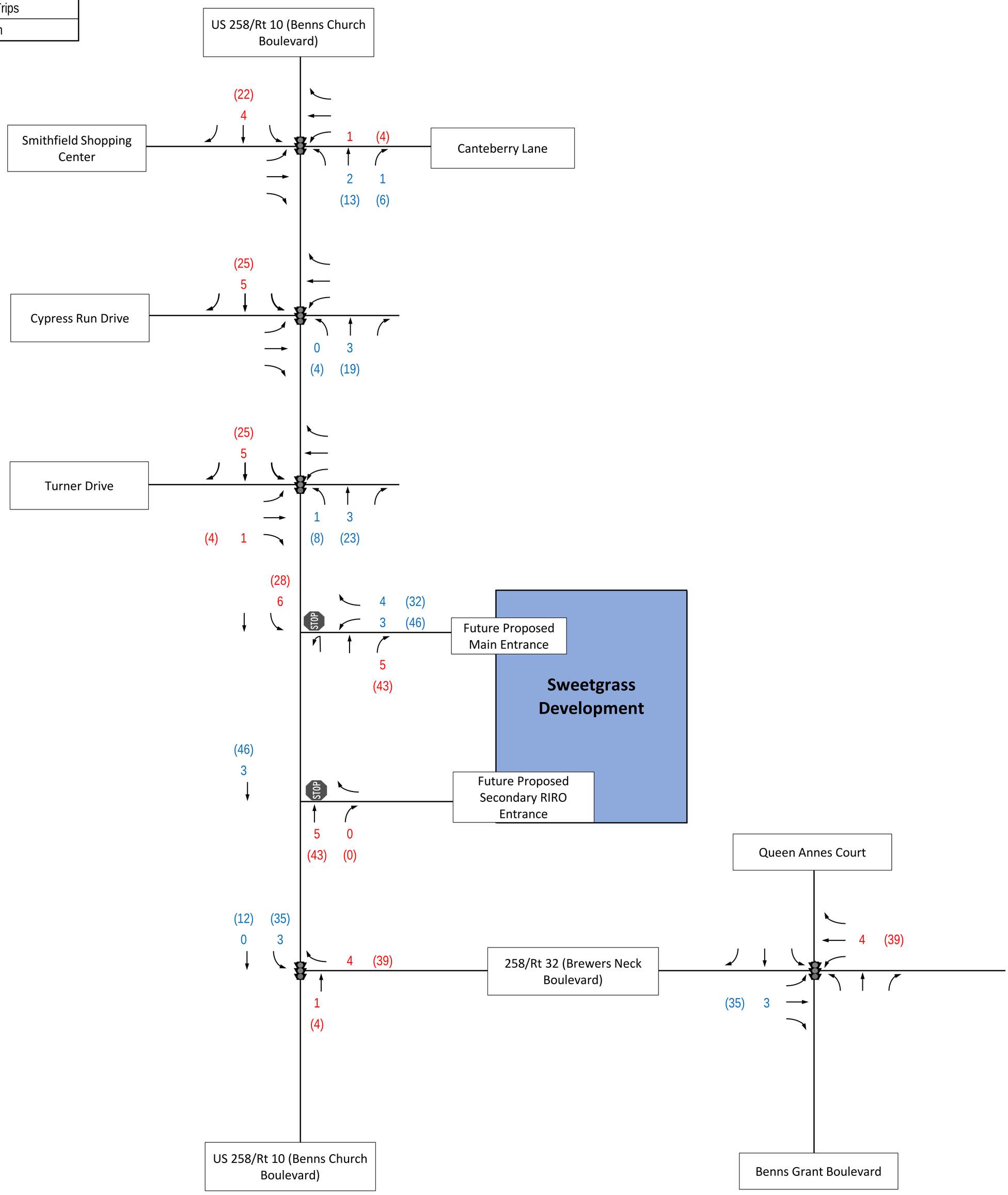


Figure F-8
Shopping Center AM and PM Peak Hour Site Trips

Sweetgrass,
Isle of Wight County, VA

LEGEND	
——	Existing Roadway
– –	Future Roadway
STOP	Existing Stop Controlled Approach
	Existing Signalized Intersection
⟶	Turning Movement
XX%(XX%)	AM (PM) Entering Percentage of Site Trips
XX%(XX%)	AM (PM) Exiting Percentage of Site Trips
STOP	Future Stop Controlled Approach

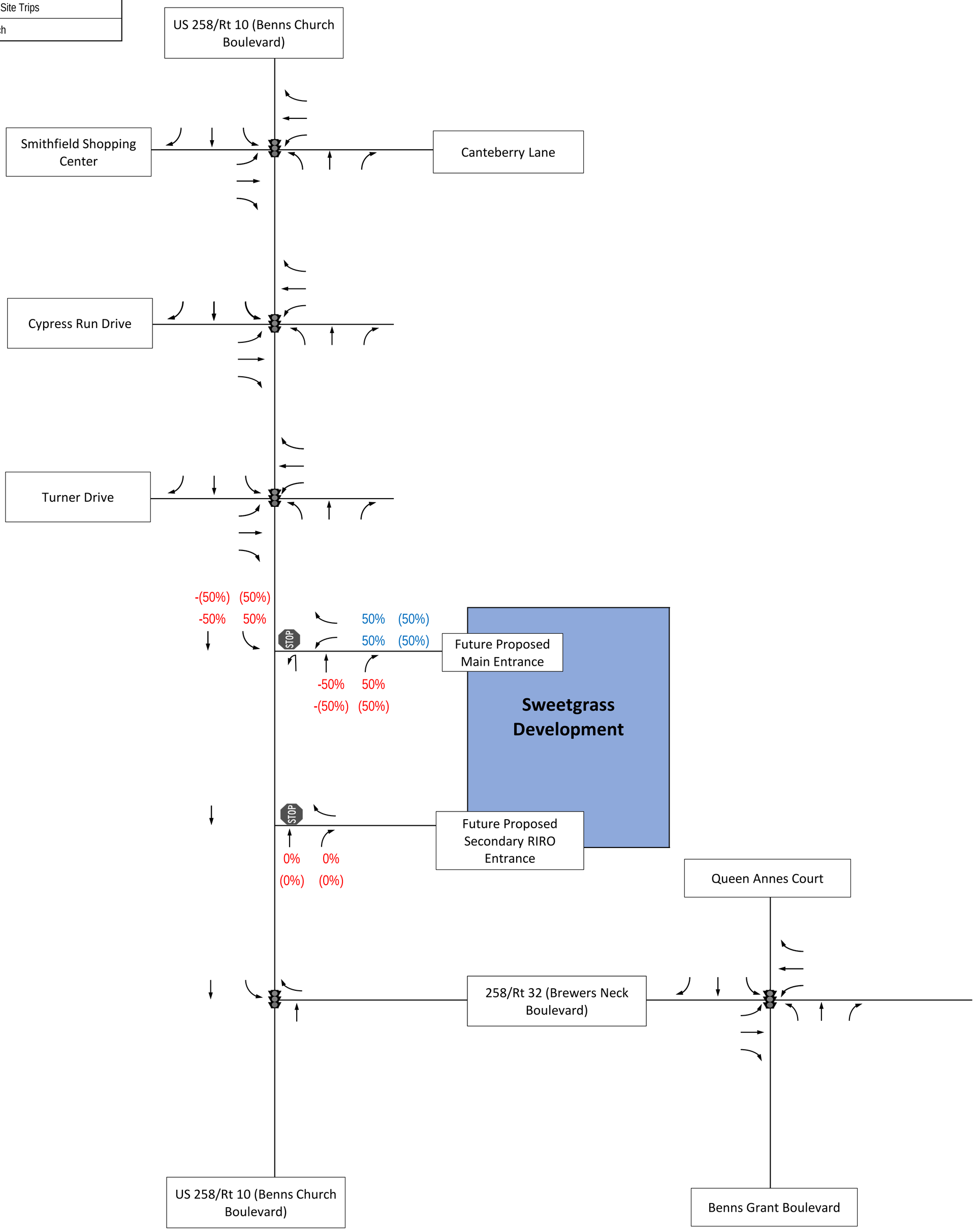


Figure F-9
Shopping Center Pass-by AM and PM Peak Hour Directional Distribution Percentages

Sweetgrass
Isle of Wight County, VA

LEGEND	
——	Existing Roadway
- - -	Future Roadway
STOP	Existing Stop Controlled Approach
	Existing Signalized Intersection
⟶	Turning Movement
XX(XX)	Weekday AM (PM) Entering Site Trips
XX(XX)	Weekday AM (PM) Exiting Site Trips
STOP	Future Stop Controlled Approach

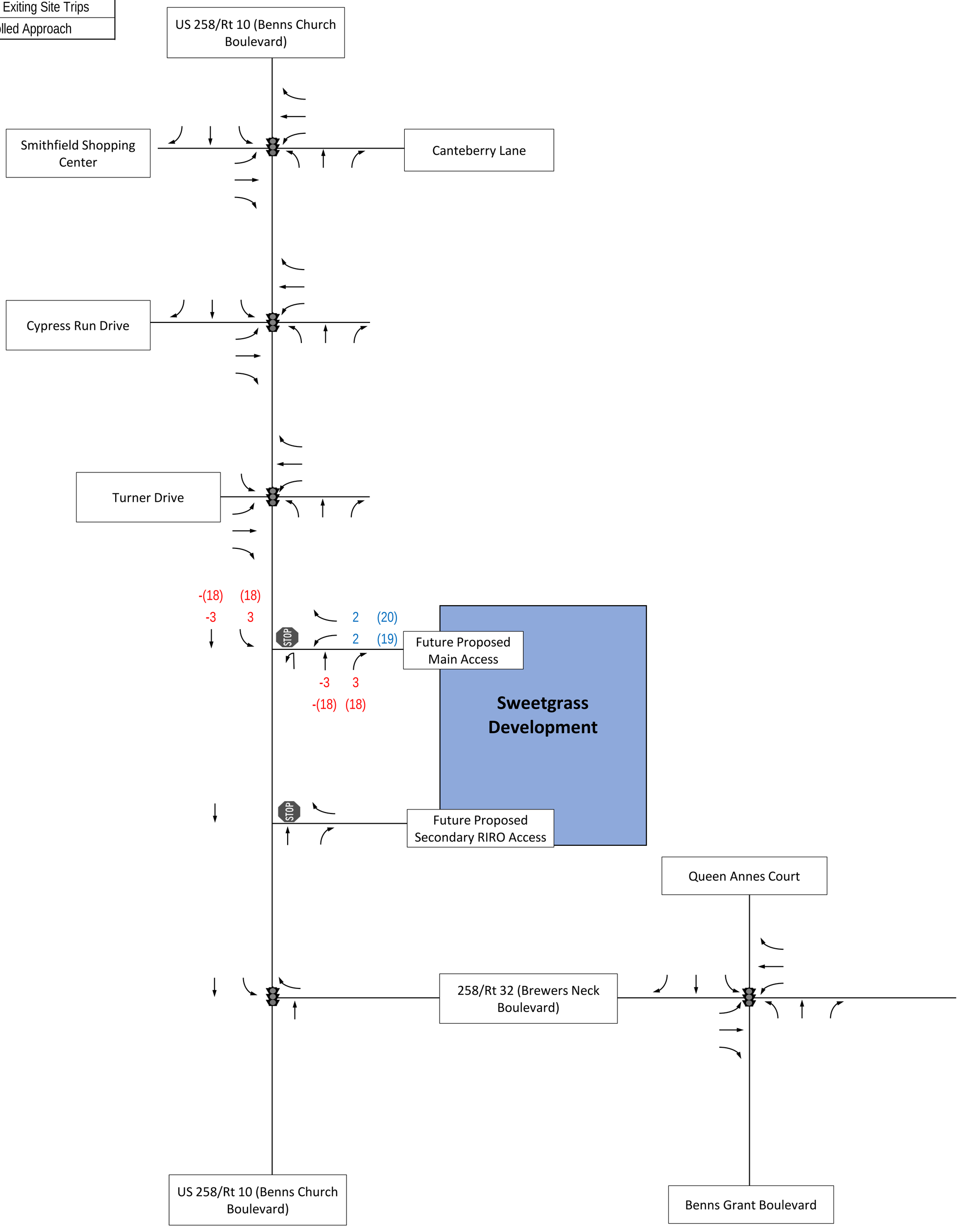


Figure F-10
Shopping Center AM and PM Peak Hour Pass-by Trips

Sweetgrass
Isle of Wight County, VA

LEGEND	
——	Existing Roadway
- -	Future Roadway
STOP	Existing Stop Controlled Approach
	Existing Signalized Intersection
⟶	Turning Movement
XX%(XX%)	AM (PM) Entering Percentage of Site Trips
XX%(XX%)	AM (PM) Exiting Percentage of Site Trips
STOP	Future Stop Controlled Approach

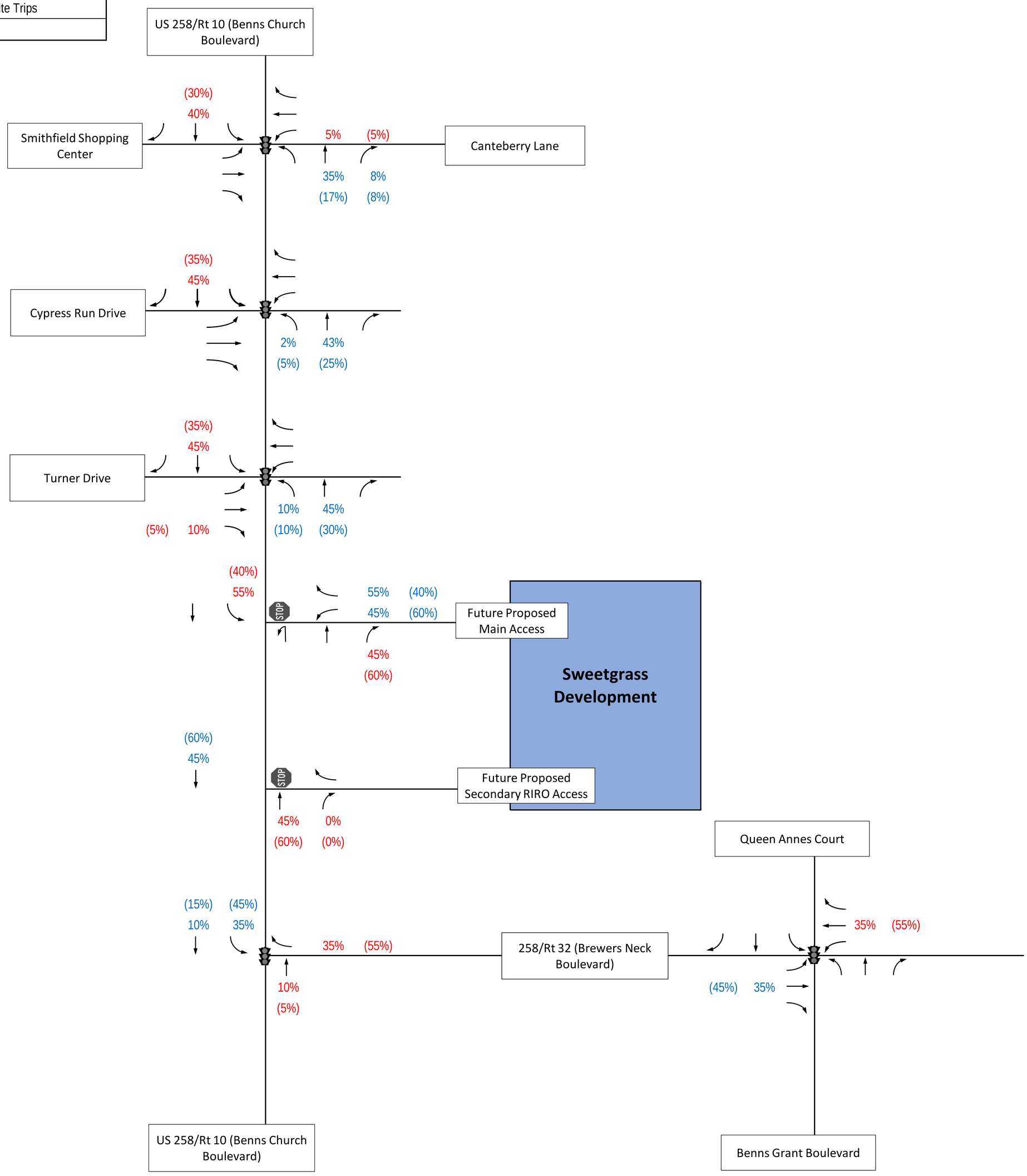


Figure F-11
Fast Food AM and PM Peak Hour Directional Distribution Percentages

Sweetgrass
Isle of Wight County, VA

LEGEND	
——	Existing Roadway
- -	Future Roadway
STOP	Existing Stop Controlled Approach
	Existing Signalized Intersection
⟶	Turning Movement
XX(XX)	Weekday AM (PM) Entering Site Trips
XX(XX)	Weekday AM (PM) Exiting Site Trips
STOP	Future Stop Controlled Approach

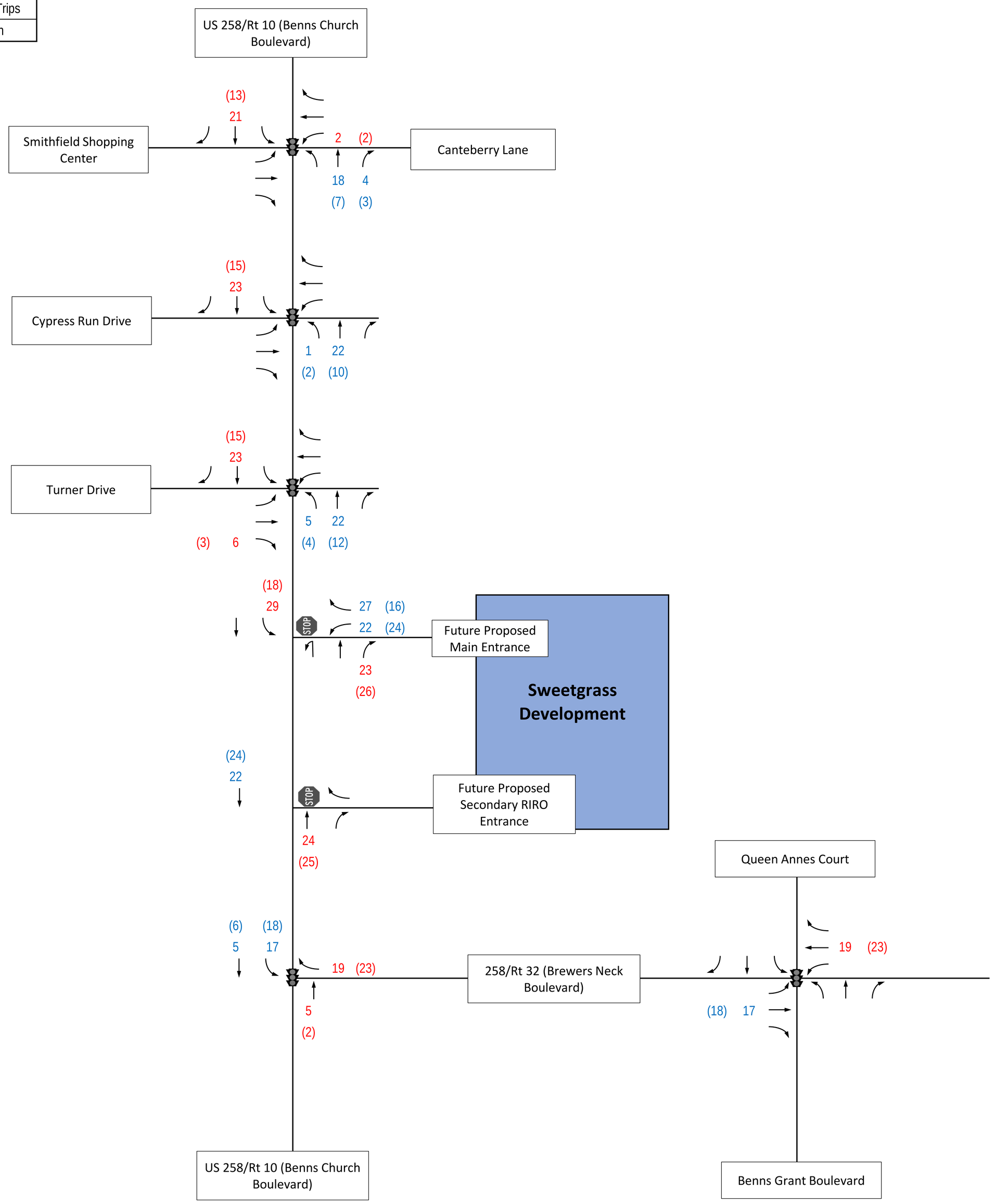


Figure F-12
Fast Food AM and PM Peak Hour New Site Trips

Sweetgrass
Isle of Wight County, VA

LEGEND	
——	Existing Roadway
– –	Future Roadway
STOP	Existing Stop Controlled Approach
	Existing Signalized Intersection
⟶	Turning Movement
XX%(XX%)	AM (PM) Entering Percentage of Site Trips
XX%(XX%)	AM (PM) Exiting Percentage of Site Trips
STOP	Future Stop Controlled Approach

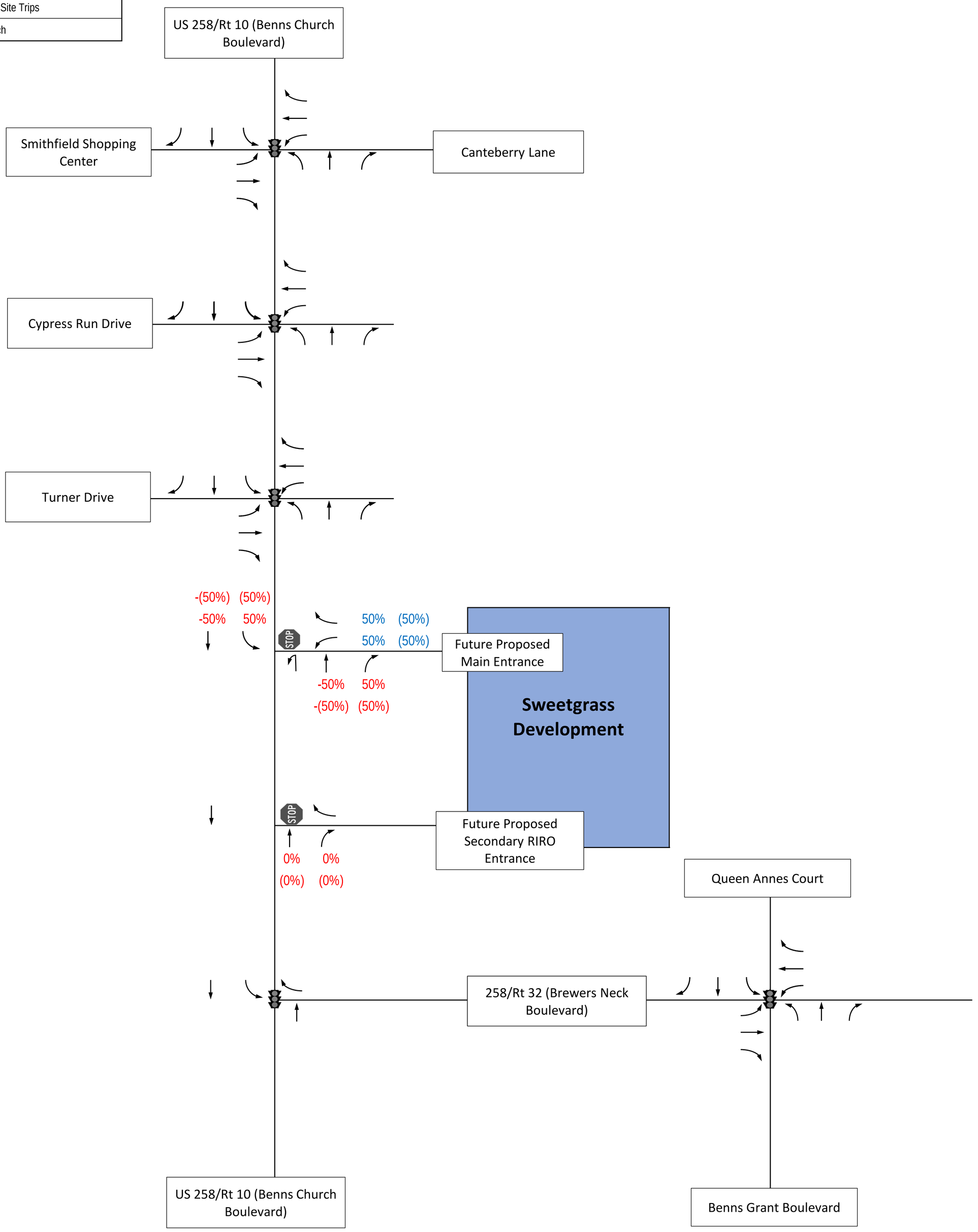


Figure F-15
Fast Food AM and PM Peak Hour Pass-by Directional Distribution Percentages

Sweetgrass
Isle of Wight County, VA

LEGEND	
——	Existing Roadway
- - -	Future Roadway
STOP	Existing Stop Controlled Approach
	Existing Signalized Intersection
⟶	Turning Movement
XX(XX)	Weekday AM (PM) Entering Site Trips
XX(XX)	Weekday AM (PM) Exiting Site Trips
STOP	Future Stop Controlled Approach

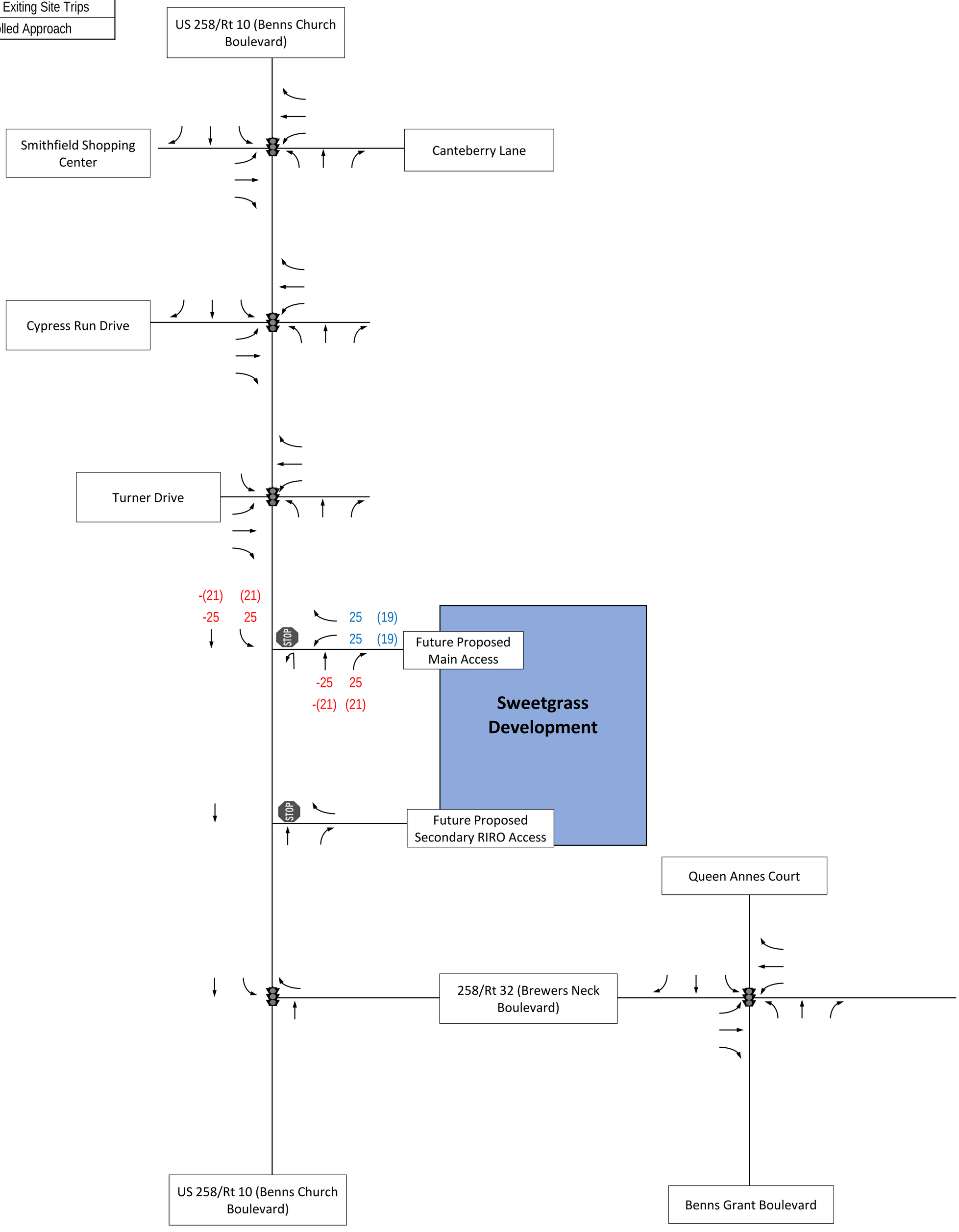


Figure F-16
Fast Food AM and PM Peak Hour Pass-by Trips

Sweetgrass
Isle of Wight County, VA

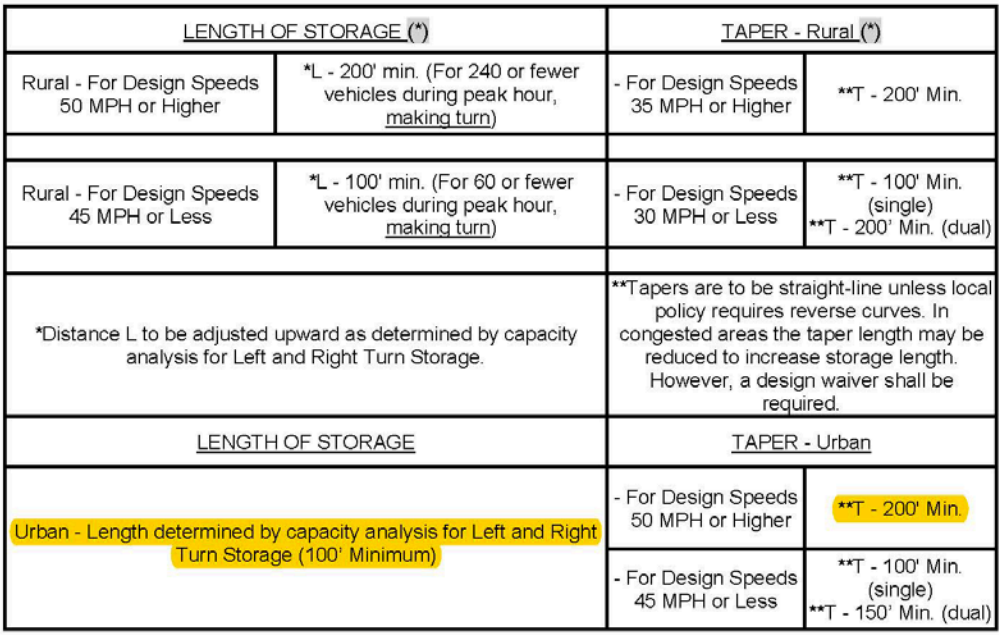
APPENDIX G

Turn Lane Warrant Analysis

Turn Lanes Warrant Analysis

Based on Figure 3-1 from Appendix F of VDOT Road Design Manual, provided below on Figure 1, both proposed entrances into development require right turn lanes. Based on the requirements shown in figure one, along with a capacity analysis, a 200-foot right turn lane with 200-foot storage is recommended at the Proposed Main Entrance and a right turn lane with 200-foot foot storage with a 200-foot taper is recommended at the Proposed Secondary Entrance.

Figure 1. Turn Lane Criteria for Single and Dual Lanes.



LENGTH OF STORAGE (*)		TAPER - Rural (*)	
Rural - For Design Speeds 50 MPH or Higher	*L - 200' min. (For 240 or fewer vehicles during peak hour, making turn)	- For Design Speeds 35 MPH or Higher	**T - 200' Min.
Rural - For Design Speeds 45 MPH or Less	*L - 100' min. (For 60 or fewer vehicles during peak hour, making turn)	- For Design Speeds 30 MPH or Less	**T - 100' Min. (single) **T - 200' Min. (dual)
*Distance L to be adjusted upward as determined by capacity analysis for Left and Right Turn Storage.		**Tapers are to be straight-line unless local policy requires reverse curves. In congested areas the taper length may be reduced to increase storage length. However, a design waiver shall be required.	
LENGTH OF STORAGE		TAPER - Urban	
Urban - Length determined by capacity analysis for Left and Right Turn Storage (100' Minimum)		- For Design Speeds 50 MPH or Higher	**T - 200' Min.
		- For Design Speeds 45 MPH or Less	**T - 100' Min. (single) **T - 150' Min. (dual)

(*) For instructions on selection of design speed, see Appendix A, Section A-1*

FIGURE 3-1 RIGHT AND LEFT TURN LANE CRITERIA FOR SINGLE AND DUAL LANES

Based on the projected volumes in year 2026 at full build-out, the projected peak hour volume right turns and approach totals at both entrances are presented below:

Entrance	Peak Hour Volume Right Turns, Vehicles per Hour	Peak Hour Volume Approach Total, Vehicles per Hour
Proposed Main Entrance	208	1724
Proposed Secondary Entrance	116	1797

Blue dots on Figure 2 below reflect where the points fall on the graph based on volumes calculations. Full-width right turn lane and a taper is required at both proposed entrances.

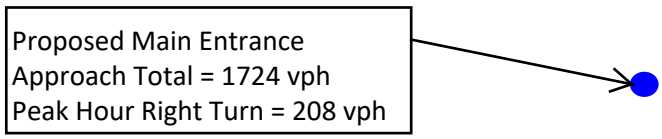
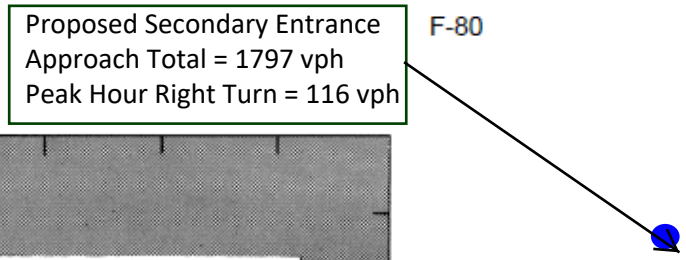
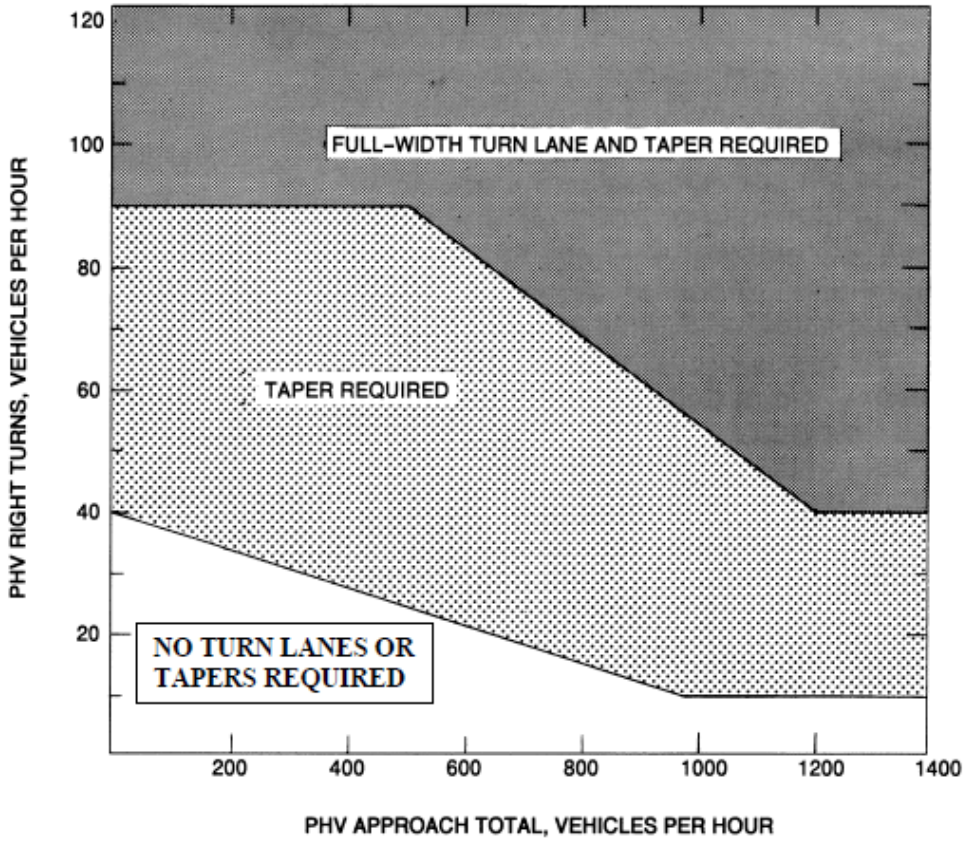


Figure 2. Warrants for Right Turn Treatment (4-Lane Highway)



F-80



Appropriate Radius required at all Intersections and Entrances (Commercial or Private).

LEGEND

PHV- - Peak Hour Volume (also Design Hourly Volume equivalent)

Adjustment for Right Turns

If PHV is not known use formula: PHV = ADT x K x D

K = the percent of AADT occurring in the peak hour
D = the percent of traffic in the peak direction of flow

Note: An average of 11% for K x D will suffice.

When right turn facilities are warranted, see Figure 3-1 for design criteria.*

FIGURE 3-27 WARRANTS FOR RIGHT TURN TREATMENT (4-LANE HIGHWAY)

* Rev. 1/15

Based on the provided guidance on Figure 2 from Appendix F of VDOT Road Design Manual on the previous page, along with a capacity analysis, a 200-foot right turn lane with 200-foot storage is recommended at the Proposed Main Entrance and a 200-foot foot storage with a 200-foot taper is recommended at the Proposed Secondary Entrance. These right turn lane recommendations were used in the 2026 and 2032 Build analyses.

Furthermore, left turn volumes were evaluated at the proposed future main entrance based on the left turn lane storage warrant from VDOT Road Design Manual presented on Figure 1. Based on the projected queues for 2026 and 2032 Build scenarios, the existing left turn lane at the intersection of US 258/Rt 10 (Benns Church Boulevard) & Future Proposed Main Entrance will need to be lengthened in order to facilitate the projected peak hour queues. A 200-foot left turn storage lane with 200-foot taper is recommended at this location and was assumed for AM and PM 2026 and 2032 Build scenarios in this analysis.

APPENDIX H

Signal Warrant Analysis

Traffic Signal Warrant Analysis

This report details the findings of a traffic signal warrant analysis on the US 258/Rt 10 (Benns Church Boulevard) & Proposed Main Entrance intersection, to determine whether a signal would be warranted for the opening day build year, 2026, of the Sweetgrass Development.

Evaluation of the need for a traffic signal at an intersection requires the examination of various factors such as traffic volumes, traffic flow and progression, and overall safety of the intersection to determine if a traffic signal would be warranted. Each of these elements is described below.

Methodology

Signal warrant analyses were performed following the procedures outlined in the 2009 edition of the Manual of Uniform Traffic Control Devices (MUTCD). Existing peak hour turning movement counts were collected at the study intersection and were used for this warrant analysis.

The traffic conditions of the intersection in the build year, 2026, were derived from a composition of existing turning movement volumes and a distribution of site trips from the Sweetgrass Development. The extent of signal warrant of the future conditions is limited by the data derived from the traffic forecast which includes only morning and evening peak hours and two additional hours, that were selected based on land uses that generate the highest traffic volumes: single-family detached housing, multifamily housing (low-rise) and fast-food restaurant.

Warrant Analysis Results

Warrant 1 – Eight Hour Vehicular Volume

Warrant 1, Eight-Hour Vehicular Volume, consists of two separate warrants; Warrant 1A-Minimum Vehicular Volume and Warrant 1B-Interruption of Continuous Traffic. The Minimum Vehicular Volume warrant is intended for use at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic signal. The Interruption of Continuous Traffic warrant is intended for use at locations where Warrant A is not satisfied and where the volume of traffic on a major street is so heavy that traffic on a minor intersecting street suffers excessive delay when attempting to cross or enter the major street. Warrant 1 is intended to be used as a single warrant; if Warrant A is met and Warrant B is not met, a traffic signal is warranted. Conversely, if Warrant A is not met and Warrant B is met, a traffic signal is still warranted.

Since this is a proposed entrance, VDOT's Traffic Signal Warrant Using Average Daily Traffic Estimate for the Virginia Supplement to the MUTCD was used. The future traffic projections at the US 258/Rt 10 (Benns Church Boulevard) & Proposed Main Entrance intersection were developed using the daily trip generation and distribution patterns shown in the TIA. The daily trip projections and associated site traffic are shown in the following table and figure respectively. For the signal warrant, the projected site trips on US 258/Rt 10 (Benns Church Boulevard) were added to the 2017 VDOT AADT of 25,000 vpd projected to Opening Day 2026 AADT of 28,585 vpd.

Land Use	ITE Code	Size	Units	Daily		
				Enter	Exit	Total
Conceptual Site Plan						
Single-Family Detached Housing	210	400	Dwelling Units	1888	1,888	3,776
Multifamily Housing (Low-Rise)	220	220	Dwelling Units	1072	1,072	2,144
Public Park	411	4	Acres	46	45	91
Shopping Center	820	30	1000 Sq. Ft. GLA	1326	1,325	2,651
Fast Food with Drive-Thru	934	5	1000 Sq. Ft. GLA	1177	1,178	2,355
Subtotal				**5,509**	**5,508**	**11,017**
Pass-by Trips (Fast Food only)	49%		% Pass-by	577	577	1,154
Pass-by Trips (Shopping Center)	34%		% Pass-by	451	450	901
Total New Trips				**4,481**	**4,481**	**8,962**

Reference: Trip Generation, 10th Edition, Institute of Transportation Engineers, Washington, DC. 2017.
Note: Used highest total between average rate and fitted curve unless R2<0.75

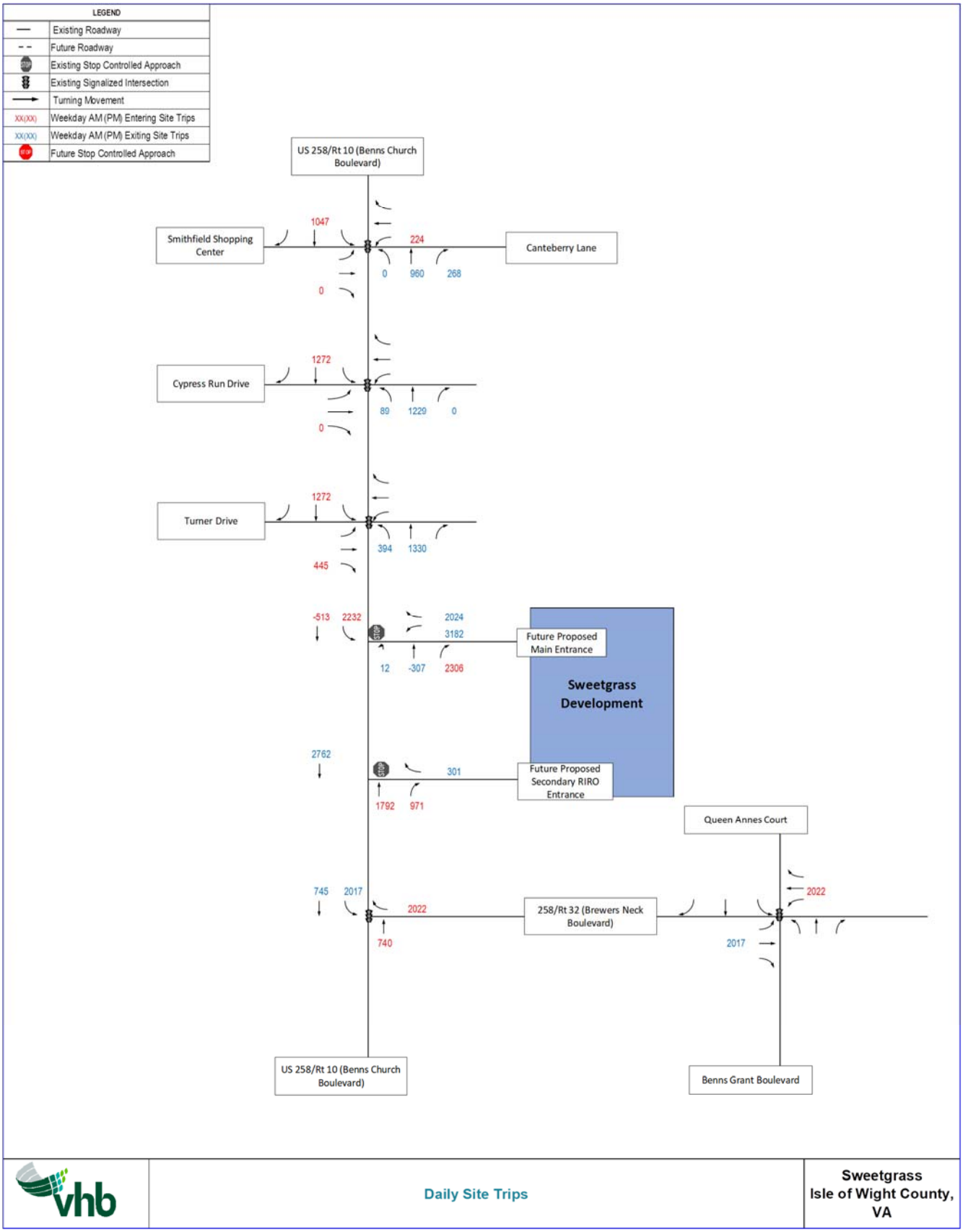

LEGEND
Existing Roadway
Future Roadway
Existing Stop Controlled Approach
Existing Signalized Intersection
Turning Movement
XX(XX) Weekday AM (PM) Entering Site Trips
XX(XX) Weekday AM (PM) Exiting Site Trips
Future Stop Controlled Approach
US 258/Rt 10 (Benns Church Boulevard)
Smithfield Shopping Center
Canteberry Lane
1047
224
0
960
268
0
Cypress Run Drive
1272
89
1229
0
0
Turner Drive
1272
394
1330
445
-513
2232
2024
3182
12
-307
2306
Future Proposed Main Entrance
Sweetgrass Development
2762
301
1792
971
Future Proposed Secondary RIRO Entrance
Queen Annes Court
745
2017
2022
2022
740
258/Rt 32 (Brewers Neck Boulevard)
2022
2017
US 258/Rt 10 (Benns Church Boulevard)
Benns Grant Boulevard
Daily Site Trips
Sweetgrass
Isle of Wight County, VA

Table 1: Future Conditions – Warrant 1 Condition A Summary

Number of Lanes		Vehicles per day on major street (total of both approaches)					Vehicles per day on minor street (total of both approaches)				
Major	Minor	100%	80%	70%	56%	Projected	100%	80%	70%	56%	Projected
2 or more	2 or more	9600	7680	6720	5376	32315	3200	2560	2240	1792	5206

Proposed signal warranted when development is: 43%

Warrant 1 is satisfied. The signal is projected to be warranted when the development is 43% built out with the 70% reduction due to the speed limit along the corridor.

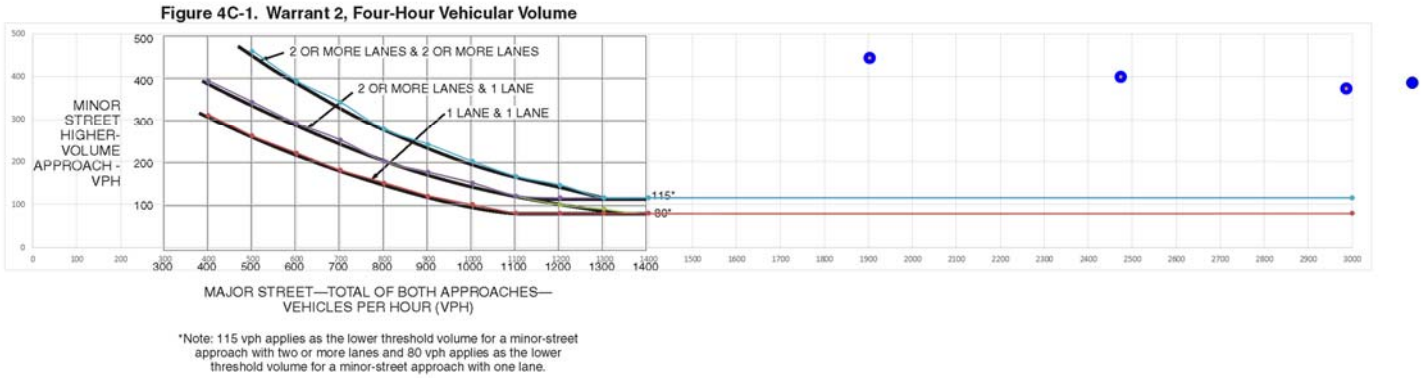
Warrant 2 – Four Hour Vehicular Volume

Warrant 2, Four-Hour Vehicular Volume, is intended for use at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic signal. A traffic signal is warranted based on Warrant 2 if "the plotted points representing the vehicles per hour on the major street and the minor street fall above the applicable curve."

Considering the two highest peak hours in terms of traffic volume at the study intersection the following figure shows that both, AM and PM peak hours, as well as additional two hours, would exceed the threshold of the Warrant. Based on the future land uses, it is expected that four hours would meet the minimum threshold volumes of the warrant.

Figure 1: 2026 Build Conditions Warrant 2

Time	Major Street (vph)	Minor Street (vph)
7:00 AM to 8:00 AM	2474	399
12:00 PM to 1:00 PM	1903	444
4:00 PM to 5:00 PM	3271	388
4:30 PM to 5:30 PM	2988	372



Warrant 2 is satisfied.

Warrant 3 – Peak Hour

Warrant 3, Peak Hour, "is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street." The Peak Hour warrant is met when "the plotted point representing the vehicles per hour on the major street and the minor street for one hour fall above the applicable curve" or based on the following conditions:

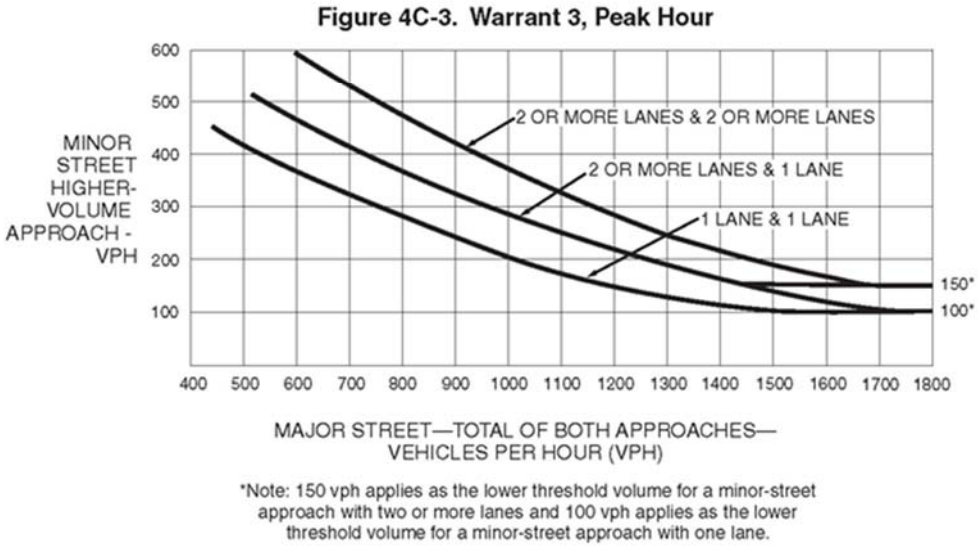
a) The total stopped time delay experienced by the traffic on one minor-street approach controlled by a stop sign equals or exceeds: 4 vehicle-hours for a one-lane approach; or 5 vehicle-hours for a two-lane approach, and

b) The volume on the same minor-street approach equals or exceeds 100 vehicles per hour for one lane or 150 vehicles per hour for two lanes, and

c) The total entering volume during the hour meets or exceeds 650 vehicles per hour for intersections with three approaches or 800 vehicles per hour for intersections with four or more approaches.

Figure 2: 2026 Build Conditions Warrant 3

Time	Major Street (vph)	Minor Street+ (vph)
7:00 AM to 8:00 AM	2474	336
4:30 PM to 8:00 AM	2988	352



As shown in Figure 2, both AM and PM peak hours fall above the curve for the geometric combination of 2 or more lanes on both the major and minor roadways.

Warrant 3 is satisfied.

Warrant 4 – Pedestrian Volume

Warrant 4, Pedestrian Volume, is intended for use at locations where the volume of traffic on the major street is so heavy that pedestrians experience significant delay or conflict when attempting to cross the major street. Warrant 4 is satisfied when "the pedestrian volume crossing the major street at an intersection during an average day is: 100 or more for each of any four hours; or 190 or more during any one hour."

Currently, there are no existing pedestrian sidewalks in the area of the study. It is not expected that the development will generate the pedestrian volumes levels required to satisfy the warrant due to the rural nature of the surrounding area.

Warrant 4 is not satisfied.

Warrant 5 – School Crossing

Warrant 5, School Crossing, is intended for use at locations “where the fact that school children cross the major street is the principal reason to consider installing a traffic control signal.” For the purposes of this warrant, the word "schoolchildren" includes elementary through high school students.

Warrant 5 is not applicable because there are no school crossings near the subject intersection.

Warrant 5 is not satisfied.

Warrant 6 – Coordinated Signal System

Warrant 6, Coordinated Signal System, is satisfied when “on a two-way street, adjacent signals do not provide the necessary degree of platooning and speed control and the proposed and adjacent signals could constitute a progressive signal system.”

A signal at Proposed Main Entrance would not help traffic platooning since the signal located at Turner Road is not coordinated.

Warrant 6 is not satisfied.

Warrant 7 – Crash Experience

Warrant 7, Crash Experience, is intended for use at locations where “the severity and frequency of crashes are the principal reasons to consider installing a traffic control signal.” A traffic signal is warranted based on Warrant 7 if the following criteria are met:

a) Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency; and
b) Five or more reported crashes, of types susceptible to correction by a traffic signal, have occurred within a 12-month period, each crash involving personal injury or property damage exceeding the applicable requirements for a reportable crash.

Due to the lack of crash data, we were unable to evaluate the severity and frequency of crashes at the intersection.

Warrant 7 is not satisfied.

Warrant 8 – Roadway Network

Warrant 8, Roadway Network, is intended when the proposed traffic signal will encourage concentration and traffic flow organization on a given roadway network. This Warrant is intended for location where two major routes meet or where traffic volumes exceed 1000 vehicles per hour.

Warrant 8 is not applicable because the minor street is an entrance into the development and is not a major roadway.

Warrant 8 is not satisfied.

Warrant 9 – Intersection Near a Grade Crossing

Warrant 9, Intersection Near a Grade Crossing, is intended for "use at a location where none of the conditions described in the other eight traffic signal warrants are met, but the proximity to the intersection of a grade crossing on an intersection approach controlled by a STOP or YIELD sign is the principal reason to consider installing a traffic control signal."

Warrant 9 is not applicable.

Warrant 9 is not satisfied.

Conclusions

Warrant Analysis Conclusions

This engineering study examined traffic signal warrants at the intersection of US 257/Rt 10 (Benns Church Boulevard) and the Proposed Main entrance. The analysis showed that the traffic volume warrants (Warrants 1, 2 and 3) are met at the 70% and 100% thresholds defined by the MUTCD. The warrant is based on projected traffic volumes as well as volumes generated by the development, calculated based on available traffic data from 10th edition of ITE Trip Generation Manual.

APPENDIX I

2026 Build Synchro Reports

1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane

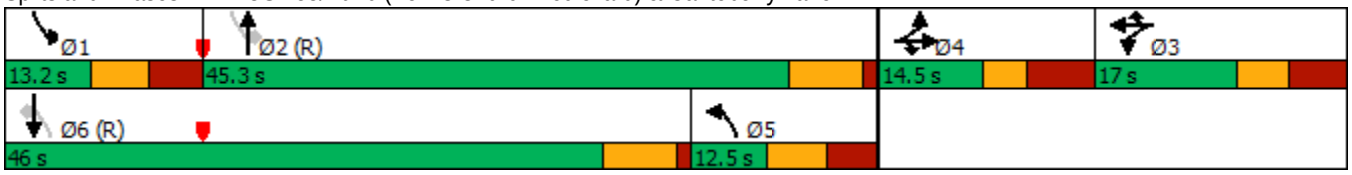
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	26	1	19	108	5	43	15	868	71	55	1201	36
Future Volume (vph)	26	1	19	108	5	43	15	868	71	55	1201	36
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	200		350	275		325
Storage Lanes	0		1	0		1	1		1	1		1
Taper Length (ft)	25			25			125			225		
Satd. Flow (prot)	0	1813	1615	0	1778	1553	1805	3539	1583	1687	3505	1615
Flt Permitted		0.954			0.954		0.120			0.223		
Satd. Flow (perm)	0	1813	1615	0	1778	1553	228	3539	1583	396	3505	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			309			309			236			236
Link Speed (mph)		25			25			45			45	
Link Distance (ft)		335			1232			773			1937	
Travel Time (s)		9.1			33.6			11.7			29.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	2%	0%	4%	0%	2%	2%	7%	3%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	29	21	0	122	47	16	943	77	60	1305	39
Turn Type	Split	NA	Prot	Split	NA	Prot	D.P+P	NA	Perm	D.P+P	NA	Perm
Protected Phases	4	4	4	3	3	3	5	2		1	6	
Permitted Phases							6		2	2		6
Detector Phase	4	4	4	3	3	3	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	5.0	15.0	15.0	5.0	15.0	15.0
Minimum Split (s)	14.5	14.5	14.5	14.5	14.5	14.5	12.5	21.0	21.0	12.5	21.0	21.0
Total Split (s)	14.5	14.5	14.5	17.0	17.0	17.0	12.5	45.3	45.3	13.2	46.0	46.0
Total Split (%)	16.1%	16.1%	16.1%	18.9%	18.9%	18.9%	13.9%	50.3%	50.3%	14.7%	51.1%	51.1%
Maximum Green (s)	7.0	7.0	7.0	9.5	9.5	9.5	5.0	39.3	39.3	5.7	40.0	40.0
Yellow Time (s)	3.0	3.0	3.0	3.5	3.5	3.5	4.0	5.0	5.0	4.0	5.0	5.0
All-Red Time (s)	4.5	4.5	4.5	4.0	4.0	4.0	3.5	1.0	1.0	3.5	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.5	7.5		7.5	7.5	7.5	6.0	6.0	7.5	6.0	6.0
Lead/Lag	Lead	Lead	Lead	Lag	Lag	Lag	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	2.0	6.0	6.0	2.0	6.0	6.0
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	3.5	3.5	0.2	3.5	3.5
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	20.0	0.0	20.0	20.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0	15.0	0.0	15.0	15.0
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	C-Min
Act Effct Green (s)		7.0	7.0		9.1	9.1	59.5	48.3	48.3	51.2	56.2	56.2
Actuated g/C Ratio		0.08	0.08		0.10	0.10	0.66	0.54	0.54	0.57	0.62	0.62
v/c Ratio		0.21	0.05		0.69	0.11	0.07	0.50	0.08	0.20	0.60	0.04
Control Delay		42.7	0.3		59.3	0.5	6.7	11.3	0.2	10.2	14.2	0.1
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		42.7	0.3		59.3	0.5	6.7	11.3	0.2	10.2	14.2	0.1
LOS		D	A		E	A	A	B	A	B	B	A
Approach Delay		24.9			43.0			10.4			13.7	
Approach LOS		C			D			B			B	

1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		16	0		68	0	3	232	0	14	239	0
Queue Length 95th (ft)		43	0		#142	0	8	88	0	32	428	0
Internal Link Dist (ft)		255			1152			693			1857	
Turn Bay Length (ft)							200		350	275		325
Base Capacity (vph)		141	410		187	440	238	1900	959	308	2190	1097
Starvation Cap Reductn		0	0		0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0		0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0		0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.21	0.05		0.65	0.11	0.07	0.50	0.08	0.19	0.60	0.04

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 50 (56%), Referenced to phase 2:NBSB and 6:NBSB, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.69			
Intersection Signal Delay: 14.5		Intersection LOS: B	
Intersection Capacity Utilization 67.8%		ICU Level of Service C	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane

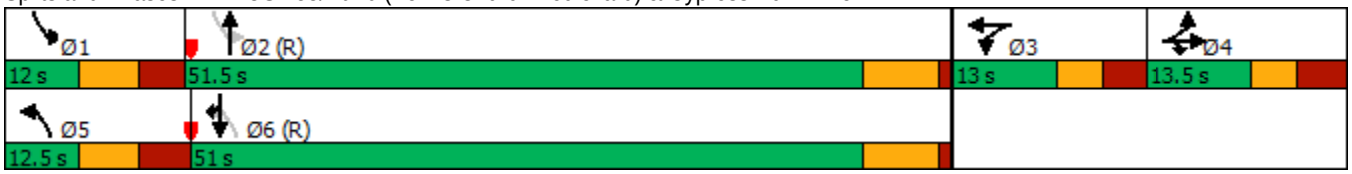


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	0	20	0	0	0	31	804	0	2	1459	32
Future Volume (vph)	5	0	20	0	0	0	31	804	0	2	1459	32
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	150		235
Storage Lanes	0		1	0		0	1		0	1		1
Taper Length (ft)	25			25			150			125		
Satd. Flow (prot)	0	1787	1599	0	1900	0	1805	3539	0	1805	3505	1615
Flt Permitted		0.950					0.118			0.315		
Satd. Flow (perm)	0	1787	1599	0	1900	0	224	3539	0	598	3505	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			194									200
Link Speed (mph)		15			25			45			45	
Link Distance (ft)		1905			1451			1986			773	
Travel Time (s)		86.6			39.6			30.1			11.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	1%	0%	0%	0%	0%	2%	0%	0%	3%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	5	22	0	0	0	34	874	0	2	1586	35
Turn Type	Split	NA	Prot				D.P+P	NA		D.P+P	NA	Prot
Protected Phases	4	4	4	3	3		5	2		1	6	6
Permitted Phases							6			2		
Detector Phase	4	4	4	3	3		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		5.0	14.0		5.0	14.0	14.0
Minimum Split (s)	13.5	13.5	13.5	13.0	13.0		12.5	20.0		12.0	20.0	20.0
Total Split (s)	13.5	13.5	13.5	13.0	13.0		12.5	51.5		12.0	51.0	51.0
Total Split (%)	15.0%	15.0%	15.0%	14.4%	14.4%		13.9%	57.2%		13.3%	56.7%	56.7%
Maximum Green (s)	7.0	7.0	7.0	7.0	7.0		5.0	45.5		5.0	45.0	45.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		4.0	5.0		4.0	5.0	5.0
All-Red Time (s)	3.5	3.5	3.5	3.0	3.0		3.5	1.0		3.0	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		6.5	6.5		6.0		7.5	6.0		7.0	6.0	6.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		2.0	5.0		2.0	5.0	5.0
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2		0.2	3.5		0.2	3.5	3.5
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	18.0		0.0	18.0	18.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	15.0		0.0	15.0	15.0
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	C-Min
Act Effct Green (s)		7.0	7.0				72.6	79.8		76.2	73.5	73.5
Actuated g/C Ratio		0.08	0.08				0.81	0.89		0.85	0.82	0.82
v/c Ratio		0.04	0.07				0.13	0.28		0.00	0.55	0.03
Control Delay		39.2	0.5				2.8	1.9		0.5	2.0	0.0
Queue Delay		0.0	0.0				0.0	0.0		0.0	0.0	0.0
Total Delay		39.2	0.5				2.8	1.9		0.5	2.0	0.0
LOS		D	A				A	A		A	A	A
Approach Delay		7.6						1.9			1.9	
Approach LOS		A						A			A	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		3	0				1	0		0	9	0
Queue Length 95th (ft)		14	0				m7	m47		m0	63	m0
Internal Link Dist (ft)		1825			1371			1906			693	
Turn Bay Length (ft)							250			150		235
Base Capacity (vph)		138	303				268	3138		573	2862	1355
Starvation Cap Reductn		0	0				0	0		0	0	0
Spillback Cap Reductn		0	0				0	0		0	0	0
Storage Cap Reductn		0	0				0	0		0	0	0
Reduced v/c Ratio		0.04	0.07				0.13	0.28		0.00	0.55	0.03

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 54 (60%), Referenced to phase 2:NBSB and 6:NBSB, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.55			
Intersection Signal Delay: 2.0		Intersection LOS: A	
Intersection Capacity Utilization 56.6%		ICU Level of Service B	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 2: US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive



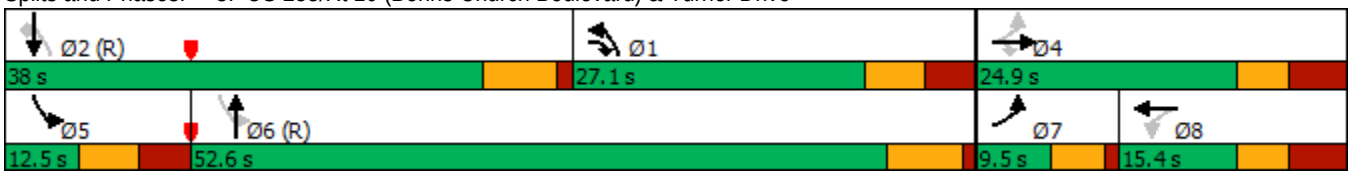
3: US 258/Rt 10 (Benns Church Boulevard) & Turner Drive

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	193	1	302	1	72	1	276	725	70	7	993	324
Future Volume (vph)	193	1	302	1	72	1	276	725	70	7	993	324
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		300	0		0	125		0	125		275
Storage Lanes	0		1	0		0	1		0	1		1
Taper Length (ft)	200			25			100			100		
Satd. Flow (prot)	0	1793	1599	0	1894	0	1687	3499	0	1805	3505	1482
Flt Permitted		0.669			0.995		0.138			0.281		
Satd. Flow (perm)	0	1259	1599	0	1887	0	245	3499	0	534	3505	1482
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			127		1			17				352
Link Speed (mph)		40			25			45			45	
Link Distance (ft)		1499			695			1153			1986	
Travel Time (s)		25.6			19.0			17.5			30.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	1%	0%	0%	0%	7%	2%	0%	0%	3%	9%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	211	328	0	80	0	300	864	0	8	1079	352
Turn Type	pm+pt	NA	pm+ov	Perm	NA		D.P+P	NA		D.P+P	NA	Perm
Protected Phases	7	4	1		8		1	6		5	2	
Permitted Phases	4		4	8			2			6		2
Detector Phase	7	4	1	8	8		1	6		5	2	2
Switch Phase												
Minimum Initial (s)	5.0	7.0	5.0	7.0	7.0		5.0	15.0		5.0	15.0	15.0
Minimum Split (s)	9.5	15.0	12.5	14.5	14.5		12.5	21.0		12.5	21.0	21.0
Total Split (s)	9.5	24.9	27.1	15.4	15.4		27.1	52.6		12.5	38.0	38.0
Total Split (%)	10.6%	27.7%	30.1%	17.1%	17.1%		30.1%	58.4%		13.9%	42.2%	42.2%
Maximum Green (s)	5.0	17.4	19.6	7.9	7.9		19.6	46.6		5.0	32.0	32.0
Yellow Time (s)	3.5	3.5	4.0	3.5	3.5		4.0	5.0		4.0	5.0	5.0
All-Red Time (s)	1.0	4.0	3.5	4.0	4.0		3.5	1.0		3.5	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		7.5	7.5		7.5		7.5	6.0		7.5	6.0	6.0
Lead/Lag	Lead		Lag	Lag	Lag		Lag	Lag		Lead	Lead	Lead
Lead-Lag Optimize?	Yes		Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Vehicle Extension (s)	3.0	5.0	4.0	3.0	3.0		4.0	6.0		2.0	6.0	6.0
Minimum Gap (s)	3.0	3.5	0.2	0.2	0.2		0.2	3.5		0.2	3.5	3.5
Time Before Reduce (s)	0.0	20.0	0.0	0.0	0.0		0.0	20.0		0.0	20.0	20.0
Time To Reduce (s)	0.0	10.0	0.0	0.0	0.0		0.0	15.0		0.0	15.0	15.0
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	C-Min
Act Effct Green (s)		17.4	41.6		15.3		50.1	56.6		56.1	34.9	34.9
Actuated g/C Ratio		0.19	0.46		0.17		0.56	0.63		0.62	0.39	0.39
v/c Ratio		0.87	0.41		0.25		0.74	0.39		0.02	0.79	0.45
Control Delay		69.3	10.5		32.7		26.8	3.7		3.7	21.0	4.3
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		69.3	10.5		32.7		26.8	3.7		3.7	21.0	4.3
LOS		E	B		C		C	A		A	C	A
Approach Delay		33.5			32.7			9.7			16.8	
Approach LOS		C			C			A			B	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Queue Length 50th (ft)		117	65		38		101	7		2	297	39
Queue Length 95th (ft)		#244	123		78		160	80		m2	#324	44
Internal Link Dist (ft)		1419			615			1073			1906	
Turn Bay Length (ft)			300				125			125		275
Base Capacity (vph)		243	776		325		458	2206		403	1360	790
Starvation Cap Reductn		0	0		0		0	0		0	0	0
Spillback Cap Reductn		0	0		0		0	0		0	0	0
Storage Cap Reductn		0	0		0		0	0		0	0	0
Reduced v/c Ratio		0.87	0.42		0.25		0.66	0.39		0.02	0.79	0.45

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 10 (11%), Referenced to phase 2:NBSB and 6:NBSB, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.87			
Intersection Signal Delay: 17.4		Intersection LOS: B	
Intersection Capacity Utilization 77.7%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 3: US 258/Rt 10 (Benns Church Boulevard) & Turner Drive

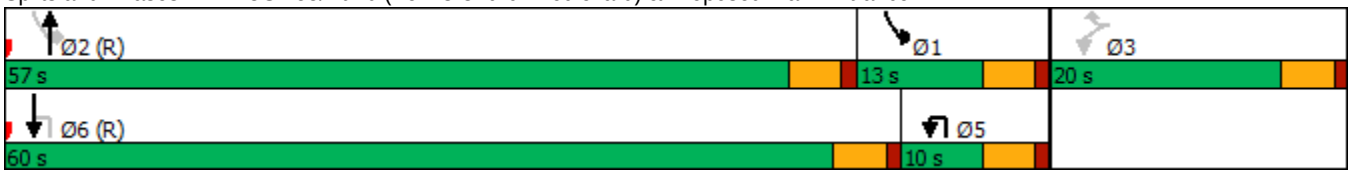


Lane Group	WBL	WBR	NBU	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	267	132	16	1026	92	95	1245
Future Volume (vph)	267	132	16	1026	92	95	1245
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	125		300	300	
Storage Lanes	2	1	1		1	1	
Taper Length (ft)	25		25			200	
Satd. Flow (prot)	3502	1615	1805	3505	1615	1805	3539
Flt Permitted	0.950		0.155			0.200	
Satd. Flow (perm)	3502	1615	294	3505	1615	380	3539
Right Turn on Red		Yes			Yes		
Satd. Flow (RTOR)		143			100		
Link Speed (mph)	25			45			45
Link Distance (ft)	872			696			1153
Travel Time (s)	23.8			10.5			17.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	3%	0%	0%	2%
Shared Lane Traffic (%)							
Lane Group Flow (vph)	290	143	17	1115	100	103	1353
Turn Type	Perm	Perm	D.P+P	NA	Perm	D.P+P	NA
Protected Phases			5	2		1	6
Permitted Phases	3	3	6		2	2	
Detector Phase	3	3	5	2	2	1	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	9.5	9.5	22.5	22.5	9.5	22.5
Total Split (s)	20.0	20.0	10.0	57.0	57.0	13.0	60.0
Total Split (%)	22.2%	22.2%	11.1%	63.3%	63.3%	14.4%	66.7%
Maximum Green (s)	15.5	15.5	5.5	52.5	52.5	8.5	55.5
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag			Lag	Lead	Lead	Lag	Lead
Lead-Lag Optimize?			Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Recall Mode	None	None	None	C-Min	C-Min	None	C-Min
Walk Time (s)				7.0	7.0		7.0
Flash Dont Walk (s)				11.0	11.0		11.0
Pedestrian Calls (#/hr)				0	0		0
Act Effct Green (s)	12.7	12.7	67.6	58.5	58.5	65.8	64.3
Actuated g/C Ratio	0.14	0.14	0.75	0.65	0.65	0.73	0.71
v/c Ratio	0.59	0.41	0.05	0.49	0.09	0.26	0.54
Control Delay	40.9	9.8	4.1	10.3	2.2	2.9	3.3
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	40.9	9.8	4.1	10.3	2.2	2.9	3.3
LOS	D	A	A	B	A	A	A
Approach Delay	30.6			9.5			3.3
Approach LOS	C			A			A

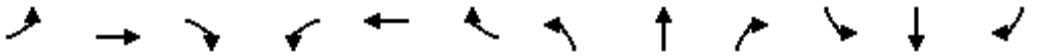
Lane Group	WBL	WBR	NBU	NBT	NBR	SBL	SBT
Queue Length 50th (ft)	80	0	2	155	0	7	54
Queue Length 95th (ft)	115	49	7	261	21	m5	71
Internal Link Dist (ft)	792			616			1073
Turn Bay Length (ft)			125		300	300	
Base Capacity (vph)	608	398	313	2297	1092	428	2533
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.48	0.36	0.05	0.49	0.09	0.24	0.53

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 12 (13%), Referenced to phase 2:NBSB and 6:NBSB, Start of Green			
Natural Cycle: 55			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.59			
Intersection Signal Delay: 9.5		Intersection LOS: A	
Intersection Capacity Utilization 57.4%		ICU Level of Service B	
Analysis Period (min) 15			
m Volume for 95th percentile queue is metered by upstream signal.			

Splits and Phases: 4: US 258/Rt 10 (Benns Church Boulevard) & Proposed Main Entrance



5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)



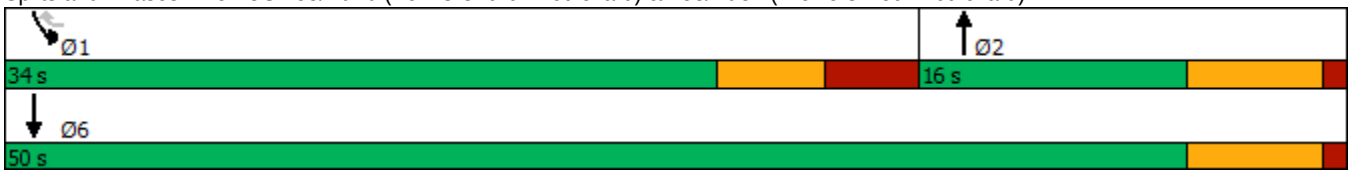
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	0	810	0	215	0	1192	313	0
Future Volume (vph)	0	0	0	0	0	810	0	215	0	1192	313	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	300		0
Storage Lanes	0		0	0		2	0		0	1		0
Taper Length (ft)	25			25			100			75		
Satd. Flow (prot)	0	0	0	0	0	2760	0	3471	0	3400	3471	0
Flt Permitted										0.950		
Satd. Flow (perm)	0	0	0	0	0	2760	0	3471	0	3400	3471	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						417						
Link Speed (mph)		30			45			45			45	
Link Distance (ft)		963			1126			2837			3270	
Travel Time (s)		21.9			17.1			43.0			49.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	3%	0%	4%	0%	3%	4%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	0	880	0	234	0	1296	340	0
Turn Type						Perm		NA		Prot	NA	
Protected Phases								2		1	6	
Permitted Phases						1						
Detector Phase						1		2		1	6	
Switch Phase												
Minimum Initial (s)						15.0		10.0		15.0	15.0	
Minimum Split (s)						22.5		16.0		22.5	21.0	
Total Split (s)						34.0		16.0		34.0	50.0	
Total Split (%)						68.0%		32.0%		68.0%	100.0%	
Maximum Green (s)						26.5		10.0		26.5	44.0	
Yellow Time (s)						4.0		5.0		4.0	5.0	
All-Red Time (s)						3.5		1.0		3.5	1.0	
Lost Time Adjust (s)						0.0		0.0		0.0	0.0	
Total Lost Time (s)						7.5		6.0		7.5	6.0	
Lead/Lag						Lead		Lag		Lead		
Lead-Lag Optimize?						Yes		Yes		Yes		
Vehicle Extension (s)						3.5		2.5		3.5	5.0	
Recall Mode						Min		Max		Min	Min	
Act Effct Green (s)						25.2		10.0		25.2	48.8	
Actuated g/C Ratio						0.52		0.20		0.52	1.00	
v/c Ratio						0.54		0.33		0.74	0.10	
Control Delay						5.2		18.6		12.2	0.1	
Queue Delay						0.0		0.0		0.0	0.0	
Total Delay						5.2		18.6		12.2	0.1	
LOS						A		B		B	A	
Approach Delay					5.2			18.6			9.7	
Approach LOS					A			B			A	
Queue Length 50th (ft)						38		31		131	0	
Queue Length 95th (ft)						72		56		193	0	
Internal Link Dist (ft)		883			1046			2757			3190	

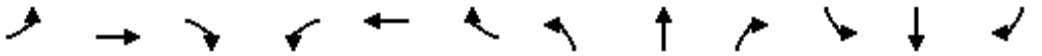
5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)										300		
Base Capacity (vph)						1693		713		1852	3471	
Starvation Cap Reductn						0		0		0	0	
Spillback Cap Reductn						0		0		0	0	
Storage Cap Reductn						0		0		0	0	
Reduced v/c Ratio						0.52		0.33		0.70	0.10	

Intersection Summary			
Area Type:	Other		
Cycle Length: 50			
Actuated Cycle Length: 48.8			
Natural Cycle: 50			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.74			
Intersection Signal Delay: 9.0		Intersection LOS: A	
Intersection Capacity Utilization 52.3%		ICU Level of Service A	
Analysis Period (min) 15			

Splits and Phases: 5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	1171	0	243	783	3	0	1	433	7	3	12
Future Volume (vph)	7	1171	0	243	783	3	0	1	433	7	3	12
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	225		0	600		325	0		350	0		0
Storage Lanes	1		0	1		1	0		2	0		1
Taper Length (ft)	200			200			25			25		
Satd. Flow (prot)	1805	3539	0	1787	3539	1380	0	1900	2787	0	1716	1380
Flt Permitted	0.950			0.950							0.965	
Satd. Flow (perm)	1805	3539	0	1787	3539	1380	0	1900	2787	0	1716	1380
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						175			471			214
Link Speed (mph)		45			45			45			25	
Link Distance (ft)		1126			846			914			623	
Travel Time (s)		17.1			12.8			13.8			17.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	0%	1%	2%	17%	0%	0%	2%	0%	25%	17%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	8	1273	0	264	851	3	0	1	471	0	11	13
Turn Type	Prot	NA		Prot	NA	Perm		NA	pm+ov	Split	NA	Perm
Protected Phases	1	6		5	2		4	4	5	3	3	
Permitted Phases						2			4			3
Detector Phase	1	6		5	2	2	4	4	5	3	3	3
Switch Phase												
Minimum Initial (s)	10.0	15.0		10.0	15.0	15.0	10.0	10.0	10.0	5.0	5.0	5.0
Minimum Split (s)	19.0	24.5		19.5	24.5	24.5	26.0	26.0	19.5	26.0	26.0	26.0
Total Split (s)	19.0	57.9		30.1	69.0	69.0	26.0	26.0	30.1	26.0	26.0	26.0
Total Split (%)	13.6%	41.4%		21.5%	49.3%	49.3%	18.6%	18.6%	21.5%	18.6%	18.6%	18.6%
Maximum Green (s)	10.0	51.4		20.6	62.5	62.5	18.0	18.0	20.6	18.0	18.0	18.0
Yellow Time (s)	5.0	5.5		5.0	5.5	5.5	4.0	4.0	5.0	3.5	3.5	3.5
All-Red Time (s)	4.0	1.0		4.5	1.0	1.0	4.0	4.0	4.5	4.5	4.5	4.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Lost Time (s)	9.0	6.5		9.5	6.5	6.5		8.0	9.5		8.0	8.0
Lead/Lag	Lag	Lead		Lag	Lead	Lead	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Vehicle Extension (s)	3.0	5.0		3.0	5.0	5.0	3.5	3.5	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	Max	Max	None	None	None	None	None	None
Act Effct Green (s)	10.3	48.4		21.2	80.9	80.9		10.3	22.5		6.3	6.3
Actuated g/C Ratio	0.11	0.52		0.23	0.86	0.86		0.11	0.24		0.07	0.07
v/c Ratio	0.04	0.70		0.66	0.28	0.00		0.00	0.46		0.10	0.04
Control Delay	46.7	21.9		45.6	6.1	0.0		47.0	4.0		50.6	0.2
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Delay	46.7	21.9		45.6	6.1	0.0		47.0	4.0		50.6	0.2
LOS	D	C		D	A	A		D	A		D	A
Approach Delay		22.1			15.4			4.0			23.3	
Approach LOS		C			B			A			C	
Queue Length 50th (ft)	4	222		132	0	0		1	0		6	0
Queue Length 95th (ft)	22	565		#354	271	0		7	32		28	0
Internal Link Dist (ft)		1046			766			834			543	

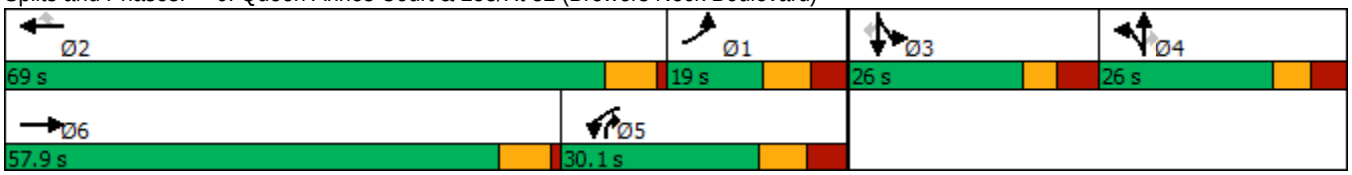
6: Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Turn Bay Length (ft)	225			600		325			350			
Base Capacity (vph)	197	1993		403	3049	1213		374	1026		338	443
Starvation Cap Reductn	0	0		0	0	0		0	0		0	0
Spillback Cap Reductn	0	0		0	0	0		0	0		0	0
Storage Cap Reductn	0	0		0	0	0		0	0		0	0
Reduced v/c Ratio	0.04	0.64		0.66	0.28	0.00		0.00	0.46		0.03	0.03

Intersection Summary			
Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 93.9			
Natural Cycle: 140			
Control Type: Semi Act-Uncoord			
Maximum v/c Ratio: 0.70			
Intersection Signal Delay: 16.6		Intersection LOS: B	
Intersection Capacity Utilization 74.2%		ICU Level of Service D	
Analysis Period (min) 15			

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)



Intersection	
Int Delay, s/veh	0.2

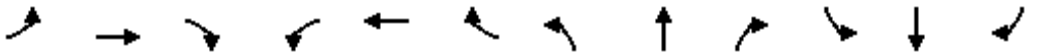
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	0	0	33	0	1101	37	0	1528	0
Future Vol, veh/h	0	0	0	0	0	33	0	1101	37	0	1528	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	0	-	-	300	-	-	-
Veh in Median Storage, #	-	-	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	36	0	1197	40	0	1661	0

Major/Minor	Minor1			Major1			Major2		
Conflicting Flow All	-	-	599	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	445	0	-	-	0	-	0
Stage 1	0	0	-	0	-	-	0	-	0
Stage 2	0	0	-	0	-	-	0	-	0
Platoon blocked, %					-	-		-	
Mov Cap-1 Maneuver	-	0	445	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	0	-	-	-	-	-	-	-
Stage 1	-	0	-	-	-	-	-	-	-
Stage 2	-	0	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	13.8	0	0
HCM LOS	B		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	445	-
HCM Lane V/C Ratio	-	-	0.081	-
HCM Control Delay (s)	-	-	13.8	-
HCM Lane LOS	-	-	B	-
HCM 95th %tile Q(veh)	-	-	0.3	-

1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane



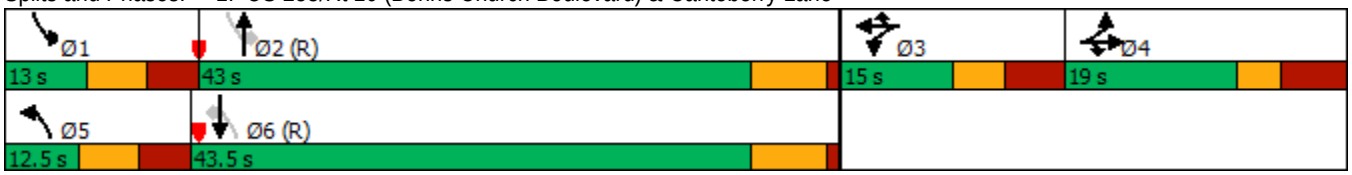
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	143	6	45	87	9	80	52	1312	134	133	1193	99
Future Volume (vph)	143	6	45	87	9	80	52	1312	134	133	1193	99
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	200		350	275		325
Storage Lanes	0		1	0		1	1		1	1		1
Taper Length (ft)	25			25			125			225		
Satd. Flow (prot)	0	1813	1615	0	1786	1553	1805	3539	1583	1687	3505	1615
Flt Permitted		0.954			0.957		0.102			0.106		
Satd. Flow (perm)	0	1813	1615	0	1786	1553	194	3539	1583	188	3505	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			218			218			236			236
Link Speed (mph)		25			25			45			45	
Link Distance (ft)		335			1232			773			1937	
Travel Time (s)		9.1			33.6			11.7			29.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	2%	0%	4%	0%	2%	2%	7%	3%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	162	49	0	105	87	57	1426	146	145	1297	108
Turn Type	Split	NA	Prot	Split	NA	Prot	D.P+P	NA	Perm	D.P+P	NA	Perm
Protected Phases	4	4	4	3	3	3	5	2		1	6	
Permitted Phases							6		2	2		6
Detector Phase	4	4	4	3	3	3	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	5.0	15.0	15.0	5.0	15.0	15.0
Minimum Split (s)	14.5	14.5	14.5	14.5	14.5	14.5	12.5	21.0	21.0	12.5	21.0	21.0
Total Split (s)	19.0	19.0	19.0	15.0	15.0	15.0	12.5	43.0	43.0	13.0	43.5	43.5
Total Split (%)	21.1%	21.1%	21.1%	16.7%	16.7%	16.7%	13.9%	47.8%	47.8%	14.4%	48.3%	48.3%
Yellow Time (s)	3.0	3.0	3.0	3.5	3.5	3.5	4.0	5.0	5.0	4.0	5.0	5.0
All-Red Time (s)	4.5	4.5	4.5	4.0	4.0	4.0	3.5	1.0	1.0	3.5	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.5	7.5		7.5	7.5	7.5	6.0	6.0	7.5	6.0	6.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes						
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	C-Min
Act Effct Green (s)		10.9	10.9		7.4	7.4	43.2	37.7	37.7	41.7	40.7	40.7
Actuated g/C Ratio		0.12	0.12		0.08	0.08	0.48	0.42	0.42	0.46	0.45	0.45
v/c Ratio		0.74	0.13		0.72	0.27	0.31	0.96	0.18	0.81	0.82	0.13
Control Delay		58.8	0.7		68.2	2.0	15.2	37.3	1.0	50.4	28.2	0.3
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		58.8	0.7		68.2	2.0	15.2	37.3	1.0	50.4	28.2	0.3
LOS		E	A		E	A	B	D	A	D	C	A
Approach Delay		45.3			38.2			33.3			28.4	
Approach LOS		D			D			C			C	
Queue Length 50th (ft)		90	0		59	0	11	418	0	39	350	0
Queue Length 95th (ft)		#178	0		#139	0	m23	#556	m3	#140	#487	0
Internal Link Dist (ft)		255			1152			693			1857	
Turn Bay Length (ft)							200		350	275		325
Base Capacity (vph)		231	396		148	329	182	1480	799	178	1583	858

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn		0	0		0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0		0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0		0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.70	0.12		0.71	0.26	0.31	0.96	0.18	0.81	0.82	0.13

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 55 (61%), Referenced to phase 2:NBSB and 6:NBSB, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.96			
Intersection Signal Delay: 32.1		Intersection LOS: C	
Intersection Capacity Utilization 76.0%		ICU Level of Service D	
Analysis Period (min) 15			

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane



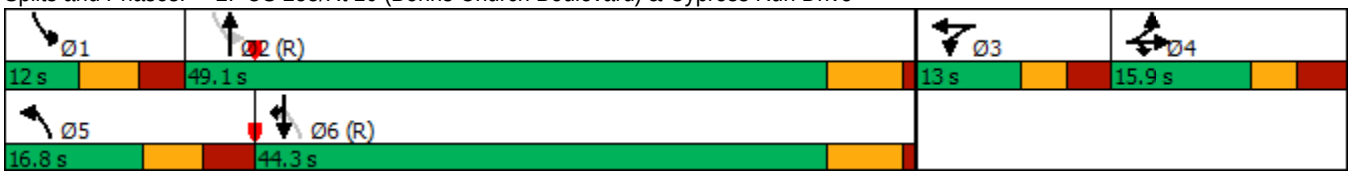
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	116	0	83	0	0	1	172	1381	0	0	1188	134
Future Volume (vph)	116	0	83	0	0	1	172	1381	0	0	1188	134
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	150		235
Storage Lanes	0		1	0		0	1		0	1		1
Taper Length (ft)	25			25			150			125		
Satd. Flow (prot)	0	1787	1599	0	1644	0	1805	3539	0	1900	3505	1615
Flt Permitted		0.950					0.114					
Satd. Flow (perm)	0	1787	1599	0	1644	0	217	3539	0	1900	3505	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			194		200							200
Link Speed (mph)		15			25			45			45	
Link Distance (ft)		1905			1451			1986			773	
Travel Time (s)		86.6			39.6			30.1			11.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	1%	0%	0%	0%	0%	2%	0%	0%	3%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	126	90	0	1	0	187	1501	0	0	1291	146
Turn Type	Split	NA	Prot		NA		D.P+P	NA		D.P+P	NA	Prot
Protected Phases	4	4	4	3	3		5	2		1	6	6
Permitted Phases							6			2		
Detector Phase	4	4	4	3	3		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		5.0	14.0		5.0	14.0	14.0
Minimum Split (s)	13.5	13.5	13.5	13.0	13.0		12.5	20.0		12.0	20.0	20.0
Total Split (s)	15.9	15.9	15.9	13.0	13.0		16.8	49.1		12.0	44.3	44.3
Total Split (%)	17.7%	17.7%	17.7%	14.4%	14.4%		18.7%	54.6%		13.3%	49.2%	49.2%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		4.0	5.0		4.0	5.0	5.0
All-Red Time (s)	3.5	3.5	3.5	3.0	3.0		3.5	1.0		3.0	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		6.5	6.5		6.0		7.5	6.0		7.0	6.0	6.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	C-Min
Act Effct Green (s)		9.0	9.0		7.0		56.9	65.9			50.0	50.0
Actuated g/C Ratio		0.10	0.10		0.08		0.63	0.73			0.56	0.56
v/c Ratio		0.71	0.27		0.00		0.66	0.58			0.66	0.15
Control Delay		61.3	2.0		0.0		24.1	7.6			5.6	0.2
Queue Delay		0.0	0.0		0.0		0.0	0.0			0.0	0.0
Total Delay		61.3	2.0		0.0		24.1	7.6			5.6	0.2
LOS		E	A		A		C	A			A	A
Approach Delay		36.6						9.4			5.1	
Approach LOS		D						A			A	
Queue Length 50th (ft)		70	0		0		25	152			33	0
Queue Length 95th (ft)		#150	0		0		#134	351			#44	m0
Internal Link Dist (ft)		1825			1371			1906			693	
Turn Bay Length (ft)							250					235
Base Capacity (vph)		186	340		312		303	2590			1947	986

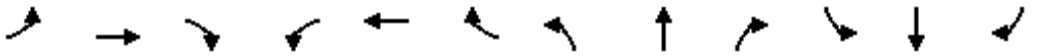
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn		0	0		0		0	0			0	0
Spillback Cap Reductn		0	0		0		0	0			0	0
Storage Cap Reductn		0	0		0		0	0			0	0
Reduced v/c Ratio		0.68	0.26		0.00		0.62	0.58			0.66	0.15

Intersection Summary			
Area Type:	Other		
Cycle Length: 90			
Actuated Cycle Length: 90			
Offset: 68 (76%), Referenced to phase 2:NBSB and 6:NBSB, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.71			
Intersection Signal Delay: 9.3		Intersection LOS: A	
Intersection Capacity Utilization 72.1%		ICU Level of Service C	
Analysis Period (min) 15			

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive



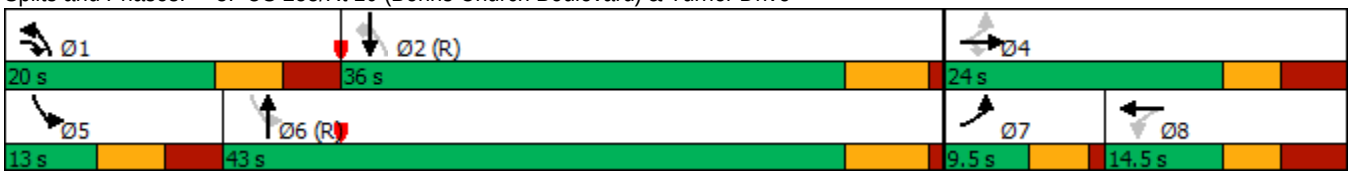


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	86	0	122	0	1	2	203	1453	1	33	1154	126
Future Volume (vph)	86	0	122	0	1	2	203	1453	1	33	1154	126
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		300	0		0	125		0	125		275
Storage Lanes	0		1	0		0	1		0	1		1
Taper Length (ft)	200			25			100			100		
Satd. Flow (prot)	0	1787	1599	0	1729	0	1687	3539	0	1805	3505	1482
Flt Permitted		0.756					0.111			0.092		
Satd. Flow (perm)	0	1422	1599	0	1729	0	197	3539	0	175	3505	1482
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			41		2							225
Link Speed (mph)		40			25			45			45	
Link Distance (ft)		1499			695			1153			1986	
Travel Time (s)		25.6			19.0			17.5			30.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	1%	0%	0%	0%	7%	2%	0%	0%	3%	9%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	93	133	0	3	0	221	1580	0	36	1254	137
Turn Type	pm+pt	NA	pm+ov		NA		D.P+P	NA		D.P+P	NA	Perm
Protected Phases	7	4	1		8		1	6		5	2	
Permitted Phases	4		4	8			2			6		2
Detector Phase	7	4	1	8	8		1	6		5	2	2
Switch Phase												
Minimum Initial (s)	5.0	7.0	5.0	7.0	7.0		5.0	15.0		5.0	15.0	15.0
Minimum Split (s)	9.5	14.5	12.5	14.5	14.5		12.5	21.0		12.5	21.0	21.0
Total Split (s)	9.5	24.0	20.0	14.5	14.5		20.0	43.0		13.0	36.0	36.0
Total Split (%)	11.9%	30.0%	25.0%	18.1%	18.1%		25.0%	53.8%		16.3%	45.0%	45.0%
Yellow Time (s)	3.5	3.5	4.0	3.5	3.5		4.0	5.0		4.0	5.0	5.0
All-Red Time (s)	1.0	4.0	3.5	4.0	4.0		3.5	1.0		3.5	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		7.5	7.5		7.5		7.5	6.0		7.5	6.0	6.0
Lead/Lag	Lead		Lead	Lag	Lag		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes			Yes	Yes							
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	C-Min
Act Effct Green (s)		13.9	29.1		8.9		46.8	49.3		49.8	37.4	37.4
Actuated g/C Ratio		0.17	0.36		0.11		0.58	0.62		0.62	0.47	0.47
v/c Ratio		0.38	0.22		0.02		0.69	0.73		0.17	0.77	0.17
Control Delay		32.8	10.3		22.7		28.8	19.1		8.5	25.3	0.7
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		32.8	10.3		22.7		28.8	19.1		8.5	25.3	0.7
LOS		C	B		C		C	B		A	C	A
Approach Delay		19.6			22.7			20.3			22.5	
Approach LOS		B			C			C			C	
Queue Length 50th (ft)		40	26		1		62	371		6	306	0
Queue Length 95th (ft)		82	57		7		#152	#555		17	#457	4
Internal Link Dist (ft)		1419			615			1073			1906	
Turn Bay Length (ft)			300				125			125		275
Base Capacity (vph)		293	639		194		351	2179		220	1637	812

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn		0	0		0		0	0		0	0	0
Spillback Cap Reductn		0	0		0		0	0		0	0	0
Storage Cap Reductn		0	0		0		0	0		0	0	0
Reduced v/c Ratio		0.32	0.21		0.02		0.63	0.73		0.16	0.77	0.17

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 0 (0%), Referenced to phase 2:NBSB and 6:NBSB, Start of Green			
Natural Cycle: 80			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.77			
Intersection Signal Delay: 21.1		Intersection LOS: C	
Intersection Capacity Utilization 73.3%		ICU Level of Service D	
Analysis Period (min) 15			
# 95th percentile volume exceeds capacity, queue may be longer.			
Queue shown is maximum after two cycles.			

Splits and Phases: 3: US 258/Rt 10 (Benns Church Boulevard) & Turner Drive



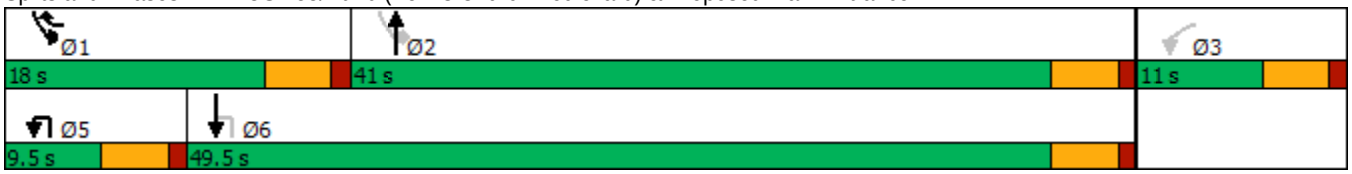
Lane Group	WBL	WBR	NBU	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	227	145	13	1503	208	231	1033
Future Volume (vph)	227	145	13	1503	208	231	1033
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	125		300	300	
Storage Lanes	2	1	1		1	1	
Taper Length (ft)	25		25			200	
Satd. Flow (prot)	3502	1615	1805	3505	1615	1805	3539
Flt Permitted	0.950		0.223			0.103	
Satd. Flow (perm)	3502	1615	424	3505	1615	196	3539
Right Turn on Red		Yes			Yes		
Satd. Flow (RTOR)		158			226		
Link Speed (mph)	25			45			45
Link Distance (ft)	872			696			1153
Travel Time (s)	23.8			10.5			17.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	3%	0%	0%	2%
Shared Lane Traffic (%)							
Lane Group Flow (vph)	247	158	14	1634	226	251	1123
Turn Type	Perm	Over	D.P+P	NA	Perm	D.P+P	NA
Protected Phases		1	5	2		1	6
Permitted Phases	3		6		2	2	
Detector Phase	3	1	5	2	2	1	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	9.5	9.5	22.5	22.5	9.5	22.5
Total Split (s)	11.0	18.0	9.5	41.0	41.0	18.0	49.5
Total Split (%)	15.7%	25.7%	13.6%	58.6%	58.6%	25.7%	70.7%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag		Lead	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?			Yes				Yes
Recall Mode	None	None	None	Min	Min	None	Min
Act Effct Green (s)	6.5	9.9	48.6	35.0	35.0	45.0	47.7
Actuated g/C Ratio	0.10	0.15	0.75	0.54	0.54	0.69	0.73
v/c Ratio	0.70	0.42	0.03	0.87	0.23	0.66	0.43
Control Delay	42.4	8.5	2.0	20.1	2.1	20.7	4.4
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	42.4	8.5	2.0	20.1	2.1	20.7	4.4
LOS	D	A	A	C	A	C	A
Approach Delay	29.2			17.8			7.4
Approach LOS	C			B			A
Queue Length 50th (ft)	51	0	1	269	0	45	57
Queue Length 95th (ft)	#107	44	4	#476	29	113	155
Internal Link Dist (ft)	792			616			1073
Turn Bay Length (ft)			125		300	300	
Base Capacity (vph)	352	462	423	1979	1010	480	2658

Lane Group	WBL	WBR	NBU	NBT	NBR	SBL	SBT
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.70	0.34	0.03	0.83	0.22	0.52	0.42

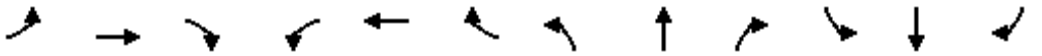
Intersection Summary			
Area Type:	Other		
Cycle Length: 70			
Actuated Cycle Length: 65.1			
Natural Cycle: 60			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.87			
Intersection Signal Delay: 15.1		Intersection LOS: B	
Intersection Capacity Utilization 72.1%		ICU Level of Service C	
Analysis Period (min) 15			

95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 4: US 258/Rt 10 (Benns Church Boulevard) & Proposed Main Entrance



5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)

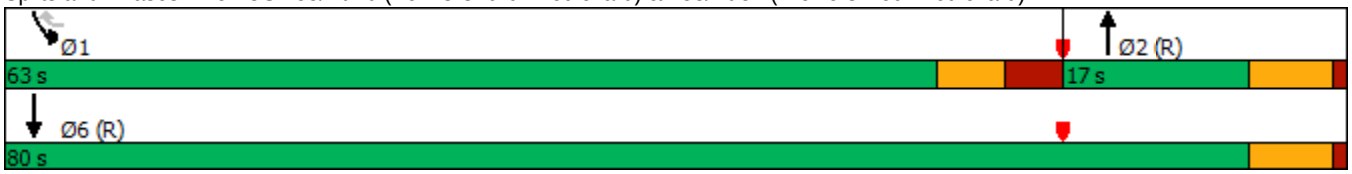


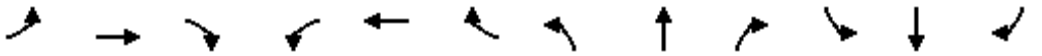
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	0	1562	0	249	0	876	360	0
Future Volume (vph)	0	0	0	0	0	1562	0	249	0	876	360	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	300		0
Storage Lanes	0		0	0		2	0		0	1		0
Taper Length (ft)	25			25			100			75		
Satd. Flow (prot)	0	0	0	0	0	2760	0	3471	0	3400	3471	0
Flt Permitted										0.950		
Satd. Flow (perm)	0	0	0	0	0	2760	0	3471	0	3400	3471	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						139						
Link Speed (mph)		30			45			45			45	
Link Distance (ft)		963			1126			2837			3270	
Travel Time (s)		21.9			17.1			43.0			49.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	3%	0%	4%	0%	3%	4%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	0	1698	0	271	0	952	391	0
Turn Type						Perm		NA		Prot	NA	
Protected Phases								2		1	6	
Permitted Phases						1						
Detector Phase						1		2		1	6	
Switch Phase												
Minimum Initial (s)						15.0		10.0		15.0	15.0	
Minimum Split (s)						22.5		16.0		22.5	21.0	
Total Split (s)						63.0		17.0		63.0	80.0	
Total Split (%)						78.8%		21.3%		78.8%	100.0%	
Yellow Time (s)						4.0		5.0		4.0	5.0	
All-Red Time (s)						3.5		1.0		3.5	1.0	
Lost Time Adjust (s)						0.0		0.0		0.0	0.0	
Total Lost Time (s)						7.5		6.0		7.5	6.0	
Lead/Lag						Lead		Lag		Lead		
Lead-Lag Optimize?												
Recall Mode						Min		C-Max		Min	C-Min	
Act Effct Green (s)						55.0		11.5		55.0	80.0	
Actuated g/C Ratio						0.69		0.14		0.69	1.00	
v/c Ratio						0.87		0.55		0.41	0.11	
Control Delay						15.5		36.7		6.0	0.1	
Queue Delay						0.0		0.0		0.0	0.0	
Total Delay						15.5		36.7		6.0	0.1	
LOS						B		D		A	A	
Approach Delay					15.5			36.7			4.2	
Approach LOS					B			D			A	
Queue Length 50th (ft)						286		67		87	0	
Queue Length 95th (ft)						430		106		117	0	
Internal Link Dist (ft)		883			1046			2757			3190	
Turn Bay Length (ft)										300		
Base Capacity (vph)						1957		497		2358	3471	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn						0		0		0	0	
Spillback Cap Reductn						0		0		0	0	
Storage Cap Reductn						0		0		0	0	
Reduced v/c Ratio						0.87		0.55		0.40	0.11	

Intersection Summary			
Area Type:	Other		
Cycle Length: 80			
Actuated Cycle Length: 80			
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green			
Natural Cycle: 70			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.87			
Intersection Signal Delay: 12.7		Intersection LOS: B	
Intersection Capacity Utilization 74.2%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)





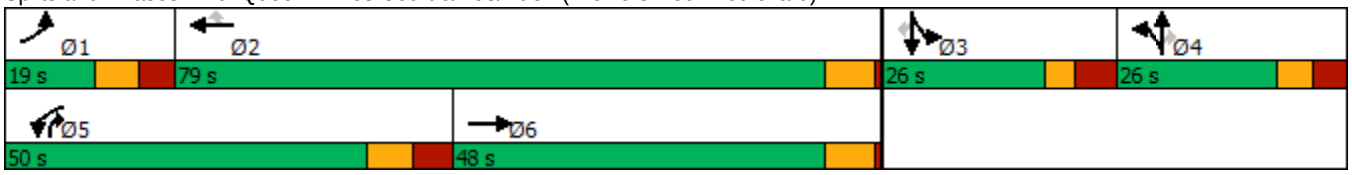
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	9	919	3	471	1530	14	1	3	250	2	5	7
Future Volume (vph)	9	919	3	471	1530	14	1	3	250	2	5	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	225		0	600		325	0		350	0		0
Storage Lanes	1		0	1		1	0		2	0		1
Taper Length (ft)	200			200			25			25		
Satd. Flow (prot)	1805	3539	0	1787	3539	1380	0	1877	2787	0	1590	1380
Flt Permitted	0.950			0.950				0.988			0.986	
Satd. Flow (perm)	1805	3539	0	1787	3539	1380	0	1877	2787	0	1590	1380
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						160			272			218
Link Speed (mph)		45			45			45			25	
Link Distance (ft)		1126			846			914			623	
Travel Time (s)		17.1			12.8			13.8			17.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	0%	1%	2%	17%	0%	0%	2%	0%	25%	17%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	10	1002	0	512	1663	15	0	4	272	0	7	8
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	1	6		5	2		4	4	5	3	3	
Permitted Phases						2			4			3
Detector Phase	1	6		5	2	2	4	4	5	3	3	3
Switch Phase												
Minimum Initial (s)	10.0	15.0		10.0	15.0	15.0	10.0	10.0	10.0	5.0	5.0	5.0
Minimum Split (s)	19.0	24.5		19.5	24.5	24.5	26.0	26.0	19.5	26.0	26.0	26.0
Total Split (s)	19.0	48.0		50.0	79.0	79.0	26.0	26.0	50.0	26.0	26.0	26.0
Total Split (%)	12.7%	32.0%		33.3%	52.7%	52.7%	17.3%	17.3%	33.3%	17.3%	17.3%	17.3%
Yellow Time (s)	5.0	5.5		5.0	5.5	5.5	4.0	4.0	5.0	3.5	3.5	3.5
All-Red Time (s)	4.0	1.0		4.5	1.0	1.0	4.0	4.0	4.5	4.5	4.5	4.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Lost Time (s)	9.0	6.5		9.5	6.5	6.5		8.0	9.5		8.0	8.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead
Lead-Lag Optimize?												
Recall Mode	None	None		None	None	None	None	None	None	None	None	None
Act Effct Green (s)	10.1	42.1		41.1	94.0	94.0		10.1	44.0		6.1	6.1
Actuated g/C Ratio	0.09	0.39		0.38	0.87	0.87		0.09	0.41		0.06	0.06
v/c Ratio	0.06	0.72		0.75	0.54	0.01		0.02	0.21		0.08	0.03
Control Delay	51.7	33.4		39.3	8.4	0.0		51.5	3.0		55.8	0.1
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Delay	51.7	33.4		39.3	8.4	0.0		51.5	3.0		55.8	0.1
LOS	D	C		D	A	A		D	A		E	A
Approach Delay		33.6			15.5			3.7			26.1	
Approach LOS		C			B			A			C	
Queue Length 50th (ft)	6	258		257	0	0		2	0		4	0
Queue Length 95th (ft)	27	#548		#638	718	0		15	27		23	0
Internal Link Dist (ft)		1046			766			834			543	
Turn Bay Length (ft)	225			600		325			350			
Base Capacity (vph)	170	1383		681	3090	1225		318	1300		269	415

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0		0	0	0		0	0		0	0
Spillback Cap Reductn	0	0		0	0	0		0	0		0	0
Storage Cap Reductn	0	0		0	0	0		0	0		0	0
Reduced v/c Ratio	0.06	0.72		0.75	0.54	0.01		0.01	0.21		0.03	0.02

Intersection Summary			
Area Type:	Other		
Cycle Length: 150			
Actuated Cycle Length: 107.6			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.75			
Intersection Signal Delay: 19.9		Intersection LOS: B	
Intersection Capacity Utilization 79.9%		ICU Level of Service D	
Analysis Period (min) 15			

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

Splits and Phases: 6: Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)



Intersection	
Int Delay, s/veh	0.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	0	0	0	0	0	38	0	1681	116	0	1272	0
Future Vol, veh/h	0	0	0	0	0	38	0	1681	116	0	1272	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Free	Free	Free	Free	Free	Free
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	0	-	-	300	-	-	-
Veh in Median Storage, #	-	-	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	92	92	92	92	92	92	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	0	0	0	0	0	41	0	1838	126	0	1383	0

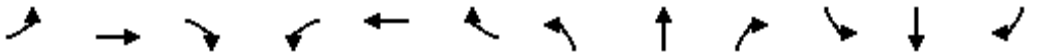
Major/Minor	Minor1			Major1			Major2		
Conflicting Flow All	-	-	919	-	0	0	-	-	0
Stage 1	-	-	-	-	-	-	-	-	-
Stage 2	-	-	-	-	-	-	-	-	-
Critical Hdwy	-	-	6.94	-	-	-	-	-	-
Critical Hdwy Stg 1	-	-	-	-	-	-	-	-	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	-	-
Follow-up Hdwy	-	-	3.32	-	-	-	-	-	-
Pot Cap-1 Maneuver	0	0	273	0	-	-	0	-	0
Stage 1	0	0	-	0	-	-	0	-	0
Stage 2	0	0	-	0	-	-	0	-	0
Platoon blocked, %					-	-		-	
Mov Cap-1 Maneuver	-	0	273	-	-	-	-	-	-
Mov Cap-2 Maneuver	-	0	-	-	-	-	-	-	-
Stage 1	-	0	-	-	-	-	-	-	-
Stage 2	-	0	-	-	-	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s	20.5	0	0
HCM LOS	C		

Minor Lane/Major Mvmt	NBT	NBR	WBLn1	SBT
Capacity (veh/h)	-	-	273	-
HCM Lane V/C Ratio	-	-	0.151	-
HCM Control Delay (s)	-	-	20.5	-
HCM Lane LOS	-	-	C	-
HCM 95th %tile Q(veh)	-	-	0.5	-

APPENDIX J

2032 Build Synchro Reports

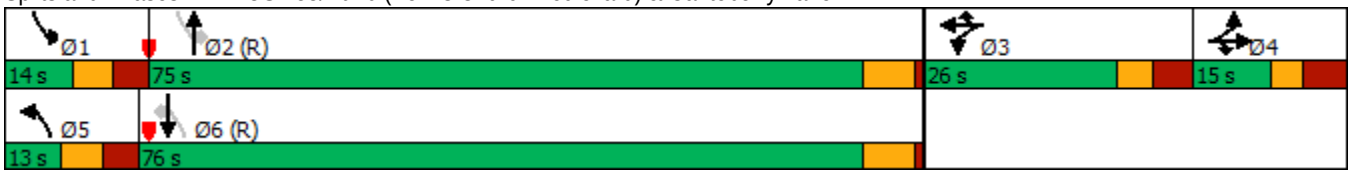


Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	28	1	21	117	5	47	16	943	76	60	1309	39
Future Volume (vph)	28	1	21	117	5	47	16	943	76	60	1309	39
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	200		350	275		325
Storage Lanes	0		1	0		1	1		1	1		1
Taper Length (ft)	0			0			0			0		
Satd. Flow (prot)	0	1813	1615	0	1778	1553	1805	3539	1583	1687	3505	1615
Flt Permitted		0.954			0.954		0.115			0.217		
Satd. Flow (perm)	0	1813	1615	0	1778	1553	218	3539	1583	385	3505	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			151			151			164			164
Link Speed (mph)		25			25			45			45	
Link Distance (ft)		335			1232			773			1937	
Travel Time (s)		9.1			33.6			11.7			29.3	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	2%	0%	4%	0%	2%	2%	7%	3%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	31	23	0	132	51	17	1025	83	65	1423	42
Turn Type	Split	NA	Prot	Split	NA	Prot	D.P+P	NA	Perm	D.P+P	NA	Perm
Protected Phases	4	4	4	3	3	3	5	2		1	6	
Permitted Phases							6		2	2		6
Detector Phase	4	4	4	3	3	3	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	5.0	15.0	15.0	5.0	15.0	15.0
Minimum Split (s)	14.5	14.5	14.5	14.5	14.5	14.5	12.5	21.0	21.0	12.5	21.0	21.0
Total Split (s)	15.0	15.0	15.0	26.0	26.0	26.0	13.0	75.0	75.0	14.0	76.0	76.0
Total Split (%)	11.5%	11.5%	11.5%	20.0%	20.0%	20.0%	10.0%	57.7%	57.7%	10.8%	58.5%	58.5%
Yellow Time (s)	3.0	3.0	3.0	3.5	3.5	3.5	4.0	5.0	5.0	4.0	5.0	5.0
All-Red Time (s)	4.5	4.5	4.5	4.0	4.0	4.0	3.5	1.0	1.0	3.5	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.5	7.5		7.5	7.5	7.5	6.0	6.0	7.5	6.0	6.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	C-Min
Act Effct Green (s)		7.3	7.3		14.5	14.5	85.6	79.1	79.1	82.6	85.0	85.0
Actuated g/C Ratio		0.06	0.06		0.11	0.11	0.66	0.61	0.61	0.64	0.65	0.65
v/c Ratio		0.31	0.10		0.67	0.17	0.08	0.48	0.08	0.21	0.62	0.04
Control Delay		67.0	0.9		71.3	1.2	10.4	15.9	1.0	10.5	17.3	0.1
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		67.0	0.9		71.3	1.2	10.4	15.9	1.0	10.5	17.3	0.1
LOS		E	A		E	A	B	B	A	B	B	A
Approach Delay		38.8			51.7			14.7			16.6	
Approach LOS		D			D			B			B	
Queue Length 50th (ft)		26	0		108	0	5	257	2	18	327	0
Queue Length 95th (ft)		60	0		173	0	14	340	11	39	565	0
Internal Link Dist (ft)		255			1152			693			1857	
Turn Bay Length (ft)							200		350	275		325
Base Capacity (vph)		104	235		253	350	210	2154	1027	310	2290	1112

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn		0	0		0	0	0	0	0	0	0	0
Spillback Cap Reductn		0	0		0	0	0	0	0	0	0	0
Storage Cap Reductn		0	0		0	0	0	0	0	0	0	0
Reduced v/c Ratio		0.30	0.10		0.52	0.15	0.08	0.48	0.08	0.21	0.62	0.04

Intersection Summary			
Area Type:	Other		
Cycle Length: 130			
Actuated Cycle Length: 130			
Offset: 112 (86%), Referenced to phase 2:NBSB and 6:NBSB, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.67			
Intersection Signal Delay: 18.5		Intersection LOS: B	
Intersection Capacity Utilization 71.3%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane



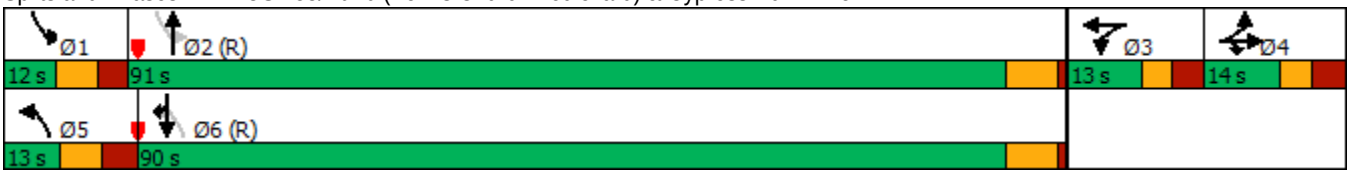
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	5	0	22	0	0	0	33	871	0	2	1591	34
Future Volume (vph)	5	0	22	0	0	0	33	871	0	2	1591	34
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	150		235
Storage Lanes	0		1	0		0	1		0	1		1
Taper Length (ft)	0			0			0			0		
Satd. Flow (prot)	0	1787	1599	0	1900	0	1805	3539	0	1805	3505	1615
Flt Permitted		0.950					0.108			0.292		
Satd. Flow (perm)	0	1787	1599	0	1900	0	205	3539	0	555	3505	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			134									138
Link Speed (mph)		15			25			45			45	
Link Distance (ft)		1905			1451			1986			773	
Travel Time (s)		86.6			39.6			30.1			11.7	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	1%	0%	0%	0%	0%	2%	0%	0%	3%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	5	24	0	0	0	36	947	0	2	1729	37
Turn Type	Split	NA	Prot				D.P+P	NA		D.P+P	NA	Prot
Protected Phases	4	4	4	3	3		5	2		1	6	6
Permitted Phases							6			2		
Detector Phase	4	4	4	3	3		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		5.0	14.0		5.0	14.0	14.0
Minimum Split (s)	13.5	13.5	13.5	13.0	13.0		12.5	20.0		12.0	20.0	20.0
Total Split (s)	14.0	14.0	14.0	13.0	13.0		13.0	91.0		12.0	90.0	90.0
Total Split (%)	10.8%	10.8%	10.8%	10.0%	10.0%		10.0%	70.0%		9.2%	69.2%	69.2%
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		4.0	5.0		4.0	5.0	5.0
All-Red Time (s)	3.5	3.5	3.5	3.0	3.0		3.5	1.0		3.0	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		6.5	6.5		6.0		7.5	6.0		7.0	6.0	6.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?	Yes	Yes	Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	C-Min
Act Effct Green (s)		7.0	7.0				109.9	115.9		113.5	110.7	110.7
Actuated g/C Ratio		0.05	0.05				0.85	0.89		0.87	0.85	0.85
v/c Ratio		0.05	0.11				0.15	0.30		0.00	0.58	0.03
Control Delay		59.6	1.1				2.2	1.2		1.0	3.0	0.0
Queue Delay		0.0	0.0				0.0	0.0		0.0	0.0	0.0
Total Delay		59.6	1.1				2.2	1.2		1.0	3.0	0.0
LOS		E	A				A	A		A	A	A
Approach Delay		11.2						1.2			2.9	
Approach LOS		B						A			A	
Queue Length 50th (ft)		4	0				0	4		0	84	0
Queue Length 95th (ft)		18	0				m6	102		m0	92	m0
Internal Link Dist (ft)		1825			1371			1906			693	
Turn Bay Length (ft)							250			150		235
Base Capacity (vph)		103	218				241	3155		532	2984	1395

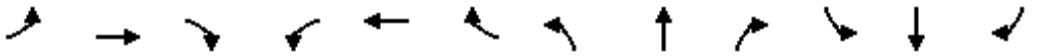
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn		0	0				0	0		0	42	0
Spillback Cap Reductn		0	0				0	0		0	0	0
Storage Cap Reductn		0	0				0	0		0	0	0
Reduced v/c Ratio		0.05	0.11				0.15	0.30		0.00	0.59	0.03

Intersection Summary			
Area Type:	Other		
Cycle Length: 130			
Actuated Cycle Length: 130			
Offset: 116 (89%), Referenced to phase 2:NBSB and 6:NBSB, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.58			
Intersection Signal Delay: 2.4		Intersection LOS: A	
Intersection Capacity Utilization 60.2%		ICU Level of Service B	
Analysis Period (min) 15			

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 2: US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive





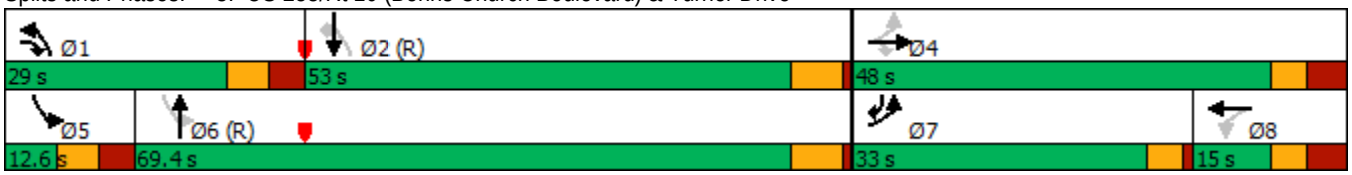
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	211	1	329	1	79	1	299	784	76	7	1081	355
Future Volume (vph)	211	1	329	1	79	1	299	784	76	7	1081	355
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		300	0		0	125		0	125		275
Storage Lanes	0		1	0		0	1		0	1		1
Taper Length (ft)	0			0			0			0		
Satd. Flow (prot)	0	1793	1599	0	1894	0	1687	3499	0	1805	3505	1482
Flt Permitted		0.597			0.997		0.081			0.232		
Satd. Flow (perm)	0	1123	1599	0	1891	0	144	3499	0	441	3505	1482
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			25					11				164
Link Speed (mph)		40			25			45			45	
Link Distance (ft)		1499			695			1153			1986	
Travel Time (s)		25.6			19.0			17.5			30.1	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	1%	0%	1%	0%	0%	0%	7%	2%	0%	0%	3%	9%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	230	358	0	88	0	325	935	0	8	1175	386
Turn Type	pm+pt	NA	pm+ov	Perm	NA		D.P+P	NA		D.P+P	NA	pm+ov
Protected Phases	7	4	1		8		1	6		5	2	7
Permitted Phases	4		4	8			2			6		2
Detector Phase	7	4	1	8	8		1	6		5	2	7
Switch Phase												
Minimum Initial (s)	5.0	7.0	5.0	7.0	7.0		5.0	15.0		5.0	15.0	5.0
Minimum Split (s)	9.5	14.5	12.5	14.5	14.5		12.5	21.0		12.5	21.0	9.5
Total Split (s)	33.0	48.0	29.0	15.0	15.0		29.0	69.4		12.6	53.0	33.0
Total Split (%)	25.4%	36.9%	22.3%	11.5%	11.5%		22.3%	53.4%		9.7%	40.8%	25.4%
Yellow Time (s)	3.5	3.5	4.0	3.5	3.5		4.0	5.0		4.0	5.0	3.5
All-Red Time (s)	1.0	4.0	3.5	4.0	4.0		3.5	1.0		3.5	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		7.5	7.5		7.5		7.5	6.0		7.5	6.0	4.5
Lead/Lag	Lead		Lead	Lag	Lag		Lead	Lag		Lead	Lag	Lead
Lead-Lag Optimize?	Yes		Yes	Yes	Yes		Yes	Yes		Yes	Yes	Yes
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	None
Act Effct Green (s)		38.4	67.4		27.5		69.1	75.6		75.1	49.1	61.5
Actuated g/C Ratio		0.30	0.52		0.21		0.53	0.58		0.58	0.38	0.47
v/c Ratio		0.66	0.43		0.22		0.98	0.46		0.03	0.89	0.49
Control Delay		48.6	19.3		43.1		74.5	14.3		15.9	41.8	10.2
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		48.6	19.3		43.1		74.5	14.3		15.9	41.8	10.2
LOS		D	B		D		E	B		B	D	B
Approach Delay		30.7			43.1			29.8			33.9	
Approach LOS		C			D			C			C	
Queue Length 50th (ft)		153	161		61		207	125		1	503	169
Queue Length 95th (ft)		230	237		109		#414	414		m6	#623	105
Internal Link Dist (ft)		1419			615			1073			1906	
Turn Bay Length (ft)			300				125			125		275
Base Capacity (vph)		367	841		400		331	2038		308	1323	1011

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn		0	0		0		0	0		0	0	0
Spillback Cap Reductn		0	0		0		0	0		0	0	0
Storage Cap Reductn		0	0		0		0	0		0	0	0
Reduced v/c Ratio		0.63	0.43		0.22		0.98	0.46		0.03	0.89	0.38

Intersection Summary			
Area Type:	Other		
Cycle Length: 130			
Actuated Cycle Length: 130			
Offset: 6 (5%), Referenced to phase 2:NBSB and 6:NBSB, Start of Green			
Natural Cycle: 90			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.98			
Intersection Signal Delay: 32.1		Intersection LOS: C	
Intersection Capacity Utilization 82.4%		ICU Level of Service E	
Analysis Period (min) 15			

\# 95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.
m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 3: US 258/Rt 10 (Benns Church Boulevard) & Turner Drive



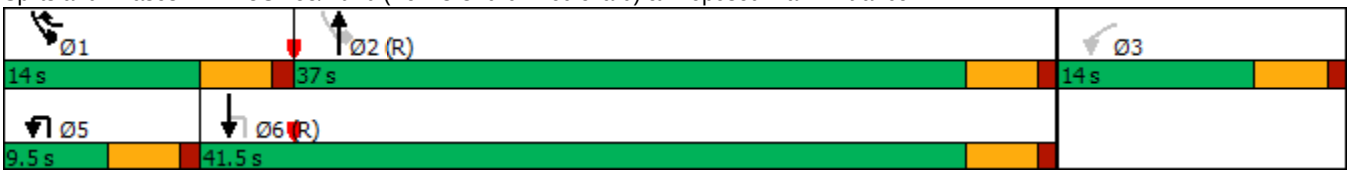
Lane Group	WBL	WBR	NBU	NBT	NBR	SBL	SBT
Lane Configurations							
Traffic Volume (vph)	267	132	16	1122	92	95	1364
Future Volume (vph)	267	132	16	1122	92	95	1364
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0	0	125		300	300	
Storage Lanes	2	1	1		1	1	
Taper Length (ft)	0		0			0	
Satd. Flow (prot)	3502	1615	1805	3505	1615	1805	3539
Flt Permitted	0.950		0.118			0.158	
Satd. Flow (perm)	3502	1615	224	3505	1615	300	3539
Right Turn on Red		Yes			Yes		
Satd. Flow (RTOR)		143			100		
Link Speed (mph)	25			45			45
Link Distance (ft)	872			696			1153
Travel Time (s)	23.8			10.5			17.5
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	3%	0%	0%	2%
Shared Lane Traffic (%)							
Lane Group Flow (vph)	290	143	17	1220	100	103	1483
Turn Type	Perm	Over	D.P+P	NA	Perm	D.P+P	NA
Protected Phases		1	5	2		1	6
Permitted Phases	3		6		2	2	
Detector Phase	3	1	5	2	2	1	6
Switch Phase							
Minimum Initial (s)	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Minimum Split (s)	9.5	9.5	9.5	22.5	22.5	9.5	22.5
Total Split (s)	14.0	14.0	9.5	37.0	37.0	14.0	41.5
Total Split (%)	21.5%	21.5%	14.6%	56.9%	56.9%	21.5%	63.8%
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5	3.5	3.5
All-Red Time (s)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Lost Time Adjust (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Lead/Lag		Lead	Lead	Lag	Lag	Lead	Lag
Lead-Lag Optimize?		Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None	None	C-Min	C-Min	None	C-Min
Act Effct Green (s)	9.3	7.0	45.8	37.1	37.1	43.1	44.8
Actuated g/C Ratio	0.14	0.11	0.70	0.57	0.57	0.66	0.69
v/c Ratio	0.58	0.47	0.06	0.61	0.10	0.29	0.61
Control Delay	30.9	11.1	3.9	14.5	3.1	6.2	6.6
Queue Delay	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay	30.9	11.1	3.9	14.5	3.1	6.2	6.6
LOS	C	B	A	B	A	A	A
Approach Delay	24.4			13.5			6.6
Approach LOS	C			B			A
Queue Length 50th (ft)	54	0	2	269	3	19	186
Queue Length 95th (ft)	91	43	m4	347	17	m23	265
Internal Link Dist (ft)	792			616			1073
Turn Bay Length (ft)			125		300	300	
Base Capacity (vph)	523	358	287	2002	965	426	2436

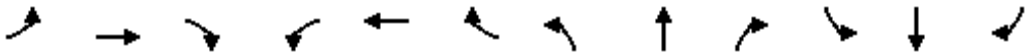
Lane Group	WBL	WBR	NBU	NBT	NBR	SBL	SBT
Starvation Cap Reductn	0	0	0	0	0	0	0
Spillback Cap Reductn	0	0	0	0	0	0	0
Storage Cap Reductn	0	0	0	0	0	0	0
Reduced v/c Ratio	0.55	0.40	0.06	0.61	0.10	0.24	0.61

Intersection Summary			
Area Type:	Other		
Cycle Length: 65			
Actuated Cycle Length: 65			
Offset: 26 (40%), Referenced to phase 2:NBSB and 6:NBSB, Start of Green			
Natural Cycle: 60			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.61			
Intersection Signal Delay: 11.6		Intersection LOS: B	
Intersection Capacity Utilization 60.7%		ICU Level of Service B	
Analysis Period (min) 15			

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 4: US 258/Rt 10 (Benns Church Boulevard) & Proposed Main Entrance



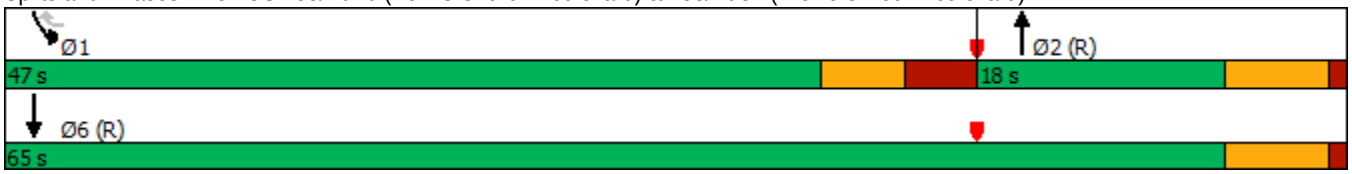


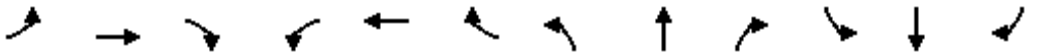
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	0	879	0	233	0	1287	336	0
Future Volume (vph)	0	0	0	0	0	879	0	233	0	1287	336	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	300		0
Storage Lanes	0		0	0		2	0		0	1		0
Taper Length (ft)	0			0			0			0		
Satd. Flow (prot)	0	0	0	0	0	2760	0	3471	0	3400	3471	0
Flt Permitted										0.950		
Satd. Flow (perm)	0	0	0	0	0	2760	0	3471	0	3400	3471	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						318						
Link Speed (mph)		30			45			45			45	
Link Distance (ft)		963			1126			2837			3270	
Travel Time (s)		21.9			17.1			43.0			49.5	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	0%	0%	0%	0%	3%	0%	4%	0%	3%	4%	0%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	0	955	0	253	0	1399	365	0
Turn Type						Perm		NA		Prot	NA	
Protected Phases								2		1	6	
Permitted Phases						1						
Detector Phase						1		2		1	6	
Switch Phase												
Minimum Initial (s)						15.0		10.0		15.0	15.0	
Minimum Split (s)						22.5		16.0		22.5	21.0	
Total Split (s)						47.0		18.0		47.0	65.0	
Total Split (%)						72.3%		27.7%		72.3%	100.0%	
Yellow Time (s)						4.0		5.0		4.0	5.0	
All-Red Time (s)						3.5		1.0		3.5	1.0	
Lost Time Adjust (s)						0.0		0.0		0.0	0.0	
Total Lost Time (s)						7.5		6.0		7.5	6.0	
Lead/Lag						Lead		Lag		Lead		
Lead-Lag Optimize?						Yes		Yes		Yes		
Recall Mode						Min		C-Max		Min	C-Min	
Act Effct Green (s)						37.4		14.1		37.4	65.0	
Actuated g/C Ratio						0.58		0.22		0.58	1.00	
v/c Ratio						0.55		0.34		0.72	0.11	
Control Delay						8.1		24.0		10.3	0.1	
Queue Delay						0.0		0.0		0.0	0.0	
Total Delay						8.1		24.0		10.3	0.1	
LOS						A		C		B	A	
Approach Delay					8.1			24.0			8.2	
Approach LOS					A			C			A	
Queue Length 50th (ft)						148		46		228	0	
Queue Length 95th (ft)						97		78		59	0	
Internal Link Dist (ft)		883			1046			2757			3190	
Turn Bay Length (ft)										300		
Base Capacity (vph)						1801		752		2066	3471	

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn						0		0		0	0	
Spillback Cap Reductn						0		0		0	0	
Storage Cap Reductn						0		0		0	0	
Reduced v/c Ratio						0.53		0.34		0.68	0.11	

Intersection Summary			
Area Type:	Other		
Cycle Length: 65			
Actuated Cycle Length: 65			
Offset: 64 (98%), Referenced to phase 2:NBT and 6:SBT, Start of Green			
Natural Cycle: 50			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 0.72			
Intersection Signal Delay: 9.5		Intersection LOS: A	
Intersection Capacity Utilization 55.0%		ICU Level of Service B	
Analysis Period (min) 15			

Splits and Phases: 5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	7	1263	0	266	850	4	0	1	473	7	4	14
Future Volume (vph)	7	1263	0	266	850	4	0	1	473	7	4	14
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	225		0	600		325	0		350	0		0
Storage Lanes	1		0	1		1	0		2	0		1
Taper Length (ft)	0			0			0			0		
Satd. Flow (prot)	1805	3539	0	1787	3539	1380	0	1900	2787	0	1698	1380
Flt Permitted	0.950			0.950							0.968	
Satd. Flow (perm)	1805	3539	0	1787	3539	1380	0	1900	2787	0	1698	1380
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						189			514			231
Link Speed (mph)		45			45			45			25	
Link Distance (ft)		1126			846			914			623	
Travel Time (s)		17.1			12.8			13.8			17.0	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Heavy Vehicles (%)	0%	2%	0%	1%	2%	17%	0%	0%	2%	0%	25%	17%
Shared Lane Traffic (%)												
Lane Group Flow (vph)	8	1373	0	289	924	4	0	1	514	0	12	15
Turn Type	Prot	NA		Prot	NA	Perm		NA	pm+ov	Split	NA	Perm
Protected Phases	1	6		5	2		4	4	5	3	3	
Permitted Phases						2			4			3
Detector Phase	1	6		5	2	2	4	4	5	3	3	3
Switch Phase												
Minimum Initial (s)	10.0	15.0		10.0	15.0	15.0	10.0	10.0	10.0	5.0	5.0	5.0
Minimum Split (s)	19.0	24.5		19.5	24.5	24.5	26.0	26.0	19.5	26.0	26.0	26.0
Total Split (s)	19.0	50.0		28.0	59.0	59.0	26.0	26.0	28.0	26.0	26.0	26.0
Total Split (%)	14.6%	38.5%		21.5%	45.4%	45.4%	20.0%	20.0%	21.5%	20.0%	20.0%	20.0%
Yellow Time (s)	5.0	5.5		5.0	5.5	5.5	4.0	4.0	5.0	3.5	3.5	3.5
All-Red Time (s)	4.0	1.0		4.5	1.0	1.0	4.0	4.0	4.5	4.5	4.5	4.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Lost Time (s)	9.0	6.5		9.5	6.5	6.5		8.0	9.5		8.0	8.0
Lead/Lag	Lag	Lead		Lag	Lead	Lead	Lag	Lag	Lag	Lead	Lead	Lead
Lead-Lag Optimize?	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Recall Mode	None	None		None	C-Max	C-Max	None	None	None	None	None	None
Act Effct Green (s)	10.0	82.8		18.5	109.6	109.6		10.0	20.2		6.5	6.5
Actuated g/C Ratio	0.08	0.64		0.14	0.84	0.84		0.08	0.16		0.05	0.05
v/c Ratio	0.06	0.61		1.14	0.31	0.00		0.01	0.59		0.14	0.05
Control Delay	70.3	9.7		148.1	6.2	0.0		56.0	5.8		62.2	0.4
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Delay	70.3	9.7		148.1	6.2	0.0		56.0	5.8		62.2	0.4
LOS	E	A		F	A	A		E	A		E	A
Approach Delay		10.1			39.8			5.9			27.8	
Approach LOS		B			D			A			C	
Queue Length 50th (ft)	7	387		~283	67	0		1	0		10	0
Queue Length 95th (ft)	m11	407		#464	299	0		7	36		31	0
Internal Link Dist (ft)		1046			766			834			543	
Turn Bay Length (ft)	225			600		325			350			
Base Capacity (vph)	138	2253		254	2983	1193		263	867		235	390

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Starvation Cap Reductn	0	0		0	0	0		0	0		0	0
Spillback Cap Reductn	0	0		0	0	0		0	0		0	0
Storage Cap Reductn	0	0		0	0	0		0	0		0	0
Reduced v/c Ratio	0.06	0.61		1.14	0.31	0.00		0.00	0.59		0.05	0.04

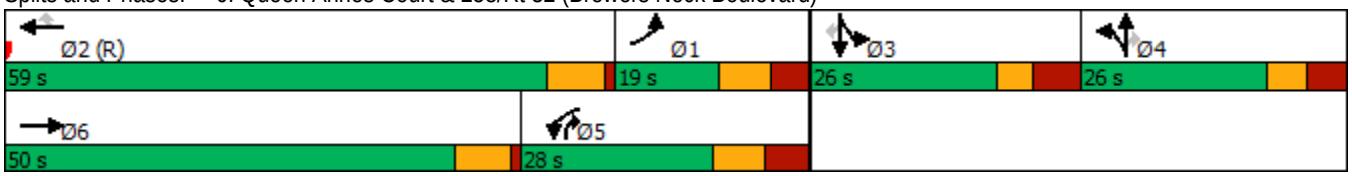
Intersection Summary			
Area Type:	Other		
Cycle Length: 130			
Actuated Cycle Length: 130			
Offset: 20 (15%), Referenced to phase 2:WBT, Start of Green			
Natural Cycle: 150			
Control Type: Actuated-Coordinated			
Maximum v/c Ratio: 1.14			
Intersection Signal Delay: 21.1		Intersection LOS: C	
Intersection Capacity Utilization 78.0%		ICU Level of Service D	
Analysis Period (min) 15			

~ Volume exceeds capacity, queue is theoretically infinite.
Queue shown is maximum after two cycles.

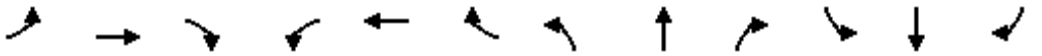
95th percentile volume exceeds capacity, queue may be longer.
Queue shown is maximum after two cycles.

m Volume for 95th percentile queue is metered by upstream signal.

Splits and Phases: 6: Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)



1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	156	6	49	70	10	87	57	1366	117	145	1147	108
Future Volume (vph)	156	6	49	70	10	87	57	1366	117	145	1147	108
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	200		350	275		325
Storage Lanes	0		1	0		1	1		1	1		1
Taper Length (ft)	25			25			125			225		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	0.95	1.00
Frt			0.850			0.850			0.850			0.850
Flt Protected		0.956			0.959		0.950			0.950		
Satd. Flow (prot)	0	1816	1615	0	1791	1553	1805	3539	1583	1687	3505	1615
Flt Permitted		0.956			0.959		0.103			0.076		
Satd. Flow (perm)	0	1816	1615	0	1791	1553	196	3539	1583	135	3505	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			164			164			177			177
Link Speed (mph)		25			25			45			45	
Link Distance (ft)		335			1232			773			1937	
Travel Time (s)		9.1			33.6			11.7			29.3	
Peak Hour Factor	0.91	0.42	0.56	0.75	0.67	0.93	0.60	0.94	0.64	0.76	0.94	0.71
Heavy Vehicles (%)	0%	0%	0%	2%	0%	4%	0%	2%	2%	7%	3%	0%
Adj. Flow (vph)	171	14	88	93	15	94	95	1453	183	191	1220	152
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	185	88	0	108	94	95	1453	183	191	1220	152
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0	0	0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6	20	20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA	Prot	Split	NA	Prot	D.P+P	NA	Perm	D.P+P	NA	Perm
Protected Phases	4	4	4	3	3	3	5	2		1	6	

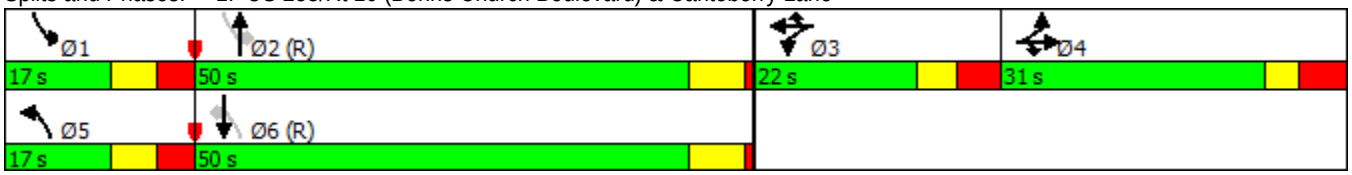
1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases							6		2	2		6
Detector Phase	4	4	4	3	3	3	5	2	2	1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0	7.0	5.0	15.0	15.0	5.0	15.0	15.0
Minimum Split (s)	14.5	14.5	14.5	14.5	14.5	14.5	12.5	21.0	21.0	12.5	21.0	21.0
Total Split (s)	31.0	31.0	31.0	22.0	22.0	22.0	17.0	50.0	50.0	17.0	50.0	50.0
Total Split (%)	25.8%	25.8%	25.8%	18.3%	18.3%	18.3%	14.2%	41.7%	41.7%	14.2%	41.7%	41.7%
Maximum Green (s)	23.5	23.5	23.5	14.5	14.5	14.5	9.5	44.0	44.0	9.5	44.0	44.0
Yellow Time (s)	3.0	3.0	3.0	3.5	3.5	3.5	4.0	5.0	5.0	4.0	5.0	5.0
All-Red Time (s)	4.5	4.5	4.5	4.0	4.0	4.0	3.5	1.0	1.0	3.5	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Lost Time (s)		7.5	7.5		7.5	7.5	7.5	6.0	6.0	7.5	6.0	6.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead	Lag	Lag	Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	2.0	6.0	6.0	2.0	6.0	6.0
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2	0.2	0.2	3.5	3.5	0.2	3.5	3.5
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	20.0	20.0	0.0	20.0	20.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	15.0	15.0	0.0	15.0	15.0
Recall Mode	None	None	None	None	None	None	None	C-Min	C-Min	None	C-Min	C-Min
Act Effct Green (s)		17.4	17.4		12.0	12.0	60.6	52.6	52.6	60.6	54.7	54.7
Actuated g/C Ratio		0.14	0.14		0.10	0.10	0.50	0.44	0.44	0.50	0.46	0.46
v/c Ratio		0.70	0.24		0.61	0.31	0.48	0.94	0.23	1.00	0.76	0.18
Control Delay		62.7	1.5		65.8	2.7	26.4	39.9	2.1	97.9	32.9	2.8
Queue Delay		0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total Delay		62.7	1.5		65.8	2.7	26.4	39.9	2.1	97.9	32.9	2.8
LOS		E	A		E	A	C	D	A	F	C	A
Approach Delay		43.0			36.4			35.2			37.9	
Approach LOS		D			D			D			D	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 0 (0%), Referenced to phase 2:NBSB and 6:NBSB, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 1.00
Intersection Signal Delay: 36.9 Intersection LOS: D
Intersection Capacity Utilization 78.9% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	127	0	91	0	0	1	171	1412	0	0	1117	147
Future Volume (vph)	127	0	91	0	0	1	171	1412	0	0	1117	147
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	250		0	150		235
Storage Lanes	0		1	0		0	1		0	1		1
Taper Length (ft)	25			25			150			125		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850		0.865							0.850
Flt Protected		0.950					0.950					
Satd. Flow (prot)	0	1787	1599	0	1644	0	1805	3539	0	1900	3505	1615
Flt Permitted		0.950					0.145					
Satd. Flow (perm)	0	1787	1599	0	1644	0	276	3539	0	1900	3505	1615
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			214		218							218
Link Speed (mph)		15			25			45			45	
Link Distance (ft)		1905			1451			1986			773	
Travel Time (s)		86.6			39.6			30.1			11.7	
Peak Hour Factor	0.81	0.25	0.62	0.25	0.25	0.25	0.67	0.93	0.25	0.25	0.95	0.80
Heavy Vehicles (%)	1%	0%	1%	0%	0%	0%	0%	2%	0%	0%	3%	0%
Adj. Flow (vph)	157	0	147	0	0	4	255	1518	0	0	1176	184
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	157	147	0	4	0	255	1518	0	0	1176	184
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		0			0			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Split	NA	Prot		NA		D.P+P	NA		D.P+P	NA	Prot
Protected Phases	4	4	4	3	3		5	2		1	6	6

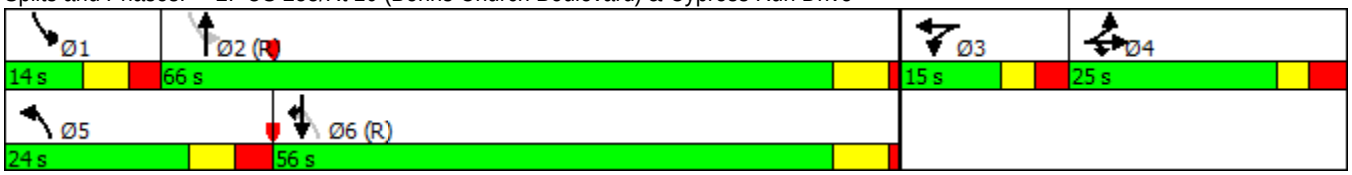
2: US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases							6			2		
Detector Phase	4	4	4	3	3		5	2		1	6	6
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		5.0	14.0		5.0	14.0	14.0
Minimum Split (s)	13.5	13.5	13.5	13.0	13.0		12.5	20.0		12.0	20.0	20.0
Total Split (s)	25.0	25.0	25.0	15.0	15.0		24.0	66.0		14.0	56.0	56.0
Total Split (%)	20.8%	20.8%	20.8%	12.5%	12.5%		20.0%	55.0%		11.7%	46.7%	46.7%
Maximum Green (s)	18.5	18.5	18.5	9.0	9.0		16.5	60.0		7.0	50.0	50.0
Yellow Time (s)	3.0	3.0	3.0	3.0	3.0		4.0	5.0		4.0	5.0	5.0
All-Red Time (s)	3.5	3.5	3.5	3.0	3.0		3.5	1.0		3.0	1.0	1.0
Lost Time Adjust (s)		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		6.5	6.5		6.0		7.5	6.0		7.0	6.0	6.0
Lead/Lag	Lag	Lag	Lag	Lead	Lead		Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0		2.0	5.0		2.0	5.0	5.0
Minimum Gap (s)	0.2	0.2	0.2	0.2	0.2		0.2	3.5		0.2	3.5	3.5
Time Before Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	18.0		0.0	18.0	18.0
Time To Reduce (s)	0.0	0.0	0.0	0.0	0.0		0.0	15.0		0.0	15.0	15.0
Recall Mode	None	None	None	None	None		None	C-Min		None	C-Min	C-Min
Act Effct Green (s)		15.2	15.2		7.0		80.7	89.7			66.7	66.7
Actuated g/C Ratio		0.13	0.13		0.06		0.67	0.75			0.56	0.56
v/c Ratio		0.69	0.38		0.01		0.67	0.57			0.60	0.19
Control Delay		65.8	3.8		0.0		22.8	8.9			6.7	0.3
Queue Delay		0.0	0.0		0.0		0.0	0.0			0.0	0.0
Total Delay		65.8	3.8		0.0		22.8	8.9			6.7	0.3
LOS		E	A		A		C	A			A	A
Approach Delay		35.8						10.9			5.8	
Approach LOS		D						B			A	

Intersection Summary

Area Type: Other
Cycle Length: 120
Actuated Cycle Length: 120
Offset: 12 (10%), Referenced to phase 2:NBSB and 6:NBSB, Start of Green
Natural Cycle: 90
Control Type: Actuated-Coordinated
Maximum v/c Ratio: 0.69
Intersection Signal Delay: 11.1 Intersection LOS: B
Intersection Capacity Utilization 73.2% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 2: US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive



Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	94	0	106	0	1	2	188	1473	1	36	1080	138
Future Volume (vph)	94	0	106	0	1	2	188	1473	1	36	1080	138
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		300	100		0	125		0	125		275
Storage Lanes	0		1	1		0	1		0	1		1
Taper Length (ft)	200			25			100			100		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	0.95	1.00	0.95	1.00
Frt			0.850		0.925							0.850
Flt Protected		0.950					0.950			0.950		
Satd. Flow (prot)	0	1787	1599	1900	1758	0	1687	3539	0	1805	3505	1482
Flt Permitted		0.752					0.156			0.072		
Satd. Flow (perm)	0	1415	1599	1900	1758	0	277	3539	0	137	3505	1482
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)			133		4							141
Link Speed (mph)		40			25			45			45	
Link Distance (ft)		1493			695			1153			1986	
Travel Time (s)		25.4			19.0			17.5			30.1	
Peak Hour Factor	0.63	0.25	0.80	0.25	0.25	0.50	0.90	0.94	0.25	0.50	0.98	0.85
Heavy Vehicles (%)	1%	0%	1%	0%	0%	0%	7%	2%	0%	0%	3%	9%
Adj. Flow (vph)	149	0	133	0	4	4	209	1567	4	72	1102	162
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	149	133	0	8	0	209	1571	0	72	1102	162
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			12			12	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2	1	1	2		1	2		1	2	1
Detector Template	Left	Thru	Right	Left	Thru		Left	Thru		Left	Thru	Right
Leading Detector (ft)	20	100	20	20	100		20	100		20	100	20
Trailing Detector (ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Position(ft)	0	0	0	0	0		0	0		0	0	0
Detector 1 Size(ft)	20	6	20	20	6		20	6		20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Perm	NA	Perm	Perm	NA		D.P+P	NA		D.P+P	NA	Perm
Protected Phases		4			8		1	6		5	2	

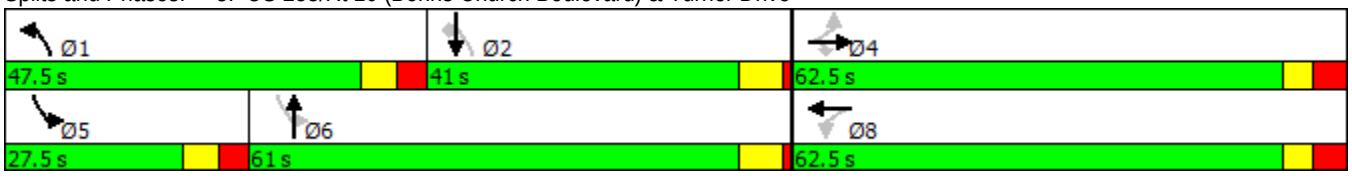
3: US 258/Rt 10 (Benns Church Boulevard) & Turner Drive

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases	4		4	8			2			6		2
Detector Phase	4	4	4	8	8		1	6		5	2	2
Switch Phase												
Minimum Initial (s)	7.0	7.0	7.0	7.0	7.0		5.0	15.0		5.0	15.0	15.0
Minimum Split (s)	14.5	14.5	14.5	14.5	14.5		12.5	21.0		12.5	21.0	21.0
Total Split (s)	62.5	62.5	62.5	62.5	62.5		47.5	61.0		27.5	41.0	41.0
Total Split (%)	41.4%	41.4%	41.4%	41.4%	41.4%		31.5%	40.4%		18.2%	27.2%	27.2%
Maximum Green (s)	55.0	55.0	55.0	55.0	55.0		40.0	55.0		20.0	35.0	35.0
Yellow Time (s)	3.5	3.5	3.5	3.5	3.5		4.0	5.0		4.0	5.0	5.0
All-Red Time (s)	4.0	4.0	4.0	4.0	4.0		3.5	1.0		3.5	1.0	1.0
Lost Time Adjust (s)		0.0	0.0	0.0	0.0		0.0	0.0		0.0	0.0	0.0
Total Lost Time (s)		7.5	7.5	7.5	7.5		7.5	6.0		7.5	6.0	6.0
Lead/Lag							Lead	Lag		Lead	Lag	Lag
Lead-Lag Optimize?												
Vehicle Extension (s)	5.0	5.0	5.0	3.0	3.0		4.0	6.0		2.0	6.0	6.0
Minimum Gap (s)	3.5	3.5	3.5	0.2	0.2		0.2	3.5		0.2	3.5	3.5
Time Before Reduce (s)	20.0	20.0	20.0	0.0	0.0		0.0	20.0		0.0	20.0	20.0
Time To Reduce (s)	10.0	10.0	10.0	0.0	0.0		0.0	15.0		0.0	15.0	15.0
Recall Mode	None	None	None	None	None		None	Min		None	Min	Min
Act Effct Green (s)		17.8	17.8		10.3		57.1	55.6		58.9	45.3	45.3
Actuated g/C Ratio		0.18	0.18		0.11		0.59	0.57		0.60	0.46	0.46
v/c Ratio		0.58	0.33		0.04		0.59	0.78		0.39	0.68	0.21
Control Delay		46.8	8.6		29.7		18.6	21.8		15.5	24.5	5.4
Queue Delay		0.0	0.0		0.0		0.0	0.0		0.0	0.0	0.0
Total Delay		46.8	8.6		29.7		18.6	21.8		15.5	24.5	5.4
LOS		D	A		C		B	C		B	C	A
Approach Delay		28.8			29.7			21.4			21.7	
Approach LOS		C			C			C			C	

Intersection Summary

Area Type: Other
Cycle Length: 151
Actuated Cycle Length: 97.6
Natural Cycle: 70
Control Type: Actuated-Uncoordinated
Maximum v/c Ratio: 0.78
Intersection Signal Delay: 22.2 Intersection LOS: C
Intersection Capacity Utilization 74.3% ICU Level of Service D
Analysis Period (min) 15

Splits and Phases: 3: US 258/Rt 10 (Benns Church Boulevard) & Turner Drive



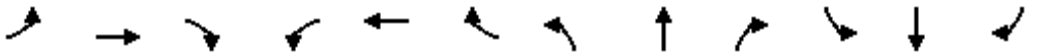
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBU	NBL	NBT	NBR	SBU	SBL
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	0	0	5	0	1652	0	0	0
Future Volume (vph)	0	0	0	0	0	0	5	0	1652	0	0	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0		125		0		140
Storage Lanes	0		0	0		0		1		0		1
Taper Length (ft)	25			25				25				75
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.95	1.00	1.00	1.00
Frt												
Flt Protected							0.950					
Satd. Flow (prot)	0	0	0	0	0	0	1805	0	3505	0	1900	0
Flt Permitted							0.950					
Satd. Flow (perm)	0	0	0	0	0	0	1805	0	3505	0	1900	0
Link Speed (mph)		30			30				45			
Link Distance (ft)		810			872				3921			
Travel Time (s)		18.4			19.8				59.4			
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.25	0.25	0.97	0.25	0.50	0.25
Heavy Vehicles (%)	0%	0%	0%	0%	0%	0%	0%	0%	3%	0%	0%	0%
Adj. Flow (vph)	0	0	0	0	0	0	20	0	1703	0	0	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	0	0	20	0	1703	0	0	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	R NA	Left	Left	Right	R NA	Left
Median Width(ft)		0			0				12			
Link Offset(ft)		0			0				0			
Crosswalk Width(ft)		16			16				16			
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	9	15		9	9	15
Sign Control		Stop			Stop				Free			

Intersection Summary			
Area Type:	Other		
Control Type: Unsignalized			
Intersection Capacity Utilization 49.0%		ICU Level of Service A	
Analysis Period (min) 15			

Lane Group	SBT	SBR
Lane Configurations		
Traffic Volume (vph)	1173	0
Future Volume (vph)	1173	0
Ideal Flow (vphpl)	1900	1900
Storage Length (ft)		0
Storage Lanes		0
Taper Length (ft)		
Lane Util. Factor	0.95	1.00
Frt		
Flt Protected		
Satd. Flow (prot)	3539	0
Flt Permitted		
Satd. Flow (perm)	3539	0
Link Speed (mph)	45	
Link Distance (ft)	1153	
Travel Time (s)	17.5	
Peak Hour Factor	0.95	0.25
Heavy Vehicles (%)	2%	0%
Adj. Flow (vph)	1235	0
Shared Lane Traffic (%)		
Lane Group Flow (vph)	1235	0
Enter Blocked Intersection	No	No
Lane Alignment	Left	Right
Median Width(ft)	12	
Link Offset(ft)	0	
Crosswalk Width(ft)	16	
Two way Left Turn Lane		
Headway Factor	1.00	1.00
Turning Speed (mph)		9
Sign Control	Free	

Intersection Summary

5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)



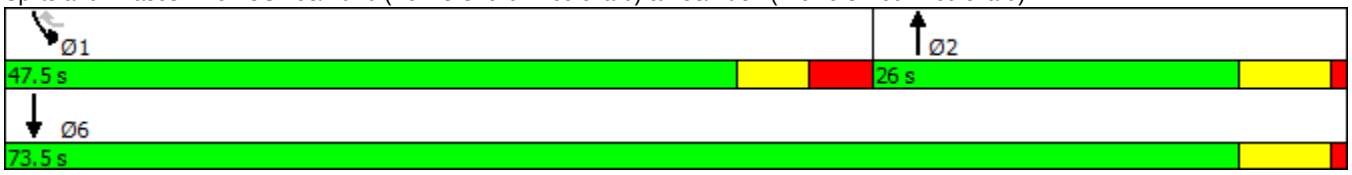
Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	0	0	0	0	0	1421	0	246	0	797	340	0
Future Volume (vph)	0	0	0	0	0	1421	0	246	0	797	340	0
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	0		0	0		0	0		0	300		0
Storage Lanes	0		0	0		2	0		0	1		0
Taper Length (ft)	25			25			100			75		
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00	0.88	1.00	0.95	1.00	0.97	0.95	1.00
Frt						0.850						
Flt Protected										0.950		
Satd. Flow (prot)	0	0	0	0	0	2760	0	3471	0	3400	3471	0
Flt Permitted										0.950		
Satd. Flow (perm)	0	0	0	0	0	2760	0	3471	0	3400	3471	0
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						514						
Link Speed (mph)		30			45			45			45	
Link Distance (ft)		963			1126			2837			3921	
Travel Time (s)		21.9			17.1			43.0			59.4	
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.93	0.25	0.89	0.25	0.99	0.85	0.25
Heavy Vehicles (%)	0%	0%	0%	0%	0%	3%	0%	4%	0%	3%	4%	0%
Adj. Flow (vph)	0	0	0	0	0	1528	0	276	0	805	400	0
Shared Lane Traffic (%)												
Lane Group Flow (vph)	0	0	0	0	0	1528	0	276	0	805	400	0
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			24			24	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors						1		2		1	2	
Detector Template						Right		Thru		Left	Thru	
Leading Detector (ft)						20		100		20	100	
Trailing Detector (ft)						0		0		0	0	
Detector 1 Position(ft)						0		0		0	0	
Detector 1 Size(ft)						20		6		20	6	
Detector 1 Type						Cl+Ex		Cl+Ex		Cl+Ex	Cl+Ex	
Detector 1 Channel												
Detector 1 Extend (s)						0.0		0.0		0.0	0.0	
Detector 1 Queue (s)						0.0		0.0		0.0	0.0	
Detector 1 Delay (s)						0.0		0.0		0.0	0.0	
Detector 2 Position(ft)								94			94	
Detector 2 Size(ft)								6			6	
Detector 2 Type								Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)								0.0			0.0	
Turn Type						Perm		NA		Prot	NA	
Protected Phases								2		1	6	

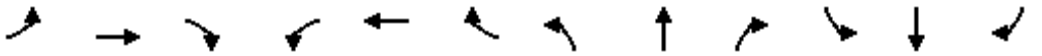
5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases						1						
Detector Phase						1		2		1	6	
Switch Phase												
Minimum Initial (s)						15.0		10.0		15.0	15.0	
Minimum Split (s)						22.5		16.0		22.5	21.0	
Total Split (s)						47.5		26.0		47.5	73.5	
Total Split (%)						64.6%		35.4%		64.6%	100.0%	
Maximum Green (s)						40.0		20.0		40.0	67.5	
Yellow Time (s)						4.0		5.0		4.0	5.0	
All-Red Time (s)						3.5		1.0		3.5	1.0	
Lost Time Adjust (s)						0.0		0.0		0.0	0.0	
Total Lost Time (s)						7.5		6.0		7.5	6.0	
Lead/Lag						Lead		Lag		Lead		
Lead-Lag Optimize?												
Vehicle Extension (s)						3.5		2.5		3.5	5.0	
Recall Mode						Min		None		Min	Min	
Act Effct Green (s)						35.9		10.8		35.9	60.4	
Actuated g/C Ratio						0.59		0.18		0.59	1.00	
v/c Ratio						0.83		0.44		0.40	0.12	
Control Delay						10.9		25.8		7.1	0.1	
Queue Delay						0.0		0.0		0.0	0.0	
Total Delay						10.9		25.8		7.1	0.1	
LOS						B		C		A	A	
Approach Delay					10.9			25.8			4.7	
Approach LOS					B			C			A	

Intersection Summary			
Area Type:	Other		
Cycle Length: 73.5			
Actuated Cycle Length: 60.4			
Natural Cycle: 60			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.83			
Intersection Signal Delay: 9.8		Intersection LOS: A	
Intersection Capacity Utilization 69.3%		ICU Level of Service C	
Analysis Period (min) 15			

Splits and Phases: 5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)





Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	10	844	4	515	1387	15	1	4	273	2	5	7
Future Volume (vph)	10	844	4	515	1387	15	1	4	273	2	5	7
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Storage Length (ft)	225		0	600		325	0		350	0		0
Storage Lanes	1		0	1		1	0		2	0		1
Taper Length (ft)	200			200			25			25		
Lane Util. Factor	1.00	0.95	0.95	1.00	0.95	1.00	1.00	1.00	0.88	1.00	1.00	1.00
Frt		0.999				0.850			0.850			0.850
Flt Protected	0.950			0.950				0.987			0.978	
Satd. Flow (prot)	1805	3536	0	1787	3539	1380	0	1875	2787	0	1632	1380
Flt Permitted	0.950			0.950				0.987			0.978	
Satd. Flow (perm)	1805	3536	0	1787	3539	1380	0	1875	2787	0	1632	1380
Right Turn on Red			Yes			Yes			Yes			Yes
Satd. Flow (RTOR)						171			350			160
Link Speed (mph)		45			45			45			25	
Link Distance (ft)		1126			846			914			623	
Travel Time (s)		17.1			12.8			13.8			17.0	
Peak Hour Factor	0.35	0.98	1.00	0.86	0.96	0.60	0.25	0.38	0.78	0.50	1.00	0.75
Heavy Vehicles (%)	0%	2%	0%	1%	2%	17%	0%	0%	2%	0%	25%	17%
Adj. Flow (vph)	29	861	4	599	1445	25	4	11	350	4	5	9
Shared Lane Traffic (%)												
Lane Group Flow (vph)	29	865	0	599	1445	25	0	15	350	0	9	9
Enter Blocked Intersection	No	No	No	No	No	No	No	No	No	No	No	No
Lane Alignment	Left	Left	Right	Left	Left	Right	Left	Left	Right	Left	Left	Right
Median Width(ft)		12			12			0			0	
Link Offset(ft)		0			0			0			0	
Crosswalk Width(ft)		16			16			16			16	
Two way Left Turn Lane												
Headway Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Turning Speed (mph)	15		9	15		9	15		9	15		9
Number of Detectors	1	2		1	2	1	1	2	1	1	2	1
Detector Template	Left	Thru		Left	Thru	Right	Left	Thru	Right	Left	Thru	Right
Leading Detector (ft)	20	100		20	100	20	20	100	20	20	100	20
Trailing Detector (ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Position(ft)	0	0		0	0	0	0	0	0	0	0	0
Detector 1 Size(ft)	20	6		20	6	20	20	6	20	20	6	20
Detector 1 Type	Cl+Ex	Cl+Ex		Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex	Cl+Ex
Detector 1 Channel												
Detector 1 Extend (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Queue (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 1 Delay (s)	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Detector 2 Position(ft)		94			94			94			94	
Detector 2 Size(ft)		6			6			6			6	
Detector 2 Type		Cl+Ex			Cl+Ex			Cl+Ex			Cl+Ex	
Detector 2 Channel												
Detector 2 Extend (s)		0.0			0.0			0.0			0.0	
Turn Type	Prot	NA		Prot	NA	Perm	Split	NA	pm+ov	Split	NA	Perm
Protected Phases	1	6		5	2		4	4	5	3	3	

6: Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)

Lane Group	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Permitted Phases						2			4			3
Detector Phase	1	6		5	2	2	4	4	5	3	3	3
Switch Phase												
Minimum Initial (s)	10.0	15.0		10.0	15.0	15.0	10.0	10.0	10.0	5.0	5.0	5.0
Minimum Split (s)	19.0	24.5		19.5	24.5	24.5	26.0	26.0	19.5	26.0	26.0	26.0
Total Split (s)	34.0	41.5		39.5	47.0	47.0	26.0	26.0	39.5	33.0	33.0	33.0
Total Split (%)	24.3%	29.6%		28.2%	33.6%	33.6%	18.6%	18.6%	28.2%	23.6%	23.6%	23.6%
Maximum Green (s)	25.0	35.0		30.0	40.5	40.5	18.0	18.0	30.0	25.0	25.0	25.0
Yellow Time (s)	5.0	5.5		5.0	5.5	5.5	4.0	4.0	5.0	3.5	3.5	3.5
All-Red Time (s)	4.0	1.0		4.5	1.0	1.0	4.0	4.0	4.5	4.5	4.5	4.5
Lost Time Adjust (s)	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Lost Time (s)	9.0	6.5		9.5	6.5	6.5		8.0	9.5		8.0	8.0
Lead/Lag	Lead	Lag		Lead	Lag	Lag	Lag	Lag	Lead	Lead	Lead	Lead
Lead-Lag Optimize?												
Vehicle Extension (s)	3.0	5.0		3.0	5.0	5.0	3.5	3.5	3.0	3.0	3.0	3.0
Recall Mode	None	None		None	None	None	None	None	None	None	None	None
Act Effct Green (s)	10.4	32.9		31.2	72.6	72.6		10.4	37.0		6.3	6.3
Actuated g/C Ratio	0.11	0.36		0.34	0.80	0.80		0.11	0.41		0.07	0.07
v/c Ratio	0.14	0.68		0.98	0.51	0.02		0.07	0.26		0.08	0.04
Control Delay	45.6	30.5		66.1	13.6	0.1		45.6	2.7		49.6	0.3
Queue Delay	0.0	0.0		0.0	0.0	0.0		0.0	0.0		0.0	0.0
Total Delay	45.6	30.5		66.1	13.6	0.1		45.6	2.7		49.6	0.3
LOS	D	C		E	B	A		D	A		D	A
Approach Delay		31.0			28.6			4.5			24.9	
Approach LOS		C			C			A			C	

Intersection Summary			
Area Type:	Other		
Cycle Length: 140			
Actuated Cycle Length: 91.3			
Natural Cycle: 150			
Control Type: Actuated-Uncoordinated			
Maximum v/c Ratio: 0.98			
Intersection Signal Delay: 26.6		Intersection LOS: C	
Intersection Capacity Utilization 80.3%		ICU Level of Service D	
Analysis Period (min) 15			

Splits and Phases: 6: Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)

APPENDIX K

Queue Reports

Intersection: 1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LT	R	L	T	T	R	L	T	T	R
Maximum Queue (ft)	64	51	144	70	42	217	230	54	74	222	221	25
Average Queue (ft)	18	14	68	25	9	76	75	10	22	105	105	6
95th Queue (ft)	49	39	125	59	31	160	168	36	52	187	190	22
Link Distance (ft)	277	277	1172	1172		663	663			1895	1895	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)					200			350	275			325
Storage Blk Time (%)						0	0					
Queuing Penalty (veh)						0	0					

Intersection: 2: US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive

Movement	EB	EB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	L	T	TR	L	T	T	R
Maximum Queue (ft)	18	47	48	86	104	1	79	86	19
Average Queue (ft)	2	7	11	11	14	0	13	18	1
95th Queue (ft)	10	29	35	49	59	1	47	62	10
Link Distance (ft)	1824	1824		1925	1925		663	663	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			250			150			235
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 3: US 258/Rt 10 (Benns Church Boulevard) & Turner Drive

Movement	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LTR	LTR	L	T	TR	L	T	T	R
Maximum Queue (ft)	374	108	222	304	278	112	392	409	190
Average Queue (ft)	195	44	120	120	131	9	239	249	68
95th Queue (ft)	326	88	207	238	233	59	366	383	140
Link Distance (ft)	1442	648		1098	1098		1925	1925	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			125			125			275
Storage Blk Time (%)			9	5			34	8	
Queuing Penalty (veh)			24	12			2	24	

Intersection: 4: US 258/Rt 10 (Benns Church Boulevard) & Proposed Main Entrance

Movement	NB	SB
Directions Served	U	U
Maximum Queue (ft)	21	2
Average Queue (ft)	2	0
95th Queue (ft)	12	2
Link Distance (ft)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	125	140
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	R	R	T	T	L	L	T
Maximum Queue (ft)	135	140	78	78	160	182	4
Average Queue (ft)	46	43	35	34	89	111	0
95th Queue (ft)	109	109	67	70	149	175	4
Link Distance (ft)	1008	1008	2766	2766		3866	3866
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)					300		
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 6: Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	R	LT	R	R	LT	R
Maximum Queue (ft)	34	274	298	181	264	237	10	14	192	140	33	39
Average Queue (ft)	5	135	159	82	123	96	0	0	96	34	7	9
95th Queue (ft)	21	246	261	145	236	205	4	9	162	99	26	30
Link Distance (ft)		1008	1008		785	785		858			565	565
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	225			600			325		350	350		
Storage Blk Time (%)		1				0						
Queuing Penalty (veh)		0				0						

Zone Summary

Zone wide Queuing Penalty: 62

Intersection: 1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LT	R	L	T	T	R	L	T	T	R
Maximum Queue (ft)	186	74	122	146	175	361	368	60	146	256	264	48
Average Queue (ft)	89	24	48	55	33	185	203	20	65	141	145	17
95th Queue (ft)	158	59	98	112	108	349	364	46	119	235	242	40
Link Distance (ft)	277	277	1172	1172		663	663			1895	1895	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)					200			350	275			325
Storage Blk Time (%)						7	1			0		
Queuing Penalty (veh)						3	1			0		

Intersection: 2: US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	T	T	R
Maximum Queue (ft)	171	126	12	139	189	200	132	150	67
Average Queue (ft)	68	41	1	56	54	64	35	44	13
95th Queue (ft)	131	93	8	111	143	159	90	108	44
Link Distance (ft)	1824	1824	1402		1925	1925	663	663	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)				250					235
Storage Blk Time (%)					0		0	0	
Queuing Penalty (veh)					0		0	0	

Intersection: 3: US 258/Rt 10 (Benns Church Boulevard) & Turner Drive

Movement	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LTR	LTR	L	T	TR	L	T	T	R
Maximum Queue (ft)	144	33	194	330	314	108	304	315	82
Average Queue (ft)	68	5	72	128	140	20	126	135	30
95th Queue (ft)	121	22	148	258	264	69	243	253	64
Link Distance (ft)	1442	648		1106	1106		1925	1925	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			125			125			275
Storage Blk Time (%)			1	6			8	1	
Queuing Penalty (veh)			5	9			2	1	

Intersection: 4: US 258/Rt 10 (Benns Church Boulevard) & Proposed Main Entrance

Movement	NB
Directions Served	U
Maximum Queue (ft)	24
Average Queue (ft)	2
95th Queue (ft)	11
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	125
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	R	R	T	T	L	L	T
Maximum Queue (ft)	305	291	86	101	137	154	2
Average Queue (ft)	103	101	41	42	57	78	0
95th Queue (ft)	222	225	73	80	116	135	2
Link Distance (ft)	1008	1008	2766	2766		3866	3866
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)					300		
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 6: Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	R	LT	R	R	LT	R
Maximum Queue (ft)	34	220	240	282	406	386	21	25	110	53	35	43
Average Queue (ft)	7	107	124	149	169	158	2	3	50	11	4	6
95th Queue (ft)	25	192	208	244	344	334	12	14	91	38	21	26
Link Distance (ft)		1008	1008		785	785		858			565	565
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	225			600			325		350	350		
Storage Blk Time (%)		0				1						
Queuing Penalty (veh)		0				0						

Zone Summary

Zone wide Queuing Penalty: 21

Intersection: 1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LT	R	L	T	T	R	L	T	T	R
Maximum Queue (ft)	70	54	168	87	46	229	241	47	72	227	239	28
Average Queue (ft)	21	15	79	28	11	89	87	11	25	120	126	6
95th Queue (ft)	51	42	145	67	35	181	186	35	59	209	220	22
Link Distance (ft)	277	277	1172	1172		663	663			1895	1895	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)					200			350	275			325
Storage Blk Time (%)						0	0			0		
Queuing Penalty (veh)						0	0			0		

Intersection: 2: US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive

Movement	EB	EB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	L	T	TR	L	T	T	R
Maximum Queue (ft)	18	55	48	92	114	7	87	100	26
Average Queue (ft)	2	10	14	15	22	0	19	21	2
95th Queue (ft)	11	34	37	56	75	4	62	69	12
Link Distance (ft)	1824	1824		1925	1925		663	663	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			250			150			235
Storage Blk Time (%)									
Queuing Penalty (veh)									

Intersection: 3: US 258/Rt 10 (Benns Church Boulevard) & Turner Drive

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	T	R
Maximum Queue (ft)	228	179	110	216	263	201	67	333	344	174
Average Queue (ft)	113	82	53	120	91	94	6	186	194	73
95th Queue (ft)	195	149	97	205	199	178	39	302	311	137
Link Distance (ft)	1440		648		1093	1093		1925	1925	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)		300		125			125			275
Storage Blk Time (%)	0			10	2			19	2	0
Queuing Penalty (veh)	0			32	5			1	7	0

Intersection: 4: US 258/Rt 10 (Benns Church Boulevard) & Proposed Main Entrance

Movement	NB	SB
Directions Served	U	U
Maximum Queue (ft)	23	8
Average Queue (ft)	2	0
95th Queue (ft)	13	6
Link Distance (ft)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	125	140
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	R	R	T	T	L	L	T
Maximum Queue (ft)	184	180	79	92	174	195	11
Average Queue (ft)	56	54	40	36	94	119	0
95th Queue (ft)	140	141	71	74	152	177	8
Link Distance (ft)	1008	1008	2766	2766		3866	3866
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)					300		
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 6: Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	R	LT	R	R	LT	R
Maximum Queue (ft)	41	296	301	210	314	275	11	12	217	182	45	43
Average Queue (ft)	7	150	169	95	146	119	1	1	116	51	9	9
95th Queue (ft)	27	259	272	169	283	246	5	8	185	137	32	32
Link Distance (ft)		1008	1008		785	785		858			565	565
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	225			600			325		350	350		
Storage Blk Time (%)		2				0						
Queuing Penalty (veh)		0				0						

Zone Summary

Zone wide Queuing Penalty: 45

Intersection: 1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LT	R	L	T	T	R	L	T	T	R
Maximum Queue (ft)	211	74	118	141	278	457	464	59	176	318	328	44
Average Queue (ft)	101	28	53	58	47	265	277	24	77	171	177	19
95th Queue (ft)	179	63	104	113	167	439	445	51	144	275	288	39
Link Distance (ft)	277	277	1172	1172		663	663			1895	1895	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)					200			350	275			325
Storage Blk Time (%)						12	3			1	0	
Queuing Penalty (veh)						6	3			1	0	

Intersection: 2: US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	T	T	R
Maximum Queue (ft)	188	124	15	175	205	232	123	144	58
Average Queue (ft)	77	46	1	61	72	85	38	47	13
95th Queue (ft)	146	99	8	125	171	185	91	109	44
Link Distance (ft)	1824	1824	1402		1919	1919	663	663	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)				250				235	
Storage Blk Time (%)				0	0		0		
Queuing Penalty (veh)				2	0		0		

Intersection: 3: US 258/Rt 10 (Benns Church Boulevard) & Turner Drive

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	TR	L	T	TR	L	T	T	R
Maximum Queue (ft)	103	91	30	200	285	284	143	272	288	73
Average Queue (ft)	46	34	3	68	106	114	25	115	125	26
95th Queue (ft)	89	68	18	139	212	220	80	226	241	58
Link Distance (ft)	1444		648		1085	1085		1919	1919	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)		300		125			125			275
Storage Blk Time (%)				2	3			6	0	
Queuing Penalty (veh)				11	6			2	0	

Intersection: 4: US 258/Rt 10 (Benns Church Boulevard) & Proposed Main Entrance

Movement	NB
Directions Served	U
Maximum Queue (ft)	27
Average Queue (ft)	3
95th Queue (ft)	15
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	125
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	R	R	T	T	L	L	T
Maximum Queue (ft)	354	348	93	105	159	165	1
Average Queue (ft)	136	138	45	47	67	89	0
95th Queue (ft)	286	291	81	86	128	150	1
Link Distance (ft)	1008	1008	2766	2766		3866	3866
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)					300		
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 6: Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	R	LT	R	R	LT	R
Maximum Queue (ft)	47	291	305	331	469	460	33	23	128	64	44	57
Average Queue (ft)	8	132	144	182	182	177	3	3	60	12	6	8
95th Queue (ft)	29	240	249	296	406	408	16	15	108	43	26	34
Link Distance (ft)		1008	1008		785	785		858			565	565
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	225			600			325		350	350		
Storage Blk Time (%)		1				3						
Queuing Penalty (veh)		0				0						

Zone Summary

Zone wide Queuing Penalty: 31

Intersection: 1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LT	R	L	T	T	R	L	T	T	R
Maximum Queue (ft)	77	61	230	109	77	278	287	48	73	270	290	26
Average Queue (ft)	28	17	109	38	12	123	125	12	28	138	147	7
95th Queue (ft)	66	46	194	86	51	244	249	38	60	248	265	24
Link Distance (ft)	277	277	1172	1172		663	663			1895	1895	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)					200			350	275			325
Storage Blk Time (%)						2				0	0	
Queuing Penalty (veh)						0				0	0	

Intersection: 2: US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive

Movement	EB	EB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	L	T	TR	L	T	T	R
Maximum Queue (ft)	15	57	54	94	115	4	158	175	28
Average Queue (ft)	2	10	15	18	29	0	31	40	2
95th Queue (ft)	9	35	43	63	86	2	103	123	13
Link Distance (ft)	1824	1824		1919	1919		663	663	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			250			150			235
Storage Blk Time (%)							0	0	
Queuing Penalty (veh)							0	0	

Intersection: 3: US 258/Rt 10 (Benns Church Boulevard) & Turner Drive

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	T	R
Maximum Queue (ft)	293	253	145	224	387	329	106	430	433	251
Average Queue (ft)	167	123	64	160	147	124	8	254	266	81
95th Queue (ft)	269	219	119	251	329	266	57	414	423	178
Link Distance (ft)	1440		648		1080	1080		1919	1919	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)		300		125			125			275
Storage Blk Time (%)	1	0	4	26	5			23	9	
Queuing Penalty (veh)	2	0	0	89	14			2	31	

Intersection: 4: US 258/Rt 10 (Benns Church Boulevard) & Proposed Main Entrance

Movement	NB	SB
Directions Served	U	U
Maximum Queue (ft)	25	13
Average Queue (ft)	3	1
95th Queue (ft)	14	6
Link Distance (ft)		
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)	125	140
Storage Blk Time (%)		
Queuing Penalty (veh)		

Intersection: 5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)

Movement	WB	WB	NB	NB	SB	SB
Directions Served	R	R	T	T	L	L
Maximum Queue (ft)	220	240	87	86	196	208
Average Queue (ft)	76	69	33	36	115	140
95th Queue (ft)	172	172	64	72	169	193
Link Distance (ft)	1008	1008	2766	2766		3866
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)					300	
Storage Blk Time (%)					0	
Queuing Penalty (veh)					0	

Intersection: 6: Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	R	LT	R	R	LT	R
Maximum Queue (ft)	34	328	326	254	359	351	8	16	265	222	43	59
Average Queue (ft)	6	175	194	126	158	134	0	1	144	85	9	11
95th Queue (ft)	23	294	302	215	318	297	4	12	224	191	31	39
Link Distance (ft)		1008	1008		785	785		858			565	565
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	225			600			325		350	350		
Storage Blk Time (%)		3				0			0			
Queuing Penalty (veh)		0				0			0			

Zone Summary

Zone wide Queuing Penalty: 139

Intersection: 1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LT	R	L	T	T	R	L	T	T	R
Maximum Queue (ft)	209	92	130	143	301	563	581	278	206	346	367	50
Average Queue (ft)	105	33	60	59	67	345	359	38	93	211	220	21
95th Queue (ft)	181	74	107	116	222	555	563	173	176	330	347	43
Link Distance (ft)	277	277	1172	1172		663	663			1895	1895	
Upstream Blk Time (%)						0	0					
Queuing Penalty (veh)						0	0					
Storage Bay Dist (ft)					200			350	275			325
Storage Blk Time (%)						23	9		0	2	1	
Queuing Penalty (veh)						13	11		1	3	1	

Intersection: 2: US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	T	T	R
Maximum Queue (ft)	169	151	18	159	250	263	131	146	70
Average Queue (ft)	77	52	1	71	97	110	39	50	15
95th Queue (ft)	141	116	9	130	214	231	92	112	46
Link Distance (ft)	1824	1824	1402		1919	1919	663	663	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)				250				235	
Storage Blk Time (%)					0		0	0	
Queuing Penalty (veh)					0		0	0	

Intersection: 3: US 258/Rt 10 (Benns Church Boulevard) & Turner Drive

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	TR	L	T	TR	L	T	T	R
Maximum Queue (ft)	129	80	34	216	348	369	144	376	383	129
Average Queue (ft)	53	38	4	92	146	161	25	167	180	33
95th Queue (ft)	100	71	20	180	280	295	81	319	328	91
Link Distance (ft)	1437		648		1084	1084		1919	1919	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)		300		125			125			275
Storage Blk Time (%)				3	7			13	3	
Queuing Penalty (veh)				22	13			5	4	

Intersection: 4: US 258/Rt 10 (Benns Church Boulevard) & Proposed Main Entrance

Movement	NB
Directions Served	U
Maximum Queue (ft)	20
Average Queue (ft)	2
95th Queue (ft)	12
Link Distance (ft)	
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	125
Storage Blk Time (%)	
Queuing Penalty (veh)	

Intersection: 5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	R	R	T	T	L	L	T
Maximum Queue (ft)	461	463	106	118	157	181	12
Average Queue (ft)	188	188	50	55	76	97	0
95th Queue (ft)	372	373	88	99	138	160	7
Link Distance (ft)	1008	1008	2766	2766		3866	3866
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)					300		
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 6: Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	R	LT	R	R	LT	R
Maximum Queue (ft)	32	271	281	390	544	546	153	28	135	62	38	49
Average Queue (ft)	7	143	159	212	208	207	6	3	66	14	5	8
95th Queue (ft)	25	251	263	347	471	481	81	17	116	45	22	31
Link Distance (ft)		1008	1008		785	785		858			565	565
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	225			600			325		350	350		
Storage Blk Time (%)		1			0	5						
Queuing Penalty (veh)		0			0	1						

Zone Summary

Zone wide Queuing Penalty: 75

Intersection: 1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LT	R	L	T	T	R	L	T	T	R
Maximum Queue (ft)	58	48	164	85	50	163	165	42	72	262	283	31
Average Queue (ft)	19	13	72	29	12	71	75	12	29	115	123	8
95th Queue (ft)	49	37	134	68	38	136	145	36	62	210	230	26
Link Distance (ft)	277	277	1172	1172		663	663			1895	1895	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)					200			350	275			325
Storage Blk Time (%)						0				0	0	
Queuing Penalty (veh)						0				0	0	

Intersection: 2: US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive

Movement	EB	EB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	L	T	TR	L	T	T	R
Maximum Queue (ft)	15	47	61	53	71	5	95	127	23
Average Queue (ft)	2	8	20	8	15	0	16	21	2
95th Queue (ft)	11	28	48	35	51	3	58	78	12
Link Distance (ft)	1824	1824		1925	1925		663	663	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			250			150			235
Storage Blk Time (%)							0	0	
Queuing Penalty (veh)							0	0	

Intersection: 3: US 258/Rt 10 (Benns Church Boulevard) & Turner Drive

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	T	R
Maximum Queue (ft)	275	195	125	223	268	202	28	282	291	178
Average Queue (ft)	139	89	56	135	80	73	4	156	161	66
95th Queue (ft)	242	158	102	222	200	157	19	252	257	131
Link Distance (ft)	1442		648		1065	1065		1925	1925	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)		300		125			125			275
Storage Blk Time (%)	1			13	1			11	0	
Queuing Penalty (veh)	2			49	2			1	1	

Intersection: 4: US 258/Rt 10 (Benns Church Boulevard) & Proposed Main Entrance

Movement	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	U	T	T	R	L	T	T
Maximum Queue (ft)	185	158	98	89	260	257	46	131	257	251
Average Queue (ft)	107	59	42	13	105	101	18	50	79	100
95th Queue (ft)	167	132	78	50	206	202	42	98	181	204
Link Distance (ft)	816	816	816		636	636			1065	1065
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)				125			300	300		
Storage Blk Time (%)					4	0			0	
Queuing Penalty (veh)					1	0			0	

Intersection: 5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	R	R	T	T	L	L	T
Maximum Queue (ft)	148	147	77	93	170	184	5
Average Queue (ft)	51	44	35	41	106	129	0
95th Queue (ft)	104	101	66	77	150	173	5
Link Distance (ft)	1008	1008	2766	2766		3192	3192
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)					300		
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 6: Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	R	LT	R	R	LT	R
Maximum Queue (ft)	38	298	319	212	235	208	9	19	223	190	45	61
Average Queue (ft)	6	173	192	110	36	30	0	1	129	64	8	11
95th Queue (ft)	24	267	277	188	135	121	4	9	204	163	31	40
Link Distance (ft)		1008	1008		785	785		858			565	565
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	225			600			325		350	350		
Storage Blk Time (%)		2				0						
Queuing Penalty (veh)		0				0						

Intersection: 7: US 258/Rt 10 (Benns Church Boulevard) & Proposed Secondary Entrance

Movement	WB
Directions Served	R
Maximum Queue (ft)	63
Average Queue (ft)	18
95th Queue (ft)	43
Link Distance (ft)	1244
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Zone Summary

Zone wide Queuing Penalty: 56

Intersection: 1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LT	R	L	T	T	R	L	T	T	R
Maximum Queue (ft)	176	73	175	140	175	366	366	78	162	284	286	43
Average Queue (ft)	86	26	78	55	38	186	198	27	76	171	177	20
95th Queue (ft)	152	60	158	114	108	325	335	58	141	262	268	41
Link Distance (ft)	277	277	1172	1172		663	663			1895	1895	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)					200			350	275			325
Storage Blk Time (%)						8	1		0	0	0	
Queuing Penalty (veh)						4	1		0	1	0	

Intersection: 2: US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	T	T	R
Maximum Queue (ft)	142	116	21	147	160	180	121	138	52
Average Queue (ft)	66	40	1	71	65	84	40	45	15
95th Queue (ft)	126	91	9	122	142	163	90	100	42
Link Distance (ft)	1824	1824	1402		1925	1925	663	663	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)				250					235
Storage Blk Time (%)							0	0	
Queuing Penalty (veh)							0	0	

Intersection: 3: US 258/Rt 10 (Benns Church Boulevard) & Turner Drive

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	T	R
Maximum Queue (ft)	126	106	32	206	293	292	139	325	328	77
Average Queue (ft)	57	42	4	86	105	116	24	134	140	25
95th Queue (ft)	105	84	20	161	239	251	88	274	283	60
Link Distance (ft)	1442		648		1065	1065		1925	1925	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)		300		125			125			275
Storage Blk Time (%)				2	5			9	1	
Queuing Penalty (veh)				17	10			3	1	

Intersection: 4: US 258/Rt 10 (Benns Church Boulevard) & Proposed Main Entrance

Movement	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	U	T	T	R	L	T	T
Maximum Queue (ft)	184	150	148	103	375	370	110	202	140	142
Average Queue (ft)	111	62	68	14	209	207	44	96	38	57
95th Queue (ft)	170	138	121	61	340	336	83	167	99	120
Link Distance (ft)	816	816	816		636	636			1065	1065
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)				125			300	300		
Storage Blk Time (%)					18	2				
Queuing Penalty (veh)					2	4				

Intersection: 5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)

Movement	WB	WB	NB	NB	SB	SB
Directions Served	R	R	T	T	L	L
Maximum Queue (ft)	577	532	131	124	222	243
Average Queue (ft)	204	210	62	67	75	98
95th Queue (ft)	451	451	109	111	155	177
Link Distance (ft)	1008	1008	2766	2766		3192
Upstream Blk Time (%)	0					
Queuing Penalty (veh)	0					
Storage Bay Dist (ft)					300	
Storage Blk Time (%)					0	0
Queuing Penalty (veh)					0	0

Intersection: 6: Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	R	LT	R	R	LT	R
Maximum Queue (ft)	35	338	349	628	717	736	236	25	148	106	35	41
Average Queue (ft)	7	174	188	219	219	230	10	2	66	15	6	5
95th Queue (ft)	27	304	314	407	568	588	115	11	120	56	25	24
Link Distance (ft)		1008	1008		785	785		858			565	565
Upstream Blk Time (%)				0	0	0						
Queuing Penalty (veh)				0	0	0						
Storage Bay Dist (ft)	225			600			325		350	350		
Storage Blk Time (%)		4			1	9						
Queuing Penalty (veh)		0			5	1						

Intersection: 7: US 258/Rt 10 (Benns Church Boulevard) & Proposed Secondary Entrance

Movement	WB	NB
Directions Served	R	T
Maximum Queue (ft)	92	1
Average Queue (ft)	27	0
95th Queue (ft)	71	1
Link Distance (ft)	1244	3192
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Zone Summary

Zone wide Queuing Penalty: 50

Intersection: 1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LT	R	L	T	T	R	L	T	T	R
Maximum Queue (ft)	73	68	201	106	71	292	313	86	105	271	296	64
Average Queue (ft)	25	19	97	33	11	133	141	18	35	143	155	8
95th Queue (ft)	60	50	173	77	53	243	258	62	75	247	267	45
Link Distance (ft)	277	277	1172	1172		663	663			1895	1895	
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)					200			350	275			325
Storage Blk Time (%)					0	2	0	0		0	0	0
Queuing Penalty (veh)					0	0	0	0		0	0	0

Intersection: 2: US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive

Movement	EB	EB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	L	T	TR	L	T	T	R
Maximum Queue (ft)	28	48	63	99	114	5	148	184	24
Average Queue (ft)	3	8	21	16	29	0	31	40	2
95th Queue (ft)	15	28	50	62	89	2	95	119	12
Link Distance (ft)	1824	1824		1925	1925		663	663	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)			250			150			235
Storage Blk Time (%)							0	0	
Queuing Penalty (veh)							0	0	

Intersection: 3: US 258/Rt 10 (Benns Church Boulevard) & Turner Drive

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	T	R
Maximum Queue (ft)	334	271	160	125	449	404	86	387	408	275
Average Queue (ft)	158	123	66	121	253	194	7	218	221	119
95th Queue (ft)	277	231	130	135	427	351	41	344	361	269
Link Distance (ft)	1442		648		1065	1065		1925	1925	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)		300		125			125			275
Storage Blk Time (%)	0	0		39	25		0	24	3	0
Queuing Penalty (veh)	2	1		155	75		0	2	9	2

Intersection: 4: US 258/Rt 10 (Benns Church Boulevard) & Proposed Main Entrance

Movement	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	U	T	T	R	L	T	T
Maximum Queue (ft)	176	142	144	98	224	217	54	104	185	207
Average Queue (ft)	101	50	67	16	130	119	22	45	78	99
95th Queue (ft)	154	114	120	63	197	184	49	87	155	177
Link Distance (ft)	816	816	816		636	636			1065	1065
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)				125			300	300		
Storage Blk Time (%)				0	5	0				
Queuing Penalty (veh)				0	1	0				

Intersection: 5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)

Movement	WB	WB	NB	NB	SB	SB
Directions Served	R	R	T	T	L	L
Maximum Queue (ft)	170	163	97	101	239	279
Average Queue (ft)	56	47	46	50	125	156
95th Queue (ft)	118	109	84	87	196	233
Link Distance (ft)	1008	1008	2766	2766		3192
Upstream Blk Time (%)						
Queuing Penalty (veh)						
Storage Bay Dist (ft)					300	
Storage Blk Time (%)					0	0
Queuing Penalty (veh)					0	0

Intersection: 6: Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	R	LT	R	R	LT	R
Maximum Queue (ft)	76	346	351	238	237	217	4	14	230	197	47	48
Average Queue (ft)	8	172	193	116	38	31	0	1	139	77	10	12
95th Queue (ft)	44	308	318	191	147	129	4	7	208	174	34	37
Link Distance (ft)		1008	1008		785	785		858			565	565
Upstream Blk Time (%)												
Queuing Penalty (veh)												
Storage Bay Dist (ft)	225			600			325		350	350		
Storage Blk Time (%)	0	4				0						
Queuing Penalty (veh)	0	0				0						

Intersection: 7: US 258/Rt 10 (Benns Church Boulevard) & Proposed Secondary Entrance

Movement	WB	SB
Directions Served	R	T
Maximum Queue (ft)	50	3
Average Queue (ft)	16	0
95th Queue (ft)	39	3
Link Distance (ft)	1244	636
Upstream Blk Time (%)		
Queuing Penalty (veh)		
Storage Bay Dist (ft)		
Storage Blk Time (%)		
Queuing Penalty (veh)		

Network Summary

Network wide Queuing Penalty: 247

Intersection: 1: US 258/Rt 10 (Benns Church Boulevard) & Canteberry Lane

Movement	EB	EB	WB	WB	NB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LT	R	L	T	T	R	L	T	T	R
Maximum Queue (ft)	226	85	156	139	277	532	552	294	201	525	364	52
Average Queue (ft)	108	29	70	57	62	292	304	41	88	219	218	22
95th Queue (ft)	200	64	131	110	190	500	509	176	164	425	341	42
Link Distance (ft)	277	277	1172	1172		663	663			1895	1895	
Upstream Blk Time (%)	0					0	0			0		
Queuing Penalty (veh)	0					0	1			0		
Storage Bay Dist (ft)					200			350	275			325
Storage Blk Time (%)						22	8		0	3	1	
Queuing Penalty (veh)						13	11		0	4	1	

Intersection: 2: US 258/Rt 10 (Benns Church Boulevard) & Cypress Run Drive

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	T	T	R
Maximum Queue (ft)	211	134	24	187	142	152	153	170	86
Average Queue (ft)	104	47	2	89	38	53	51	57	22
95th Queue (ft)	212	101	13	156	97	110	128	134	61
Link Distance (ft)	1824	1824	1402		1925	1925	663	663	
Upstream Blk Time (%)									
Queuing Penalty (veh)									
Storage Bay Dist (ft)				250				235	
Storage Blk Time (%)				0			0		
Queuing Penalty (veh)				0			0		

Intersection: 3: US 258/Rt 10 (Benns Church Boulevard) & Turner Drive

Movement	EB	EB	WB	NB	NB	NB	SB	SB	SB	SB
Directions Served	LT	R	LTR	L	T	TR	L	T	T	R
Maximum Queue (ft)	132	107	35	217	242	239	84	210	213	78
Average Queue (ft)	60	49	4	109	123	121	25	80	81	21
95th Queue (ft)	111	93	22	192	234	230	62	159	162	57
Link Distance (ft)	1442		648		1065	1065		1925	1925	
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)		300		125			125			275
Storage Blk Time (%)				8	6		0	2	0	
Queuing Penalty (veh)				61	14		0	1	0	

Intersection: 4: US 258/Rt 10 (Benns Church Boulevard) & Proposed Main Entrance

Movement	WB	WB	WB	NB	NB	NB	NB	SB	SB	SB
Directions Served	L	L	R	U	T	T	R	L	T	T
Maximum Queue (ft)	214	187	183	92	448	445	210	198	192	204
Average Queue (ft)	127	86	85	11	264	258	47	112	76	92
95th Queue (ft)	193	175	151	54	412	405	129	181	151	165
Link Distance (ft)	816	816	816		636	636			1065	1065
Upstream Blk Time (%)										
Queuing Penalty (veh)										
Storage Bay Dist (ft)				125			300	300		
Storage Blk Time (%)					23	5			0	
Queuing Penalty (veh)					3	10			0	

Intersection: 5: US 258/Rt 10 (Benns Church Boulevard) & 258/Rt 32 (Brewers Neck Boulevard)

Movement	WB	WB	NB	NB	SB	SB	SB
Directions Served	R	R	T	T	L	L	T
Maximum Queue (ft)	575	610	122	142	142	159	8
Average Queue (ft)	265	272	59	71	74	96	0
95th Queue (ft)	531	551	104	119	124	146	6
Link Distance (ft)	1008	1008	2766	2766		3192	3192
Upstream Blk Time (%)							
Queuing Penalty (veh)							
Storage Bay Dist (ft)					300		
Storage Blk Time (%)							
Queuing Penalty (veh)							

Intersection: 6: Queen Annes Court & 258/Rt 32 (Brewers Neck Boulevard)

Movement	EB	EB	EB	WB	WB	WB	WB	NB	NB	NB	SB	SB
Directions Served	L	T	TR	L	T	T	R	LT	R	R	LT	R
Maximum Queue (ft)	43	352	356	516	722	768	242	34	164	105	46	50
Average Queue (ft)	9	189	201	247	245	262	17	5	75	18	8	7
95th Queue (ft)	31	315	319	406	630	673	152	21	134	64	30	30
Link Distance (ft)		1008	1008		785	785		858			565	565
Upstream Blk Time (%)				0	0	1						
Queuing Penalty (veh)				0	0	0						
Storage Bay Dist (ft)	225			600			325		350	350		
Storage Blk Time (%)		5			2	10						
Queuing Penalty (veh)		1			11	2						

Intersection: 7: US 258/Rt 10 (Benns Church Boulevard) & Proposed Secondary Entrance

Movement	WB
Directions Served	R
Maximum Queue (ft)	101
Average Queue (ft)	29
95th Queue (ft)	72
Link Distance (ft)	1244
Upstream Blk Time (%)	
Queuing Penalty (veh)	
Storage Bay Dist (ft)	
Storage Blk Time (%)	
Queuing Penalty (veh)	

Network Summary

Network wide Queuing Penalty: 132

APPENDIX L

Signal Justification Reports

VHB
Virginia Beach, VA
TRAFFIC ENGINEER

VDOT Signal Justification Report (SJR)
Hampton Roads District

Date: 12/16/2019

I. Study Intersection

Major Street Route # and Name: US 258/Rt 10 (Benns Church Boulevard) **Direction:** North/South
Minor Street Route # and Name: Sweet Grass Main Entrance **Direction:** East/West
County or Locality: Isle of Wight County
Intersection on Arterial Preservation Network (APN)? No
If on APN, type of APN Corridor? N/A
Sketch/Diagram/Aerial of the Intersection Geometry: See Attached.

Describe the Origin and Nature of Request. If this SJR is based on a recommendation from another study (e.g. Traffic Impact Analysis or Safety Study), then note the name/date of the study and attach the study to this SJR.
Sweetgrass is an undeveloped parcel located at 14096 Benns Church Boulevard in Isle of Wight County. The parcel is on the northeast side of Route 10 (Benns Church Boulevard) between Route 32 (Brewers Neck Boulevard) and Canteberry Lane. Ryan Homes is planning a development of single family and multi-family residential units as well as a public park, and shopping center, with a fast food restaurant, on this parcel.
Traffic Impact Analysis has been prepared by VHB, and a traffic signal is recommended at the proposed main entrance into the development. The SJR is required for the proposed signal. The Sweetgrass TIA is attached to this report.

If the origin of this SJR comes from another study, what were the key conclusions from that study that are related to this intersection?
The origin of this SJR came from the attached Sweetgrass TIA. The following conclusions came from the TIA:

- Construct northbound right turn lane (200’ storage plus 200’ taper) into right in/right out Proposed Secondary Entrance off of US 258/Rt 10 (Benns Church Boulevard).
- Construct northbound right turn lane (200’ storage plus 200’ taper) into Proposed Main Entrance off of US 258/Rt 10 (Benns Church Boulevard).
- Lengthen southbound left turn lane to provide 200’ storage plus 200’ taper into Proposed Main Entrance off of US 258/Rt 10 (Benns Church Boulevard).
- Install traffic signal at intersection of US 258/Rt 10 (Benns Church Boulevard) and Proposed Main Entrance.

II. Signal Warrant Analysis Summary

Intersection Approach Information:

Approach Direction	Road Name/Route Number	Approach Speed	Approach Speed Type	Approach Speed Notes[1]	Number of Through Lanes	Annual Average Daily Traffic (AADT)
Northbound	US 258/Rt 10 (Benns Church Boulveard)	45 MPH	Posted Speed Limit	none	2	25,000 vpd[2]
Southbound	US 258/Rt 10 (Benns Church Boulveard)	45 MPH	Posted Speed Limit	none	2	
Eastbound	N/A	N/A	N/A	N/A	N/A	N/A
Westbound	Proposed Main Entrance	25 mph	Proposed Posted Speed Limit	none	0	5,206 vpd[3]

[1] If approach speed type is not the posted/statutory speed limit, explain the reason why the posted/statutory speed limit was not used.
[2] Source: VDOT 2017 Daily Traffic Volume Estimates (AADT) Jurisdiction Report.
[3] Source: Sweetgrass t TIA trip generation.

Summary of Traffic Count Source:
Thirteen-hour turning movement counts (TMC), were collected from 6 AM to 7 PM using Miovision video on a typical, non-holiday weekday (Thursday, April 26th, 2018). These counts consisted of vehicular turning movements and pedestrian crossings at each approach. The 13-hour TMC is summarized in 15-minute intervals and is included in the attached signal warrant analysis.

Summary of MUTCD Signal Warrant Analysis:

MUTCD Signal Warrants	Warrant Satisfied?	Notes / Summary
Warrant 1: Eight-Hour Vehicular Volume	☐ Yes ☐ No ☐ N/A	
Warrant 1: VDOT ADT Option[1]	☒ Yes ☐ No ☐ N/A	Projected volumes: Mainline -32,315 vpd Minor Street (1-direction) – 5,206 vpd (see graphic on page 4 for site generated traffic that was added to existing mainline ADT). See information on following pages.
Warrant 2: Four-Hour Vehicular Volume	☒ Yes ☐ No ☐ N/A	Numerical requirements for Warrant 2 are met. See attached signal warrant analysis for details.
Warrant 3: Peak Hour[2]	☒ Yes ☐ No ☐ N/A	Numerical requirements for Warrant 3 are met. See attached signal warrant analysis for details.
Warrant 4: Pedestrian Volume	☐ Yes ☒ No ☐ N/A	Pedestrian activity is minimal at this study intersection.
Warrant 5: School Crossing	☐ Yes ☐ No ☒ N/A	Click or tap here to enter text.
Warrant 6: Coordinated Signal System	☐ Yes ☒ No ☐ N/A	Upstream signal has no coordination.
Warrant 7: Crash Experience	☐ Yes ☐ No ☒ N/A	Click or tap here to enter text.
Warrant 8: Roadway Network	☐ Yes ☐ No ☒ N/A	Click or tap here to enter text.
Warrant 9: Intersection Near a Grade Crossing	☐ Yes ☐ No ☒ N/A	Click or tap here to enter text.

Are the signal warrant analyses based on current volumes or anticipated future volumes?
☐ Current volumes ☒ Anticipated future volumes/conditions

If the signal warrant is only met under future conditions, provide a summary of trip generation assumptions and anticipated development thresholds that will trigger the signal being justified:
Signal warrants were met based on the forecasted volumes with the development being at full buildout in 2026. Traffic that may be generated by the proposed development was established using equations and rates available through the Institute of Transportation Engineer's (ITE) Trip Generation, 10th Edition.

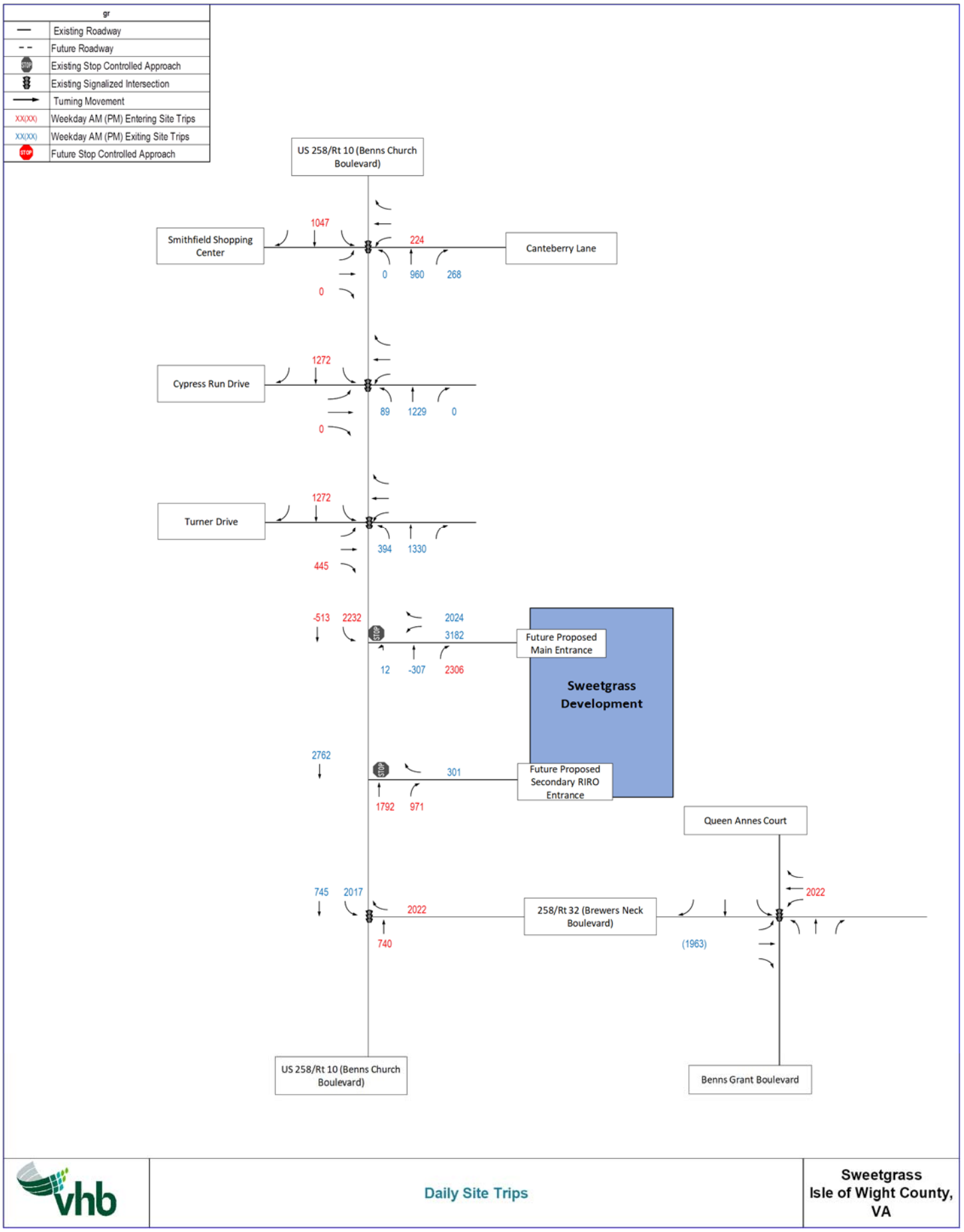
Trip generation for the site was prepared for each individual land use. ITE provides information for single-family detached housing (Land Use 210), low-rise multi-family housing (Land Use 220), public park (Land Use 411), shopping center (Land Use Code 820) and fast food with drive-through (Land Use 934).
The types of commercial development are unknown at this time, so shopping center was used. Pass-by trips to/from fast food restaurant were considered at 49% rate and pass-by trips to/from the shopping center were considered at 34% rate.
Summary of all future site trips are presented in the following tables and graphic.
Based on 70% reduction for speeds over 40 mph, a signal is warranted when the development is 43% complete.

Land Use	ITE Code	Size	Units	Daily	AM Peak Hour			PM Peak Hour		
					Enter	Exit	Total	Enter	Exit	Total
Conceptual Site Plan										
Single-Family Detached Housing	210	400	Dwelling Units	3,776	74	222	296	249	147	396
Multifamily Housing (Low-Rise)	220	285	Dwelling Units	2,144	30	101	131	101	59	160
Public Park	411	4	Acres	91	0	0	0	13	10	23
Shopping Center	820	30	1000 Sq. Ft. GLA	2,651	17	11	28	107	116	223
Fast Food with Drive-Thru	934	5	1000 Sq. Ft. GLA	2,355	102	99	201	85	78	163
Subtotal				**11,017**	**223**	**433**	**656**	**555**	**410**	**965**
Pass-by Trips (Fast Food only)	49%		% Pass-by	1,154	50	49	98	42	38	80
Pass-by Trips (Shopping Center)	34%		% Pass-by	901	6	4	10	36	39	76
Total New Trips				**8,962**	**167**	**380**	**548**	**477**	**333**	**809**

Reference: Trip Generation, 10th Edition, Institute of Transportation Engineers, Washington, DC. 2017.
Note: Used highest total between average rate and fitted curve unless R2<0.75

Land Use	ITE Code	Size	Units	Daily		
				Enter	Exit	Total
Conceptual Site Plan						
Single-Family Detached Housing	210	400	Dwelling Units	1888	1,888	3,776
Multifamily Housing (Low-Rise)	220	220	Dwelling Units	1072	1,072	2,144
Public Park	411	4	Acres	46	45	91
Shopping Center	820	30	1000 Sq. Ft. GLA	1326	1,325	2,651
Fast Food with Drive-Thru	934	5	1000 Sq. Ft. GLA	1177	1,178	2,355
Subtotal				**5,509**	**5,508**	**11,017**
Pass-by Trips (Fast Food only)	49%		% Pass-by	577	577	1,154
Pass-by Trips (Shopping Center)	34%		% Pass-by	451	450	901
Total New Trips				**4,481**	**4,481**	**8,962**

Reference: Trip Generation, 10th Edition, Institute of Transportation Engineers, Washington, DC. 2017.
Note: Used highest total between average rate and fitted curve unless R2<0.75



Daily Site Trips

Sweetgrass
Isle of Wight County, VA

III. VJuST Innovative Intersection Consideration

Summary of Potentially Feasible Innovative Intersections according to VJuST results:

Innovative Intersection Type	Feasibility Decision and Reason
Roundabout	Is a roundabout feasible? ☐ Yes ☒ No Explanation: The roundabout design was found to exceed capacity in both the AM and PM 2026 Build Condition. Additionally, the subject intersection is located on the major roadway (US 258/Rt 10 (Benns Church Boulevard) were the posted speed limit is 45 MPH. The mainline approach speeds would need to be slowed to 25-30mph to facilitate the roundabout. Slowing traffic down on northbound and southbound approaches, roundabout installation would be impractical and can potentially create a bottleneck on US 258/Rt 10.
All Innovative Intersection Designs Example: Median U-Turn	Is this Innovative Intersection type feasible? ☐ Yes ☒ No Explanation: The space needed for a continuous green tee is anticipated to exceed the available median storage width and would require the removal of the northbound U-turn. Additionally it is anticipated the west parcel will be developed soon and a green-t would restrict access to the parcel as well as pedestrian activity between Sweetgrass and the future development. The spacing between Turner Drive and the proposed signal is just over 1,000 feet. The signalized locations of the displaced lefts or median U-turn would be placed with the influence of the intersection at Turner Drive. In the case of the median u-turn the median opening for the displaced southbound lefts would fall within the vicinity of the secondary right in/right out access which would create undesirable weaving movement conflicts.

IV. Intersection Configuration and Control Recommendations and Signal Justification

Intersection Configuration and Control Recommendations:

This engineering study examined traffic signal warrants using existing volumes and Sweetgrass development trip generation at the intersection of US 258/Rt 10 (Benns Church Boulevard) & Proposed Main Entrance into the development in Isle of Wight County, VA. It is important to note that the satisfaction of a traffic signal warrant or warrants shall not in itself require the installation of a traffic control signal. Engineering judgement should also be used in the evaluation of the warrants to ensure that a traffic control signal will improve the overall safety and/or operation of the intersection. The analysis showed that the traffic volume warrants (Warrants 1, 2 and 3) are met at the 70% and 100% thresholds defined by the MUTCD.

Left turn lanes (200’ storage with 200’ taper) and right turn lanes (200’ storage with 200’ taper) are required on US 258/Rt 10 (Benns Church Boulevard). The Proposed Main Entrance should have a single-entry lane and three exit lanes (dual lefts and an exclusive right).

Signal Justification:

The signal is recommended in this location based on the projected volumes. US 258/Rt 10 (Benns Church Boulevard) has heavy through volumes with posted speed limit of 45 mph. Left-turns onto the roadway out of the proposed development will be almost impossible without the proposed signal. The capacity analysis has shown that the intersection will operate acceptably with a minimum impact on the adjacent transportation network with signal installation in this location.

V. Approvals

Signal Justification Report Approvals:

District Traffic Engineer (DTE): Required for all SJRs

☐ Concur ☐ Do Not Concur

_____	_____	_____
Name	Signature	Date

Comments:

_____

_____

_____

_____

District Engineer/Administrator (DE/DA): Only required if SJR recommends a proposed signal on the APN

☐ Concur ☐ Do Not Concur

_____	_____	_____
Name	Signature	Date

Comments:

_____

_____

_____

_____

State Traffic Engineer (STE): Only required if SJR recommends a proposed signal on the APN

☐ Approved ☐ Denied

_____	_____	_____
Name	Signature	Date

Comments:

_____

_____

_____

_____

If additional comments are necessary, please attach the comments on another sheet.

Appendix A:
Signal Warrant Analysis

Traffic Signal Warrant Analysis

This report details the findings of a traffic signal warrant analysis on the US 258/Rt 10 (Benns Church Boulevard) & Proposed Main Entrance intersection, to determine whether a signal would be warranted for the opening day build year, 2026, of the Sweetgrass Development.

Evaluation of the need for a traffic signal at an intersection requires the examination of various factors such as traffic volumes, traffic flow and progression, and overall safety of the intersection to determine if a traffic signal would be warranted. Each of these elements is described below.

Methodology

Signal warrant analyses were performed following the procedures outlined in the 2009 edition of the Manual of Uniform Traffic Control Devices (MUTCD). Existing peak hour turning movement counts were collected at the study intersection and were used for this warrant analysis.

The traffic conditions of the intersection in the build year, 2026, were derived from a composition of existing turning movement volumes and a distribution of site trips from the Sweetgrass Development. The extent of signal warrant of the future conditions is limited by the data derived from the traffic forecast which includes only morning and evening peak hours and two additional hours, that were selected based on land uses that generate the highest traffic volumes: single-family detached housing, multifamily housing (low-rise) and fast-food restaurant.

Warrant Analysis Results

Warrant 1 – Eight Hour Vehicular Volume

Warrant 1, Eight-Hour Vehicular Volume, consists of two separate warrants; Warrant 1A-Minimum Vehicular Volume and Warrant 1B-Interruption of Continuous Traffic. The Minimum Vehicular Volume warrant is intended for use at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic signal. The Interruption of Continuous Traffic warrant is intended for use at locations where Warrant A is not satisfied and where the volume of traffic on a major street is so heavy that traffic on a minor intersecting street suffers excessive delay when attempting to cross or enter the major street. Warrant 1 is intended to be used as a single warrant; if Warrant A is met and Warrant B is not met, a traffic signal is warranted. Conversely, if Warrant A is not met and Warrant B is met, a traffic signal is still warranted.

Since this is a proposed entrance, VDOT's Traffic Signal Warrant Using Average Daily Traffic Estimate for the Virginia Supplement to the MUTCD was used. The future traffic projections at the US 258/Rt 10 (Benns Church Boulevard) & Proposed Main Entrance intersection were developed using the daily trip generation and distribution patterns shown in the TIA. The daily trip projections and associated site traffic are shown in the following table and figure respectively. For the signal warrant, the projected site trips on US 258/Rt 10 (Benns Church Boulevard) were added to the 2017 VDOT AADT of 25,000 vpd projected to Opening Day 2026 AADT of 28,585 vpd.

Land Use	ITE Code	Size	Units	Daily		
				Enter	Exit	Total
Conceptual Site Plan						
Single-Family Detached Housing	210	400	Dwelling Units	1888	1,888	3,776
Multifamily Housing (Low-Rise)	220	220	Dwelling Units	1072	1,072	2,144
Public Park	411	4	Acres	46	45	91
Shopping Center	820	30	1000 Sq. Ft. GLA	1326	1,325	2,651
Fast Food with Drive-Thru	934	5	1000 Sq. Ft. GLA	1177	1,178	2,355
Subtotal				**5,509**	**5,508**	**11,017**
Pass-by Trips (Fast Food only)	49%		% Pass-by	577	577	1,154
Pass-by Trips (Shopping Center)	34%		% Pass-by	451	450	901
Total New Trips				**4,481**	**4,481**	**8,962**

Reference: Trip Generation, 10th Edition, Institute of Transportation Engineers, Washington, DC. 2017.
Note: Used highest total between average rate and fitted curve unless R2<0.75

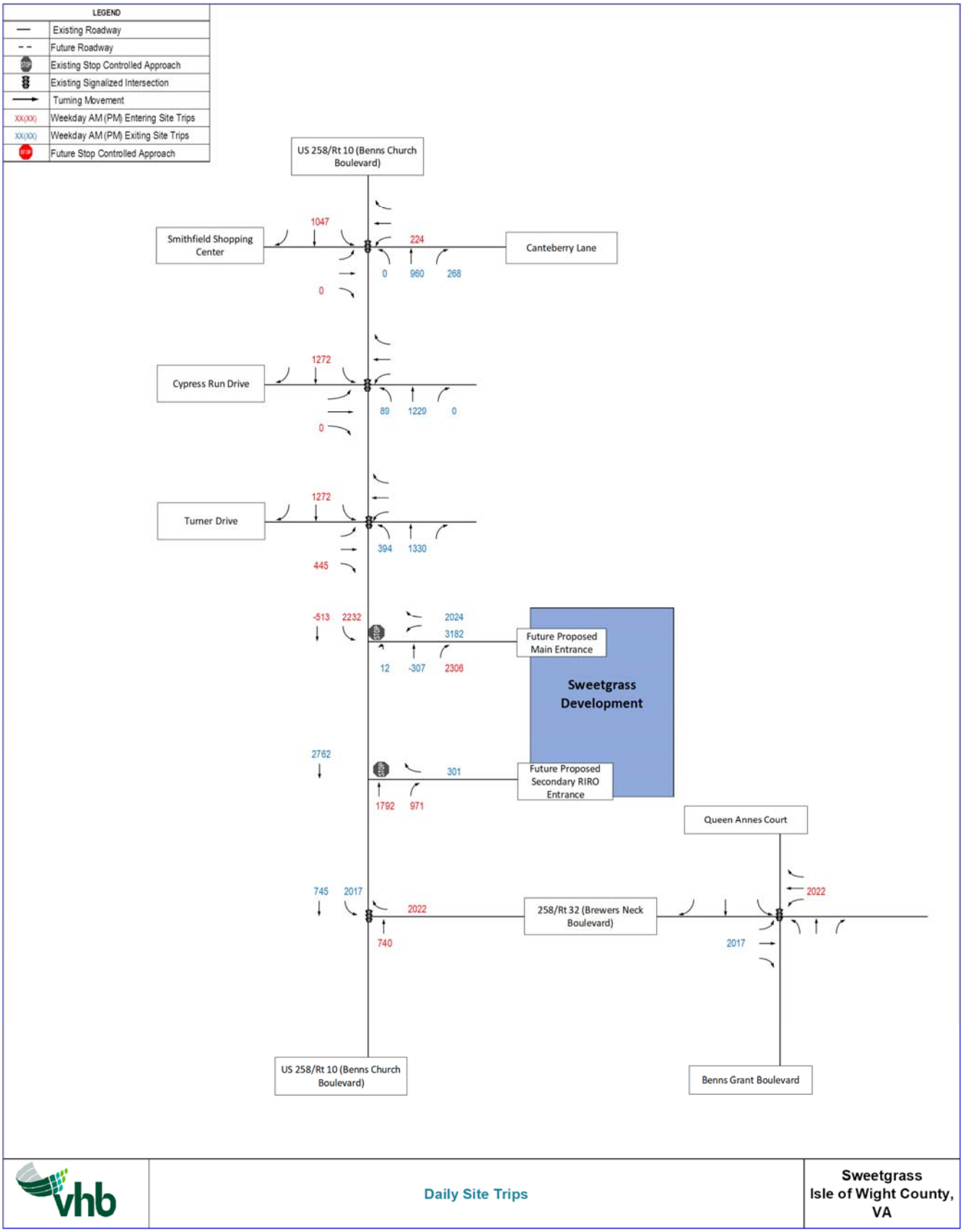

LEGEND
Existing Roadway
Future Roadway
Existing Stop Controlled Approach
Existing Signalized Intersection
Turning Movement
XX(XX) Weekday AM (PM) Entering Site Trips
XX(XX) Weekday AM (PM) Exiting Site Trips
Future Stop Controlled Approach
US 258/Rt 10 (Benns Church Boulevard)
Smithfield Shopping Center
Canteberry Lane
1047
224
0
960
268
0
Cypress Run Drive
1272
89
1229
0
0
Turner Drive
1272
394
1330
445
-513
2232
2024
3182
12
-307
2306
Future Proposed Main Entrance
Sweetgrass Development
2762
301
1792
971
Future Proposed Secondary RIRO Entrance
Queen Annes Court
745
2017
2022
2022
740
258/Rt 32 (Brewers Neck Boulevard)
2022
2017
US 258/Rt 10 (Benns Church Boulevard)
Benns Grant Boulevard
Daily Site Trips
Sweetgrass
Isle of Wight County, VA

Table 1: Future Conditions – Warrant 1 Condition A Summary

Number of Lanes		Vehicles per day on major street (total of both approaches)					Vehicles per day on minor street (total of both approaches)				
Major	Minor	100%	80%	70%	56%	Projected	100%	80%	70%	56%	Projected
2 or more	2 or more	9600	7680	6720	5376	32315	3200	2560	2240	1792	5206

Proposed signal warranted when development is: 43%

Warrant 1 is satisfied. The signal is projected to be warranted when the development is 43% built out with the 70% reduction due to the speed limit along the corridor.

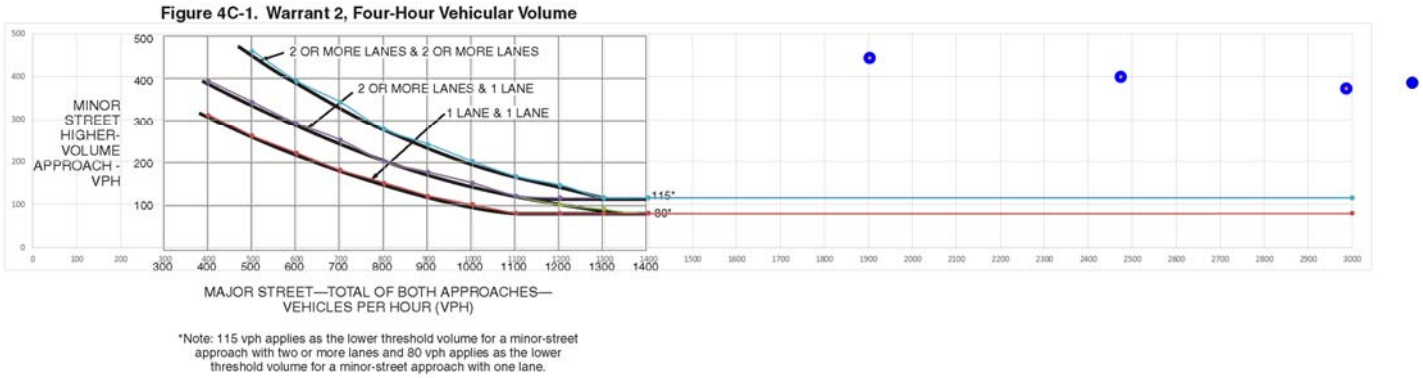
Warrant 2 – Four Hour Vehicular Volume

Warrant 2, Four-Hour Vehicular Volume, is intended for use at locations where a large volume of intersecting traffic is the principal reason to consider installing a traffic signal. A traffic signal is warranted based on Warrant 2 if "the plotted points representing the vehicles per hour on the major street and the minor street fall above the applicable curve."

Considering the two highest peak hours in terms of traffic volume at the study intersection the following figure shows that both, AM and PM peak hours, as well as additional two hours, would exceed the threshold of the Warrant. Based on the future land uses, it is expected that four hours would meet the minimum threshold volumes of the warrant.

Figure 1: 2026 Build Conditions Warrant 2

Time	Major Street (vph)	Minor Street (vph)
7:00 AM to 8:00 AM	2474	399
12:00 PM to 1:00 PM	1903	444
4:00 PM to 5:00 PM	3271	388
4:30 PM to 5:30 PM	2988	372



Warrant 2 is satisfied.

Warrant 3 – Peak Hour

Warrant 3, Peak Hour, "is intended for use at a location where traffic conditions are such that for a minimum of 1 hour of an average day, the minor-street traffic suffers undue delay when entering or crossing the major street." The Peak Hour warrant is met when "the plotted point representing the vehicles per hour on the major street and the minor street for one hour fall above the applicable curve" or based on the following conditions:

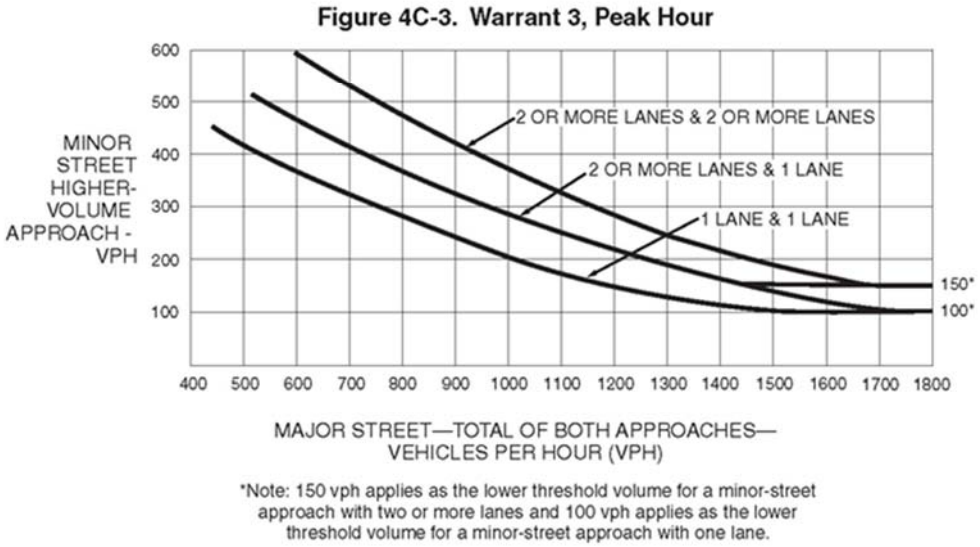
a) The total stopped time delay experienced by the traffic on one minor-street approach controlled by a stop sign equals or exceeds: 4 vehicle-hours for a one-lane approach; or 5 vehicle-hours for a two-lane approach, and

b) The volume on the same minor-street approach equals or exceeds 100 vehicles per hour for one lane or 150 vehicles per hour for two lanes, and

c) The total entering volume during the hour meets or exceeds 650 vehicles per hour for intersections with three approaches or 800 vehicles per hour for intersections with four or more approaches.

Figure 2: 2026 Build Conditions Warrant 3

Time	Major Street (vph)	Minor Street+ (vph)
7:00 AM to 8:00 AM	2474	336
4:30 PM to 8:00 AM	2988	352



As shown in Figure 2, both AM and PM peak hours fall above the curve for the geometric combination of 2 or more lanes on both the major and minor roadways.

Warrant 3 is satisfied.

Warrant 4 – Pedestrian Volume

Warrant 4, Pedestrian Volume, is intended for use at locations where the volume of traffic on the major street is so heavy that pedestrians experience significant delay or conflict when attempting to cross the major street. Warrant 4 is satisfied when "the pedestrian volume crossing the major street at an intersection during an average day is: 100 or more for each of any four hours; or 190 or more during any one hour."

Currently, there are no existing pedestrian sidewalks in the area of the study. It is not expected that the development will generate the pedestrian volumes levels required to satisfy the warrant due to the rural nature of the surrounding area.

Warrant 4 is not satisfied.

Warrant 5 – School Crossing

Warrant 5, School Crossing, is intended for use at locations “where the fact that school children cross the major street is the principal reason to consider installing a traffic control signal.” For the purposes of this warrant, the word "schoolchildren" includes elementary through high school students.

Warrant 5 is not applicable because there are no school crossings near the subject intersection.

Warrant 5 is not satisfied.

Warrant 6 – Coordinated Signal System

Warrant 6, Coordinated Signal System, is satisfied when “on a two-way street, adjacent signals do not provide the necessary degree of platooning and speed control and the proposed and adjacent signals could constitute a progressive signal system.”

A signal at Proposed Main Entrance would not help traffic platooning since the signal located at Turner Road is not coordinated.

Warrant 6 is not satisfied.

Warrant 7 – Crash Experience

Warrant 7, Crash Experience, is intended for use at locations where “the severity and frequency of crashes are the principal reasons to consider installing a traffic control signal.” A traffic signal is warranted based on Warrant 7 if the following criteria are met:

a) Adequate trial of alternatives with satisfactory observance and enforcement has failed to reduce the crash frequency; and
b) Five or more reported crashes, of types susceptible to correction by a traffic signal, have occurred within a 12-month period, each crash involving personal injury or property damage exceeding the applicable requirements for a reportable crash.

Due to the lack of crash data, we were unable to evaluate the severity and frequency of crashes at the intersection.

Warrant 7 is not satisfied.

Warrant 8 – Roadway Network

Warrant 8, Roadway Network, is intended when the proposed traffic signal will encourage concentration and traffic flow organization on a given roadway network. This Warrant is intended for location where two major routes meet or where traffic volumes exceed 1000 vehicles per hour.

Warrant 8 is not applicable because the minor street is an entrance into the development and is not a major roadway.

Warrant 8 is not satisfied.

Warrant 9 – Intersection Near a Grade Crossing

Warrant 9, Intersection Near a Grade Crossing, is intended for "use at a location where none of the conditions described in the other eight traffic signal warrants are met, but the proximity to the intersection of a grade crossing on an intersection approach controlled by a STOP or YIELD sign is the principal reason to consider installing a traffic control signal."

Warrant 9 is not applicable.

Warrant 9 is not satisfied.

Conclusions

Warrant Analysis Conclusions

This engineering study examined traffic signal warrants at the intersection of US 257/Rt 10 (Benns Church Boulevard) and the Proposed Main entrance. The analysis showed that the traffic volume warrants (Warrants 1, 2 and 3) are met at the 70% and 100% thresholds defined by the MUTCD. The warrant is based on projected traffic volumes as well as volumes generated by the development, calculated based on available traffic data from 10th edition of ITE Trip Generation Manual.

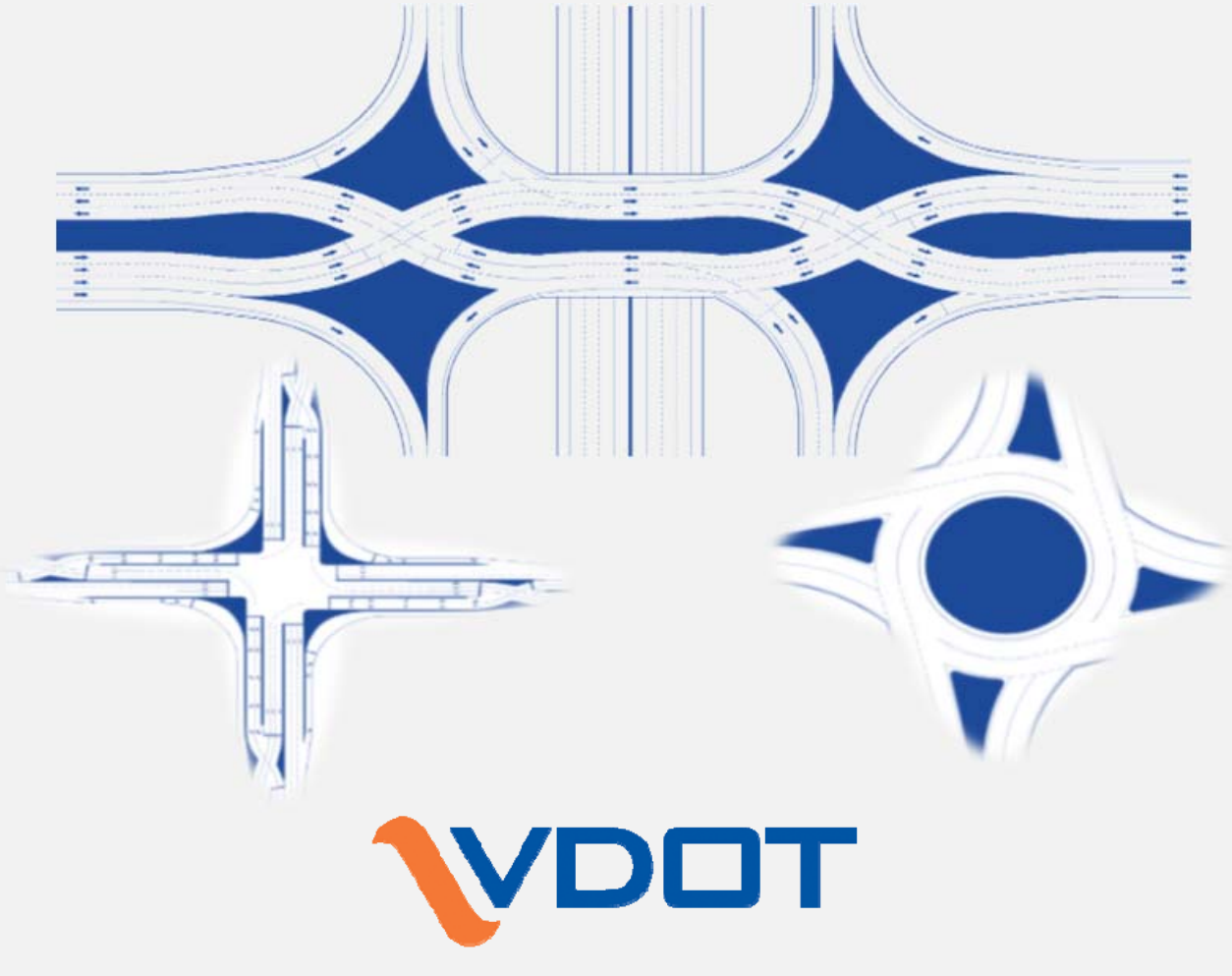
Appendix B:
VJuST Input and Results Worksheets

VJuST

VDOT Junction Screening Tool

Version 1.02
June 2018

View Disclaimer



VDOT

Modified from FHWA's Capacity Analysis for Junctions (CAP-X)

To Download the latest version of VJuST please go to: http://www.virginiadot.org/innovativeintersections
For Technical Support or Help please email: vjustsupport@vdot.virginia.gov

DISCLAIMER & ACKNOWLEDGMENTS

DISCLAIMER ACKNOWLEDGMENT

By indicating below, I acknowledge that I have obtained the most up-to-date version of this tool and that I have reviewed the Disclaimer.

Yes

DISCLAIMER FOR USERS OF THE VDOT JUNCTION SCREENING TOOL

The VDOT Junction Screening Tool ("VJuST") is offered to Users strictly for informational and educational purposes. VJuST is provided as-is, without warranty of any kind, express or implied. VDOT and the Commonwealth assume no liability or responsibility for VJuST's content or any Users' use of VJuST's content. VDOT and the Commonwealth do not endorse any course of action or recommendations adopted by Users as a result of using VJuST. By using VJuST, Users covenant not to sue VDOT or the Commonwealth for any effects arising out of or related to Users' use of VJuST. Users agree to hold VDOT and the Commonwealth harmless from any resulting liability from Users' use of VJuST. Users are strictly prohibited from altering, distributing, selling, or marketing VJuST.

The VDOT Junction Screening Tool is a modified or altered version of the CAP-X Software developed by the Federal Highway Administration (FHWA). VDOT's alterations to the CAP-X Software include:

- Seven new intersection and four new interchange configurations
- Two additional metrics (other than congestion):
    1. safety - based on weighted vehicle conflict points and
    2. pedestrians - based on the potential to accommodate pedestrians in terms of safety, wayfinding, and delay
- Enhanced congestion metric that includes consideration of shared lanes and/or channelized right-turn lanes

The following Disclaimer, Limited Warranty and Limitations of Remedies, and Notice apply to CAP-X Software elements within the VDOT Junction Screening Tool:

Disclaimer

The Capacity Analysis for Planning of Junctions (CAP-X) software product is disseminated under the sponsorship of the US Department of Transportation in the interest of information exchange. The United States Government assumes no liability for its content or use thereof. This software product does not constitute a standard, specification, or regulation.

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Notice

The use and testing of the CAP-X software is being done strictly on a voluntary basis. In exchange for the provision of CAP-X software, the user agrees that the Federal Highway Administration, U.S. Department of Transportation, any other agency of the Federal Government or distributor shall not be responsible for any errors, damage or other liability that may result from any and all use of the software, including installation and testing of the software. The user further agrees to hold the FHWA, the Federal Government, and distributor harmless from any resulting liability. The user agrees that this hold harmless provision shall flow to any person to whom or any entity to which the user provides the CAP-X software. It is the user's full responsibility to inform any person to whom or any entity to which it provides the CAP-X software of this hold harmless provision.

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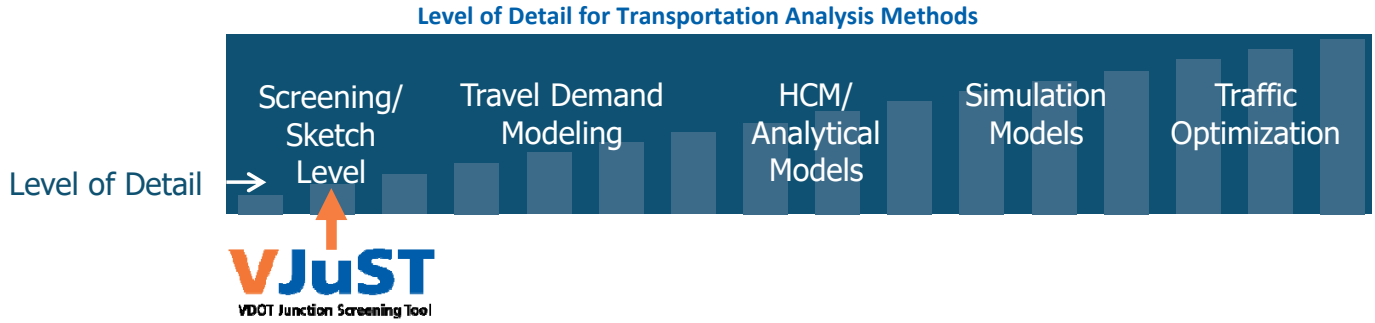
VJuST
VDOT Junction Screening Tool

OVERVIEW OF THE TOOL

BACKGROUND

The Federal Highway Administration (FHWA) Office of Operations Research and Development developed the Capacity Analysis for Planning of Junctions (CAP-X) software to screen innovative intersection and interchange configurations. CAP-X is a sketch-level tool that was created to help users focus on more effective intersection and interchange configurations prior to conducting more demanding traffic simulations. The figure below illustrates the level of detail associated with sketch-level tools in relation to more robust methods.



CAP-X uses the Critical Lane Volume (CLV) method to provide sketch-level capacity assessments for innovative intersection and interchange configurations using peak hour volumes. The CLV method estimates an overall intersection volume-to-capacity ratio assuming the maximum capacity of the intersection is fixed (i.e., no variance in traffic signal timings).

In 2016, the Virginia Department of Transportation (VDOT) altered the CAP-X software for use in determining the congestion component in the SMART SCALE application scoring process. More information about the SMART SCALE process may be found at http://vasmartscale.org/. The VDOT innovative Intersection Committee requested that the CAP-X software tool be modified further for use in screening innovative intersection and interchange configurations in terms of congestion, pedestrians, and safety. Ultimately, the VDOT Innovative Intersection Committee envisions the tool to be useable by local jurisdictions as well as VDOT engineers and planners during the SMART SCALE application process. The tool was renamed to the VDOT Junction Screening Tool and now includes 26 unique intersection and interchange configurations, 15 of which were originally in CAP-X.

PURPOSE

The VDOT Junction Screening Tool is intended to aid transportation engineers and planners in Virginia with considering and screening innovative intersection and interchange configurations that address mobility and safety issues. This sketch-level tool can help identify and screen innovative intersection and interchange configurations to be evaluated for further study, analysis and design. Results are based on user inputs for turning movement volumes and lane configurations. This tool is only applicable to isolated intersections or interchanges; however, the results may be indicative of how an intersection or interchange within a corridor will operate.

The results provided in the VDOT Junction Screening Tool are not meant to replicate the results that would be obtained from more detailed traffic operations, safety, and design analyses. As such, the VDOT Junction Screening Tool is intended to provide information to users that will aid them in the planning, screening, and decision-making processes used to determine which innovative intersection and interchange configurations should move forward to a more detailed analysis.

SCORING SYSTEM

The VDOT Junction Screening Tool provides information to users in three categories: congestion, pedestrians, and safety. Further information on the development of each category is outlined below. This tool does not prioritize any category over another and congestion is the only category dependent on user inputs. It is the user's responsibility to decide how to apply and prioritize the results from this tool.

OVERVIEW OF THE TOOL

Congestion

Volume-to-capacity (V/C) ratio is the primary metric used to reflect congestion when comparing configurations. V/C ratio is calculated using the CLV method with the assumption that the maximum capacity of the intersection is fixed. This calculation is dynamic and is dependent on the volume and lane configuration inputs entered into the VDOT Junction Screening Tool. This calculation does not consider signal timing, geometric, or driver behavior parameters and is not intended to replicate the calculations produced by traffic analysis tools.

The user must verify the number of left-turn, through, and right-turn lanes entered for each innovative intersection or interchange configuration that is considered. Misleading results are possible if lane configurations are inconsistent across similar intersection or interchange configurations. This tool generally does not limit the number of lanes that are assigned to a particular movement. The user should also consider right-of-way (ROW) impacts and/or design requirements for an individual project when assigning lane configurations.

Some of the innovative intersection or interchange configurations are divided into multiple zones, with each zone representing a location with conflicting volumes, such as a signalized intersection or crossover. The CLV method is applied individually for each zone to calculate a V/C ratio. This method determines the maximum volume per lane that must be accommodated during each signal phase and sums the critical phase volumes to determine the overall critical volume that must be accommodated by the zone. A value of 1,600 passenger cars per lane is assumed for the maximum intersection CLV. The calculated CLV for a zone is then divided by the maximum intersection CLV to determine the V/C ratio for that zone. The maximum V/C ratio of all zones that make up an innovative intersection or interchange configuration is summarized in the Results Worksheet. This V/C ratio represents the worst bottleneck in the configuration. The following table from the Highway Capacity Manual (HCM) 2000 may be used to relate the maximum V/C ratio to a description of capacity.

Capacity Description Based on V/C Ratio

V/C Ratio	Description of Capacity
< 0.85	Under capacity
0.85 - 0.95	Near capacity
0.95 - 1.0	At capacity
> 1.0	Over capacity

Source: *Highway Capacity Manual 2010*

Pedestrian

Innovative intersection and interchange configurations were evaluated based on its potential to accommodate pedestrians considering relative impact on pedestrian safety, wayfinding, and delay. The metric developed is a static metric that is not dependent on vehicular volumes, pedestrian volumes, or the number of lanes. The potential to accommodate pedestrians is qualitatively defined as better (+), similar (blank cell), or worse (-) when compared to a conventional intersection or a traditional diamond interchange. The following components were considered in determining this rating:

Safety

- Direction of traffic flow
- Number of vehicle/pedestrian conflicts
- Relative crosswalk lengths

Wayfinding

- Crosswalk alignment

Delay

- Number of crossings for a single movement
- Traffic signal cycle length

OVERVIEW OF THE TOOL

Safety

The relative safety of each innovative intersection or interchange configuration was estimated using a risk analysis based on vehicle conflict points. The three types of conflict points (crossing, merging, and diverging) were weighted based on the calculated average crash cost associated with each conflict point type. The methodology for determining the weighting system is outlined in the Safety Information worksheet. The conflict point diagram, number of conflict points, and the weighted total conflict point metric can be found in the Safety - Conflict Point Diagram section of each lane configuration worksheet.

ASSUMPTIONS

The following assumptions apply to the entire tool. Assumptions for a specific innovative intersection or interchange configuration are listed on the lane configuration worksheet.

- This tool defines an intersection configuration as a junction of two interrupted roadways, regardless of grade separation. This tool defines an interchange configuration as a junction of two roadways where one roadway remains uninterrupted.
- This tool is to be used to screen configurations for isolated intersections only. This tool does not consider adjacent intersections or a series of intersections in a corridor.
- This tool does not assume a base or existing condition. It assumes innovative configurations to be proposed conditions and compares them against each other.

- With the exception of the unsignalized configurations (50 Mini Roundabout, 75 Mini Roundabout, Roundabout, TWSC, Single Roundabout, Double Roundabout), each zone in a configuration is assumed to be signalized.
- Signal timing is not considered as part of CLV methodology.

- The TWSC and roundabout lane configuration worksheets do not use the CLV methodology. These worksheets use the *Highway Capacity Manual* (*HCM*), 6th Edition methodology or methodology established in the article *Determination of Mini-Roundabout Capacity in the United States* to compute the congestion metrics.

- Vehicule volumes, pedestrian volumes, and number of lanes were not considered as part of the pedestrian metric.
- Pedestrian and bicycle conflicts were not considered in the development of the conflict point diagrams.
- The number of lanes was not considered in the development of the conflict point diagrams.
- A default value of 1,600 passenger cars per lane is assumed for the maximum intersection CLV.
- U-turn volumes from the TMCs are treated as left-turns. This tool only analyzes U-turns that are built into an innovative intersection or interchange configuration to remove left-turning traffic from an intersection (e.g., Restricted Crossing U-Turn).
- If a turning movement shares a lane with the through movement, the turning volume is factored by an adjustment factor to convert it to an equivalent through movement. For right turns or left turns with no opposing right-turn and through movements, the turning volume is divided by the left- or right-turn adjustment factor. For left turns with opposing right-turn and through movements, the left-turn volume is instead multiplied by a custom left-turn factor based on the opposing volume.

Custom Left-Turn Factors

Opposing Volume	Custom Factor
< 200	1.1
200 - 599	2
600 - 799	3
800 - 999	4
≥ 1,000	5

Sources: *Guidelines for the Analysis of the Traffic Impact of Development Proposals; City of Frederick - Traffic Impact Study Guidelines*

● If an approach has both a shared through-left lane and an exclusive left-turn lane, this approach and its opposing approach are assumed to operate with split phasing.

● If a movement has both a shared and an exclusive lane, the volume is distributed between the two lanes based on the number of lanes indicated. The proportion of the turning volume that is assigned to the shared lane is divided by the left- or right-turn adjustment factor to convert it to an equivalent through movement. For example, if the northbound movement has a left-turn lane and a shared left-through lane, 50% of the left-turn volume is assigned to each lane.
● If a right-turn movement is channelized with a receiving lane, the right-turn volume is not considered in the CLV calculations for that zone.

● Unless specified with the lane configuration worksheet, right-turn movements are not assumed to be channelized.
● For interchange configurations, it is assumed that no vehicles on the off-ramp make through movements.

LIST OF ABBREVIATIONS

CAP-X	Capacity Analysis of Junctions
CLV	Critical Lane Volume
CGT	Continuous Green-T
DDI	Diverging Diamond Interchange
DLT	Displaced Left Turn
EB	Eastbound
E-W	East-West
FHWA	Federal Highway Administration
HCM	Highway Capacity Manual
Hr	Hour
ICD	Inscribed Circle Diameter
LTAF	Left-Turn Adjustment Factor
MUT	Median U-Turn
MUD	Michigan Urban Diamond
NB	Northbound
N-E	North-East
N-S	North-South
N-W	North-West
Parclo	Partial Cloverleaf
PC/Hr	Passenger Cars Per Hour
PCE	Passenger Car Equivalent
PCPH	Passenger Cars Per Hour
PCL	Partial Cloverleaf
PMUT	Partial Median U-Turn
QR	Quadrant Roadway
RCUT	Restricted Crossing U-Turn
ROW	Right-of-way
RTAF	Right-Turn Adjustment Factor
SB	Southbound
S-E	South-East
S-W	South-West
SPUI	Single Point Urban Interchange
TD	Traditional Diamond
TMC	Turning Movement Count
UTAF	U-Turn Adjustment Factor
V/C	Volume/Capacity
VDOT	Virginia Department of Transportation
Veh/Hr	Vehicles per hour
WB	Westbound

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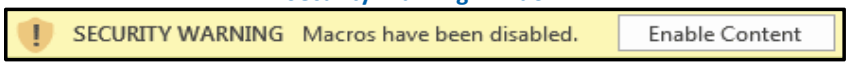
VDOT Junction Screening Tool

INSTRUCTIONS

Upon opening the tool, click the Enable Content button as shown in the security warning window.

Security Warning Window



This tool contains the following worksheets to screen innovative intersection and interchange configurations and report results:

- **Input Worksheet** - the user inputs general project information, traffic volumes, and adjustment factors and to select which innovative intersection and interchange configurations should be considered
- **Lane Configuration Worksheets (29)** - the user inputs lane configurations and calculates the congestion metrics using the Critical Lane Volume (CLV) methodology
- **Results Worksheet** - summarizes the congestion, pedestrian, and safety metrics for the innovative intersection and interchange configurations selected for comparison

The following worksheets are also included for reference and guidance in screening innovative intersection and interchange configurations:

- **Overview** - describes the methodologies used to calculate the congestion, pedestrian, and safety metrics
- **Safety Information** - summarized the process used to develop the conflict point weighting factors used to develop the safety metric
- **Design Considerations** - provides a description of the innovative intersection and interchange configurations and provides guidance on when a configuration should be considered

This tool can be used to screen innovative intersection and interchange configurations following the four steps provided below.

Step 1: Enter Volume Inputs
Step 2: Review and Select Intersection and Interchange Configurations for Comparison
Step 3: Enter Lane Configurations (for each selected worksheet)
Step 4: View and Interpret Results

STEP 1: ENTER VOLUME INPUTS

Input the project title and the names of the east-west roadway facility and the north-south roadway facility. This information will be automatically populated on each subsequent worksheet.

This tool requires the user to input turning movement counts (TMCs) into the yellow cells on the **Input Worksheet** to compare innovative intersection and interchange configurations. The traffic counts may be for the current year or may be projected to a future year. If the TMC includes U-turn volumes separately, then add the U-turn volume to the left-turn volume. This tool does not analyze U-turns unless U-turns are built into an innovative intersection configuration to remove left-turning traffic from an intersection (e.g., Restricted Crossing U-Turn).

Traffic Volume Demand Inputs

Traffic Volume Demand				
Direction	Volume (veh/hr)			Truck Percent (%)
	U-Turn / Left	Thru	Right	
Eastbound	251	276	376	2.00%
Westbound	238	377	111	2.00%
Southbound	644	0	196	2.00%
Northbound	202	0	427	2.00%
Adjustment Factor	0.80 / 0.95		0.85	
Suggested	U - 0.8 / L - 0.95		0.85	
Truck to PCE Factor		Suggested = 2.00		2.00
Critical Lane Volume		1600		

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INSTRUCTIONS

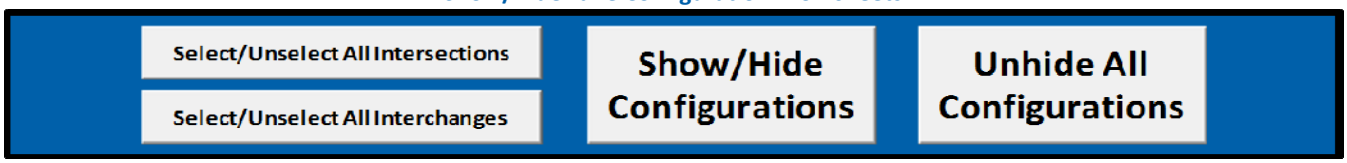
This tool uses adjustment factors to convert turning vehicles to equivalent through vehicles before calculating the CLV. Suggested values for these factors are provided in the tool; however, these values may be changed based on the typical traffic mix, driver behavior, and project location. Input the following factors into the yellow cells:

- Left-turn adjustment factor (LTAF): conversion of protected left- and U-turning vehicles to equivalent through vehicles
- Right-turn adjustment factor (RTAF): conversion of right-turning vehicles to equivalent through vehicles
- U-turn adjustment factor (UTAF): conversion of U-turning vehicles (rerouted through or left-turn movements) to equivalent through vehicles (this factor is only used if U-turns are built into an alternative configuration to remove left-turning traffic from an intersection)
- Truck to passenger car equivalent (PCE) factor: conversion of truck volume to an equivalent passenger car volume. This may be based on the *HCM, 6th Edition* .

STEP 2. REVIEW AND SELECT INTERSECTION AND INTERCHANGE CONFIGURATIONS FOR COMPARISON

Review the list of alternative intersection and interchange configurations included in this tool. Each configuration contains a link to an informational worksheet that provides guidance on when each configuration type should be considered. Indicate with a "Y" any configurations that should be considered. Indicate with an "N" any configurations that should be excluded. Use the **Show/Hide Configurations** button to hide the worksheets for all "N" configurations. The configurations selected for exclusion will also be hidden from the Results Worksheet. The **Unhide All Configurations** button may be used to unhide all worksheets. Additionally, three toggle buttons allow the user to select or unselect all intersections or interchanges. However, these toggle buttons will not hide the respective lane configuration worksheets; the user must still use the **Show/Hide Configurations** button.

Show/Hide Lane Configuration Worksheets



Provide justification by selecting an option in the drop down in the **Input Worksheet** for all alternative intersection and interchange configurations excluded for the screening comparison.

Justification Options

#	Intersections	Information	Consider?	Justification
	Signalized Intersections			
1	Conventional	-	Y	
2	Bowtie	Link	Y	
3	Center Turn Overpass	Link	N	
4	Continuous Green-T	Link	N	
5	Echelon	Link	Y	
6	Full Displaced Left Turn	Link	Y	
7	Median U-Turn	Link	Y	

Not feasible for roadway facility type
Insufficient intersection spacing
Financial constraints identified
Right-of-way restrictions identified
Unable to accommodate traffic patterns
Unable to accommodate magnitude of traffic volumes
Unable to accommodate heavy vehicles
Unable to accommodate alternative transportation modes

STEP 3: ENTER LANE CONFIGURATIONS

Complete the following steps for the intersection and interchange configurations selected for screening in the **Input Worksheet**.

Step 3.1: Answer the directional question (if applicable) **[Input Worksheet]**
Step 3.2: Enter the lane configurations **[Input Worksheet and Lane Configuration Worksheets]**

Step 3.1: Answer the Directional Questions

All asymmetrical configurations contain a question that will associate a direction with a geometric feature in the configuration to correctly reference the TMCs from the **Input Worksheet** to the lane configuration worksheets. These questions are located on the **Input Worksheet** as pictured below.

Example Directional Questions

VDOT Junction Screening Tool

Base Lane Configurations

Before entering a base number of through lanes for each direction, answer the directional question for each intersection or interchange configuration selected for consideration. Navigate to the lane configuration worksheet for example diagrams, if provided.

Intersections	Question	Selection
Bowtie	Select the roadway with the roundabouts from the drop-down list.	EB-WB / NB-SB
Continuous Green-T	Select the direction associated with the "stem" of the T-intersection from the drop-down list. See example diagrams.	
Echelon	Select the approach that shares a zone with the NB approach from the drop-down list. See example diagrams.	

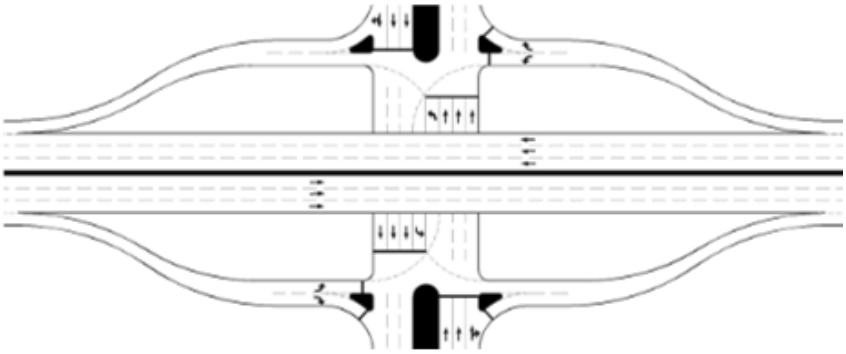
Directional Questions and Options:

- [All interchanges] Select the freeway direction from the drop-down list. EB-WB, NB-SB
- [Continuous Green-T] Select the direction associated with the "stem" of the T-intersection from the drop-down list. NB, SB, EB, WB
- [Partial Displaced Left Turn] Select the roadway with the displaced left turns. EB-WB, NB-SB
- [Multiple] Select the roadway with the U-turns from the drop-down list. EB-WB, NB-SB
- [Bowtie] Select the roadway with the roundabouts from the drop-down list. EB-WB, NB-SB
- [Split Intersection] Select the direction of the "split" roadway from the drop-down list. EB-WB, NB-SB
- [Echelon] Select the approach that shares a zone with the NB approach from the drop-down list. EB, WB
- [Single Loop] Select the quadrant that contains the loop from the drop-down list. N-E, N-W, S-E, S-W

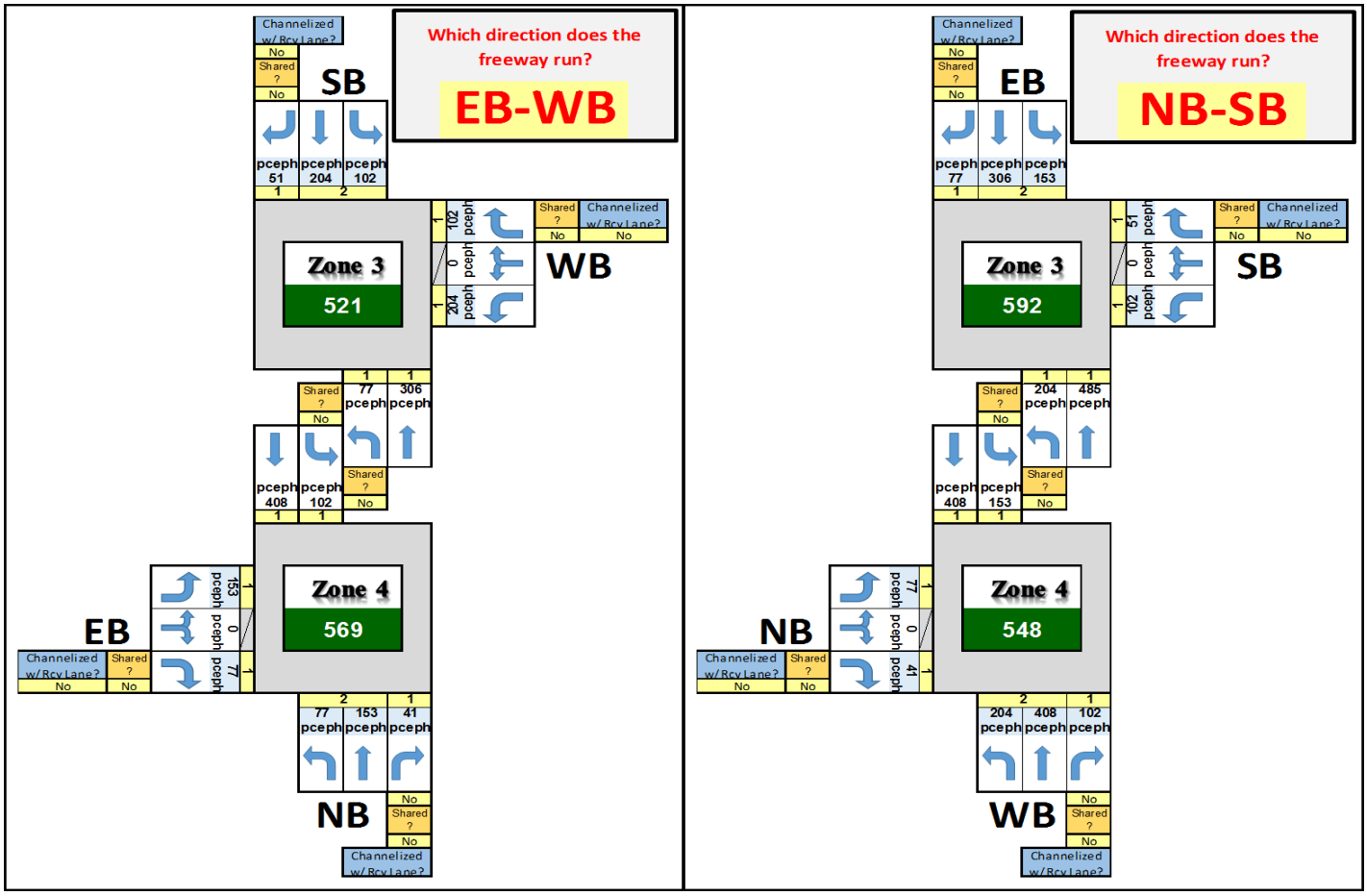
INSTRUCTIONS

Based on the answer provided in the directional question, the directional labels and volumes will update similar to the example figures shown below for a Traditional Diamond Interchange. The example figure and the layout of cells in the **Data Input and Configuration** section will not change.

Example Figure



Example Data Input and Configuration Layout



Step 3.2: Enter the Lane Configurations

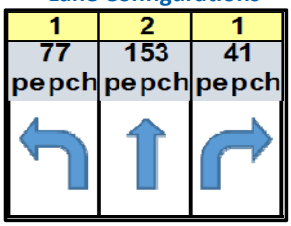
After answering the directional question for all applicable intersection and interchange configurations, enter a base number of through lanes for each travel direction on the **Input Worksheet** as pictured below. The number of through lanes entered here will be applied to each lane configuration worksheet. This base number may be overwritten on individual lane configuration worksheets. Turn lanes, shared lanes, and channelized lanes must still be entered in each lane configuration worksheet.

Base Number of Through Lanes

Base Number of Through Lanes	
If desired, enter a base number of through lanes for each direction. This number of through lanes will populate on each non-roundabout lane configuration worksheet. Although this tool allows the user to enter the number of through lanes for each lane configuration worksheet being compared on this worksheet, the user should still verify the lane configurations for each intersection or interchange configuration being compared.	
Eastbound	1
Westbound	1
Northbound	1
Southbound	1

Then, navigate to each lane configuration worksheet to verify the overall lane configuration for each approach direction. The lane configuration refers to the number of lanes for each left-turn, through, or right-turn movement. Inputs for lane configurations should be made into all yellow cells as shown in the figure below. This step should be followed on each worksheet selected for screening.

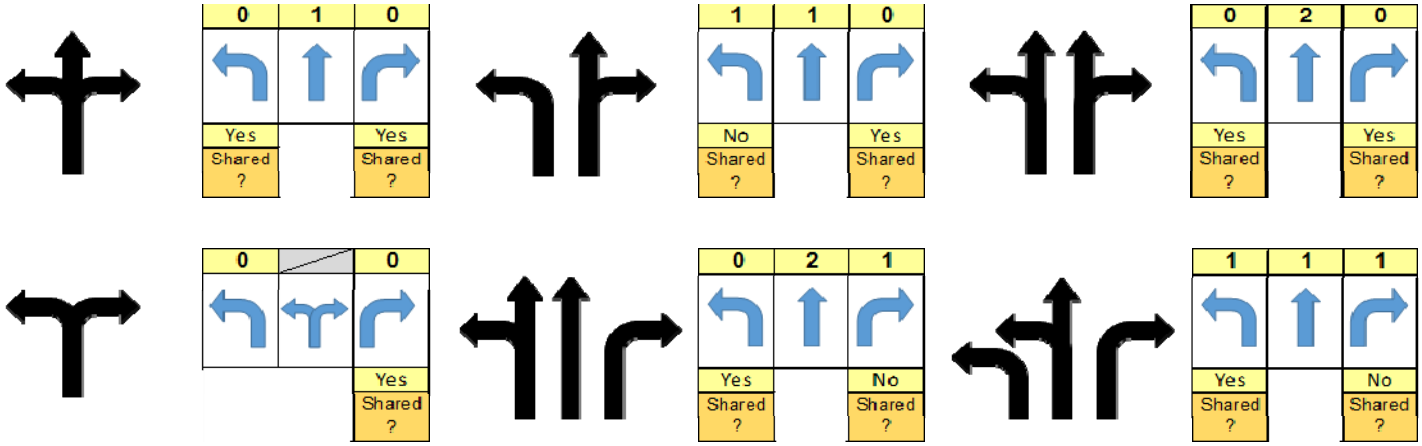
Lane Configurations



Note: This tool does not consider the geometric footprint, available right-of-way (ROW), or design requirements for an individual project. The tool generally does not limit the number of lanes that may be assigned to a particular movement. However, a pop-up box will appear asking the user to confirm the number of lanes if five or more through lanes or three or more turn lanes were entered.

Additionally, indicate if any shared lanes or channelized right-turn lanes are present. A right-turn lane should be identified as channelized only if a receiving lane is present and is at least 500 feet long. If a shared lane is present, count the lane only as a through lane and select "Yes" in the "Shared?" cell next to the appropriate turning movement. If an approach has one lane with a left-through-right movement, select one lane for the through movement and indicate that both the left- and right-turn movements are shared. If an exclusive turn lane is present in addition to the shared lane, enter one lane for the appropriate turning movement. Example shared-lane configurations and their respective inputs are shown below.

Example Shared-Lane Configurations



STEP 4: VIEW AND INTERPRET RESULTS

After completing Step 2, navigate to the **Results Worksheet**. This sheet compares the effectiveness of each alternative intersection and interchange configuration's potential to mitigate congestion, pedestrian, and safety concerns. Only the congestion metric is dependent on the inputs in Steps 1 and 2. The results shall not be interpreted until the user has performed Steps 1 and 2 on each lane configuration worksheet. The other metrics represent static values. Further descriptions of the congestion, pedestrian, and safety metrics are provided in the **Overview** and **Safety Information** tabs. These metrics do not consider signal timing parameters, geometric parameters, driver behavior parameters, available ROW, or design requirements for an individual project. It is the user's responsibility to determine how these factors may affect the results provided and decide how to apply and prioritize the results from this tool.

Descriptions of each alternative intersection and interchange configuration and guidance on when each configuration type should be considered are provided in the **Design Considerations** worksheet. Based on the results provided in the **Results Worksheet** and the information provided in the **Design Considerations** worksheet, the user may select which configurations should be selected for further study and evaluation.

SAFETY INFORMATION

The relative safety of an innovative intersection or interchange configuration was estimated by correlating crash data to assign a relative risk level associated with vehicle conflict points. The conflict points were weighted based on the calculated average crash cost associated with each conflict point type in Virginia. The methodology for determining the weighting system is outlined below. The conflict point diagram, number of conflict points, and the weighted total conflict point metric are included in the **Safety - Conflict Point Diagram** section of each lane configuration worksheet.

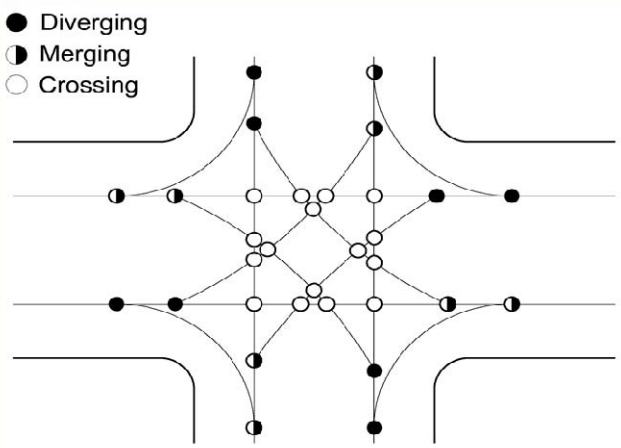
PART 1: CONFLICT POINT DIAGRAM METHODOLOGY

Conflict diagrams were developed for the innovative intersection and interchange configurations. Lines represent possible movements within the configuration. U-turns were only considered for innovative configurations that use U-turns to remove or relocate left-turning traffic from an intersection. Conflict points were defined as crossing, merging, or diverging conflicts at points of intersecting movements. A conflict point diagram is included in each lane configuration worksheet. An example diagram is shown below for a conventional intersection.

The conflict point diagrams and total number of conflict points are independent of the number of lanes, shared lanes, or channelization of movements. Additionally, the conflict point diagrams do not consider traffic signal phasing. Merge and diverge conflicts on the freeway are included for interchange configurations.

Example Conflict Diagram (Conventional Intersection)

Safety - Conflict Point Diagram



Conflict Type	Count
Crossing	16
Merging	8
Diverging	8
Total	**32**

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

48

PART 2: CONFLICT POINT WEIGHTING METHODOLOGY

The type, severities, and quantity of crashes that are likely to occur at each type of conflict point vary. Assumptions related to type and severity for the conflict point types were determined to allow for the comparison of configurations. A weighting system was then developed to produce a single safety metric. Four crash types were assigned to one or more conflict point types based on the likelihood of that crash type occurring. The crash types assigned to each conflict point type were as follows:

Crossing Conflict

- Head on
- Angle
- Sideswipe - opposite direction

Merging Conflict

- Sideswipe - same direction

Diverging Conflict

- Sideswipe - same direction

An average crash cost for an angle, head on, sideswipe - same direction, and sideswipe - opposite direction crash that occurred in Virginia between 2011 and 2015 was computed using the average crash cost by severity values from the Highway Safety Manual, 1st Edition.

Average Crash Cost By Severity

Severity	Crash Cost
Fatal (K)	$4,008,885
Disabling Injury (A)	$216,059
Evident Injury (B)	$79,777
Possible Injury (C)	$44,868
Property Damage (O)	$7,428

Source: *Highway Safety Manual, 1st Edition*

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SAFETY INFORMATION

Average Crash Cost in Virginia By Crash Type

Crash Type	Severity	Full Access Control		Partial Access		No Access Control		All Crashes	
		#	Avg Cost	#	Avg Cost	#	Avg Cost	#	Avg Cost
Angle	K	57	$72,195	28	$61,648	501	$55,276	618	$53,406
	A	542		240		6966		8689	
	B	1253		917		20917		26838	
	C	638		858		18433		23381	
	O	4546		2763		71505		94955	
	Total	7036		4806		118322		154481	
Head On	K	25	$242,784	5	$131,358	281	$162,816	331	$146,785
	A	84		33		1729		2075	
	B	91		54		2611		3286	
	C	41		38		1551		2037	
	O	293		130		4975		7135	
	Total	534		260		11147		14864	
Sideswipe - Same Direction	K	26	$34,673	3	$28,098	21	$24,967	51	$26,667
	A	390		23		556		1052	
	B	1320		75		1888		3632	
	C	635		124		2330		3562	
	O	8812		1075		19372		34309	
	Total	11183		1300		24167		42606	
Sideswipe - Opposite Direction	K	2	$108,807	0	$28,527	30	$55,669	32	$49,679
	A	11		1		413		483	
	B	32		11		1241		1450	
	C	7		16		798		1015	
	O	75		48		4273		5818	
	Total	127		76		6755		8798	

The average crash cost per conflict point type was calculated based on the average crash cost per crash type and the frequency of each crash type. These average crash costs per conflict point type were used to derive the weighting system used to assign relative risk to the conflict point types. It was determined that crashes occurring at crossing conflicts were roughly two times more costly, and therefore carry two times the risk, than crashes occurring at merging or diverging conflict points.

Average Crash Cost Per Conflict Point Type Per Facility Type

Conflict Point Type	Full Access Control		Partial Access		No Access Control		All Crashes	
	Avg Cost	Weight	Avg Cost	Weight	Avg Cost	Weight	Avg Cost	Weight
Crossing	$84,634	2.4	$64,683	2.3	$64,096	2.6	$61,014	2.3
Merging/Diverging	$34,673	1.0	$28,098	1.0	$24,967	1.0	$26,667	1.0

Weighting System Based on Risk Factor

Conflict Point Type	Assigned Weight
Crossing	2
Merging	1
Diverging	1

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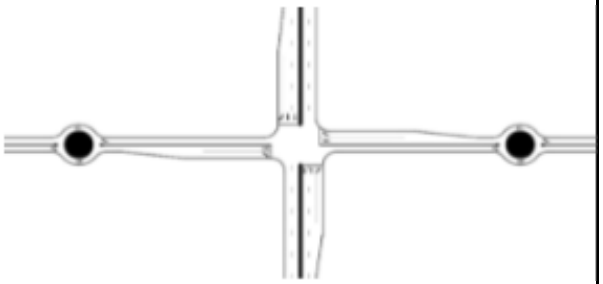
DESIGN CONSIDERATIONS

Intersection Designs

Bowtie



Back to Inputs

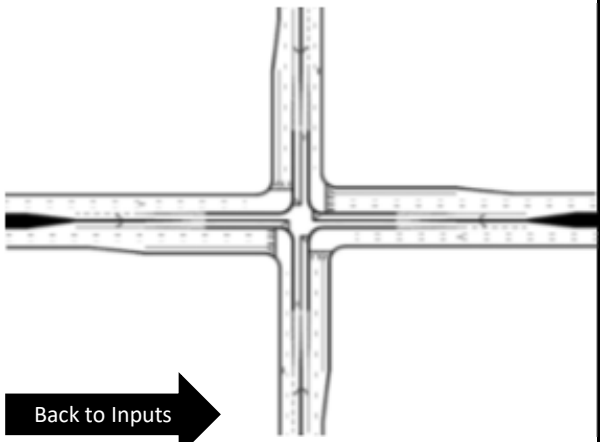
Description

The bowtie intersection is an alternative to the MUT intersection. Left-turn movements from both roadways are removed from the main intersection and are executed via a U-turn at a roundabout on the minor roadway downstream of the main intersection. Removing the left-turn movements allows for two-phase signal control.

When Should This Design Be Considered?

The bowtie intersection should be considered on roadways with high through volumes on the major roadway and low through and left-turn volumes on the minor roadway. Arterials with narrow medians and limited ROW should be considered.

Center Turn Overpass



Back to Inputs

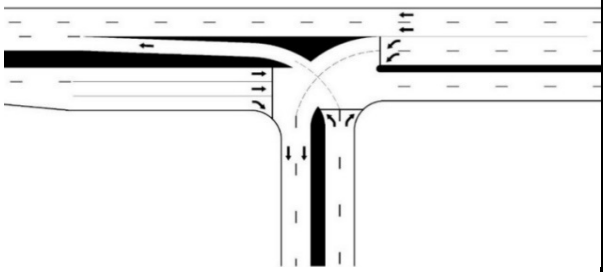
Description

All four left-turn movements are relocated to a grade-separated intersection using narrow ramps within the median. The left-turn traffic then descends back to ground level and merges into through traffic. Both intersections operate under two-phase signal control.

When Should This Design Be Considered?

The center turn overpass intersection should be considered at high-volume urban or suburban intersections where the major and minor roadways have similar left-turn volumes.

Continuous Green-T (CGT)



Back to Inputs

Description

Through traffic on the top side of a T-intersection is allowed to pass through the intersection without stopping. Left-turn volumes from the minor roadway must merge into the continuous lane of through traffic after completing the left turn. This design allows for three-phase signal control. The tool assumes the intersection is signalized. The intersection may be designed as unsignalized.

When Should This Design Be Considered?

The continuous green-T intersection should be considered at three-leg intersections with moderate to low left-turn volumes on the minor roadway, high through volumes on the major roadway, and few pedestrian crossings.

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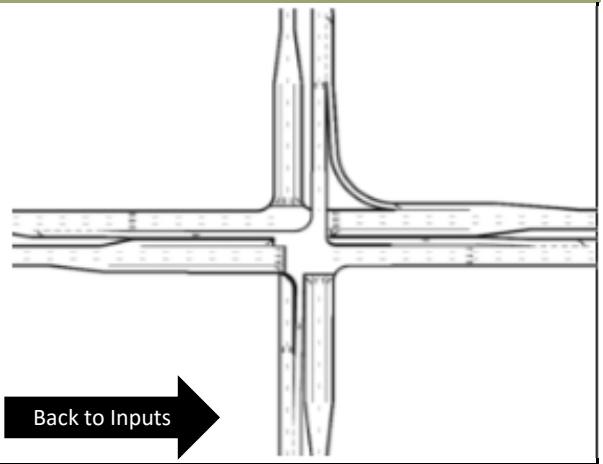
DESIGN CONSIDERATIONS

Intersection Designs

Echelon



Back to Inputs

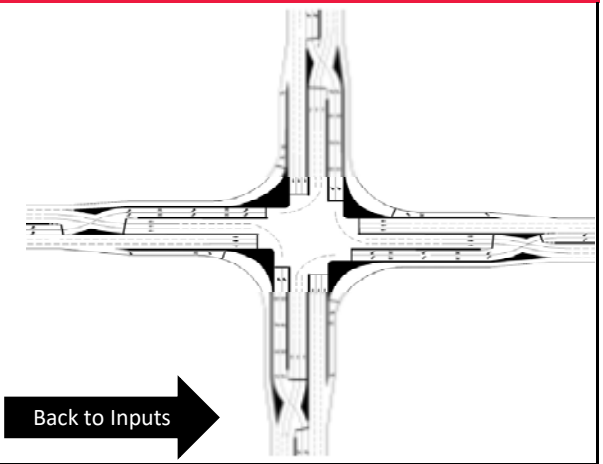
Description

One approach on both the major and minor roadways is elevated to create two grade-separated intersections of two one-way roads. Each intersection operates under two-phase signal control.

When Should This Design Be Considered?

The echelon intersection should be considered at high-volume urban or suburban intersections where the major and minor roadways have similar volumes.

Full/Partial Displaced Left Turn (DLT)



Back to Inputs

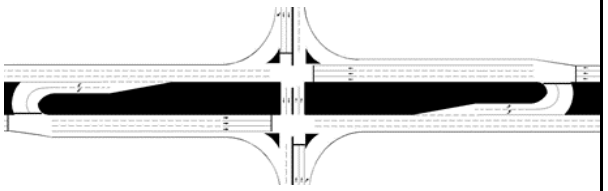
Description

Left-turning vehicles cross over to the other side of the roadway at a signalized intersection several hundred feet in advance of the main intersection. The protected left turns occur simultaneously with the opposing through movements at the main intersection, allowing for two- (full) or three-phase (partial) signal control. This design is also referred to as a Continuous Flow Intersection or Crossover Displaced Left Intersection.

When Should This Design Be Considered?

The displaced left turn intersection should be considered if opposing approaches have high and balanced through and left-turn volumes.

Full/Partial Median U-Turn (MUT)



Back to Inputs

Description

Left-turn movements from the major roadway (partial) or both roadways (full) are removed from the main intersection. These vehicles instead execute a U-turn at a median opening on the major roadway downstream of the main intersection. Removing the left-turn movements allows for two- (full) or three-phase (partial) signal control. This tool assumes all intersections are signalized. However, this intersection can be designed as partially unsignalized.

When Should This Design Be Considered?

The median U-turn intersection should be considered on high-speed, median-divided highways with moderate left-turn volumes on the major roadway and minor left-turn volumes on the minor roadway.

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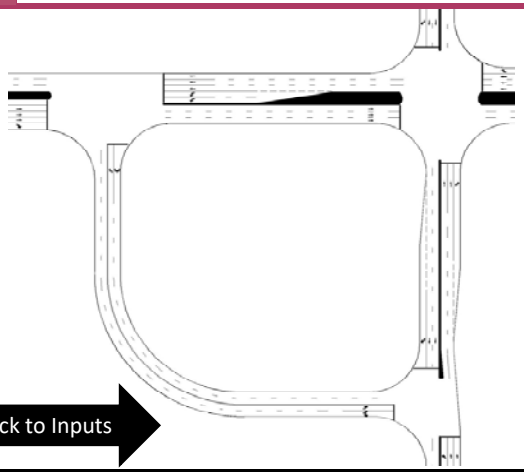
DESIGN CONSIDERATIONS

Intersection Designs

Quadrant Roadway (QR)



Back to Inputs

Description

All four left-turn movements are rerouted onto a connector road in one quadrant, allowing for two-phase signal control at the main intersection and three-phase signal control at the intersections with the connector road. This tool assumes all intersections are signalized. However, this intersection can be designed as partially unsignalized.

When Should This Design Be Considered?

The quadrant roadway intersection should be considered if an existing roadway can be used as a connection roadway or there are heavy left-turn and through volumes on the major and minor roadways. The ratio of minor road volume to total intersection volume is typically less than or equal to 0.35.

Restricted Crossing U-Turn (RCUT)

Back to Inputs

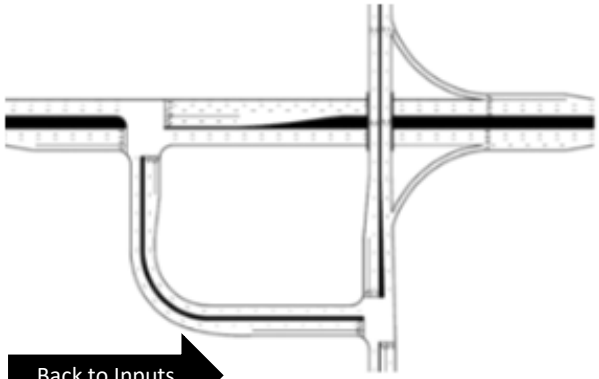
Description

Minor roadway left-turn and through movements are removed from the main intersection. These vehicles turn right onto the major roadway before making a U-turn at a downstream median opening. Removing these movements allows for two-phase signal control at the main intersection. This design is also referred to as a super street intersection. This tool assumes all intersections are signalized. However, this intersection can be designed as partially or fully unsignalized.

When Should This Design Be Considered?

The restricted crossing U-turn intersection should be considered on high-speed, median-divided highways with high through and left-turn volumes on the major roadway and low through volumes on the minor roadway.

Single Loop



Back to Inputs

Description

All four left-turn movements and some right-turn movements are rerouted onto a connector road in one quadrant, while the major and minor roadways are grade-separated. This design allows for three-phase signal control at the intersections with the connector road.This tool assumes all intersections are signalized. However, this intersection can be designed as fully unsignalized.

When Should This Design Be Considered?

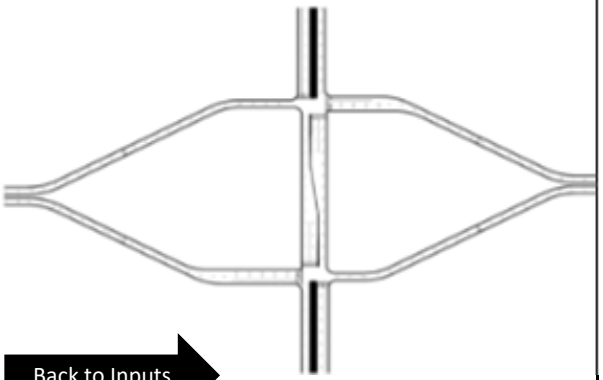
The single loop intersection should be considered for roadways with low to medium left-turn volumes.

VJuST
VDOT Junction Screening Tool

DESIGN CONSIDERATIONS

Intersection Designs

Split Intersection



Back to Inputs

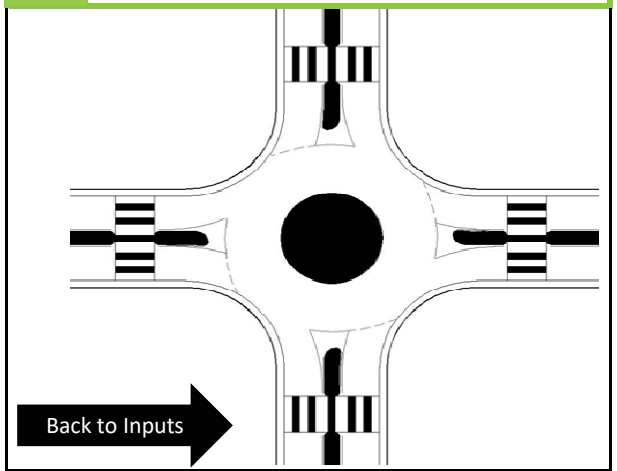
Description

The split intersection separates traffic flow on the major roadway into two one-way roads with separate intersections with the minor roadway. Each intersection may operate using three-phase signal control. This configuration is similar to a traditional diamond interchange without grade separation.

When Should This Design Be Considered?

The split intersection should be considered for isolated, suburban intersections with high left-turn volumes or in urban areas where two-way streets can be converted to one-way streets. The split intersection may also be considered if grade separation may be needed in the future.

Mini Roundabout



Back to Inputs

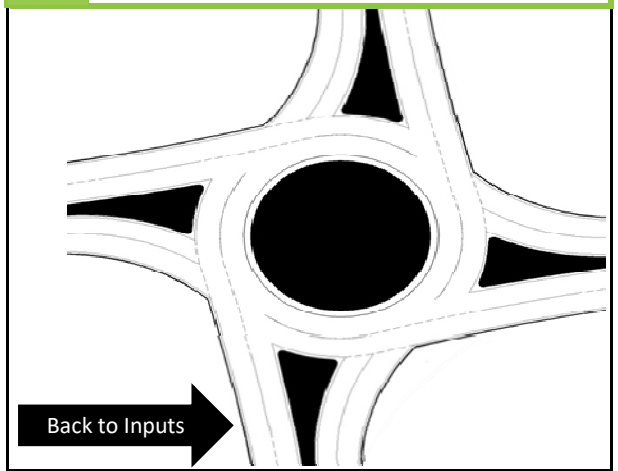
Description

A roundabout is a circular unsignalized intersection in which traffic flows in one direction around a central island. Traffic entering the roundabout must yield to traffic already inside the roundabout. This tool includes mini roundabouts with a 50 foot or 75 foot inscribed diameter.

When Should This Design Be Considered?

The mini roundabout should be considered if the posted speed limit on all four approaches is 30 mph or slower and the 85th percentile speed is 35 mph or slower.

Roundabout



Back to Inputs

Description

A roundabout is a circular unsignalized intersection in which traffic flows in one direction around a central island. Traffic entering the roundabout must yield to traffic already inside the roundabout. This tool can accommodate roundabouts with up to two lanes in each quadrant.

When Should This Design Be Considered?

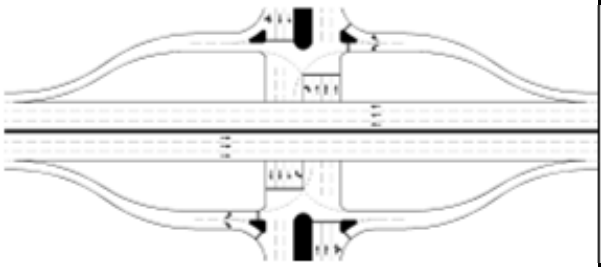
The roundabout should be considered on roadways with a high percentage of turning traffic. Additional information about when roundabouts should be considered may be found on VDOT's website.

VJuST
VDOT Junction Screening Tool

DESIGN CONSIDERATIONS

Interchange Designs

Traditional Diamond (TD)



Back to Inputs

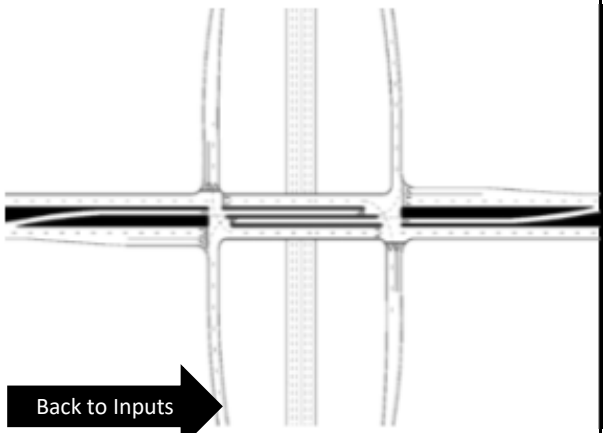
Description

The traditional diamond interchange is a grade-separated interchange with two intersections on the arterial. The intersections may be signalized or unsignalized. Each direction of travel on the freeway has one on-ramp and one off-ramp.

When Should This Design Be Considered?

The traditional diamond interchange should be considered in rural and suburban areas with moderate to low ramp volumes.

Contraflow Left



Back to Inputs

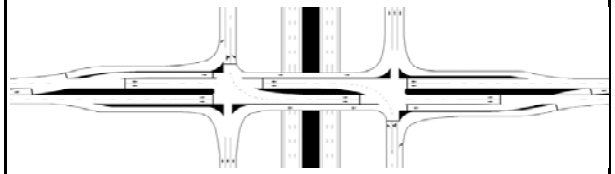
Description

The contraflow left interchange is an alternative to the traditional diamond interchange in which arterial left-turn movements cross over opposing left-turn movements into storage bays prior to the first ramp intersection. These storage bays run in the opposite direction from the adjacent through lanes. This design allows for three-phase signal control.

When Should This Design Be Considered?

The contraflow left interchange should be considered on arterials with high left-turn volumes onto the freeway ramps, especially if the left-turn demand exceeds the storage capacity between the ramps.

Displaced Left Turn (DLT)



Back to Inputs

Description

The arterial left-turning vehicles cross over to the other side of the roadway at a signalized intersection several hundred feet in advance of the first ramp intersection. At both of the ramp intersections, the protected left turns occur simultaneously with the opposing through movements, allowing for two-phase signal control. This design is also referred to as a Continuous Flow Interchange.

When Should This Design Be Considered?

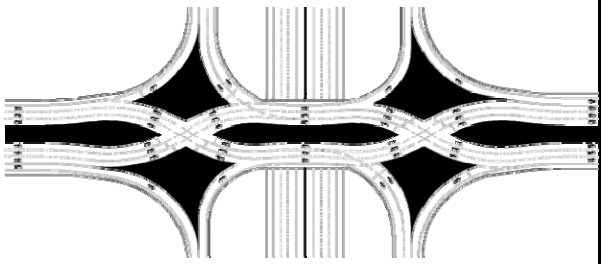
The displaced left turn intersection should be considered if there are high and balanced through volumes on the arterial, moderate to high left-turn volumes to the on-ramps, and low to moderate left-turn volumes from the off-ramps.

VJuST
VDOT Junction Screening Tool

DESIGN CONSIDERATIONS

Interchange Designs

Diverging Diamond (DDI)



Back to Inputs

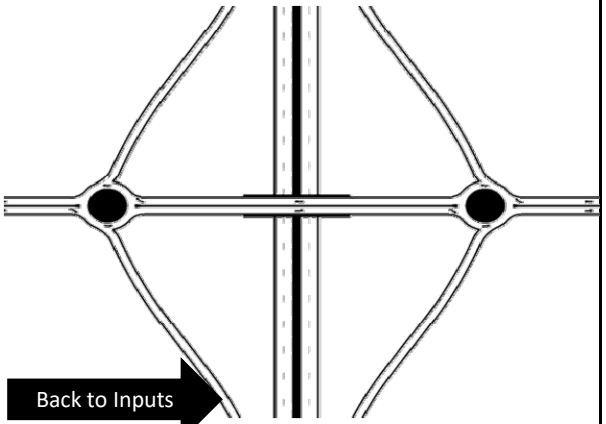
Description

The diverging diamond interchange is an alternative to the traditional diamond interchange where arterial traffic crosses over to the other side of the roadway in between the two ramps. This allows vehicles to turn left onto the on-ramps without crossing over opposing lanes of traffic. This design is also referred to as the double crossover diamond interchange.

When Should This Design Be Considered?

The diverging diamond interchange should be considered if there are high left-turn volumes onto and off of the freeway ramps and moderate but unbalanced arterial volumes.

Double Roundabout



Back to Inputs

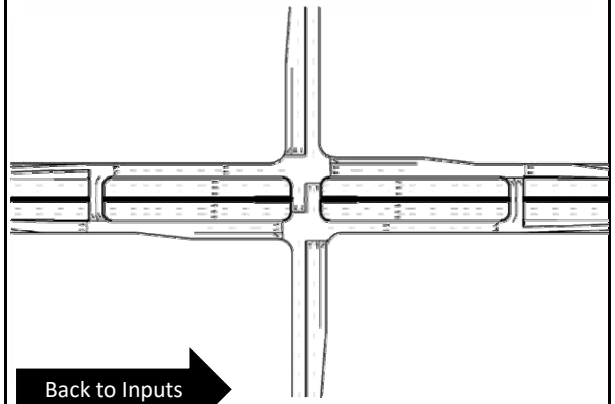
Description

The double roundabout interchange is a grade-separated interchange in which all ramps begin or end at one of two roundabouts on the arterial. This design typically allows for a narrower bridge width than the single roundabout interchange.

When Should This Design Be Considered?

The double roundabout interchange should be considered if there is a high proportion of left-turns onto the freeway ramps or where there is limited queue storage between the ramp intersections.

Michigan Urban Diamond (MUD)



Back to Inputs

Description

The Michigan urban diamond interchange is a variation of the traditional diamond interchange that removes left-turn movements from the arterial intersections. These vehicles instead make U-turns at directional crossovers on frontage roads. The intersections on the arterial operate under two-phase signal control. This design is also referred to as a Median U-Turn (MUT) Interchange. This tool assumes all intersections are signalized. However, this intersection can be designed as partially unsignalized.

When Should This Design Be Considered?

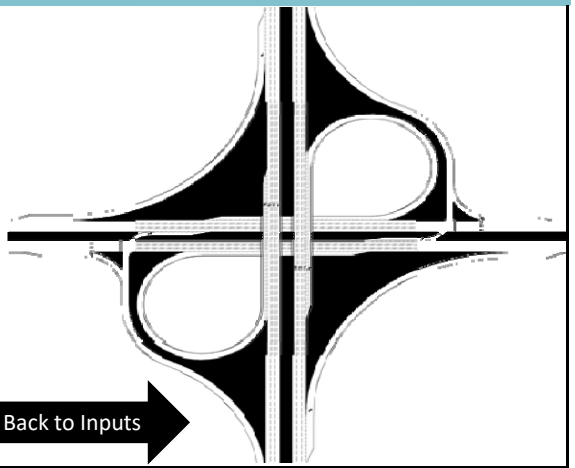
The Michigan urban diamond interchange should be considered for arterials with high through volumes and moderate to low left-turn volumes.

VJuST
VDOT Junction Screening Tool

DESIGN CONSIDERATIONS

Interchange Designs

Partial Cloverleaf (PCL or Parclo)



Back to Inputs

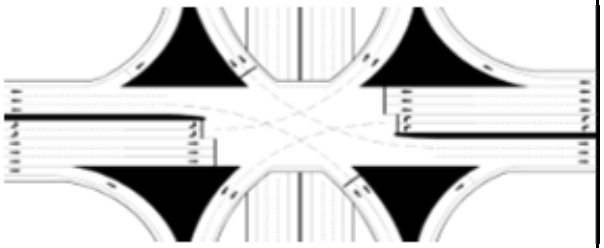
Description

The partial cloverleaf interchange is a grade-separated interchange with a combination of directional ramps and loop ramps. This configuration may include up to two intersections on the arterial. The intersections may be signalized or unsignalized.

When Should This Design Be Considered?

The partial cloverleaf interchange should be considered if a traditional diamond interchange would result in moderate to high left-turn volumes onto or off the ramps.

Single Point Urban (SPUI)



Back to Inputs

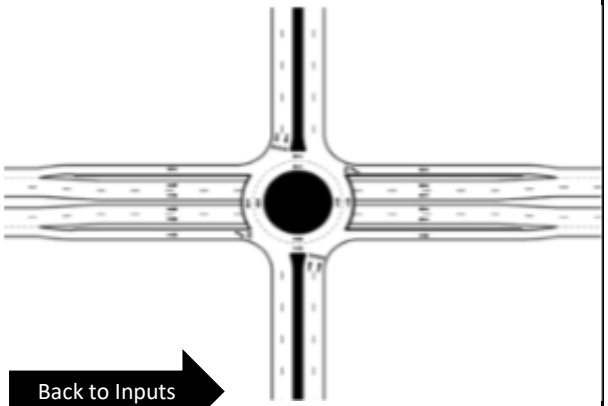
Description

The single point urban interchange is an alternative to the traditional diamond interchange in which all ramps begin or end at a single intersection on the arterial. This configuration allows for three-phase signal control.

When Should This Design Be Considered?

The single point urban interchange should be considered in urban areas with high left-turn volumes onto and off the freeway ramps or when right-of-way limitations are present.

Single Roundabout



Back to Inputs

Description

The single roundabout interchange is a grade-separated interchange in which all ramps begin or end at a single roundabout on the arterial.

When Should This Design Be Considered?

The roundabout interchange should be considered in urban areas with moderate capacity requirements or with right-of-way restrictions.

VDOT Junction Screening Tool

Input Worksheet

Project Title:	*Sweetgrasss*
E-W Facility:	*Primary Entrancd*
N-S Facility:	*Benn's Church Boulevard*
Date:	*December 17, 2019*

Traffic Volume Demand

Direction	Volume (veh/hr)				Truck Percent (%)
	U-Turn / Left		Through	Right	
Eastbound	0		0		0.00%
Westbound	227			145	0.00%
Northbound	13		1503	208	0.00%
Southbound	231		1033	0	0.00%
Adjustment Factor	0.80	0.95		0.85	
Suggested	**U - 0.8**	**L - 0.95**		**0.85**	
Truck to PCE Factor			**Suggested = 2.00**		2.00
Critical Lane Volume			1600		

Equivalent Passenger Car Volume

	Volume (pc/hr)			
	U-Turn / Left	Through	Right	Approach
Eastbound	0	0	0	0
Westbound	227	0	145	372
Northbound	13	1503	208	1724
Southbound	231	1033	0	1264

Notes:	
Left-turn Adjustment Factor	*Conversion of left-turning vehicles to equivalent through vehicles*
Right-turn Adjustment Factor	*Conversion of right-turning vehicles to equivalent through vehicles*
U-turn Adjustment Factor	*Conversion of U-turning vehicles to equivalent through vehicles*
Truck to PCE Factor	*1 truck = X Passenger Car Equivalents*
Critical Lane Volume Sum Limit	*Saturation value for critical lane volume sum at an intersection*

VDOT Junction Screening Tool

Possible Configurations

Indicate with a "Y" or "N" if each intersection or interchange configuration should or should not be considered. Use the information links for guidance. Then, click the "Show/Hide Configurations button" to hide the worksheets for the configurations that will not be considered.

#	Intersections	Information	Consider?	Justification
	Signalized Intersections			
1	Conventional	-	Y	
2	Bowtie	Link	Y	
3	Center Turn Overpass	Link	N	Not feasible for roadway facility type
4	Continuous Green-T	Link	Y	
5	Echelon	Link	N	Not feasible for roadway facility type
6	Full Displaced Left Turn	Link	N	Insufficient intersection spacing
7	Median U-Turn	Link	N	Insufficient intersection spacing
8	Partial Displaced Left Turn	Link	Y	
9	Partial Median U-Turn	Link	Y	
10	Quadrant Roadway N-E	Link	N	Not feasible for roadway facility type
11	Quadrant Roadway N-W	Link	N	Not feasible for roadway facility type
12	Quadrant Roadway S-E	Link	N	Not feasible for roadway facility type
13	Quadrant Roadway S-W	Link	N	Not feasible for roadway facility type
14	Restricted Crossing U-Turn	Link	N	Not feasible for roadway facility type
15	Single Loop	Link	N	Not feasible for roadway facility type
16	Split Intersection	Link	N	Not feasible for roadway facility type
	Unsignalized Intersections			
17	50 Mini Roundabout	Link	N	Not feasible for roadway facility type
18	75 Mini Roundabout	Link	N	Not feasible for roadway facility type
19	Roundabout	Link	Y	
20	Two-Way Stop Control	-	N	Not feasible for roadway facility type
#	**Interchanges**	**Information**	**Consider?**	**Justification**
21	Traditional Diamond	Link	N	Not feasible for roadway facility type
22	Contraflow Left	Link	N	Not feasible for roadway facility type
23	Displaced Left Turn	Link	N	Not feasible for roadway facility type
24	Diverging Diamond	Link	N	Not feasible for roadway facility type
25	Double Roundabout	Link	N	Not feasible for roadway facility type
26	Michigan Urban Diamond	Link	N	Not feasible for roadway facility type
27	Partial Cloverleaf	Link	N	Not feasible for roadway facility type
28	Single Point	Link	N	Not feasible for roadway facility type
29	Single Roundabout	Link	N	Not feasible for roadway facility type

VDOT Junction Screening Tool

Directional Questions and Base Lane Configurations

Before entering a base number of through lanes for each direction, answer all applicable directional question for each intersection or interchange configuration selected for consideration. Navigate to the lane configuration worksheet for example diagrams, if provided.

Intersections	Question	Direction
Bowtie	Select the roadway with the roundabouts from the drop-down list.	
Continuous Green-T	Select the direction associated with the "stem" of the T-intersection from the drop-down list. See example diagrams.	WB
Echelon	N/A	
Median U-Turn	N/A	
Partial Displaced Left Turn	Select the roadway with the displaced left turns from the drop-down list.	NB-SB
Partial Median U-Turn	Select the roadway with the U-turns from the drop-down list.	NB-SB
Restricted Crossing U-Turn	N/A	
Single Loop	N/A	
Split Intersection	N/A	
Interchanges	**Question**	**Direction**
All	N/A	

Base Number of Through Lanes

Enter a base number of through lanes for each direction. The number of through lanes entered will populate on each non-roundabout lane configuration worksheet. This tool also allows the user to enter the number of through lanes on the lane configuration worksheets directly. This base number may be overwritten on individual lane configuration worksheets. Turn lanes, shared lanes, and channelized lanes must still be entered in each lane configuration worksheet.

Eastbound	
Westbound	
Northbound	2
Southbound	2

VDOT Junction Screening Tool

Results Worksheet

VJuST
VDOT Junction Screening Tool

General Information	
Project Title:	Sweetgrasss
EW Facility:	Primary Entrancd
NS Facility:	Benn's Church Boulevard
Date:	December 17, 2019

Volumes (veh/hr)	U-Turn / Left	Through	Right
Eastbound	0	0	0
Westbound	227	0	145
Northbound	13	1503	208
Southbound	231	1033	0

General Instructions: All intersection and interchange configurations have a default assumption of one exclusive lane per movement. No results shall be interpreted until the user has verified the lane configurations on each worksheet.

Intersection Results

Type	Dir	Maximum V/C (Congestion)	Accommodation Compared to Conventional (Pedestrian)	Weighted Total Conflict Points (Safety)	Notes
Conventional	-	0.70		48	
Bowtie	-	1.92	+	24	
Center Turn Overpass	-	1.05	+	32	
Continuous Green-T	-	0.70	-	12*	
Echelon	-	1.09	+	28	
Full Displaced Left Turn	-	0.80	-	40	
Median U-Turn	-	1.11	+	20	
Partial Displaced Left Turn	-	0.62	-	44	
Partial Median U-Turn	-	0.72	+	28	
Quadrant Roadway	N-W	1.19		40	
	N-E	1.27		40	
	S-E	1.24		40	
	S-W	1.23		40	
Restricted Crossing U-Turn	-	2.14		20	
Single Loop	-	1.10	-	28	
Split Intersection	-	1.08		36	
50 Mini Roundabout	-	372.00		8	
75 Mini Roundabout	-	372.00		8	
Roundabout	-	1.32		8	
Two-Way Stop Control	-	N/A*		48	

*The continuous green-T is the only three-legged innovative intersection in this tool. To compare the continuous green-T to other innovative intersections, conflicts corresponding with the fourth leg must be removed. This has been done for the conventional intersection. Conflict point diagrams for three-legged and four-legged conventional intersections have been provided on the conventional intersection worksheet for reference.

Interchange Results					
		Congestion	Pedestrian	Safety	Notes
Type	Dir	Maximum V/C	Accommodation Compared to Traditional Diamond	Weighted Total Conflict Points	
Traditional Diamond	-	0.30		28	
Contraflow Left	-	1.09		32	
Displaced Left Turn	-	0.30	-	28	
Diverging Diamond	-	0.30	-	20	
Double Roundabout	-	0.27	+	16	
Michigan Urban Diamond	-	0.60	+	24	
Partial Cloverleaf	-	0.15		20	
Single Point	-	0.30	-	32	
Single Roundabout	-	0.27	+	12	

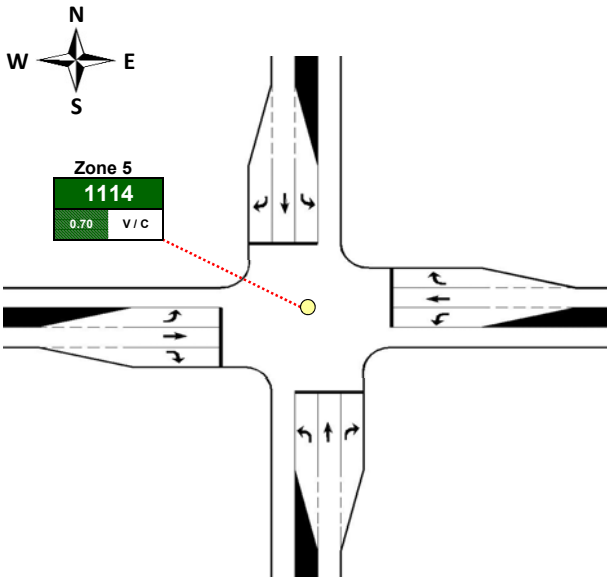
Information	
Congestion	The maximum v/c ratio represents the worst v/c of all zones that make up an intersection.
Pedestrian	Compares the potential of each design to accommodate pedestrians based on safety, wayfinding, and delay. Potential is qualitatively defined as better (+), similar (blank cell), or worse (-) than a conventional intersection or traditional diamond interchange.
Safety	Weighted Total = (2 x Crossing Conflicts) + Merging Conflicts + Diverging Conflicts

Conventional

DESIGN AND RESULTS

Project Name:	Sweetgrasss
EW Facility:	Primary Entrancd
NS Facility:	Benn's Church Boulevard
Date:	December 17, 2019

Critical Lane Volume Sum			
< 1200	1200 - 1399	1400 - 1599	≥ 1600
VOLUME / CAPACITY RATIO:			0.70

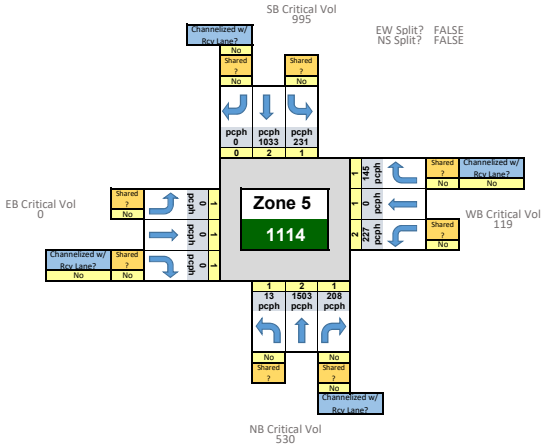


Note: This diagram does not reflect the actual lane configuration of the intersection

Conventional

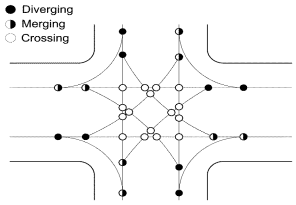
DATA INPUT AND CONFIGURATION

Enter the lane configurations in the yellow cells.



Back to Results

Safety - Conflict Point Diagram



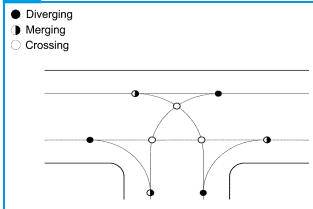
Conflict Type	Count
Crossing	16
Merging	8
Diverging	8
Total	**32**

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

48

Safety - Conflict Point Diagram (Three Legs)



Conflict Type	Count
Crossing	3
Merging	3
Diverging	3
Total	**9**

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

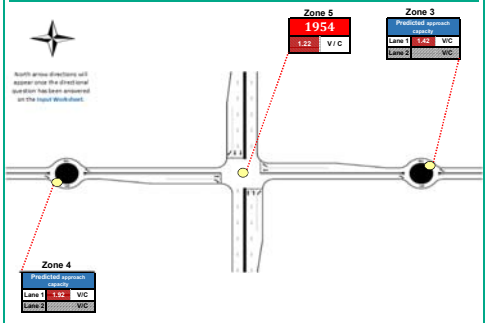
12

Bowtie Intersection

DESIGN AND RESULTS

Project Name:	Sweetgrasss
EW Facility:	Primary Entrancd
NS Facility:	Benn's Church Boulevard
Date:	December 17, 2019

Critical Lane Volume Sum			
< 1200	1200 - 1399	1400 - 1599	≥ 1600
MAXIMUM VOLUME / CAPACITY RATIO:			1.92

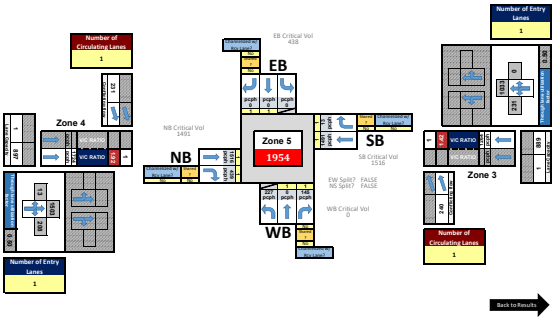


Note: This diagram does not reflect the actual lane configuration of the intersection

Bowtie Intersection

DATA INPUT AND CONFIGURATION

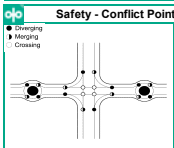
Enter the lane configurations in the yellow cells.



EQUATION: A x exp(-B x Q)

Number of Entry Lanes	Number of Circulating Lanes	Lane	A	B
1	1	--	1130	0.001
1	2	--	1130	0.0007
2	1	Left	1130	0.001
2	1	Right	1130	0.001
2	2	Left	1130	0.00075
2	2	Right	1130	0.0007

Safety - Conflict Point Diagram



Conflict Type	Count
Crossing	4
Merging	8
Diverging	8
Total	20

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

24

Assumptions

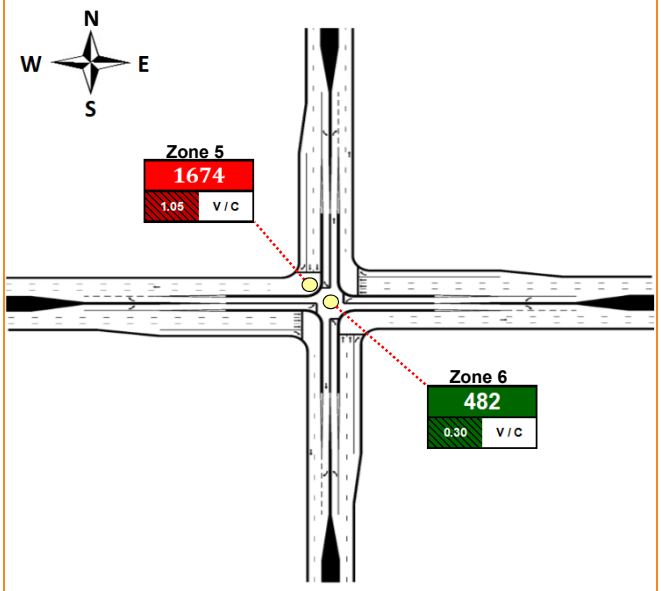
- The roundabouts have only two approaches and exits.
- Since U-turns are not considered, the CUV analysis considers only one location with conflicting volumes for each roundabout.
- The conflict point diagrams include conflict points created by U-turn movements.

Center Turn Overpass Intersection

DESIGN AND RESULTS

Project Name:	Sweetgrasss
EW Facility:	Primary Entrancd
NS Facility:	Benn's Church Boulevard
Date:	December 17, 2019

Critical Lane Volume Sum			
< 1200	1200 - 1399	1400 - 1599	≥ 1600
VOLUME / CAPACITY RATIO:			1.05

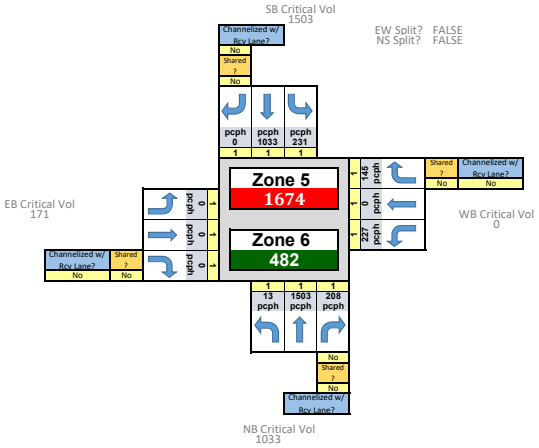


Note: This diagram does not reflect the actual lane configuration of the intersection

Center Turn Overpass Intersection

DATA INPUT AND CONFIGURATION

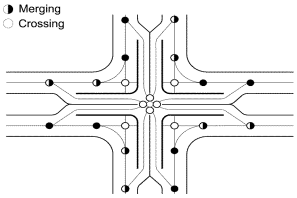
Step 1: Enter the lane configurations in the yellow cells.



Back to Results

Safety - Conflict Point Diagram

Diverging
Merging
Crossing



Conflict Type	Count
Crossing	8
Merging	8
Diverging	8
Total	24

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

32

Continuous Green-T Intersection

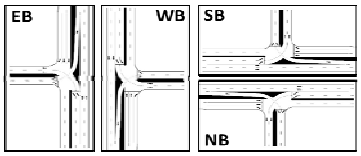
DESIGN AND RESULTS

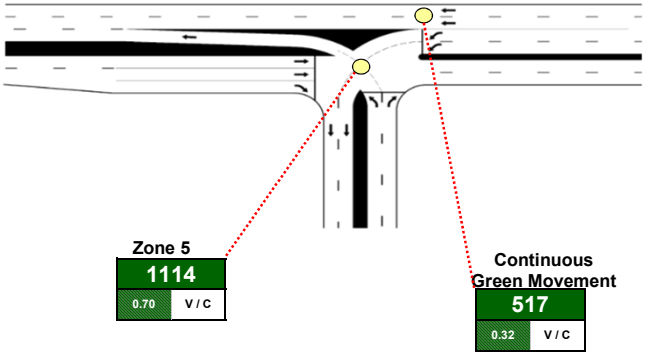
Project Name:	Sweetgrasss
EW Facility:	Primary Entrancd
NS Facility:	Benn's Church Boulevard
Date:	December 17, 2019

Critical Lane Volume Sum			
< 1200	1200 - 1399	1400 - 1599	≥ 1600
VOLUME / CAPACITY RATIO:			0.70

W S N E

North arrow directions will appear once the directional question has been answered on the **Input Worksheet**.



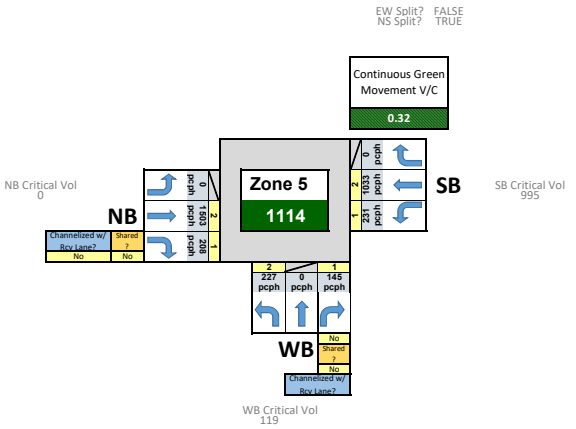


Note: This diagram does not reflect the actual lane configuration of the intersection

Continuous Green-T Intersection

DATA INPUT AND CONFIGURATION

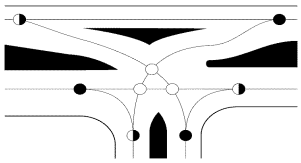
Step 1: Enter the lane configurations in the yellow cells.



Back to Results

Safety - Conflict Point Diagram

Diverging
Merging
Crossing



Conflict Type	Count
Crossing	3
Merging	3
Diverging	3
Total	9

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

12

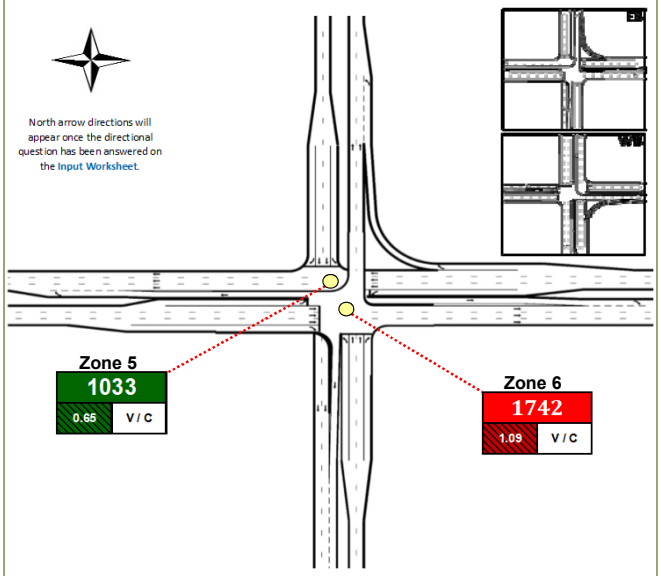
Echelon Intersection

DESIGN AND RESULTS

Project Name:	Sweetgrasss
EW Facility:	Primary Entrancd
NS Facility:	Benn's Church Boulevard
Date:	December 17, 2019

Critical Lane Volume Sum			
< 1200	1200 - 1399	1400 - 1599	≥ 1600
VOLUME / CAPACITY RATIO:			1.09

North arrow directions will appear once the directional question has been answered on the Input Worksheet.

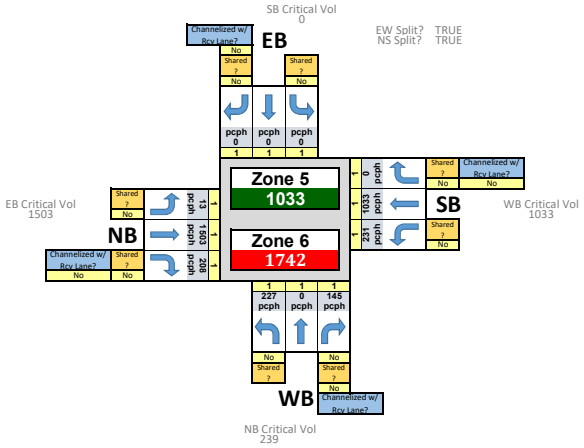


Note: This diagram does not reflect the actual lane configuration of the intersection

Echelon Intersection

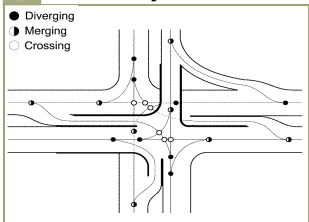
DATA INPUT AND CONFIGURATION

Enter the lane configurations in the yellow cells.



Back to Results

Safety - Conflict Point Diagram



Conflict Type	Count
Crossing	6
Merging	8
Diverging	8
Total	22

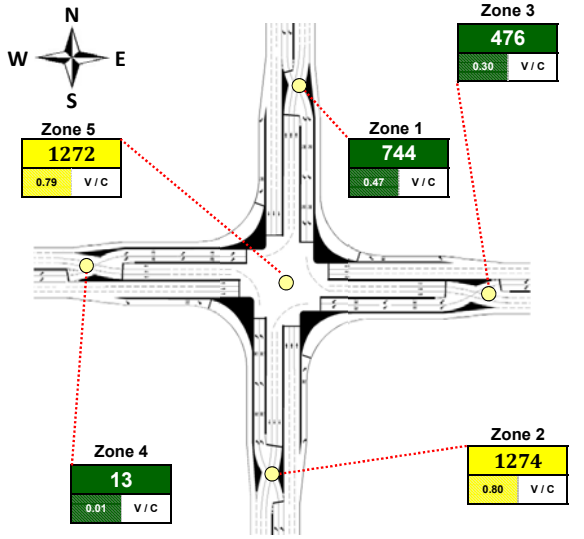
Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points
28

Full Displaced Left Turn Intersection

DESIGN AND RESULTS

		Critical Lane Volume Sum			
Project Name:	Sweetgrasss	< 1200	1200 - 1399	1400 - 1599	≥ 1600
EW Facility:	Primary Entrancd				
NS Facility:	Benn's Church Boulevard	VOLUME / CAPACITY RATIO:		0.80	
Date:	December 17, 2019				

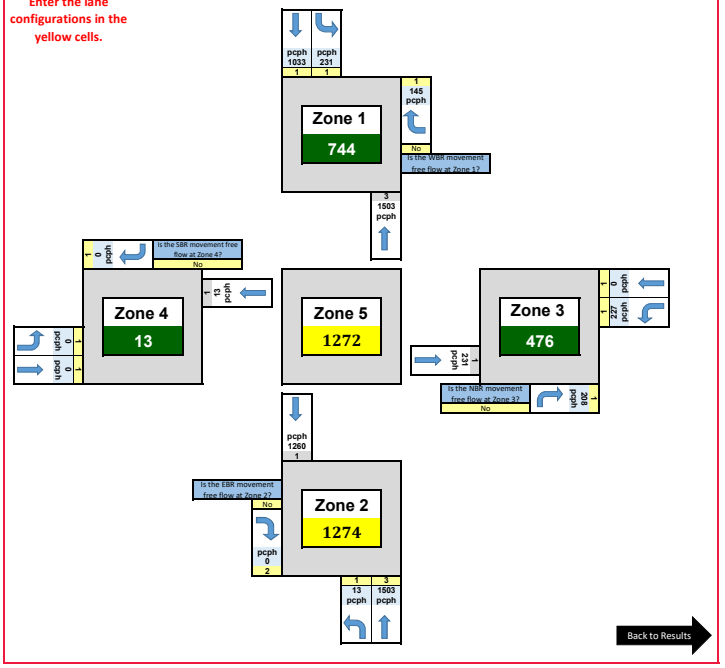


Note: This diagram does not reflect the actual lane configuration of the intersection

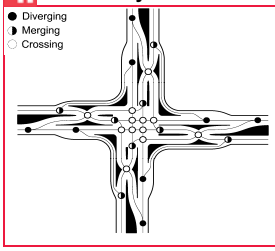
Full Displaced Left Turn Intersection

DATA INPUT AND CONFIGURATION

Enter the lane configurations in the yellow cells.



Safety - Conflict Point Diagram



Conflict Type	Count
Crossing	12
Merging	8
Diverging	8
Total	28

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

40

Assumptions

- CLV calculations at Zone 5 do not include right-turn movements.
- The number of through lanes entered in one zone is assumed to be equal to the number of through lanes in all zones that the movement passes through.

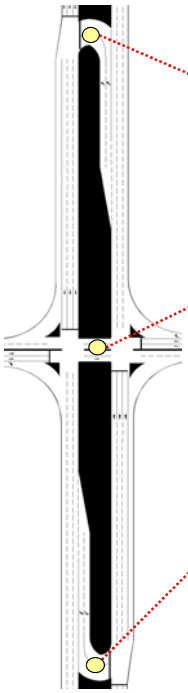
Median U-Turn Intersection

DESIGN AND RESULTS

Project Name:	Sweetgrasss
EW Facility:	Primary Entrancd
NS Facility:	Benn's Church Boulevard
Date:	December 17, 2019

Critical Lane Volume Sum			
< 1200	1200 - 1399	1400 - 1599	≥ 1600
VOLUME / CAPACITY RATIO:			1.11

North arrow directions will appear once the directional question has been answered on the **Input Worksheet**.



Zone 1: 573 — 0.36 V / C

Zone 5: 1770 — 1.11 V / C

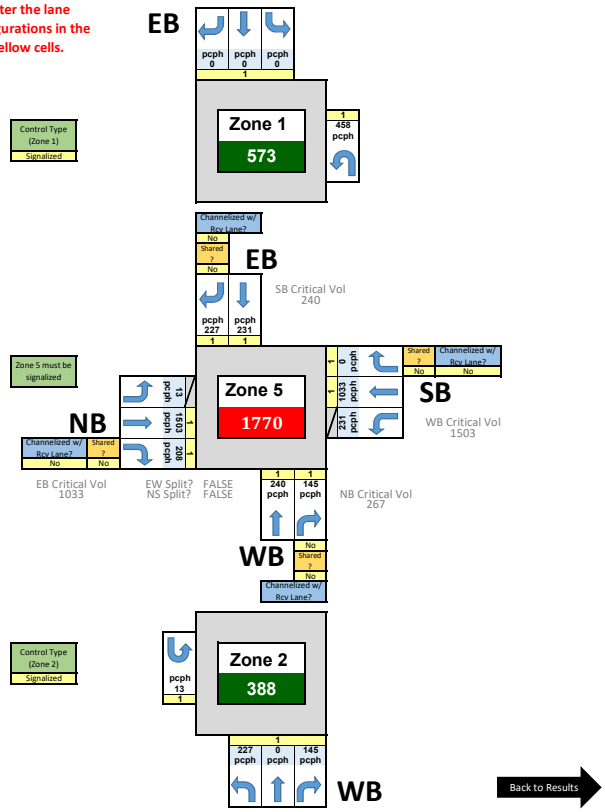
Zone 2: 388 — 0.24 V / C

Note: This diagram does not reflect the actual lane configuration of the intersection

Median U-Turn Intersection

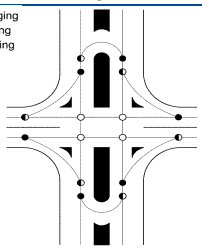
DATA INPUT AND CONFIGURATION

Enter the lane configurations in the yellow cells.



Safety - Conflict Point Diagram

● Diverging
◑ Merging
○ Crossing



Conflict Type	Count
Crossing	4
Merging	6
Diverging	6
Total	**16**

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

20

Assumptions

- This worksheet uses the CLV methodology for calculations at signalized zones. These calculations are based on passenger cars per hour.
- This worksheet uses the *HCM, 6th Edition* methodology for calculations at unsignalized zones. These calculations are based on vehicles per hour.

Partial Displaced Left Turn Intersection

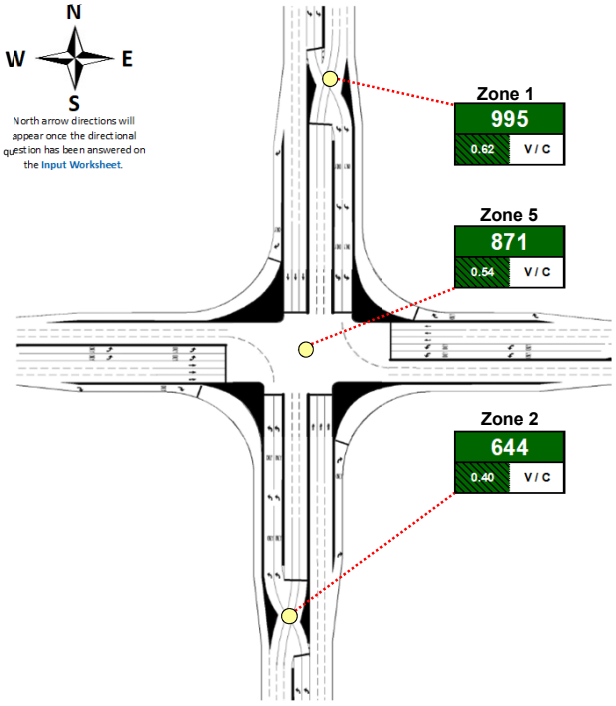
DESIGN AND RESULTS

Project Name:	Sweetgrasss
EW Facility:	Primary Entrancd
NS Facility:	Benn's Church Boulevard
Date:	December 17, 2019

Critical Lane Volume Sum			
< 1200	1200 - 1399	1400 - 1599	≥ 1600
VOLUME / CAPACITY RATIO:			0.62

N W E S

North arrow directions will appear once the directional question has been answered on the Input Worksheet.

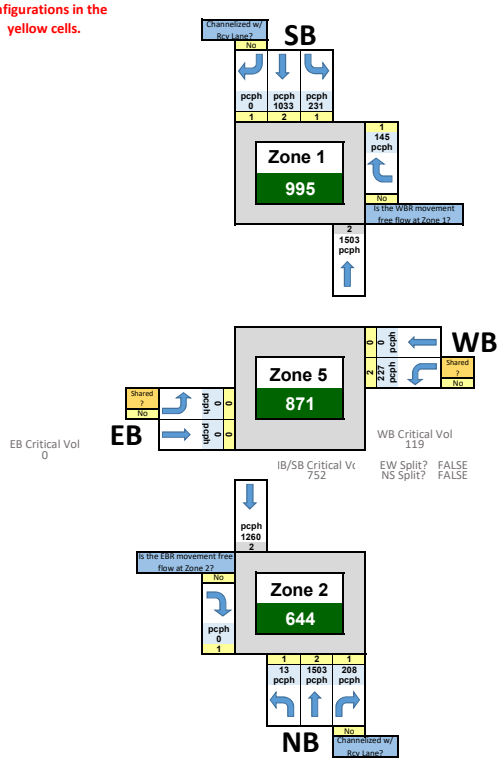


Note: This diagram does not reflect the actual lane configuration of the intersection

Partial Displaced Left Turn Intersection

DATA INPUT AND CONFIGURATION

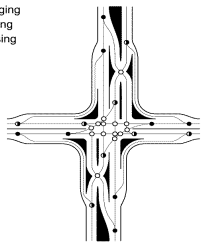
Enter the lane configurations in the yellow cells.



Back to Results

Safety - Conflict Point Diagram

● Diverging
◑ Merging
○ Crossing



Conflict Type	Count
Crossing	14
Merging	8
Diverging	8
Total	**30**

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

44

Assumptions

- CLV calculations at Zone 5 do not include the right-turn movements from the non-displaced-left approaches.
- The number of through lanes entered in one zone is assumed to be equal to the number of through lanes in all zones that the movement passes through.

Partial Median U-Turn Intersection

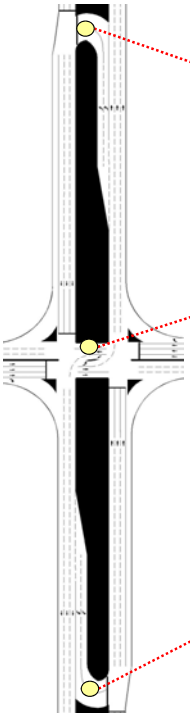
DESIGN AND RESULTS

Project Name:	Sweetgrasss
EW Facility:	Primary Entrancd
NS Facility:	Benn's Church Boulevard
Date:	December 17, 2019

Critical Lane Volume Sum			
< 1200	1200 - 1399	1400 - 1599	≥ 1600
VOLUME / CAPACITY RATIO:			0.72

N W E S

North arrow directions will appear once the directional question has been answered on the **Input Worksheet**.



Zone 1: 648 — 0.41 V / C

Zone 5: 929 — 0.58 V / C

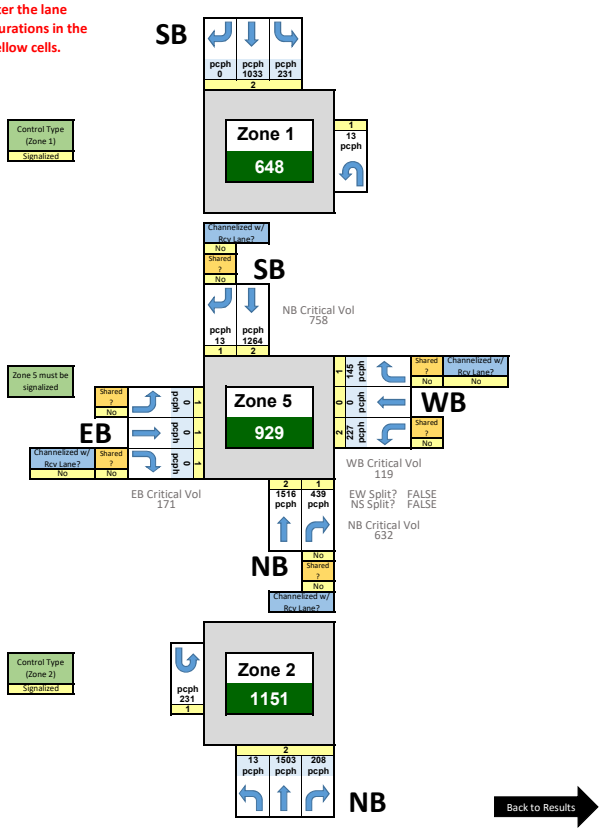
Zone 2: 1151 — 0.72 V / C

Note: This diagram does not reflect the actual lane configuration of the intersection

Patrial Median U-Turn Intersection

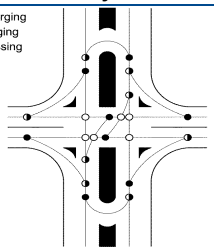
DATA INPUT AND CONFIGURATION

Enter the lane configurations in the yellow cells.



Safety - Conflict Point Diagram

● Diverging
◑ Merging
○ Crossing



Conflict Type	Count
Crossing	6
Merging	8
Diverging	8
Total	**22**

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

28

Assumptions

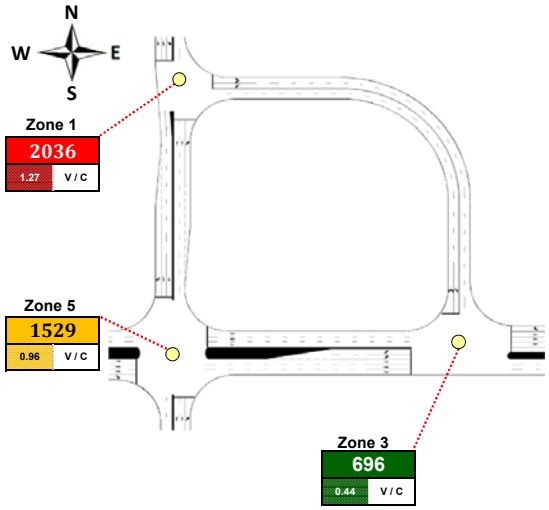
- This worksheet uses the CLV methodology for calculations at signalized zones. These calculations are based on passenger cars per hour.
- This worksheet uses the *HCM, 6th Edition* methodology for calculations at unsignalized zones. These calculations are based on vehicles per hour.

Quadrant Roadway Intersection (N-E)

DESIGN AND RESULTS

Project Name:	Sweetgrasss
EW Facility:	Primary Entrancd
NS Facility:	Benn's Church Boulevard
Date:	December 17, 2019

Critical Lane Volume Sum			
< 1200	1200 - 1399	1400 - 1599	≥ 1600
VOLUME / CAPACITY RATIO:			1.27

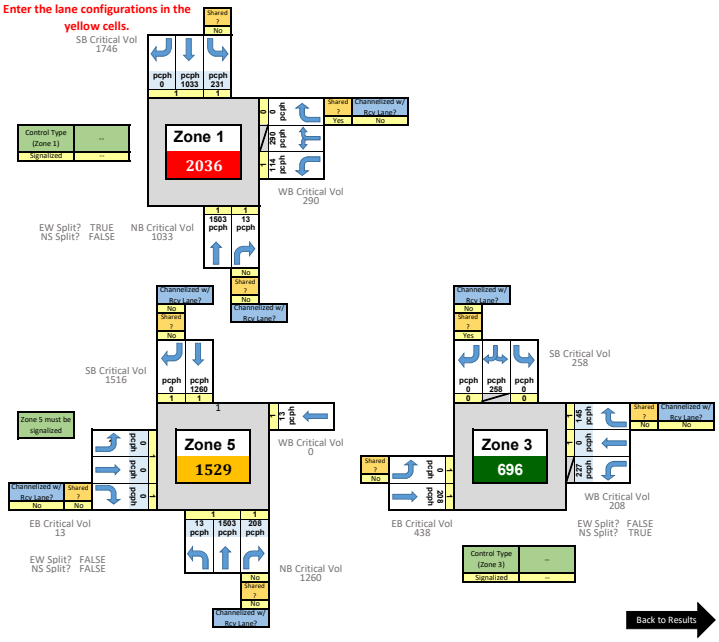


Note: This diagram does not reflect the actual lane configuration of the intersection

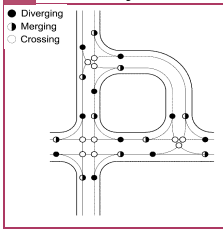
Quadrant Roadway Intersection (N-E)

DATA INPUT AND CONFIGURATION

Enter the lane configurations in the yellow cells.



Safety - Conflict Point Diagram



Conflict Type	Count
Crossing	10
Merging	10
Diverging	10
Total	30

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points
40

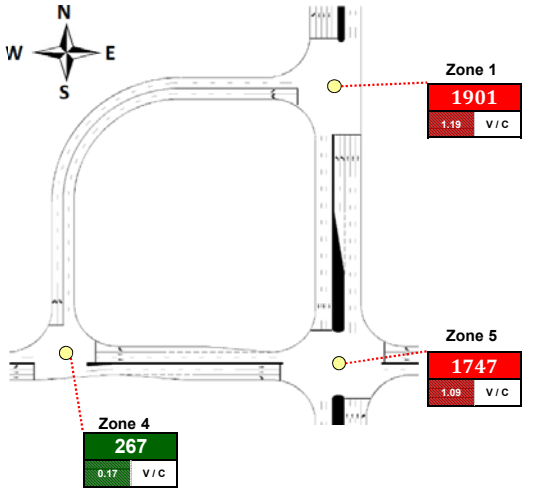
Assumptions

- All right-turning vehicles are assumed to turn right at the first opportunity.
- The northbound left-turning vehicles are assumed to go through Zone 5 and make two right turns before going through Zone 5 again to complete the left-turn movement.
- This worksheet uses the CLV methodology for calculations at signalized zones. These calculations are based on passenger cars per hour.
- This worksheet uses the *HCM, 6th Edition* methodology for calculations at unsignalized zones. These calculations are based on vehicles per hour.

Quadrant Roadway Intersection (N-W)

DESIGN AND RESULTS

		Critical Lane Volume Sum			
Project Name:	Sweetgrasss	< 1200	1200 - 1399	1400 - 1599	≥ 1600
EW Facility:	Primary Entrancd				
NS Facility:	Benn's Church Boulevard	VOLUME / CAPACITY RATIO:			1.19
Date:	December 17, 2019				

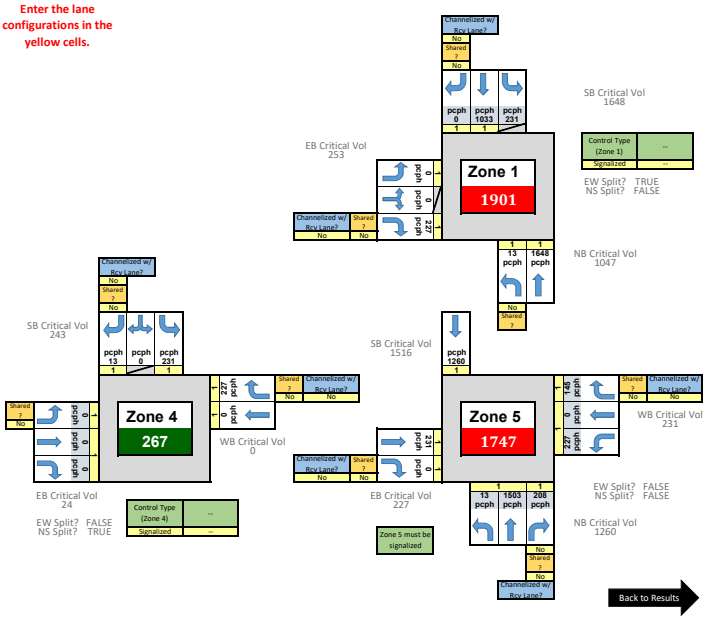


Note: This diagram does not reflect the actual lane configuration of the intersection

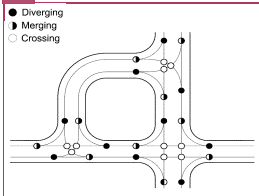
Quadrant Roadway Intersection (N-W)

DATA INPUT AND CONFIGURATION

Enter the lane configurations in the yellow cells.



Safety - Conflict Point Diagram



Conflict Type	Count
Crossing	10
Merging	10
Diverging	10
Total	30

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

40

Assumptions

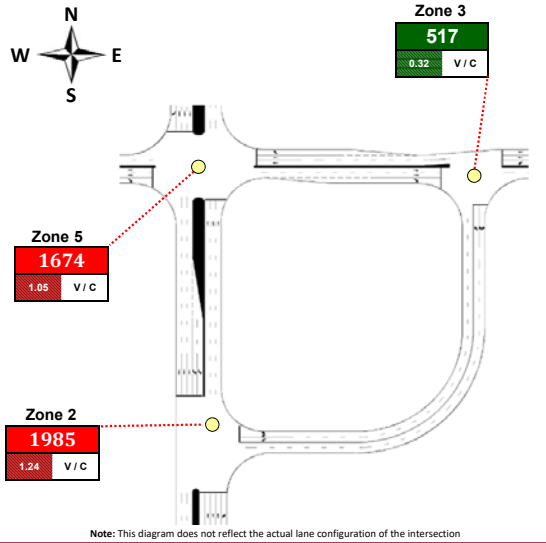
- All right-turning vehicles are assumed to turn right at the first opportunity.
- The westbound left-turning vehicles are assumed to go through Zone 5 and make two right turns before going through Zone 5 again to complete the left-turn movement.
- This worksheet uses the CLV methodology for calculations at signalized zones. These calculations are based on passenger cars per hour.
- This worksheet uses the *HCM, 6th Edition* methodology for calculations at unsignalized zones. These calculations are based on vehicles per hour.

Quadrant Roadway Intersection (S-E)

DESIGN AND RESULTS

Project Name:	Sweetgrasss
EW Facility:	Primary Entrancd
NS Facility:	Benn's Church Boulevard
Date:	December 17, 2019

Critical Lane Volume Sum			
< 1200	1200 - 1399	1400 - 1599	≥ 1600
VOLUME / CAPACITY RATIO:			1.24

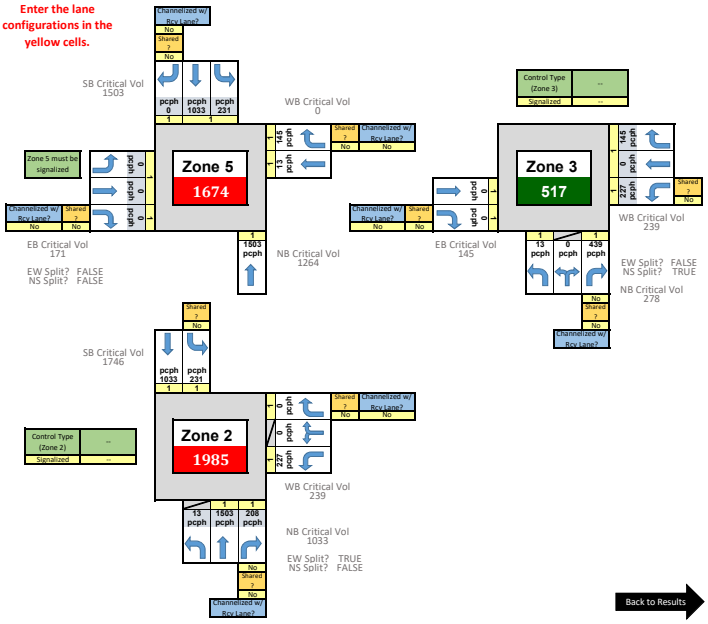


Note: This diagram does not reflect the actual lane configuration of the intersection

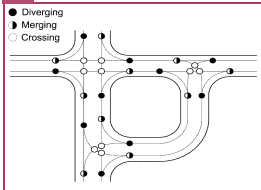
Quadrant Roadway Intersection (S-E)

DATA INPUT AND CONFIGURATION

Enter the lane configurations in the yellow cells.



Safety - Conflict Point Diagram



Conflict Type	Count
Crossing	10
Merging	10
Diverging	10
Total	30

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

40

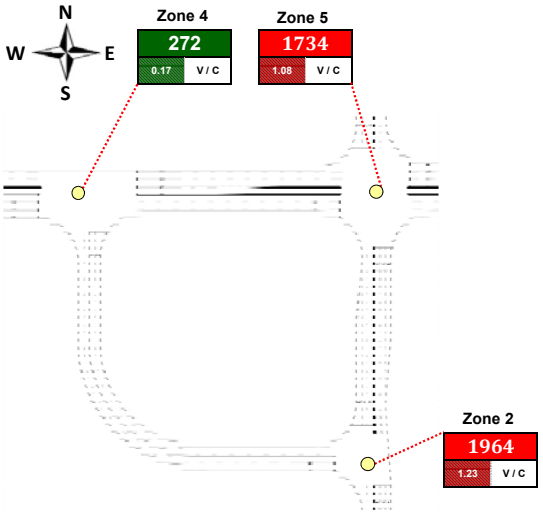
Assumptions

- All right-turning vehicles are assumed to turn right at the first opportunity.
- The eastbound left-turning vehicles are assumed to go through Zone 5 and make two right turns before going through Zone 5 again to complete the left-turn movement.
- This worksheet uses the CLV methodology for calculations at signalized zones. These calculations are based on passenger cars per hour.
- This worksheet uses the *HCM, 6th Edition* methodology for calculations at unsignalized zones. These calculations are based on vehicles per hour.

Quadrant Roadway Intersection (S-W)

DESIGN AND RESULTS

		Critical Lane Volume Sum			
Project Name:	Sweetgrasss	< 1200	1200 - 1399	1400 - 1599	≥ 1600
EW Facility:	Primary Entrancd				
NS Facility:	Benn's Church Boulevard	VOLUME / CAPACITY RATIO:			1.23
Date:	December 17, 2019				

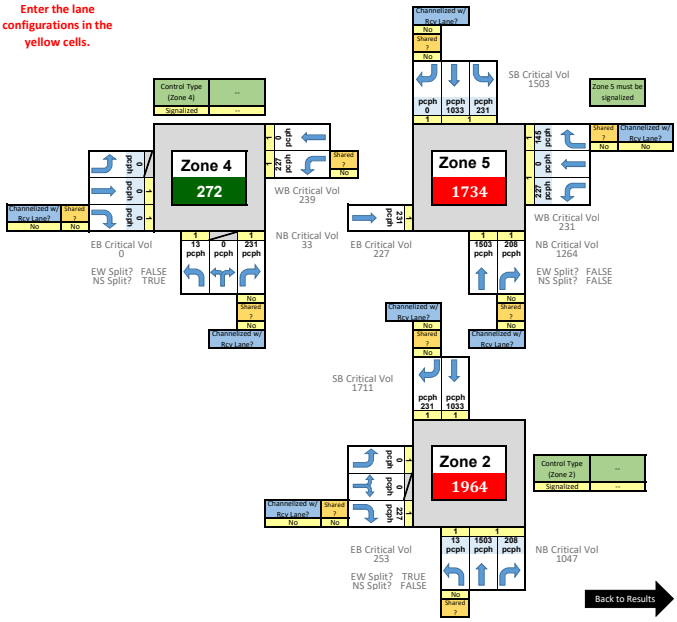


Note: This diagram does not reflect the actual lane configuration of the intersection

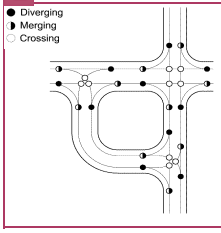
Quadrant Roadway Intersection (S-W)

DATA INPUT AND CONFIGURATION

Enter the lane configurations in the yellow cells.



Safety - Conflict Point Diagram



Conflict Type	Count
Crossing	10
Merging	10
Diverging	10
Total	30

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

40

Assumptions

- All right-turning vehicles are assumed to turn right at the first opportunity.
- The southbound left-turning vehicles are assumed to go through Zone 5 and make two right turns before going through Zone 5 again to complete the left-turn movement.
- This worksheet uses the CLV methodology for calculations at signalized zones. These calculations are based on passenger cars per hour.
- This worksheet uses the *HCM, 6th Edition* methodology for calculations at unsignalized zones. These calculations are based on vehicles per hour.

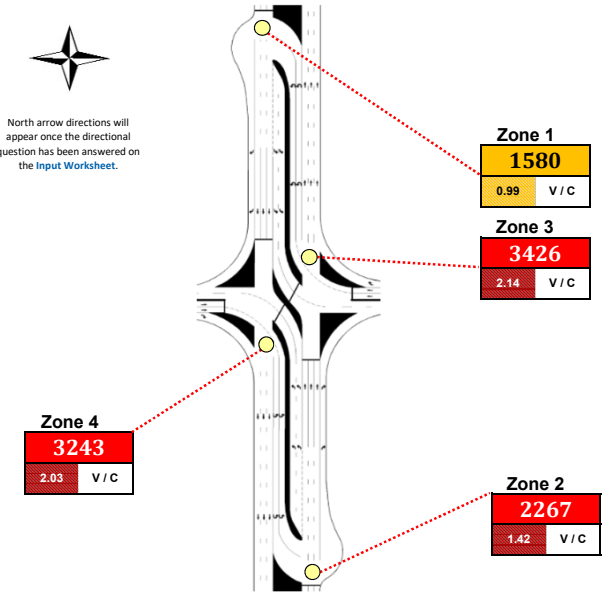
Restricted Crossing U-Turn (RCUT) Intersection

DESIGN AND RESULTS

Project Name:	*Sweetgrasss*
EW Facility:	*Primary Entrancd*
NS Facility:	*Benn's Church Boulevard*
Date:	*December 17, 2019*

Critical Lane Volume Sum			
< 1200	1200 - 1399	1400 - 1599	≥ 1600
VOLUME / CAPACITY RATIO:			**2.14**

North arrow directions will appear once the directional question has been answered on the **Input Worksheet**.

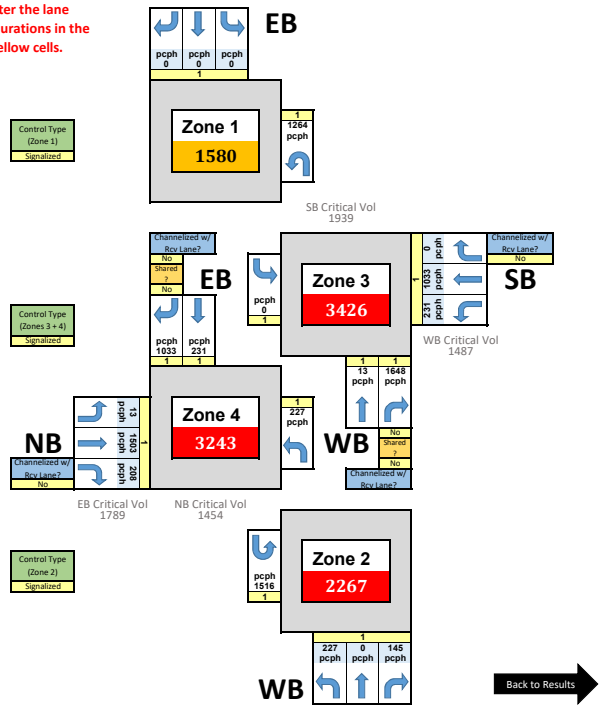


Note: This diagram does not reflect the actual lane configuration of the intersection

Restricted Crossing U-Turn (RCUT) Intersection

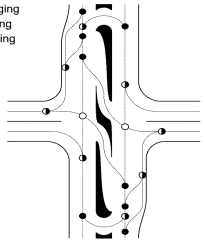
DATA INPUT AND CONFIGURATION

Enter the lane configurations in the yellow cells.



Safety - Conflict Point Diagram

- Diverging
- Merging
- Crossing



Conflict Type	Count
Crossing	2
Merging	8
Diverging	8
Total	**18**

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

20

Assumptions

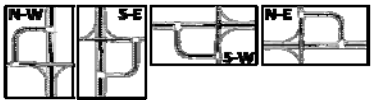
- This worksheet uses the CLV methodology for calculations at signalized zones. These calculations are based on passenger cars per hour.
- This worksheet uses the *HCM, 6th Edition* methodology for calculations at unsignalized zones. These calculations are based on vehicles per hour.

Single Loop Interchange

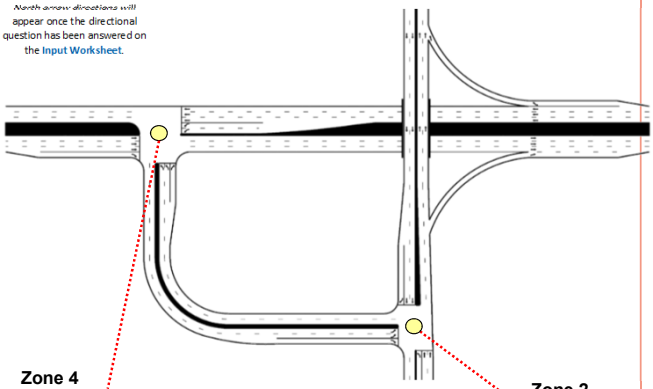
DESIGN AND RESULTS

Project Name:	Sweetgrasss
EW Facility:	Primary Entrancd
NS Facility:	Benn's Church Boulevard
Date:	December 17, 2019

Critical Lane Volume Sum			
< 1200	1200 - 1399	1400 - 1599	≥ 1600
VOLUME / CAPACITY RATIO:			1.10



North arrow directions will appear once the directional question has been answered on the **Input Worksheet**.



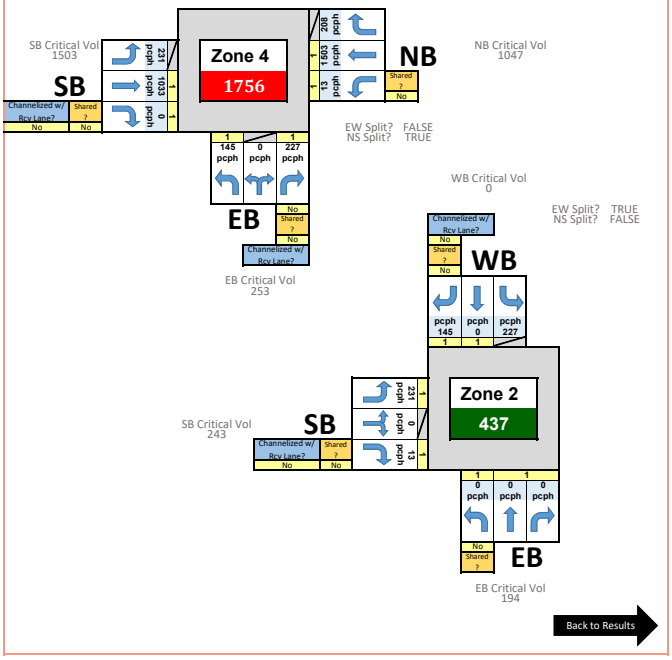
Zone 4
1756
1.10 V / C

Zone 2
437
0.27 V / C

Single Loop Interchange

DATA INPUT AND CONFIGURATION

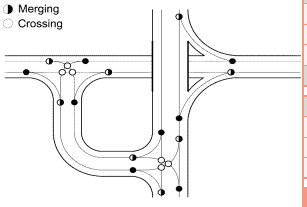
Enter the lane configurations in the yellow cells.



Back to Results

Safety - Conflict Point Diagram

● Diverging
◑ Merging
○ Crossing



Conflict Type	Count
Crossing	6
Merging	8
Diverging	8
Total	22

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

28

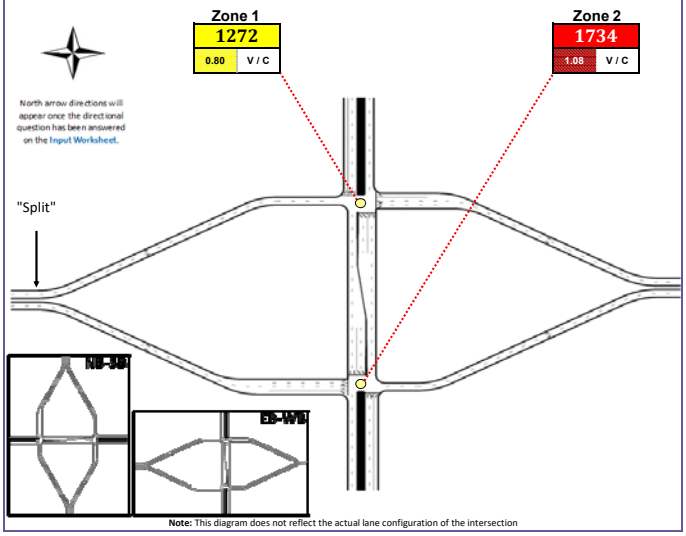
Assumptions

- The NBR movement is assumed to be free flow and is not included in any CLV calculations.

Split Intersection

DESIGN AND RESULTS

		Critical Lane Volume Sum			
Project Name:	Sweetgrasss	< 1200	1200 - 1399	1400 - 1599	≥ 1600
EW Facility:	Primary Entrancd				
NS Facility:	Benn's Church Boulevard	MAXIMUM VOLUME / CAPACITY RATIO:			1.08
Date:	December 17, 2019				

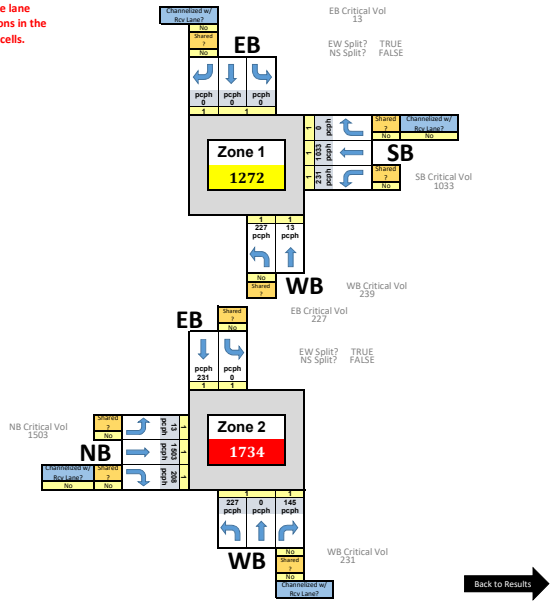


Note: This diagram does not reflect the actual lane configuration of the intersection

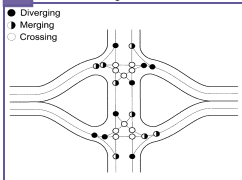
Split Intersection

DATA INPUT AND CONFIGURATION

Enter the lane configurations in the yellow cells.



Safety - Conflict Point Diagram



Conflict Type	Count
Crossing	10
Merging	8
Diverging	8
Total	26

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

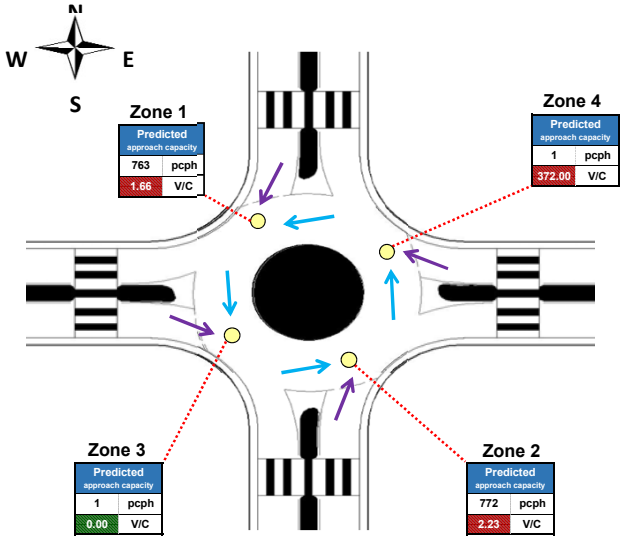
Weighted Total Conflict Points

36

50' ICD Mini-Roundabout

DESIGN AND RESULTS

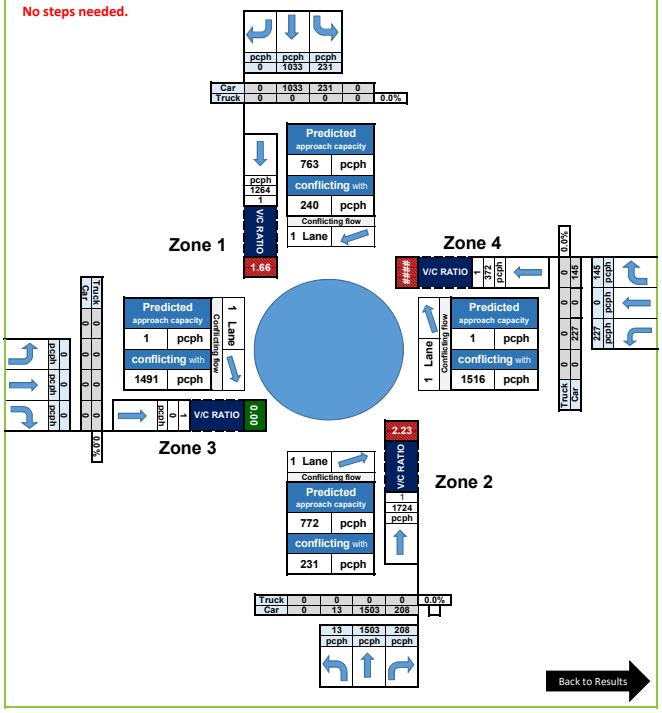
Project Name:	Sweetgrasss	Critical Lane Volume Sum			
EW Facility:	Primary Entrancd	< 1200	1200 - 1399	1400 - 1599	≥ 1600
NS Facility:	Benn's Church Boulevard	VOLUME / CAPACITY RATIO:	372.00		
Date:	December 17, 2019				



50' ICD Mini-Roundabout

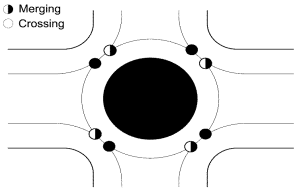
DATA INPUT AND CONFIGURATION

No steps needed.



Safety - Conflict Point Diagram

● Diverging
◑ Merging
○ Crossing



Conflict Type	Count
Crossing	0
Merging	4
Diverging	4
Total	8

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

8

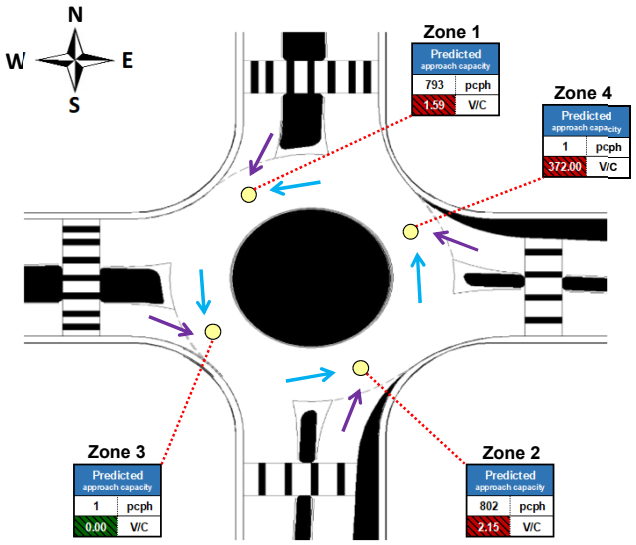
Assumptions

- This worksheet does not use the CLV methodology. The calculations are based on the article *Determination of Mini-Roundabout Capacity in the United States* , published in the *Journal of Transportation Engineering* .

75' ICD Mini-Roundabout

DESIGN AND RESULTS

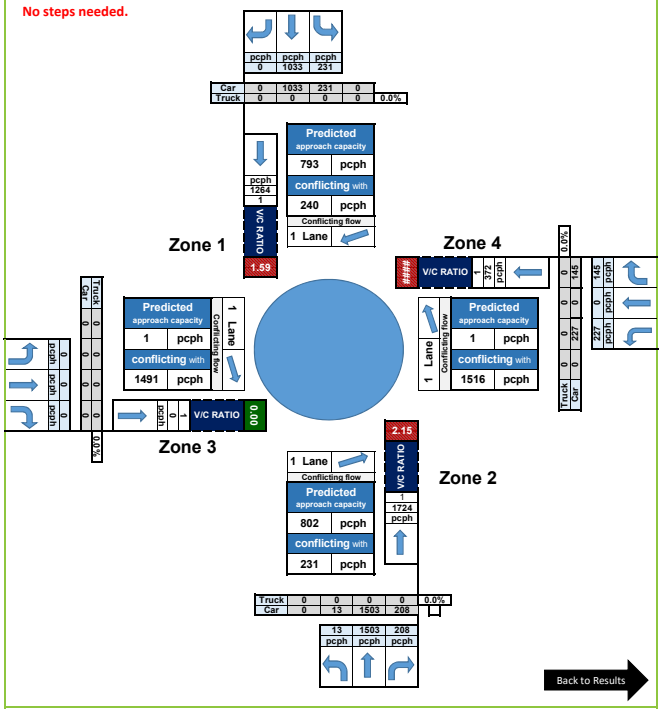
Project Name:	Sweetgrasss	Critical Lane Volume Sum			
EW Facility:	Primary Entrancd	< 1200	1200 - 1399	1400 - 1599	≥ 1600
NS Facility:	Benn's Church Boulevard	VOLUME / CAPACITY RATIO:	372.00		
Date:	December 17, 2019				



75' ICD Mini-Roundabout

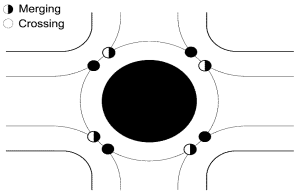
DATA INPUT AND CONFIGURATION

No steps needed.



Safety - Conflict Point Diagram

● Diverging
◑ Merging
○ Crossing



Conflict Type	Count
Crossing	0
Merging	4
Diverging	4
Total	8

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

8

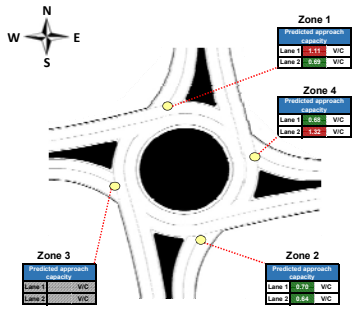
Assumptions

- This worksheet does not use the CLV methodology. The calculations are based on the article *Determination of Mini-Roundabout Capacity in the United States* , published in the *Journal of Transportation Engineering* .

Roundabout

DESIGN AND RESULTS

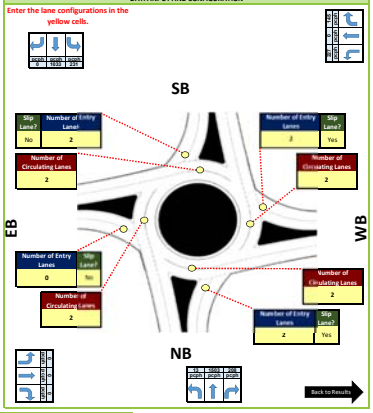
		Critical Lane Volume Sum			
Project Name:	Sweetgrasss	≤ 1200	1200 - 1399	1400 - 1599	≥ 1600
EW Facility:	Primary Entrancd	VOLUME / CAPACITY RATIO:			1.32
NS Facility:	Benn's Church Boulevard				
Date:	December 17, 2019				



Roundabout

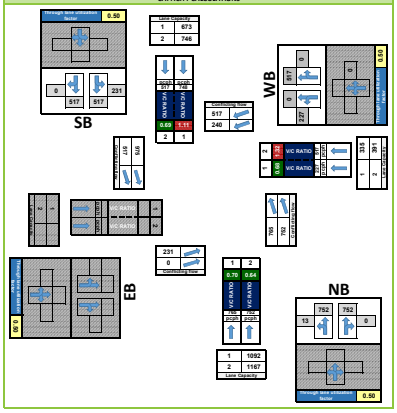
DATA INPUT AND CONFIGURATION

Enter the lane configurations in the yellow cells.



Roundabout

CAPACITY CALCULATIONS



EQUATION: A x exp(-B x Q)

Number of Entry Lanes	Number of Circulating Lanes	Lane	A	B
1	1	-	1380	0.00102
1	2	-	1420	0.00085
2	1	Left	1420	0.00091
2	1	Right	1420	0.00091
2	2	Left	1350	0.00092
2	2	Right	1420	0.00085

Safety - Conflict Point Diagram

Conflict Type	Count
Crossing	0
Merging	4
Diverging	4
Total	8

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

8

Assumptions

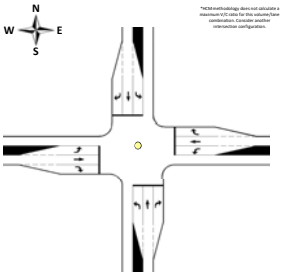
- The number of circulating lanes in one quadrant is assumed to be equal to the number of exiting lanes in the next quadrant.
- The roundabout is limited to a maximum of two entry lanes and two circulating lanes.
- All left-turning vehicles are assumed to stay in the innermost lane until exiting the roundabout.
- This worksheet does not use the CLV methodology. The calculations are based on the *HCM 6th Edition* .

Two-Way Stop Control (TWSC)

DESIGN AND RESULTS

Project Name	Sweetgrasss	Critical Lane Volume Sum
NW Facility	Primary Entrance	< 500 | 500 - 599 | 600 - 699 | ≥ 700
NE Facility	Beirn's Church Boulevard	VOLUME / CAPACITY RATIO: N/A*
Date	December 17, 2019	

*HCM methodology does not calculate a maximum V/C ratio for this volume/lane combination. Consider another intersection configuration.

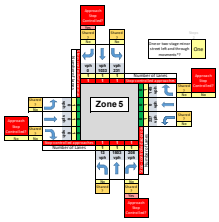


Note: This diagram does not reflect the actual lane configuration of the intersection

Two-Way Stop Control (TWSC)

DATA INPUT AND CONFIGURATION

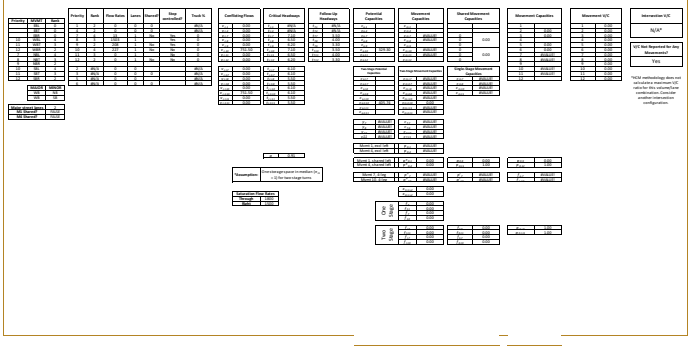
Step 1: Identify which approaches are stop-controlled by selecting "Yes" from the drop-down
Step 2: Enter the lane configurations in the yellow cells.



Back to Results

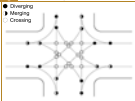
Two-Way Stop Control (TWSC)

HCM 6 CALCULATIONS



Safety - Conflict Point Diagram

- Diverging
- Merging
- Crossing



Conflict Type	Count
Crossing	16
Merging	8
Diverging	8
Total	32

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points: 48

Assumptions

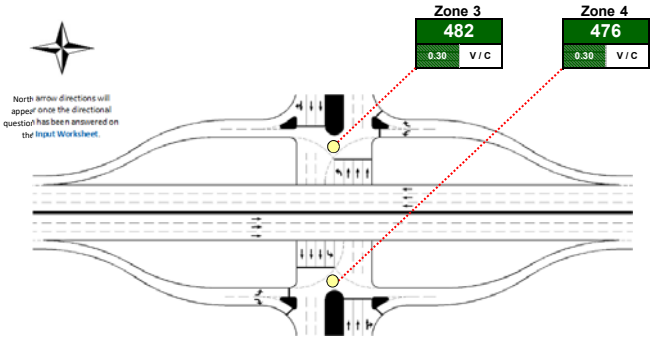
- This worksheet does not use the CLV methodology. The calculations are based on the *HCM, 6th Edition*. The calculations are based on vehicles per hour.

Traditional Diamond Interchange

DESIGN AND RESULTS

Project Name:	Sweetgrasss
EW Facility:	Primary Entrancd
NS Facility:	Benn's Church Boulevard
Date:	December 17, 2019

Critical Lane Volume Sum			
< 1200	1200 - 1399	1400 - 1599	≥ 1600
VOLUME / CAPACITY RATIO:			0.30

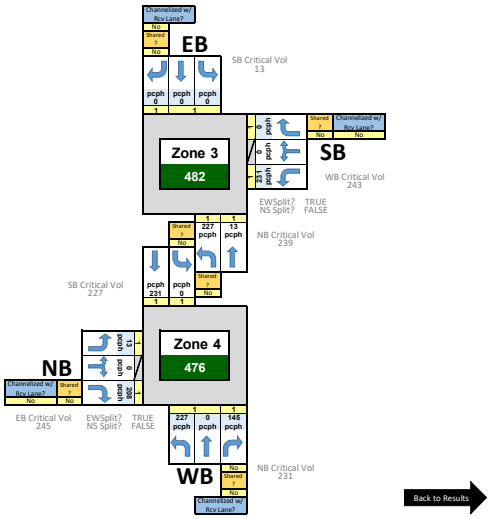


Note: This diagram does not reflect the actual lane configuration of the intersection

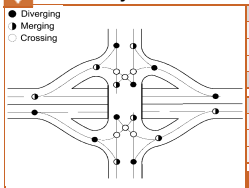
Traditional Diamond Interchange

DATA INPUT AND CONFIGURATION

Enter the lane configurations in the yellow cells.



Safety - Conflict Point Diagram



Conflict Type	Count
Crossing	6
Merging	8
Diverging	8
Total	22

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

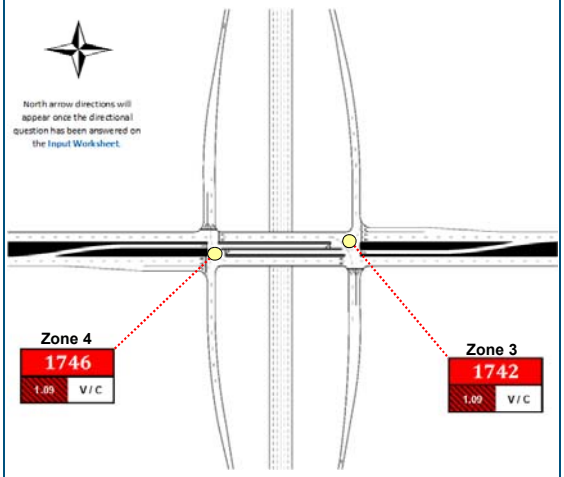
Weighted Total Conflict Points

28

Contraflow Left Interchange

DESIGN AND RESULTS

		Critical Lane Volume Sum			
Project Name:	Sweetgrasss	< 1200	1200 - 1399	1400 - 1599	≥ 1600
EW Facility:	Primary Entrancd				
NS Facility:	Benn's Church Boulevard	VOLUME / CAPACITY RATIO:			1.09
Date:	December 17, 2019				

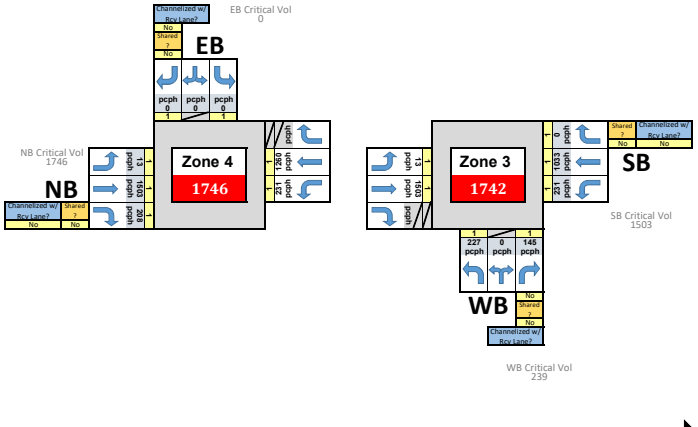


Note: This diagram does not reflect the actual lane configuration of the intersection

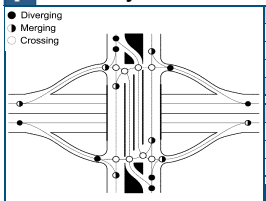
Contraflow Left Interchange

DATA INPUT AND CONFIGURATION

Enter the lane configurations in the yellow cells.



Safety - Conflict Point Diagram



Conflict Type	Count
Crossing	8
Merging	8
Diverging	8
Total	**24**

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

32

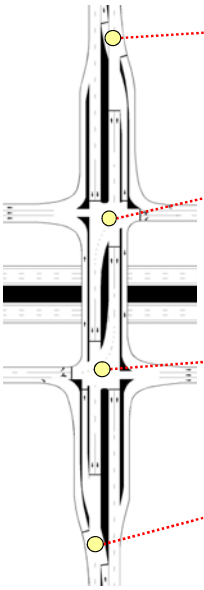
Displaced Left Turn Interchange

DESIGN AND RESULTS

Project Name:	Sweetgrasss
EW Facility:	Primary Entrancd
NS Facility:	Benn's Church Boulevard
Date:	December 17, 2019

Critical Lane Volume Sum			
< 1200	1200 - 1399	1400 - 1599	≥ 1600
VOLUME / CAPACITY RATIO:		0.30	

North arrow directions will appear once the directional question has been answered on the Input Worksheet.



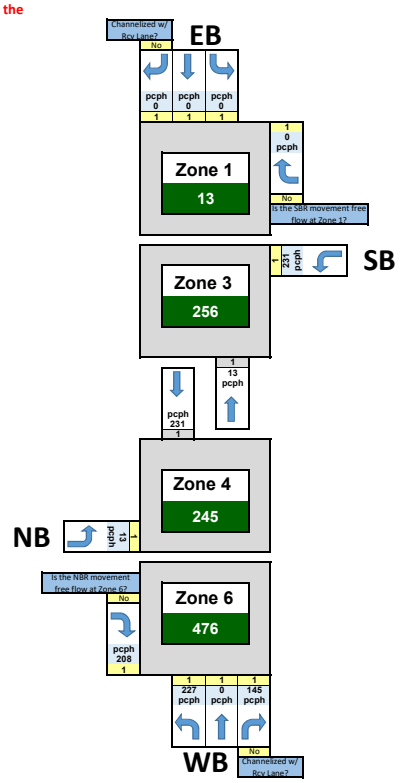
Zone 1	13	0.01 V / C
Zone 3	256	0.16 V / C
Zone 4	245	0.15 V / C
Zone 6	476	0.30 V / C

Note: This diagram does not reflect the actual lane configuration of the intersection

Displaced Left Turn Interchange

DATA INPUT AND CONFIGURATION

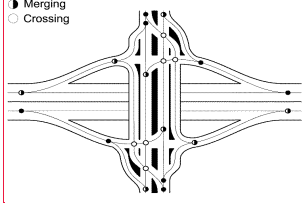
Enter the lane configurations in the yellow cells.



Back to Results

Safety - Conflict Point Diagram

Diverging
Merging
Crossing



Conflict Type	Count
Crossing	6
Merging	8
Diverging	8
Total	**22**

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

28

Assumptions

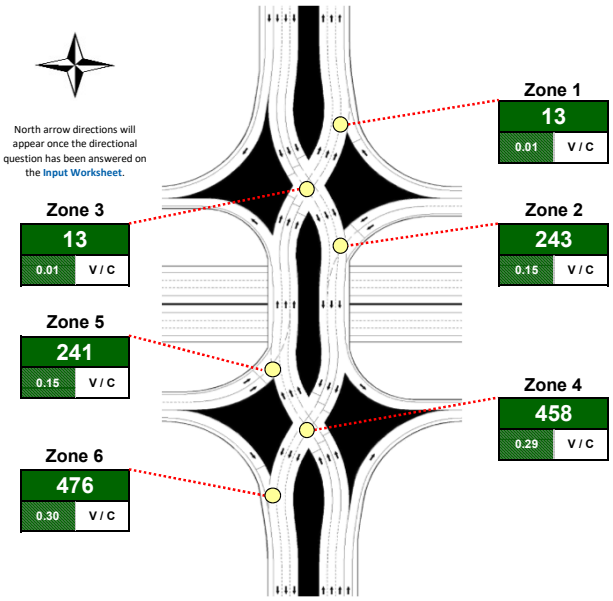
- The number of through lanes entered in one zone is assumed to be equal to the number of through lanes in all zones that the movement passes through.

Diverging Diamond Interchange (DDI)

DESIGN AND RESULTS

		Critical Lane Volume Sum			
Project Name:	Sweetgrasss	< 1200	1200 - 1399	1400 - 1599	≥ 1600
EW Facility:	Primary Entrancd				
NS Facility:	Benn's Church Boulevard	VOLUME / CAPACITY RATIO:			0.30
Date:	December 17, 2019				

North arrow directions will appear once the directional question has been answered on the Input Worksheet.

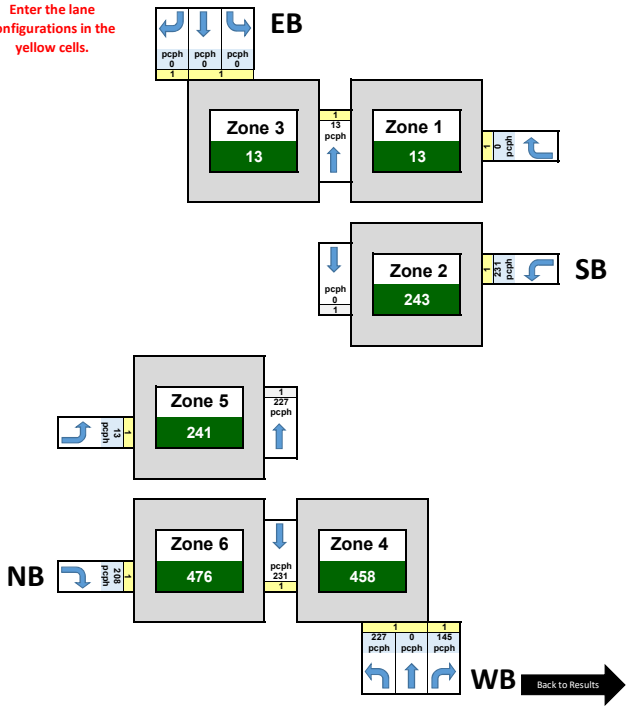


Note: This diagram does not reflect the actual lane configuration of the intersection

Diverging Diamond Interchange (DDI)

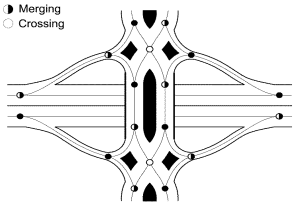
DATA INPUT AND CONFIGURATION

Enter the lane configurations in the yellow cells.



Safety - Conflict Point Diagram

● Diverging
◑ Merging
○ Crossing



Conflict Type	Count
Crossing	2
Merging	8
Diverging	8
Total	18

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

20

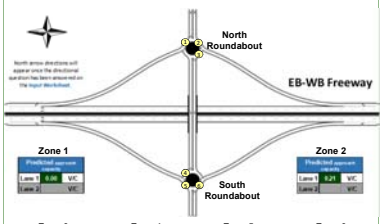
Assumptions

- The number of WB through lanes entered in Zone 4 is assumed to be equal to the number of through lanes in Zone 5. The number of EB through lanes entered in Zone 3 is assumed to be equal to the number of through lanes in Zone 2.

Double Roundabout Interchange

DESIGN AND RESULTS

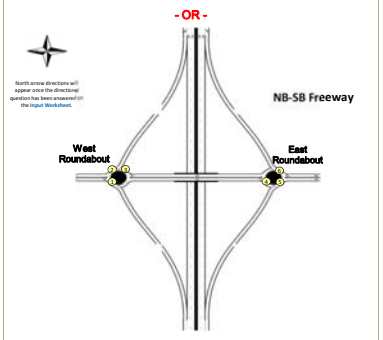
		Critical Lane Volume Sum			
Project Name:	Sweetgrasss	≤ 1200	1200 - 1399	1400 - 1599	≥ 1600
EW Facility:	Primary Entrancd				
NS Facility:	Benn's Church Boulevard	VOLUME / CAPACITY RATIO:			0.27
Date:	December 17, 2019				



Zone 1			Zone 2		
Predicted approach capacity			Predicted approach capacity		
Lane 1	0.00	V/C	Lane 1	0.21	V/C
Lane 2		V/C	Lane 2		V/C

Zone 3			Zone 4			Zone 5			Zone 6		
Predicted approach capacity			Predicted approach capacity			Predicted approach capacity			Predicted approach capacity		
Lane 1	0.17	V/C	Lane 1	0.17	V/C	Lane 1	0.29	V/C	Lane 1	0.27	V/C
Lane 2		V/C	Lane 2		V/C	Lane 2		V/C	Lane 2		V/C

- OR -

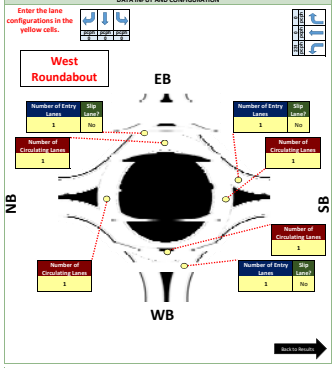


Note: This diagram does not reflect the actual lane configuration of the intersection

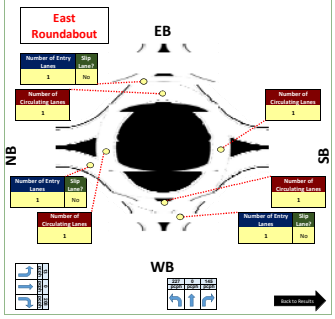
Double Roundabout Interchange

DATA INPUT AND CONFIGURATION

Enter the lane configurations in the yellow cells.

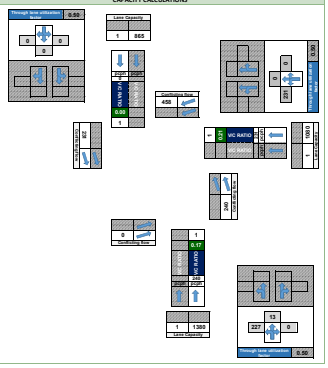


DATA INPUT AND CONFIGURATION

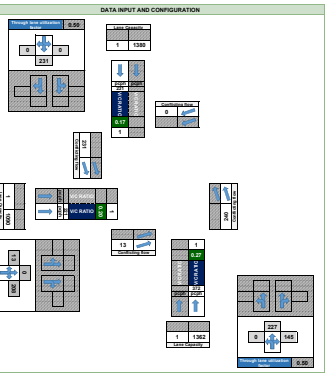


Double Roundabout Interchange

CAPACITY CALCULATIONS



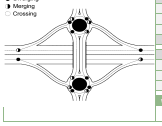
DATA INPUT AND CONFIGURATION



EQUATION: A x exp(-B x Q)

Number of Entry Lanes	Number of Circulating Lanes	Lane	A	B
1	1	-	1380	0.00102
1	2	-	1420	0.00085
2	1	Left	1420	0.00091
2	1	Right	1420	0.00091
2	2	Left	1350	0.00092
2	2	Right	1420	0.00085

Safety - Conflict Point Diagram



Conflict Type	Count
Crossing	0
Merging	8
Diverging	8
Total	16

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points: **16**

Assumptions

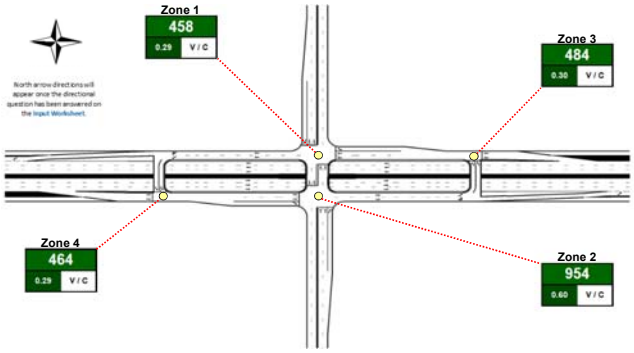
- The number of circulating lanes in one quadrant is assumed to be equal to the number of exiting lanes in the next quadrant.
- The roundabout is limited to a maximum of two entry lanes and two circulating lanes.
- All left-turning vehicles are assumed to stay in the innermost lane until exiting the roundabout.
- This worksheet does not use the CLV methodology. The calculations are based on the *HCM 6th Edition*.

Michigan Urban Diamond Intersection

DESIGN AND RESULTS

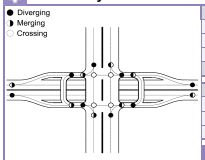
Project Name:	Sweetgrasss
EW Facility:	Primary Entrancd
NS Facility:	Benn's Church Boulevard
Date:	December 17, 2019

Critical Lane Volume Sum			
< 1200	1200 - 1399	1400 - 1599	≥ 1600
VOLUME / CAPACITY RATIO:	0.60		



Note: This diagram does not reflect the actual lane configuration of the intersection

Safety - Conflict Point Diagram



Conflict Type	Count
Crossing	4
Merging	8
Diverging	8
Total	20

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

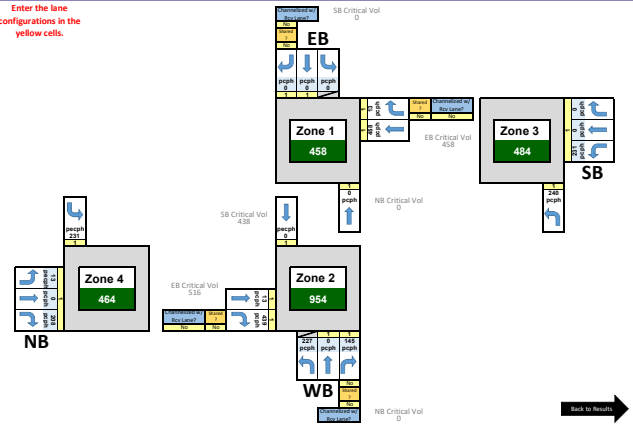
Weighted Total Conflict Points

24

Michigan Urban Diamond Intersection

DATA INPUT AND CONFIGURATION

Enter the lane configurations in the yellow cells.

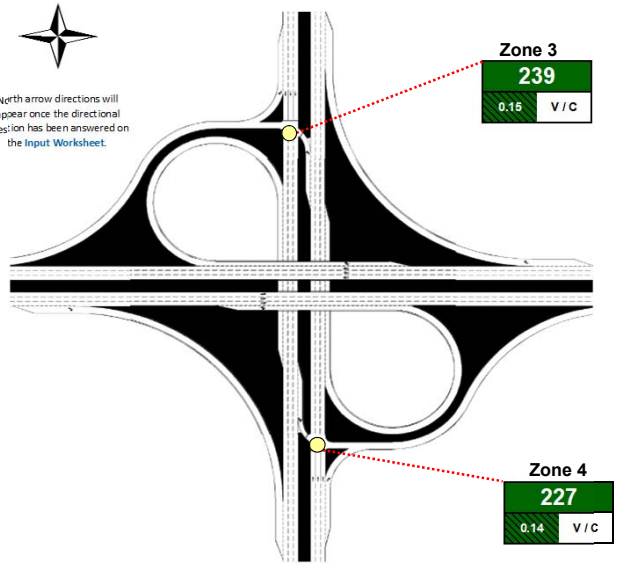


Partial Cloverleaf Interchange

DESIGN AND RESULTS

		Critical Lane Volume Sum			
Project Name:	Sweetgrasss	< 1200	1200 - 1399	1400 - 1599	≥ 1600
EW Facility:	Primary Entrancd				
NS Facility:	Benn's Church Boulevard	VOLUME / CAPACITY RATIO:			0.15
Date:	December 17, 2019				

North arrow directions will appear once the directional question has been answered on the Input Worksheet.

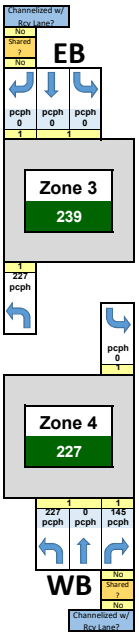


Note: This diagram does not reflect the actual lane configuration of the intersection

Partial Cloverleaf Interchange

DATA INPUT AND CONFIGURATION

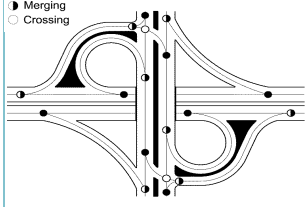
Enter the lane configurations in the yellow cells.



Back to Results

Safety - Conflict Point Diagram

● Diverging
◑ Merging
○ Crossing



Conflict Type	Count
Crossing	2
Merging	8
Diverging	8
Total	18

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

20

Assumptions

- This configuration assumes the Partial cloverleaf has two loop ramps, both of which will be used by vehicles exiting the freeway.

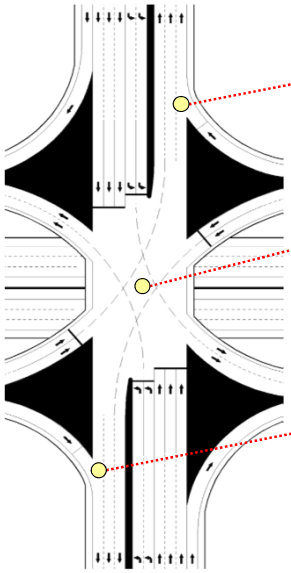
Single Point Urban Interchange (SPUI)

DESIGN AND RESULTS

Project Name:	Sweetgrasss
EW Facility:	Primary Entrancd
NS Facility:	Benn's Church Boulevard
Date:	December 17, 2019

Critical Lane Volume Sum			
< 1200	1200 - 1399	1400 - 1599	≥ 1600
VOLUME / CAPACITY RATIO:		0.30	

North arrow directions will appear once the directional question has been answered on the **Input Worksheet**.



Zone 1
13
0.01 V / C

Zone 3
482
0.30 V / C

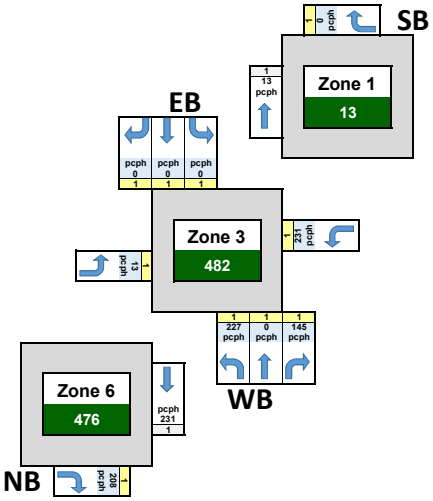
Zone 6
476
0.30 V / C

Note: This diagram does not reflect the actual lane configuration of the intersection

Single Point Urban Interchange (SPUI)

DATA INPUT AND CONFIGURATION

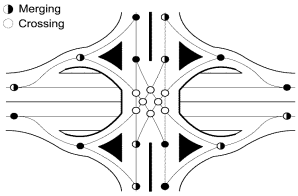
Enter the lane configurations in the yellow cells.



Back to Results

Safety - Conflict Point Diagram

● Diverging
◑ Merging
○ Crossing



Conflict Type	Count
Crossing	8
Merging	8
Diverging	8
Total	**24**

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

32

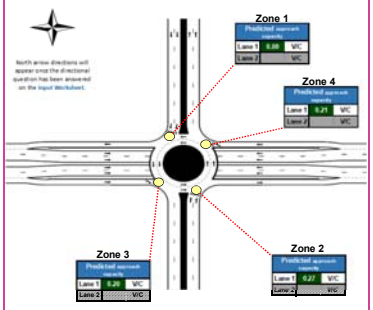
Assumptions

- The number of through lanes entered in one zone is assumed to be equal to the number of through lanes in all zones that the movement passes through.

Single Roundabout Interchange

DESIGN AND RESULTS

		Critical Lane Volume Sum			
Project Name:	Sweetgrasss	< 1200	1200 - 1399	1400 - 1599	≥ 1600
EW Facility:	Primary Entrancd	VOLUME / CAPACITY RATIO:			
NS Facility:	Benn's Church Boulevard				0.27
Date:	December 17, 2019				

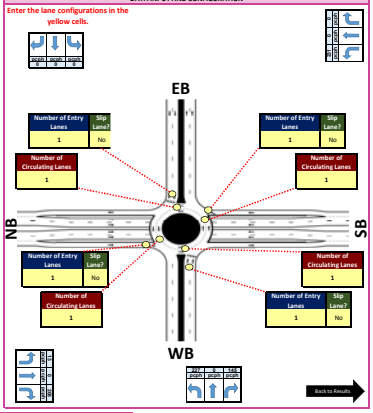


Note: This diagram does not reflect the actual lane configuration of the intersection

Single Roundabout Interchange

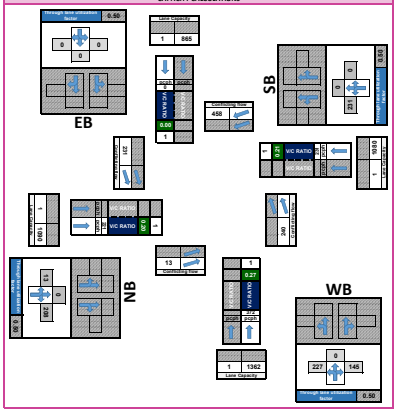
DATA INPUT AND CONFIGURATION

Enter the lane configurations in the yellow cells.



Single Roundabout Interchange

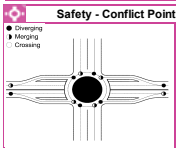
CAPACITY CALCULATIONS



EQUATION: A x exp(-B x Q)

Number of Entry Lanes	Number of Circulating Lanes	Lane	A	B
1	1	-	1380	0.00102
1	2	-	1420	0.00085
2	1	Left	1420	0.00091
2	1	Right	1420	0.00091
2	2	Left	1350	0.00092
2	2	Right	1420	0.00085

Safety - Conflict Point Diagram



Conflict Type	Count
Crossing	0
Merging	6
Diverging	6
Total	12

Conflict Type	Weight
Crossing	2
Merging	1
Diverging	1

Weighted Total Conflict Points

12

Assumptions

- The number of circulating lanes in one quadrant is assumed to be equal to the number of exiting lanes in the next quadrant.
- The roundabout is limited to a maximum of two entry lanes and two circulating lanes.
- All left-turning vehicles are assumed to stay in the innermost lane until exiting the roundabout.
- This worksheet does not use the CLV methodology. The calculations are based on the *HCM 6th Edition* .

Appendix C (optional):
TIA, Safety Study, and/or other Studies (if available)

www.vhb.com

vhb

DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS
NORFOLK DISTRICT
FORT NORFOLK
803 FRONT STREET
NORFOLK VA 23510-1011

November 10, 2021

PRELIMINARY JURISDICTIONAL DETERMINATION

Eastern Virginia Regulatory Section
NAO-2021-1053 (Jones Creek)

Jamie Armentrout
Wetland Studies and Solutions, Inc.
1008 Old Virginia Beach Road, Suite 200
Virginia Beach, Virginia 23451

Dear Mr. Armentrout:

This letter is regarding your request for a preliminary jurisdictional determination of the aquatic resources (e.g., wetlands, streams, and ponds), on an approximately 249-acre parcel located at 14096 Benns Church Road, known as Sweetgrass, in Isle of Wight County, Virginia (tax map parcel #32-01-009) hereinafter referred to as project area.

The map entitled “Wetland Delineation Sweetgrass”, by WSSI dated March 8, 2021, received by the U.S. Army Corps of Engineers (Corps) on April 15, 2021 (copy enclosed) provides the locations of the aquatic resources within the project area referenced above. This letter is not confirming the Cowardin classifications of these aquatic resources.

These aquatic resources exhibit wetland criteria as defined in the 1987 Corps of Engineers Wetland Delineation Manual, and the Atlantic and Gulf Coastal Plain Regional Supplement. This site also contains aquatic resources with an ordinary high-water mark and a high tide line.

Please be aware that you may be required to obtain a Corps permit for any discharge of dredged and/or fill material, either temporary or permanent, into a water of the U.S. In addition, you may be required to obtain a Corps permit for certain activities occurring within, under, or over a navigable water of the U.S. subject to the Section 10 of the Rivers and Harbors Act. Furthermore, you may be required to obtain state and local authorizations, including a Virginia Water Protection Permit from the Virginia Department of Environmental Quality (DEQ), a permit from the Virginia Marine Resources Commission (VMRC), and/or a permit from your local wetlands board.

This is a preliminary jurisdictional determination and is not a legally binding determination regarding whether Corps jurisdiction applies to the aquatic resources in

question. To determine Corps' jurisdiction, you may request and obtain an approved jurisdictional determination.

This delineation of aquatic resources can be relied upon for no more than five years from the date of this letter. New information may warrant revision. Enclosed is a copy of the "Preliminary Jurisdictional Determination Form". Please review the document, sign, and return one copy to the Corps, either by email george.a.janek@usace.army.mil or by standard mail to U.S. Army Corps of Engineers, Norfolk District, CENAO-WR-R, Attn: George Janek, 803 Front Street, Norfolk, VA 23510-1011.

If you have any questions, please contact me by telephone at (757) 201-7135 or by email at george.a.janek@usace.army.mil.

Sincerely,

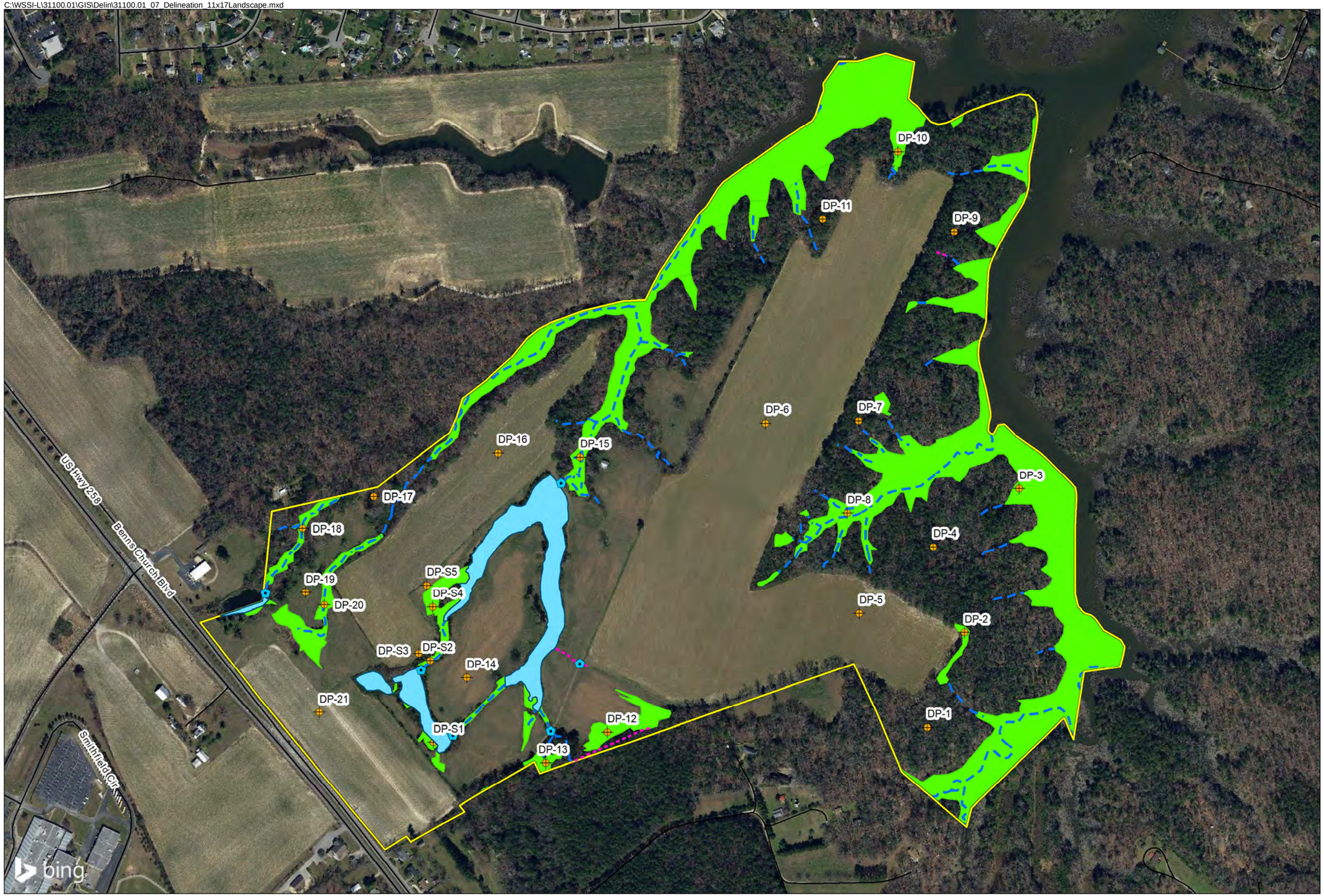
George Janek
Eastern Virginia
Regulatory Section

Enclosure(s):

cc: Henry Layden, Trustee
DEQ
Shaunee A. Beussink, Isle of Wight County

Received by USACE NAO by DGM April 15, 2021

C:\WSSI-L\31100.01\GIS\Delin\31100.01_07_Delineation_11x17Landscape.mxd



Wetland Delineation
Sweetgrass
WSSI #31100.01

NORTH

0 500

Feet

Original Scale:
1 " = 500 '

- Project Area (249.4 ac)
- Wetland Data Points
- Culvert or Outfall
- Wetland (38.75 ac)
- Farm Pond (6.05 ac)
- Stream (15,645 lf)
- Ditch (685 lf)

Delineation Notes:
In-field wetland delineation performed on December 15, 2020 through February 10, 2020 by Jamie Armentrout, PWD.

*Subject to confirmation by the USACE

Aerial Source: Bing

Figure Date: March 8, 2021

Wetland Studies and Solutions, Inc.
a DAVEY company

Figure 7

Appendix 2 - PRELIMINARY JURISDICTIONAL DETERMINATION (PJD) FORM

BACKGROUND INFORMATION

A. REPORT COMPLETION DATE FOR PJD:

B. NAME AND ADDRESS OF PERSON REQUESTING PJD:

C. DISTRICT OFFICE, FILE NAME, AND NUMBER:

D. PROJECT LOCATION(S) AND BACKGROUND INFORMATION:
(USE THE TABLE BELOW TO DOCUMENT MULTIPLE AQUATIC RESOURCES AND/OR AQUATIC RESOURCES AT DIFFERENT SITES)

State: County/parish/borough: City:

Center coordinates of site (lat/long in degree decimal format):

Lat.: xx.xxx° Long.: yy.yyy°

Universal Transverse Mercator:

Name of nearest waterbody:

E. REVIEW PERFORMED FOR SITE EVALUATION (CHECK ALL THAT APPLY):

☐ Office (Desk) Determination. Date:

☐ Field Determination. Date(s):

TABLE OF AQUATIC RESOURCES IN REVIEW AREA WHICH "MAY BE" SUBJECT TO REGULATORY JURISDICTION.

Site number	Latitude (decimal degrees)	Longitude (decimal degrees)	Estimated amount of aquatic resource in review area (acreage and linear feet, if applicable)	Type of aquatic resource (i.e., wetland vs. non-wetland waters)	Geographic authority to which the aquatic resource "may be" subject (i.e., Section 404 or Section 10/404)

1) The Corps of Engineers believes that there may be jurisdictional aquatic resources in the review area, and the requestor of this PJD is hereby advised of his or her option to request and obtain an approved JD (AJD) for that review area based on an informed decision after having discussed the various types of JDs and their characteristics and circumstances when they may be appropriate.

2) In any circumstance where a permit applicant obtains an individual permit, or a Nationwide General Permit (NWP) or other general permit verification requiring "pre-construction notification" (PCN), or requests verification for a non-reporting NWP or other general permit, and the permit applicant has not requested an AJD for the activity, the permit applicant is hereby made aware that: (1) the permit applicant has elected to seek a permit authorization based on a PJD, which does not make an official determination of jurisdictional aquatic resources; (2) the applicant has the option to request an AJD before accepting the terms and conditions of the permit authorization, and that basing a permit authorization on an AJD could possibly result in less compensatory mitigation being required or different special conditions; (3) the applicant has the right to request an individual permit rather than accepting the terms and conditions of the NWP or other general permit authorization; (4) the applicant can accept a permit authorization and thereby agree to comply with all the terms and conditions of that permit, including whatever mitigation requirements the Corps has determined to be necessary; (5) undertaking any activity in reliance upon the subject permit authorization without requesting an AJD constitutes the applicant's acceptance of the use of the PJD; (6) accepting a permit authorization (e.g., signing a proffered individual permit) or undertaking any activity in reliance on any form of Corps permit authorization based on a PJD constitutes agreement that all aquatic resources in the review area affected in any way by that activity will be treated as jurisdictional, and waives any challenge to such jurisdiction in any administrative or judicial compliance or enforcement action, or in any administrative appeal or in any Federal court; and (7) whether the applicant elects to use either an AJD or a PJD, the JD will be processed as soon as practicable. Further, an AJD, a proffered individual permit (and all terms and conditions contained therein), or individual permit denial can be administratively appealed pursuant to 33 C.F.R. Part 331. If, during an administrative appeal, it becomes appropriate to make an official determination whether geographic jurisdiction exists over aquatic resources in the review area, or to provide an official delineation of jurisdictional aquatic resources in the review area, the Corps will provide an AJD to accomplish that result, as soon as is practicable. This PJD finds that there *"may be"* waters of the U.S. and/or that there *"may be"* navigable waters of the U.S. on the subject review area, and identifies all aquatic features in the review area that could be affected by the proposed activity, based on the following information:

SUPPORTING DATA. Data reviewed for PJD (check all that apply)

Checked items should be included in subject file. Appropriately reference sources below where indicated for all checked items:

☐ Maps, plans, plots or plat submitted by or on behalf of the PJD requestor:
Map: _____.

☐ Data sheets prepared/submitted by or on behalf of the PJD requestor.
☐ Office concurs with data sheets/delineation report.
☐ Office does not concur with data sheets/delineation report. Rationale: _____.

☐ Data sheets prepared by the Corps: _____.

☐ Corps navigable waters' study: _____.

☐ U.S. Geological Survey Hydrologic Atlas: _____.
☐ USGS NHD data.
☐ USGS 8 and 12 digit HUC maps.

☐ U.S. Geological Survey map(s). Cite scale & quad name: _____.

☐ Natural Resources Conservation Service Soil Survey. Citation: _____.

☐ National wetlands inventory map(s). Cite name: _____.

☐ State/local wetland inventory map(s): _____.

☐ FEMA/FIRM maps: _____.

☐ 100-year Floodplain Elevation is: ____. (National Geodetic Vertical Datum of 1929)

☐ Photographs: ☐ Aerial (Name & Date): _____.
or ☐ Other (Name & Date): _____.

☐ Previous determination(s). File no. and date of response letter: _____.

☐ Other information (please specify): _____.

IMPORTANT NOTE: The information recorded on this form has not necessarily been verified by the Corps and should not be relied upon for later jurisdictional determinations.

_____
Signature and date of
Regulatory staff member
completing PJD

_____
Signature and date of
person requesting PJD
(REQUIRED, unless obtaining
the signature is impracticable)[1]

[1] Districts may establish timeframes for requestor to return signed PJD forms. If the requestor does not respond within the established time frame, the district may presume concurrence and no additional follow up is necessary prior to finalizing an action.

AES
CONSULTING ENGINEERS

5248 Olde Towne Road, Suite 1
Williamsburg, Virginia 23188
Phone (757) 253-0040
Fax (757) 220-8994
aesva.com

Water Quality Impact Assessment

Rezoning

For

Sweetgrass Development

Prepared For

NVR, INC
860 Greenbrier Circle, Suite 100
Chesapeake, Virginia 23320

April 29, 2019
Revised November 2021

AES
CONSULTING ENGINEERS

5248 Olde Towne Road Suite 1
Williamsburg, Virginia 23188
Phone: 757-253-0040
www.aesva.com

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II. EXISTING CONDITIONS 2
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B. Identification of Impacts and Required Information for Review 3
C. Hydrologic Impacts 4
IV. PROPOSED MITIGATION 6
V. CONCLUSION 6
VI. APPENDIX 7

APPENDIX

Exhibit A – Impact Map
Exhibit B – Clearing Exhibit

I. INTRODUCTION

On behalf of NVR, Inc. proposes to request Rezoning for a parcel within the Windsor District is to rezone a parcel containing 249.47 acres that is currently zoned (RAC Rural Conservation District) to PD/MX (Planned Development Mixed Use) at 14096 Benns Church Boulevard, Smithfield Virginia.

The site is currently mainly farmed land, with the perimeter and portions for the site furthest from Benns Church Blvd being forested. The site lies completely within the County of Isle of Wight boarding the Smithfield City limits to the North, Jones Creek to the East, Single family subdivision to the South and Benns Church Blvd. (Rt. 10) to the West. The site contains an existing lake and slopes to existing creek known as Jones Creek. The average soils slope 2% to 6%. The site is within the Peanut soils and Water district and has a hydrologic unit code of JL41 and reaches the Pagan River-Jones Creek drainage areas.

The purpose of this assessment is to summarize and organize information about the proposed impacts to the Chesapeake Bay Preservation Area(s) (CBPAs) which are reasonably necessary for the development of this property and to identify proposed mitigation that addresses such impacts. The anticipated duration of the project is five to eight years, with impacts to the RPA occurring during the first year. While the site isn't fully designed, we anticipate ten (10) specific areas of CBPA impacts in the project area. Section 4003 of the Isle of Wight County Chesapeake Bay Ordinance generally categorizes these impacts. Exhibit A, submitted with this report, identifies the relative location of the impacts. Upon approval of the formal exception, the proposed mitigation described in this assessment will be incorporated into the submitted subdivision plans, which are required as part of the development review process.

The total area impacted approximately amounts to 102,483 square feet, in which case this assessment shall be considered a Major Water Quality Impact.

II. EXISTING CONDITIONS

The site is currently mainly farmed land, with the perimeter and portions for the site furthest from Benns Church Blvd being forested. Forested area makes up ± 47% of the site, while cropland makes up ± 36%. The remaining ± 17% of the site is water (i.e. pond and wetlands). Stormwater runoff currently sheet flows to the existing ponds located in the middle of the site and perimeter wetlands. A majority of the site is currently crop land and is moderately sloped, averaging 0-3%, with smaller areas exceeding 10%. A majority of lands sloped greater than 3% are located in RPA buffers and with the exceptions of the impacts listed below shall not be disturbed. The hydrologic soil groups found to be in the areas of proposed development are primarily hydrologic group C that generally indicates a low infiltration rate. The remaining site is predominately hydrologic group D with these soils being located in areas of the RPA buffers and wetlands. Exhibit A and Master Plan sheet 4 more clearly delineates the various soils and their relative hydrological classification, erosive characteristics and typical slopes.

III. WATER QUALITY IMPACT ASSESSMENT

A. Proposed Conditions

This project proposes 400 single family detached lots, 285 townhomes and ±5 acres of commercial area. This development will have two connections to Benns Church Boulevard. This project proposes to clear 20.28 acres of forested area and proposes ±50.40 acres of impervious (21%). The existing pond located on site will be upgrade to meet current DEQ specifications to act as a BMP. This shall include modifications to the embankment, outfall structure, and providing adequate benches.

B. Identification of Impacts and Required Information for Review

RPA Buffer Impact No. 1 (Roadway)
Impact No. 1 is for the construction associated with the road accessing the rear of the property. This impact is required to access the largest developable portion of the property. The area of this impact associated with the roadway is 9,783 square feet or 0.22 acres. ***All impacts are outside the wooded portion of the site.***

RPA Buffer Impact No. 2/8 (BMP and Outfall)
Impact No. 2 is for the construction of the stormwater pond outfall into the existing BMP. Impact No. 8 is for the regrading of the small upstream pond to incorporate it into the larger facility. This upstream pond is not considered perennial and does not have an RPA buffer associated with it. However, it falls within the buffer of the adjacent facility. These impacts are necessary to safely discharge runoff from the development into the stormwater management facilities. The combined area of these impacts is 15,660 square feet or 0.36 acres; 8,699 sf of these impacts will require clearing in the RPA buffer. 1,242 square feet of the required area of clearing within the RPA buffer overlaps the clearing area for RPA Buffer Impact No. 9.

RPA Buffer Impact No. 3/4 (Roadway)
Impact Nos. 3 and 4 are for the construction associated with the road accessing the south side of the property. This road location was aligned to minimize impacts to the RPA and wetlands on the property by crossing the buffers perpendicularly. This impact is necessary in order to access the largest portion of the property; there is a wetland channel that drains across the property from the neighboring site, which feeds into the large existing stormwater lake on the property. The combined area of these impacts is 38,172 square feet or 0.88 acres. ***This impact does not propose clearing in the RPA buffer.***

RPA Buffer Impact No. 5 (BMP Outfall)
Impact No. 5 is for the construction of a BMP outfall across existing farmed areas into the large existing lake. This impact is necessary in order to safely discharge from the BMP into the adjacent lake. The area of this impact is 5,330 square feet or 0.12 acres. ***This impact does not propose clearing in the RPA buffer.***

RPA Buffer Impact No. 6 (BMP Outfall)
Impact No. 6 is for the construction of a BMP outfall across steeply sloped areas into the adjacent wetlands area. This impact is necessary to safely discharge from the BMP and avoid future erosion of the steeper slops adjacent to the pond and existing wetlands. The area of this impact is 4,870 square feet or 0.11 acres; this impact requires clearing in the RPA buffer.

RPA Buffer Impact No. 7 (BMP Outfall)
Impact No. 7 is for the construction of a BMP outfall across steeply sloped areas into the adjacent wetlands area. This impact is necessary to safely discharge from the BMP and avoid future erosion of the steeper slops adjacent to the pond and existing wetlands. The area of this impact is 6,734 square feet or 0.15 acres; this impact requires clearing in the RPA buffer.

RPA Buffer Impact No. 9/10 (Utility Crossing)
Impact Nos. 9 and 10 are for the construction of a sanitary sewer main running between the existing ponds on the property. These impacts are necessary to provide gravity sewer to both halves of the property and eliminate the need for two separate County sanitary sewer lift stations to service the property. Portions of the impacts coincide with impacts associated with stormwater grading, and the remaining portions are designed to avoid wetland impacts. The combined area of these impacts is 8,415 square feet or 0.20 acres; 2,639 sf of these impacts will require clearing in the RPA buffer. 1,242 square feet of the required area of clearing within the RPA buffer overlaps the clearing area for RPA Buffer Impact No. 2.

Careful consideration has been taken to minimize the impacts for the proposed development. Exhibit A, submitted with this report, identifies the location of these impacts. The proposed mitigation described in this assessment will be incorporated into the construction plans for the subdivision, which are required as part of the development review process.

Although not dependent on the review and approval of this assessment, required permits necessary to develop this project include: General Virginia Stormwater Management Program (VSMP) Permit, Corps of Engineers Wetland Disturbance Permit, Virginia Department of Environmental Quality's Virginia Water Protection General Permit, Land-Disturbing Permit and Siltation Agreement. These and any other permits that may be required shall be (if not already) applied for at the appropriate time.

C. Hydrologic Impacts

It should be noted that most of the RPA impacts are currently located within farmed land and do not propose significantly changing the grading of the land or adding impervious cover to the land creating additional runoff. We have looked at each specific impact area and noted any changes to existing land cover and how those changes may impact the hydrology of the system. Any areas of steep slope will be put back with flatter site grades and matting used to stabilize the slopes.

RPA Buffer Impact No. 1 (Roadway)
Impact No. 1 is for the construction associated with the road accessing the south side of the property. This portion of the site is currently farm land, which is a B soil with less than 5% slopes. The existing soil condition likely produces little surface runoff to the adjacent wetlands. The proposed improvements for the roadway would capture the associated runoff and direct it to a stormwater BMP facility to treat and control the runoff before releasing it into the downstream existing lake. This change in the hydrology should have minimal impact on the downstream wetlands in this area and is designed to protect the natural drainage way.

RPA Buffer Impact No. 2/8 (BMP and Outfall)
Impact Nos. 2 and 8 are adjacent to the three existing ponds/lakes on the property. These areas are located along the banks of those facilities, and runoff from the impact areas currently drain directly into those facilities. Portions of the impact areas will be used to create a larger stormwater facility while maintaining existing drainage patterns to the greatest extend possible. This will improve the quality and quantity of the stormwater entering the downstream lake and will protect the natural drainage way.

RPA Buffer Impact No. 3/4 (Roadway)
Impact Nos. 3 and 4 are for the construction associated with the road accessing the south side of the property. This portion of the site is currently farm land, which is a D soil with less than 5% slopes. These soils exist in a natural low area of the site and feed into the downstream pond/lake. The drainage improvements associated with the roadway would redirect the water through a proposed BMP and treat and control the runoff before releasing it into the downstream existing lake. This change in the hydrology should present an improved situation, adding additional treatment and flood controls over the existing drainage patterns.

RPA Buffer Impact No. 5 (BMP Outfall)
Impact No. 5 is for the construction of a BMP outfall. This area is within a flat portion of the site that is currently farmed. These improvements would not significantly impact the natural hydrology, as the area of impact will match the existing drainage patterns and discharge into the downstream existing lake.

RPA Buffer Impact No. 6 (BMP Outfall)
Impact No. 6 is for the construction of a BMP outfall. This area is within a steeply sloped portion of the site. These improvements would not significantly impact the natural hydrology, as the area of impact will match the existing drainage patterns to the greatest extent possible and the slopes will be stabilized to prevent erosion and protect the natural drainage way.

RPA Buffer Impact No. 7 (BMP Outfall)
Impact No. 7 is for the construction of a BMP outfall. This area is within a steeply sloped portion of the site. These improvements should not significantly impact the natural hydrology, as the area of impact will match the existing drainage patterns to the greatest extent possible and the slopes will be stabilized to prevent erosion and protect the natural drainage way.

RPA Buffer Impact No. 9/10 (Utility Crossing)

Impact Nos. 9 and 10 are for the construction of a sanitary sewer main running between the existing ponds on the property. These impacts will not present any permanent change to the existing drainage patterns. Portions of the impacts coincide with impacts associated with stormwater grading, and the remaining portions are designed to avoid wetland impacts. These improvements should not significantly impact the natural hydrology, as the area of impact will match the existing drainage patterns to the greatest extent possible and the slopes will be stabilized to prevent erosion and protect the natural drainage way.

IV. PROPOSED MITIGATION

Mitigation to the grading and impacts noted above shall include setting aside developable open space and revegetation of current crop land within the RPA buffer. Initial mitigation efforts for these impacts shall include E&S measures as described in the Virginia Erosion & Sediment Control Handbook, such as permanent seeding that will incorporate a conservation seed mix applicable to the special requirements of the RPA, super silt fencing, and ECSC-3 straw/coconut turf reinforcement matting (manufactured by East Coast Erosion Control or equal). Final mitigation will involve a detailed landscape restoration plan. Every 400 s.f. of restoration area shall, at a minimum, include 1 canopy tree, 2 understory trees and 3 shrubs; based upon our current anticipated impacts and required buffer restoration the site will require ± 2,137 canopy trees, ± 4,274 understory trees, and ± 6,411 shrubs. Areas between the rear of the lots and the RPA buffers will be set aside in open space equaling no less than 4 acres or two time the RPA impacts, whichever is greater.

V. CONCLUSION

In summary, the findings of this Water Quality Impact Analysis indicate that:

- All measures or methods have been explored to limit any impact to the CBPA. When unavoidable, the impacted area has been minimized to the greatest extent possible.

- Extensive E&SC measures will be employed to minimize the effects of the subsequent discharge of stormwater to the receiving channel and wetlands.

- A Landscape Restoration Plan, conservation seeding and additional natural open space will be provided in order to mitigate for the impacts noted.

- Additional open space of developable land will be set aside to offset impacted areas at a ratio of 2:1.

APPENDIX

EXHIBIT A – IMPACT MAP
EXHIBIT B – CLEARING EXHIBIT

SOIL CHARACTERISTICS - ISLE OF WIGHT COUNTY, VA

SOILS NO.	SOIL NAME	HYDROLOGIC SOIL GROUP	TYPICAL SLOPES	EROSION FACTOR (K_w) WHOLE SOIL	EROSION FACTOR (T)	WATER TABLE UPPER LIMIT (FT)
2	BOHICKET SILTY CLAY LOAM	D	0–1%	0.24–0.28	5	0.0
3	CHICHAHOMINY SILT LOAM	D	0–2%	0.24–0.37	4	0.0–0.5
7	KINSTON LOAM	B/D	0–4%	0.32–0.37	5	0.0–1.0
11E	NEVARC SOILS	C	15–35%	0.20–0.37	3	1.5–3.0
11E	REMLIK SOILS	A	15–35%	0.10–0.20	5	4.0–>6.0
12A	PEAWICK SILT LOAM	D	0–2%	0.24–0.37	4	1.5–3.0
12B	PEAWICK SILT LOAM	D	2–6%	0.24–0.37	4	1.5–3.0
16	RUMFORD LOAMY SAND	B	0–4%	0.17	4	–
18B	SLAGLE FINE SANDY LOAM	C	2–6%	0.24–0.28	3	1.5–3.0
W	WATER	–	–	–	–	–

INFORMATION TAKEN FROM USDA NATURAL RESOURCES CONSERVATION SERVICE, SURVEY AREA VERSION: 10, SURVEY AREA VERSION DATED: 01/25/2010.

SOIL SUSCEPTIBILITY TO EROSION CLASSIFICATION (K)
0.23 AND LOWER – LOW ERODIBILITY
0.23 TO 0.36 – MODERATE ERODIBILITY
0.36 AND UP – HIGH ERODIBILITY

THE MAP SHOWN IS A "BEST FIT MODEL" OF THE SCS MAPS WITH EXISTING BASE INFORMATION.

RPA BUFFER IMPACT TABULATIONS

ROAD IMPACTS:
47,955 S.F.± ; 1.10 AC.±

SANITARY SEWER IMPACTS:
6,876 S.F.± ; 0.16 AC.±

BMP OUTFALL & EMBANKMENT IMPACTS:
32,594 S.F.± ; 0.75 AC.±

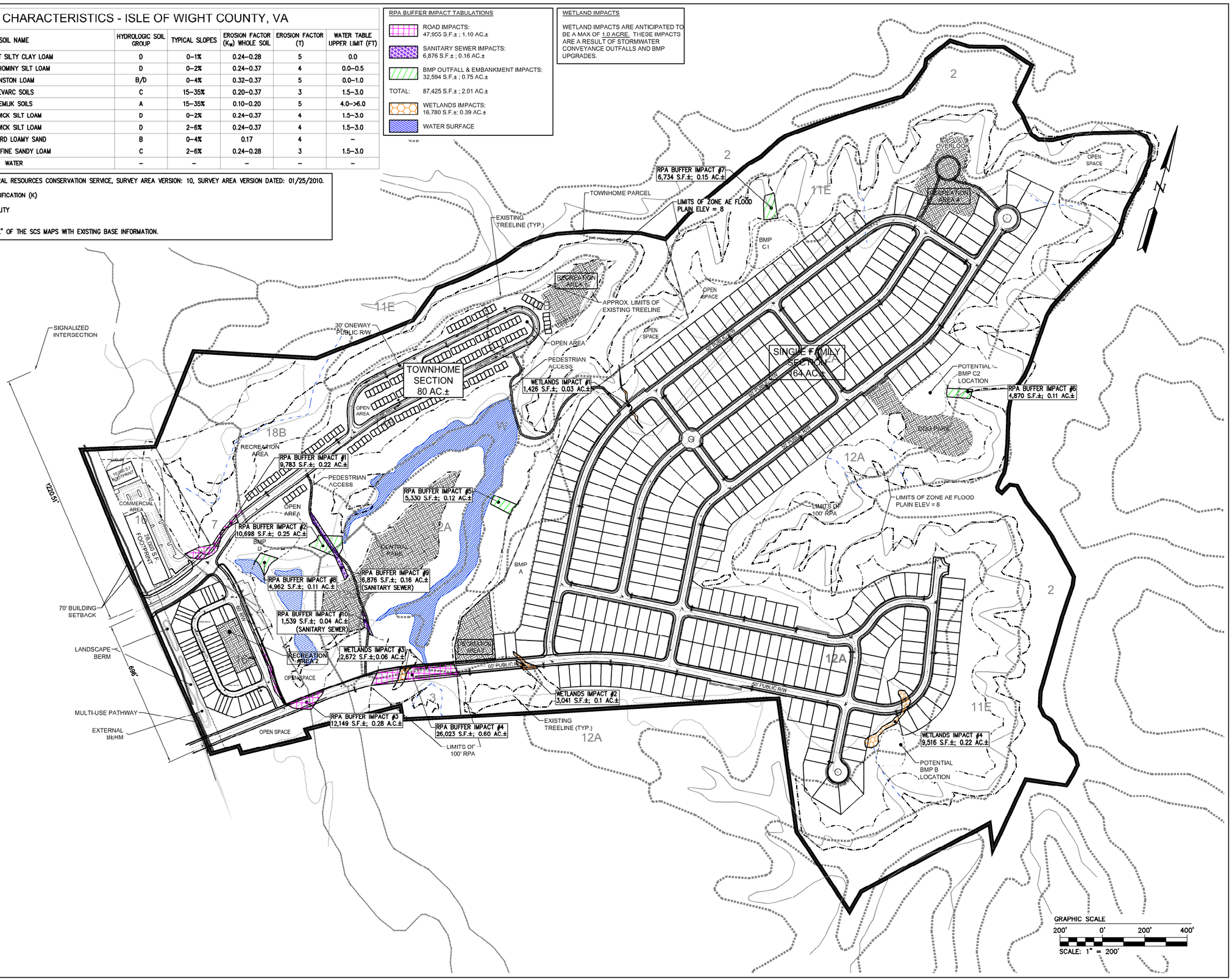
TOTAL: 87,425 S.F.± ; 2.01 AC.±

WETLANDS IMPACTS:
16,780 S.F.±; 0.39 AC.±

WATER SURFACE

WETLAND IMPACTS

WETLAND IMPACTS ARE ANTICIPATED TO BE A MAX OF 1.0 ACRE. THESE IMPACTS ARE A RESULT OF STORMWATER CONVEYANCE OUTFALLS AND BMP UPGRADES.



Remarks By	Description	Date	Rev.

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Middle Peninsula | Central Virginia | Hampton Roads

WATER QUALITY IMPACT ASSESSMENT
SWEETGRASS
REZONING
VIRGINIA
ISLE OF WIGHT COUNTY

Project Contacts:	JAC
Project Number:	W10516-00
Scale: 1"=200'	Date: 04/29/2019
Sheet Title:	WQIA EXHIBIT A

Sheet Number
1 OF 2

EXISTING	
WATER	44.65 AC.
FORESTED	115.88 AC.
CROPLAND	88.94 AC.
TOTAL	249.47 AC.
PROPOSED	
WATER	50.77 AC.
FORESTED	97.85 AC.
IMPERVIOUS	50.40 AC.
MANAGED TURF	50.45 AC.
TOTAL	249.47 AC.

HATCH LEGEND

- LIMITS OF CLEARING = 18.03 ACRES
- IMPACTS TO WOODED RPA BUFFER = 0.22 ACRES
- RPA/WETLAND AREA = 106.05 ACRES

N/F
THOMAS DARDARA T
910 CANTEBERRY LN
PARCEL ID: 22J-02-150
ZONING: SMITHFIELD: N-R

N/F
HENDRIX THOMAS
912 CANTEBERRY LN
PARCEL ID: 22J-02-149
ZONING: SMITHFIELD: N-R

N/F
EVANS ANTHONY
906 CANTEBERRY LN
PARCEL ID: 22J-02-152
ZONING: SMITHFIELD: N-R

N/F
BERLAND EDNA R
916 CANTEBERRY LN
PARCEL ID: 22J-02-147
ZONING: SMITHFIELD: N-R

N/F
DIPPO LAWRENCE A & ELIZABETH A
TRS L A & E A DIPPO LIVING TRUST
908 CANTEBERRY LN
PARCEL ID: 22J-02-151
ZONING: SMITHFIELD: N-R

N/F
FORSYTHE TIMOTHY A & DEBRA K
TRS T A & D K FORSYTHE FAMILY REV TRUST
914 CANTEBERRY LN
PARCEL ID: 22J-02-148
ZONING: SMITHFIELD: N-R

OVERLOOK

LIMITS OF ZONE AE FLOOD PLAIN ELEV = 8

APPROX. LIMITS OF EXISTING TREELINE

TOWNHOME PARCEL

N/F
EDWARDS PHILLIP F JR & CONNIE A
BENNS CHURCH BLVD
PARCEL ID: 32-01-096
ZONING: SMITHFIELD: C-C

N/F
CROWN CASTLE GI COMPANY LLC
14005 BENNS CHURCH BLVD
PARCEL ID: 32-01-096B
ZONING: RAC

N/F
ISLE OF WIGHT COUNTY SCHOOL BOARD
14171 SMITHFIELD CIR, SMITHFIELD
PARCEL ID: 32-01-010A
ZONING: RAC

N/F
WILSON ANGELA B & WILSON JAMES G JR
TRS A B WILCON REVOC LIVING TRUST
14041 BENNS CHURCH BLVD
PARCEL ID: 32-01-095
ZONING: LI

N/F
YEOMAN WILLIAM G
WILLIAM G YEOMAN III TRUST
BENNS CHURCH BLVD
PARCEL ID: 32-01-007
ZONING: RAC

N/F
CORNETT GEORGE C
14106 BENNS CHURCH BLVD
PARCEL ID: 32-01-008
ZONING: RAC

N/F
WILLIAM G. YEOMAN, TRUSTEE
14096 BENNS CURCH BOULEVARD
PARCEL ID: 32-01-009
ZONING: RAC

N/F
EDWARDS RYLAND B JR &
MARY ANN D &
EDWARDS RYLAND B & ETALS
14202 BENNS CHURCH BLVD
PARCEL ID: 32-01-067
ZONING: RAC

N/F
GIRARD PATRICIA A
14225 BENNS CHURCH BOULEVARD
PARCEL ID: 32A-02-012
ZONING: RAC

SIGNALIZED INTERSECTION

BENNS CHURCH BLVD

1236.30'

528.74'

70.00' BUILDING SETBACK

LANDSCAPE BERM

LANDSCAPE BERM

LANDSCAPE BERM

MULTI-USE PATHWAY

COMMERCIAL AREA

RECREATION AREA 1

RECREATION AREA

RECREATION AREA 2

RECREATION AREA 3

RECREATION AREA 4

PEDESTRIAN ACCESS

PEDESTRIAN ACCESS

PUBLIC PARK

DOG PARK

BMP A

BMP D

POTENTIAL BMP C1 LOCATION

POTENTIAL BMP C2 LOCATION

POTENTIAL BMP B2 LOCATION

LIMITS OF 100' RPA

LIMITS OF ZONE AE FLOOD PLAIN ELEV = 8

100'RPA

BEECHWOOD LANE

N/F
TOTTEN CHARLES D
BEECHWOOD LN
PARCEL ID: 32-01-094,094C,094D
ZONING: RAC

N/F
BELL LINWOOD E & BARBARA G
19341 BEECHWOOD LN
PARCEL ID: 31-01-094B
ZONING: RAC

N/F
WALLACE JIMMY J & MYRTLE T
14108 HAYLOFT LN
PARCEL ID: 32-01-094A
ZONING: RAC

N/F
WALLACE JIMMY J & MYRTLE T
14111 HAYLOFT LN
PARCEL ID: 32B-01-005
ZONING: RAC

N/F
CARNEY PAMELA D
14125 HAYLOFT LN
PARCEL ID: 32B-01-006
ZONING: RAC

N/F
CARNEY PAMELA D
14125 HAYLOFT LN
PARCEL ID: 32B-01-006
ZONING: RAC

N/F
ST LUKES VILLAGES LLC
C/O MCCALE DEV COR
20081 BREWERS NECK BLVD
PARCEL ID: 33-01-012B
ZONING: PD-MX

N/F
BOWDEN RONALD
BREWERS NECK BLVD
PARCEL ID: 33-01-005
ZONING: RAC

N/F
GRAY ROBERTA
C/O GARY LAWRENCE N
CHAPMANS LN
PARCEL ID: 33-03-006
ZONING: RAC

N

GRAPHIC SCALE
200' 0' 200' 400'
SCALE: 1" = 200'

Rev.	Date	Description	Revised By
1	9/23/19	REVISED PER COUNTY COMMENTS	JAG

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REZONING MASTER PLAN
FOR
SWEETGRASS

ISLE OF WIGHT COUNTY | WINDSOR DISTRICT | VIRGINIA

Project Contacts:	JAG
Project Number:	W10516-00
Scale: 1"=200'	Date: 06/14/2019

Sheet Title:
CLEARING LIMITS
EXHIBIT B

Sheet Number
2 OF 2

Fiscal Impact Analysis of Sweetgrass

Located in Isle of Wight County, Virginia

Prepared for:

Ryan Homes/NVR

June 21, 2021

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June 2021

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MEMORANDUM

To: Eric Shirey, General Manager, Land, NVR Inc.

From: Julie Herlands, AICP, Vice President, TischlerBise

Date: June 18, 2021

RE: Fiscal Impact Analysis for Sweetgrass in Isle of Wight County, Virginia

TischlerBise is under contract with NVR Inc/Ryan Homes, to conduct a Fiscal Impact Analysis of the proposed Sweetgrass development in Isle of Wight County, Virginia, for submission to Isle of Wight County as part of the applicant's rezoning request. This report provides findings and detail on the Fiscal Impact Analysis.

The overall finding is that the proposed development is fiscally positive to the County in total. The analysis factors in all variable revenues generated by the proposed development. All operating and capital costs attributable to the development are included in the analysis. Comparing available resources to projected costs reveals sufficient revenues to cover the projected expenditures. Operating and capital costs are projected separately to identify specific capital costs attributed to the development.

The twenty-year cumulative net fiscal impact is a surplus of approximately $20.9 million and an annual net surplus of approximately $1.2 million at the project's buildout.

BACKGROUND

TischlerBise is under contract with NVR, Inc. to conduct a fiscal impact analysis of the Sweetgrass development in Isle of Wight County, VA. This report reflects TischlerBise's fiscal impact analysis of the impact of the proposed development.

A fiscal impact evaluation analyzes revenue generation and operating and capital costs to a jurisdiction associated with the provision of public services and facilities to serve new development—residential, commercial, office, or industrial. It includes all direct revenues and costs associated with a specific development proposal. Unlike an economic impact analysis, it does not include spin-off, or indirect, impacts from development but rather identifies whether sufficient revenues will be generated from the new development to cover all related direct costs. For the Sweetgrass Development fiscal impact analysis, all General Fund services and facilities are included in the analysis.

This report intends to provide information to NVR, Inc. related to the fiscal impact of development of the project to identify appropriate values of potential proffers to Isle of Wight County. Any potential proffer would offset a negative fiscal impact on the County—specifically on capital facilities—thereby allowing the County to maintain current levels of service.

PROPOSED DEVELOPMENT PROGRAM

The fiscal impact analysis uses 2021 as the base year with projections over a 20-year period, with years shown throughout the study as "Years 1-20." The development assumptions and absorption were provided by NVR, Inc.

The development is anticipated to include 615 residential units with 390 age-restricted, single family detached units and 225 townhouses. An annual absorption of 65 age-restricted single family units per year and 38 townhouses is assumed in the analysis. This results in completion of the project in Year 6.

Figure 1. Sweetgrass Development Program

Land Use	Housing Units	Market Value	Annual Absorption (Housing Units per Year)
Age-Restricted Single Family Detached	390	$305,200	65
Townhome	225	$258,875	38
Total	**615**	**N/A**	**103**

Source: NVR/Ryan Homes

The above development program projects a growth of 1,458 persons and 52 public school students. A summary of the growth projections is provided below in Figure 2. Demand factors are detailed in the Appendix.

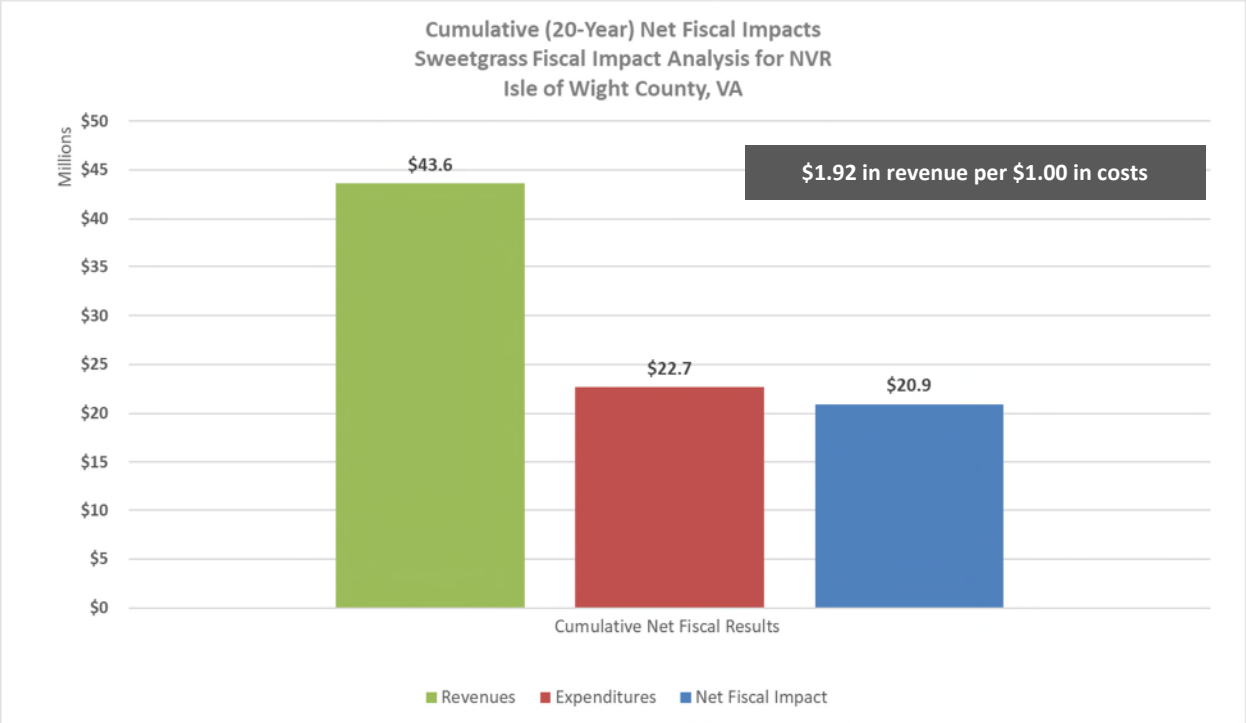
Figure 2. Sweetgrass Development Growth Projection

	Yeoman Tract (NVR)
Residential Units	
AGE-RESTRICTED, SINGLE-FAMILY DETACHED	390
TOWNHOUSE	225
TOTAL UNITS	**615**
POPULATION	**1,458**
TOTAL ENROLLMENT	**52**

SUMMARY OF FISCAL IMPACT ANALYSIS FINDINGS

The fiscal impact analysis determines that the Sweetgrass development generates sufficient revenues to offset projected costs—$1.92 in revenue for every $1.00 of costs. General Fund revenues are projected along with operating and capital impacts from the proposed development program.

Figure 3. Cumulative Net Fiscal Impact Results –Sweetgrass Development: All Revenues and Costs



In early years, lower net surpluses are generated by the Sweetgrass development due to higher ongoing capital expenditures (including debt service) and ongoing operating costs relative to revenues. However, cumulatively development results in fiscally sustainable conditions.

Capital improvements to serve new development are funded from the General Fund. The County has no dedicated capital revenues for non-utility capital improvements. Capital improvements are modeled primarily on an incremental basis and triggered when capacity is needed. A few capital facility categories are based on current or short-term planned improvements from which the proposed development will benefit. All combined, projected revenues are sufficient to cover operating and capital impacts from the development project.

SUMMARY OF APPROACH AND MAJOR ASSUMPTIONS

A fiscal impact analysis determines whether revenues generated by new growth are sufficient to cover the resulting costs for service and facility demands placed on the County. It is based on cost and revenue assumptions that reflect a community's current level of service. TischlerBise analyzed the fiscal impacts of the Sweetgrass Development scenario based on current countywide levels of service and any known infrastructure or service needs. A projection timeline of 20 years is used to show long-term trends.

The fiscal impact analysis conducted by TischlerBise incorporates a hybrid average/marginal cost approach wherever possible. The case study-marginal methodology is used in some instances; however, for smaller areas with discrete land use changes, impacts are often better analyzed using an average cost approach. This is different from a countywide fiscal analysis where facilities and other infrastructure needs are triggered and "built" once a threshold is reached, resulting in "lumpier" fiscal impact results. There are a few exceptions in this analysis, namely for current or planned improvements that are known to be needed due to capacity needs and will serve the growth from the Sweetgrass Development.

The assumptions outlined below are utilized along with the development projections to determine the potential fiscal impact to the County over the 20-year projection period. Calculations are performed using a customized fiscal impact model designed specifically for this assignment.

For this analysis, only costs to serve new growth are included. Both operating and capital costs are modeled. Some costs are not expected to be impacted by demographic changes, and may be fixed in this analysis. For example, this is true for some functions included under the Board of Supervisors budget. Other general items to note in the analysis:

- Operating costs are generally projected on an average basis with demand factors specific to the service being modeled. Personnel costs are modeled to reflect the fact that some types of positions (e.g., directors) are fixed and would not increase regardless of growth.
- Capital costs are projected on an incremental basis for most categories where capacity is needed with the exception of facilities currently being constructed or planned in the short-term. TischlerBise's experience conducting previous cash proffer studies for Isle of Wight County was helpful in this effort.
- Debt financing is assumed for capital improvements that are projected to serve growth.

LEVELS OF SERVICE

Cost projections are based on the "snapshot approach" in which it is assumed the current level of service, as funded in the County's FY2021-2022 budget, will continue through the projection period. Current

demand base data was used to calculate unit costs and service level thresholds. Examples of demand base data include population, dwelling units, employment by industry type, and jobs. In summary, the "snapshot" approach does not attempt to speculate about how levels of service, costs, revenues, and other factors will change over 20 years. Instead, it evaluates the fiscal impact to the County as it currently conducts business under the present budget.

Revenues are projected assuming that the current revenue structure and tax rates, as defined by the FY21-22 budget, will not change during the analysis period. Of particular note are the following:

- County property tax is modeled based on the cumulative assessed value of the planned residential development. The County's FY21-22 adopted tax rate of $.85 per $100 in property value.
- Personal property taxes are projected on a per capita and per job basis (and adjusted for Isle of Wight collections).

Enterprise operations such as the County's water and wastewater utilities are included in this analysis reflecting the portion of utility operating costs that are funded through the General Fund. The fiscal impact analysis assumes the level of operating subsidy continues into the future. Utility capital expenditures are assumed to be covered by private developers and therefore not included as a cost to the County.

Specific assumptions pertaining to any unique treatment of revenue and cost factors are discussed wherever relevant throughout the body of this report.

INFLATION RATE

The rate of inflation is assumed to be zero throughout the projection period, and cost and revenue projections are in constant 2021 dollars. This assumption is in accord with current budget data and avoids the difficulty of forecasting as well as interpreting results expressed in inflated dollars. In general, including inflation is complicated and unpredictable. This is particularly the case given that some costs, such as salaries, increase at different rates than other operating and capital costs such as contractual and building construction costs. And these costs, in turn, almost always increase in variation to the appreciation of real estate. Using constant 2021 dollars reinforces the snapshot approach and avoids these problems.

NON-FISCAL EVALUATIONS

It should be noted that while a fiscal impact analysis is an important consideration in planning decisions, it is only one of several issues that should be considered. Environmental and social issues, for example, should also be considered when making planning and policy decisions. In addition, economic development goals such as the ability to provide suitable locations for future employment growth should be taken into consideration when making land use decisions. The above notwithstanding, this analysis will enable interested parties to understand the fiscal implications of future development and particularly the proposed Sweetgrass development.

PROJECTION FACTORS

Projection methodologies and factors are based on our previous fiscal studies for the County and discussed where applicable in the body of this report. All variable operating costs and revenues are projected. Detail is provided in the Appendix.

FISCAL IMPACT RESULTS

Results of the fiscal impact analysis are provided in this chapter. It should be reiterated that the fiscal results include revenues and costs to serve the proposed development only.

Our results are summarized in several ways:

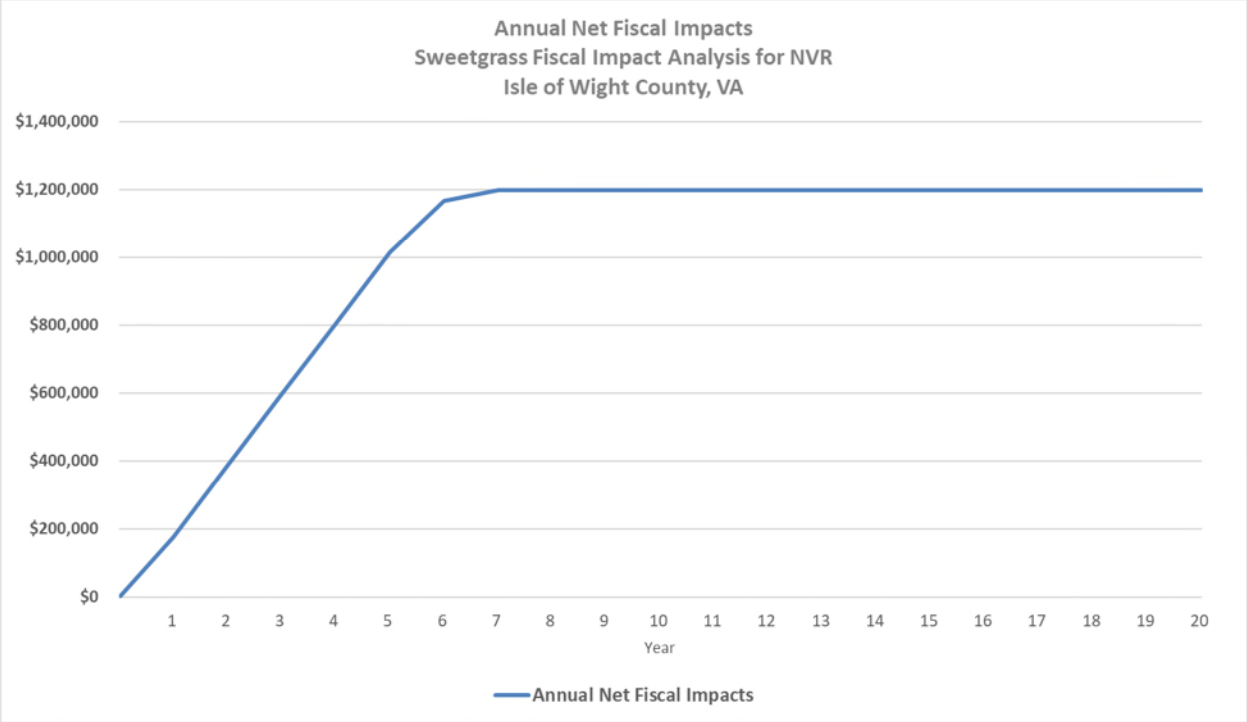
- **Annual** net fiscal results are shown first that include all revenues and costs in the funds included in the analysis in each year. Two charts are provided:
  - Combined operating and capital from the proposed development
  - Revenue compared to operating and capital impacts
- Results are then shown in a series of bar charts depicting **cumulative** net fiscal impact results
  - Cumulative net fiscal impact results convey the projected grand total revenues minus grand total expenditures over the 20-year period from the proposed development.
- The third section provides **average annual** fiscal impact results.
  - The average annual net result conveys an average impact over three time periods (Years 1-10, Years 11-20, and over the entire 20-year period).

ANNUAL NET FISCAL IMPACTS

The charts below show the annual net fiscal results to the County for the two scenarios over the 20-year development period. By showing the annual results, the magnitude, rate of change, and timeline of deficits and revenues can be observed over time. The "bumpy" nature of the annual results during particular years represents the opening of capital facilities and/or major operating costs being incurred.

Net fiscal results are **revenues minus costs in each year**, including operating and capital costs. Data points above the $0 line represent annual surpluses; points below the $0 line represent annual deficits. Surpluses in any one year are not carried forward to the next year.

Figure 4. Annual Net Fiscal Impact Results: Combined Results

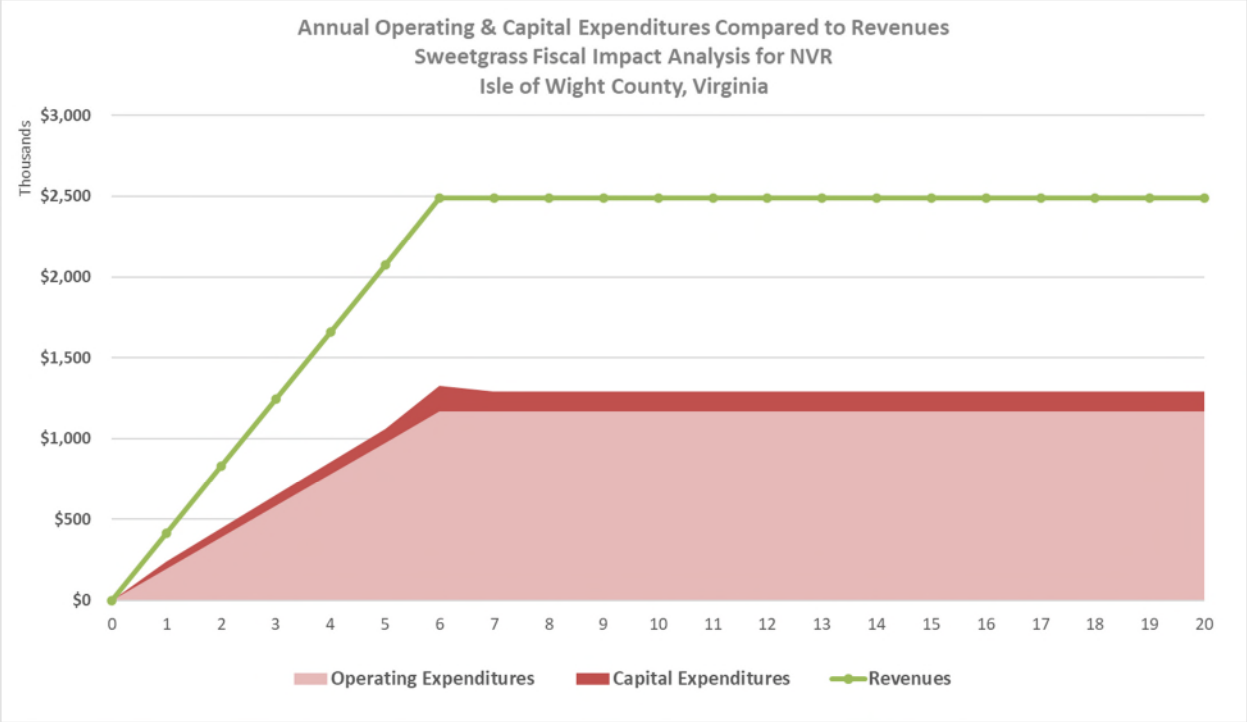


- Revenues are sufficient to cover operating and capital impacts from the proposed development.
- Each year includes the revenues generated from the proposed development minus the operating and capital costs in that same year.
- Capital improvements are assumed to be debt financed with several that are incurred in each year. Those yearly capital expenditures include:
    - Education: New Elementary School, School Administration Facility, School Fleet Bus Garage Addition
    - Sheriff Vehicles; E-911 Communication System
    - Transportation projects
- Some capital impacts are projected at the time of buildout. Year 6 reflects the projected buildout of the project. The capital expenditure triggered at that time are:
    - Parks and Recreational facilities

For further detail, the analysis segregates operating and capital impacts compared to projected revenue generation. The following figure illustrates the comparison between revenues and operating and capital expenditures.

As shown, sufficient revenues are generated in each year to cover operating and capital costs.

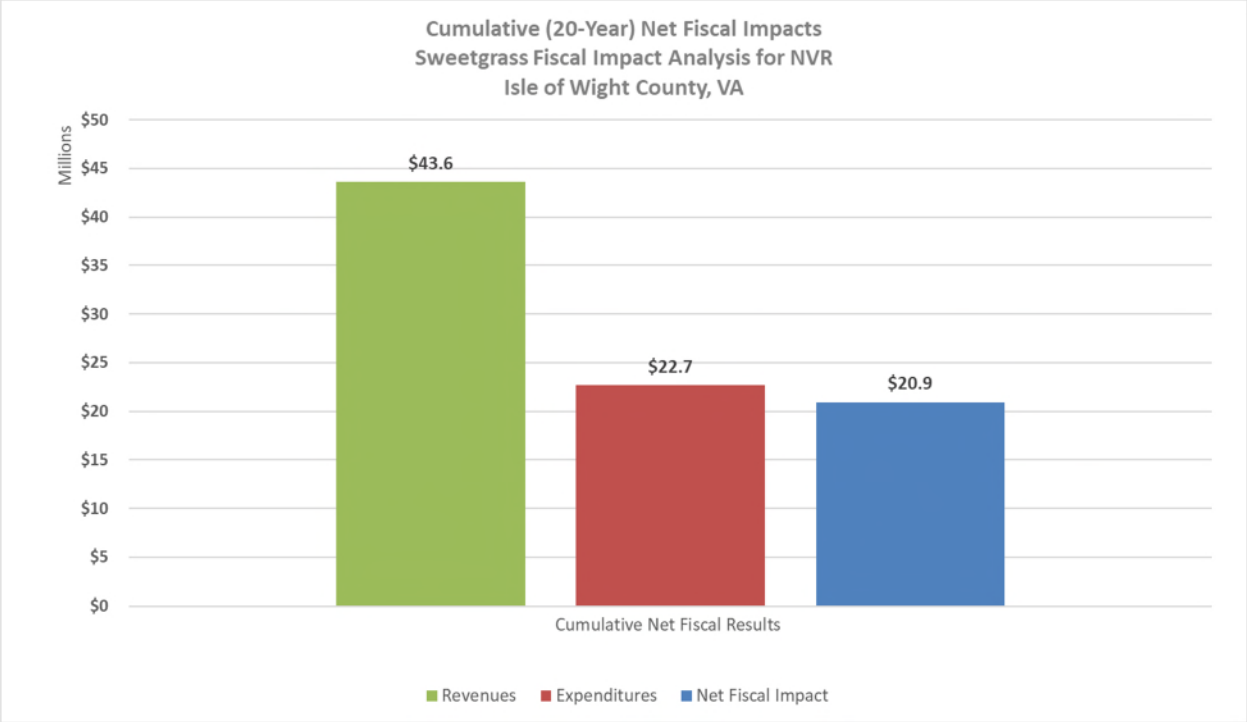
Figure 5. Annual Net Fiscal Impact Results: Revenues Compared to Operating and Capital Costs



CUMULATIVE NET FISCAL IMPACTS

Results are presented on a **cumulative** basis reflecting grand total revenues over the 20-year period minus grand total expenditures over the 20-year period.

Figure 6. Cumulative Net Fiscal Impact Results

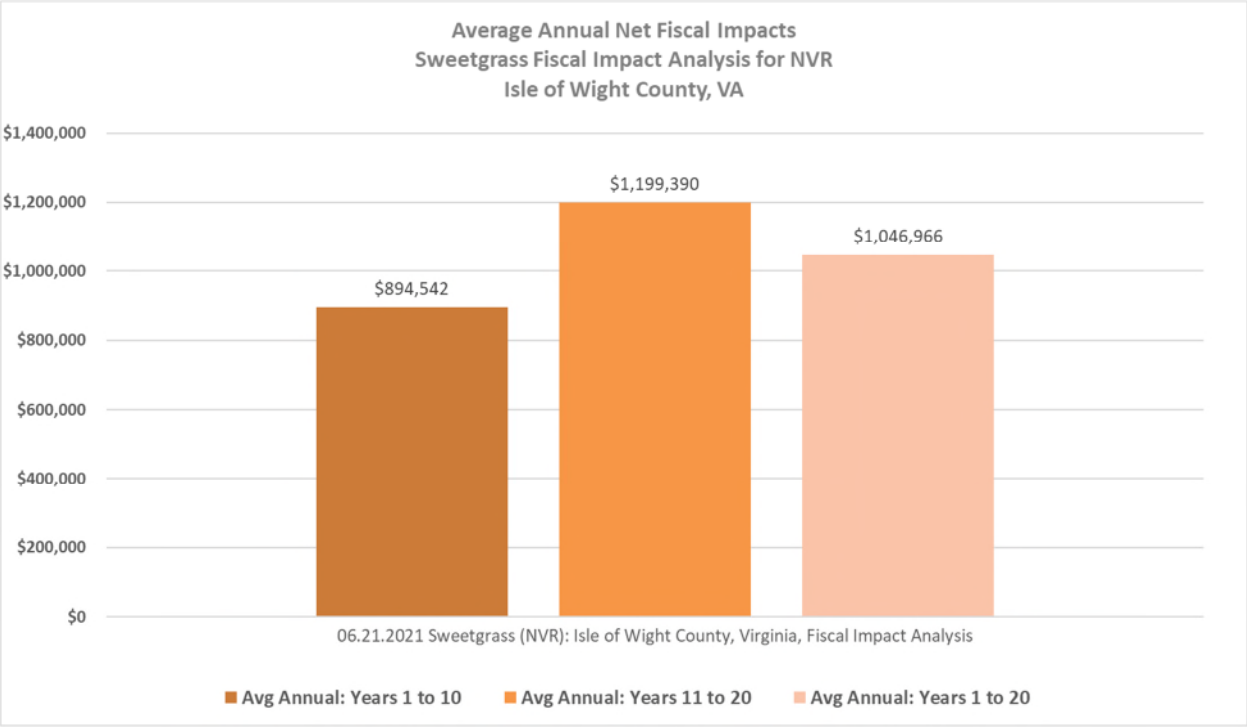


- As shown, $43.6 million in revenue is projected compared to $22.7 million in expenditures over the 20-year projection period. This generates a $20.9 million net surplus.
- Costs include ongoing annual operating expenditures and capital costs that include debt financing with payments that continue beyond the last year in the model projection period.

AVERAGE ANNUAL NET FISCAL IMPACTS

For further information, results are also presented on an **average annual** basis—in three time-period increments (First ten years, second ten years, and then over the total projection period, Years 1-20.)

Figure 7. Average Annual Net Fiscal Impact Results



- As shown in Figure 7, average annual fiscal results average approximately $1.05 million per year over the projection period with the second half of the period generating slightly better fiscal results.
- The first half of the projection period generates lower average annual fiscal results due to higher operating and capital expenditures relative to revenues during this period.

REVENUE AND EXPENDITURE PROJECTIONS

A summary of projected revenues and costs from the proposed Sweetgrass Development to the County are provided below. These figures are based on the development projections as summarized above along with the revenue and cost factors described elsewhere in this report.

Revenues

REVENUE PROJECTION METHODOLOGIES

County General Fund revenues are projected from the proposed development program. A summary of projection methodologies is shown below in Figure 8. Other items to note regarding revenue projections are:

- Property taxes are projected based on average assessed values per housing unit shown below:

Land Use	Housing Units	Market Value	Annual Absorption (Housing Units per Year)
Age-Restricted Single Family Detached	390	$305,200	65
Townhome	225	$258,875	38
Total	**615**	**N/A**	**103**

- Other revenues from the proposed residential development are projected on a per capita or per job basis.(Exceptions and/or adjustments are noted.)
- Some revenues are not affected by growth and are considered "fixed" in this analysis as shown in Figure 8.

Figure 8. Revenue Projection Methodologies

				ALLOCATION APPROACH			
Revenue Category	*Revenue Name*	*FY22 Budget $*	*% of Total*	RESIDENTIAL (Per Capita)	NONRESIDENTIAL (Per Job)	CUSTOM	FIXED
Property Taxes	Real property	$41,170,000	50%			X (Assessed Value)	
	Public service property	$1,759,000	2%				X
	Personal property - vehicles	$11,240,000	14%	X (90% from resid.)			
	Personal property - mobile homes	$167,000	0%				X
	Personal property - boats & airplanes	$108,000	0%				X
	Personal property - machinery & tools	$5,000,000	6%		X		
	Personal property - equipment	$1,905,000	2%		X		
	Penalty & interest on taxes	$570,000	1%			X (Assessed Value)	
Other Local Taxes	Local sales & use	$3,250,000	4%	X	X		
	Communications sales & use tax	$635,000	1%	X (Non-Town)	X (Non-Town)		
	Consumer utility tax	$985,000	1%	X (Non-Town)	X (Non-Town)		
	Consumption tax	$120,000	0%	X (Non-Town)	X (Non-Town)		
	Business license tax	$832,000	1%		X		
	Lodging tax	$64,000	0%				X
	Meals tax	$530,000	1%	X	X		
	Motor vehicles license tax/fee	$1,061,000	1%	X (Non-Town)			
	Cable franchise fees	$0	0%				X
	Bank stock tax	$11,000	0%				X
	Recordation & probate tax	$0	0%	X	X		
	Penalty & interest on taxes	$10,000	0%				X

Licenses, Permits & Fees	Animal license	$40,000	0%	X			
	Land use application fee	$0	0%	X	X		
	Zoning use & subdiv. Ord. fee	$75,000	0%	X	X		
	Building permits & fees	$500,000	1%	X	X		
	Concealed weapon permit fee	$40,000	0%	X			
	Land transfer fees	$1,000	0%	X	X		
	Inspections technology fee	$18,000	0%	X	X		
	Solid waste franchise fee	$30,000	0%	X	X		
Fines & Forfeitures	Court fines & forfeitures	$115,000	0%	X			
	Interest - court fine & forft.	$4,000	0%				X
	County code violations	$10,000	0%	X	X		
Use of Money & Property	Interest revenue	$300,000	0%				X
	Property rental	$185,000	0%				X
	Gain/loss on investments (PACE)	$0	0%				X
Charges for Services	Set off collection feeds	$75,000	0%	X	X		
	Finance administration fee	$1,000	0%	X	X		
	Court security fee	$65,000	0%	X	X		
	Sheriff's fee	$2,000	0%	X	X		
	Sheriff extradition revenue	$7,000	0%	X	X		
	Law library fees	$8,000	0%	X	X		
	Building const. court fees	$15,000	0%	X	X		
	Courthouse constrution fees	$20,000	0%	X	X		
	Reimb. For court appointed atty.	$2,000	0%	X	X		
	Commonwealth attorney's fees	$3,000	0%	X	X		
	Criminal check & incident report	$1,000	0%	X	X		
	Fingerprinting	$1,000	0%	X	X		
	Animal adoption fees	$30,000	0%	X			
	Miscellaneous charges for srvc.	$0	0%	X	X		
	EMS revenue recovery	$900,000	1%			X (Fire and EMS Calls)	
	Walking tours income	$0	0%				X
	Recreation and special event fees	$319,885	0%	X			
	Treasurer admin. Fees	$160,000	0%	X	X		
	Tourism	$9,080	0%	X	X		
Recovered Cost	Insurance reimbursements	$50,000	0%				X
	DSS indirect cost allocation	$387,576	0%				X
	Smithfield tourism recovered cost	$279,892	0%				X
	Smithfield debt service	$51,453	0%				X
	PU indirect cost	$230,722	0%				X
	SW indirect cost	$67,382	0%				X
	Miscellaneous	$0	0%				X
Recovered Cost	Borrow pit contribution	$50,000	0%				X
	Treasurer admin. Fees	$0	0%				X
	RAD-Emergency program	$0	0%				X
	Gifts and donations	$500	0%				X
	Animal control donations	$0	0%				X
	Sale of photocopies/maps	$10,000	0%				X
	P-card rebate	$30,000	0%				X
	Miscellaneous	$10,000	0%				X
	Sale of recyclables	$45,000	0%				X
	E-payables rebate	$11,000	0%				X
	Farmer's market fees + sponsors	$38,475	0%				X
	Vintage Market	$40,775	0%				X
	Build America Subsidy 2010C	$0	0%				X
	2011 QSCB Subsidy	$337,000	0%				X
Noncategorical Aid	Auto rental tax	$35,000	0%	X	X		
	Rolling stock tax	$42,000	0%	X	X		
	Mobile home tilting tax	$45,000	0%				X
	Grantor's tax	$135,000	0%	X	X		
	State PPTR	$5,115,890	6%	X			
Shared Expenses	Commonwealth attorney shared expenses	$421,529	1%				X
	Sheriff shared expenses	$1,332,259	2%				X
	Commissioner shared expenses	$158,295	0%				X
	Treasurer shared expenses	$140,162	0%				X
	Registrar/electoral board shared expenses	$58,290	0%				X
	Clerk of Circuit Court shared expenses	$291,573	0%				X
	Technology trust funds	$40,284	0%				X
State Aid	LOVEworks VTC grant	$0	0%				X
	Crush Friday VTC grent	$0	0%				X
	Fire Programs Fund	$93,000	0%				X
	Four for Life	$47,000	0%				X
	Local Government Challenge grant	$0	0%				X
Federal Aid	Federal grant revenue (Hurricane Matthew)	$0	0%				X
	Homeland Security grant	$0	0%				X
TOTAL		**$81,949,022**	**100%**				

REVENUE PROJECTIONS

Cumulative revenues to the County generated by the project are shown for a twenty-year cumulative period. The revenues shown in Figure 9 reflect all revenues (for operating and capital purposes) projected from the development.

Figure 9. Cumulative County Revenues (Years 1-20)

Cumulative General Fund Revenue Detail (Years 1-20) **06.21.2021 Sweetgrass (NVR): Isle of Wight County, Virginia, Fiscal Impact Analysis**		
	SCENARIO	
Category	**Sweetgrass (NVR)**	**%**
Property Taxes	$33,550,312	77%
Other Local Taxes	$5,125,424	12%
Licenses, Permits & Fees	$387,892	1%
Fines & Forfeitures	$82,659	0%
Use of Money & Property	$0	0%
Charges for Services	$900,006	2%
Recovered Cost	$0	0%
Miscellaneous Services	$0	0%
Noncategorical Aid	$3,552,482	8%
Shared Expenses	$0	0%
State Aid	$0	0%
Federal Aid	$0	0%
TOTAL	**$43,598,775**	**100%**

Expenditures

EXPENDITURE PROJECTION METHODOLOGIES

County operating and capital expenditures are projected from the proposed development program. Projection methodologies are shown below in Figure 10 . Other items to note regarding expenditure projections are:

- School operating expenditures are projected in **Transfers (Schools)** and based on an increase in enrollment from the proposed development. The Appendix includes student generation rate assumptions.

- School costs reflect the **funding provided by Isle of Wight County to the Isle of Wight Public Schools only and does not include state or federal funding** that comprises the full amount of the Public Schools' budget. Funding from the County equals approximately 42 percent of the School District's Operating expenditures.

- Public Safety expenditures are projected based on a projection of calls for service from new development. See the Appendix for further detail.

- Some expenditures are not affected by growth and are considered "fixed" in this analysis as shown in Figure 10.

Figure 10. Expenditure Projection Methodologies

				ALLOCATION APPROACH			
Expenditure Category	*Expenditure Name*	*FY22 Budget $*	*% of Total*	RESIDENTIAL (Per Capita)	NONRESIDENTIAL (Per Job)	CUSTOM	FIXED
General Administration	Board of Supervisors	$329,600	0.4%				X
	County Administrator	$483,251	0.6%	X	X		X
	County Attorney	$575,348	0.7%	X	X		X
	Human Resources	$394,837	0.5%				X
	Registrar	$391,778	0.5%	X			X
Financial Administration	Commissioner of Revenue	$765,696	0.9%	X	X		
	Real Estate Assessment	$288,900	0.3%	X	X		X
	Treasurer	$891,035	1.1%	X	X		X
	Budget and Finance	$802,014	1.0%	X	X		X
	Purchasing	$171,368	0.2%				X
Judicial	Circuit Court	$89,388	0.1%	X			X
	General District Court	$26,066	0.0%	X			
	Western Tidewater Community Corrections	$18,926	0.0%	X			
	Juvenile Accountability Program	$2,500	0.0%	X			
	Juvenile Domestic Relations Court	$12,575	0.0%	X			
	Clerk of Circuit Court	$598,133	0.7%	X			X
	Fifth District Court Services	$200,100	0.2%	X	X		
	Commonwealth Attorney	$840,042	1.0%	X	X		
Public Safety	Sheriff	$5,203,463	6.2%			X (Sheriff Calls for Service)	
	Emergency Services	$516,222	0.6%			X (Fire & EMS Calls for Service)	
	Fire & Rescue	$4,717,530	5.6%			X (Fire & EMS Calls for Service)	
	Western Tidewater Jail	$1,293,333	1.5%	X			
	Inspections	$739,804	0.9%	X	X		
	Animal Control	$594,840	0.7%	X			
Public Works	Public Works Administration	$318,110	0.4%	X	X		
	Public Works Transportation	$283,365	0.3%	X	X		
	Public Works Refuse	$2,902,214	3.5%	X	X		
	Public Works Buildings & Grounds	$1,478,908	1.8%	X	X		
	Public Works Capital Program Inspection	$76,613	0.1%				X
Parks, Recreation, Grounds	Parks & Recreation Administration	$265,736	0.3%	X			
& Cultural	Parks & Recreation Gateways & Grounds	$1,001,054	1.2%	X			
	Parks & Recreation Programs	$750,285	0.9%	X			
	Library	$891,490	1.1%	X			
Community Development	Planning & Zoning	$830,146	1.0%	X	X		
	Economic Development	$1,044,087	1.2%		X		
	Tourism	$577,222	0.7%	X	X		X
	Farmers Market	$42,220	0.1%				X
	Communications	$78,648	0.1%	X	X		
	Cooperative Extension Service	$73,823	0.1%				X
Non-Departmental	Non-Departmental	$3,667,903	4.4%				X
	Transfers (Non-Schools)	$7,056,445	8.4%	X	X		
	Transfers (Schools)	$26,422,734	31.6%	X (Enrollment)			
Debt Service	Debt Service	$13,346,056	16.0%				X^
Other Public Services	Other Public Services	$2,500,400	3.0%	X	X		X
	TOTAL	**$83,554,208**	**100.0%**				

** If "FIXED" marked along with other columns, a portion of the departmental expenditure is assumed to not be affected by the development; this is typically personnel costs.*
^ Capital expenditures projected separately.

EXPENDITURE PROJECTIONS

Cumulative County expenditures generated by the project are shown below cumulatively for Years 1-20. Operating expenditures are shown in Figure 11; capital expenditures are shown in Figure 12.

Figure 11. Cumulative County Operating Expenditures

Cumulative Operating Expenditures (Years 1-20) **06.21.2021 Sweetgrass (NVR): Isle of Wight County, Virginia, Fiscal Impact Analysis**		
	SCENARIO	
Category	**Sweetgrass (NVR)**	**%**
General Administration	$86,865	0.4%
Financial Administration	$307,015	1.5%
Judicial	$468,925	2.3%
Public Safety	$6,134,561	30.0%
Public Works	$2,781,896	13.6%
Education	$4,250,282	20.8%
Parks, Recreation, Grounds & Cultural	$1,860,367	9.1%
Community Development	$514,634	2.5%
Other Public Services	$489,840	2.4%
Debt Service*	$0	0.0%
Non-Departmental^	$3,559,651	17.4%
TOTAL	**$20,454,036**	**100%**

** Capital expenses projected separately*

^ Includes transfer to Public Utilities

Figure 12. Cumulative County Capital Expenditures

20-Year Cumulative Total Capital Expenditures **06.21.2021 Sweetgrass (NVR): Isle of Wight County, Virginia, Fiscal Impact Analysis**		
	SCENARIO	
Category	**Sweetgrass (NVR)**	**%**
Education	$1,135,478	51%
General Government	$0	0%
Parks and Recreation	$757,131	34%
Sheriff	$284,139	13%
Fire	$0	0%
Transportation	$28,675	1%
TOTAL	**$2,205,422**	**100%**

Approach to Modeling Capital Impacts

Capital expenditures are modeled using the following criteria:

- The demand from the development project create a new demand for additional capacity.
- The County does not currently have capacity to accommodate the additional demand.
- There are current/future plans by the County to build or purchase the capital need to provide additional capacity.
- The current or planned capital expenditure is anticipated to be funded by the County (as opposed to being provided by private development or funded from other sources).

A summary of the projected capital improvements and costs are shown below in Figure 13. Additional detail is provided below the figure.

Figure 13. Summary of Capital Needs and Cost

	20-Year Cumulative Total Capital Needs and Costs **06.21.2021 Sweetgrass (NVR): Isle of Wight County, Virginia, Fiscal Impact Analysis**				
	Category	**SCENARIO** **Sweetgrass (NVR)**			
		Unit of Measure	*Demand*	*Capacity Needed*	*Cost ($000s)**
EDUCATION	Elementary School	Seat	30.2	19.4	$1,119,384
	Middle School	Seat	7.0	0.0	$0
	High School	Seat	14.6	0.0	$0
	School Buses	$			$0
	School Admin Facilities	$			$0
	School Fleet Bus Garage Addition	$			$16,094
GEN GOVT	General Government	Sq. Ft.	n/a	0.0	$0
	Court Facility	Sq. Ft.	n/a	0.0	$0
	Capital Maintenance (Growth Share)	$			$0
PARKS & REC / CULTURAL	Improved Park Land	Acre	7.4	7.3	$71,552
	Improved Park Improvements	Acre	7.4	7.3	$580,838
	Recreation Facilities	Sq. Ft.	178.8	178.8	$104,740
	Trails	$			$0
	Vehicles/Equipment	Vehicle	n/a	0.0	$0
SHERIFF	Sheriff Buildings	Sq. Ft.	n/a	0.0	$0
	Animal Control	Sq. Ft.	0.0	0.0	$0
	Sheriff Vehicles/Equipment	Vehicle	1.5	1.5	$106,317
	E-911 Comm System	$			$177,821
FIRE & RESCUE	Fire Stations & Rescue Stations	Sq. Ft.	n/a	0.0	$0
	Fire Apparatus/Equipment	Vehicle	n/a	0.0	$0
	Rescue Apparatus/Equipment	Vehicle	n/a	0.0	$0
TRANSPO.	Transportation Projects	$			$28,675
				TOTAL	**$2,205,422**

** Reflects cumulative capital costs from the project over the 20-year projection period, including principal and interest.*

Education

Additional school capacity needed to serve the Sweetgrass Development is projected based on the above criteria. The schools serving the proposed development are highlighted below. (Note: Enrollment data from the 2020-21 school year is not used because of the likely effects on public school enrollment from COVID-19.)

Figure 14. Isle of Wight Public Schools

	in All Schools[1]	*County School Capacity [2]*	*School Util %*	*Seats Avail*	*PROJ. by Scen*	*$ per Seat [3]*	*Seats Needed by Scen*
ELEM (K-6)	*2,811*	*3,165*	*89%*	*354*			
Carrollton Elem (PreK-3)	710	682	104%	-28	19.4	$43,005	19.4
Carrsville Elem (PreK-5)	247	310	80%	63			
Hardy Elem (PreK-5)	517	657	79%	140			
Westside Elem (4-6)	760	849	90%	89	10.8	$43,005	0
Windsor Elem (PreK-5)	577	667	87%	90			
MS	*1,030*	*1,169*	*88%*	*139*			
Georgie Tyler Middle (6-8)	434	535	81%	101			
Smithfield Middle (7-8)	596	634	94%	38	7.0		0
HS	*1,789*	*2,463*	*73%*	*674*			
Smithfield High (9-12)	1,267	1,588	80%	321	14.6	$45,206	0
Windsor High (9-12)	522	875	60%	353			
Total	***5,630***	***6,797***	***83%***	1,167	**51.8**		**19**

[1] Virginia Dept of Education, Fall Membership Report of Isle of Wight County Schools, 2019-20 (enrollment as of Sept. 30, 2019).
[2] Isle of Wight County Schools Facility Capacity, 02/08/19
[3] Isle of Wight current cost estimates ($2021)

- Isle of Wight in FY 2025-26 plans to construct a new elementary school, valued at approximately $38.8 million
- One support facility for Isle of Wight Public Schools is included in the County FY2020-2029 CIP – Fleet/Bus Garage addition. Costs to serve the proposed Sweetgrass project are based on the cost per student for the County's contribution for the capital project.
    - Fleet Bus Garage: $2,500,000 divided by divided by planned capacity of the system over the life of the CIP 8,0476 (current capacity of 6,797 plus 1,250 additional seats) = $311 per student

General Government

No current or future capacity expansions are anticipated by the County for General Government facilities.

Parks and Recreation

Additional park and recreation improvements are projected to serve the proposed development. The projection is based on the County's current levels of service as follows:

- 5.1 acres per 1,000 persons of active parks (192 acres active parks / 37,945population x 1,000) at $77,500 per acre for land and improvements
- 123 square feet per 1,000 persons of recreation facility space (4,656 / 37,333 population x 1,000) at $508 per square foot for recreational facility expansion.

- Trails expansions are not included as a County cost as projects in the latest County Capital Improvement Program (FY2020-2029) are identified as being funded from private entities.

Sheriff

- Additional sheriff vehicles are projected based on current levels of service of 5.3 vehicles per 1,000 calls for service (48 sheriff vehicles / 9,393 Sheriff calls x 1,000). The cost per vehicle is $60,500 (inflated to 2021 dollars from Isle of Wight Cash Proffer Study, 2012).

Fire and Rescue

No current or future *capacity* expansions are anticipated by the County for Fire and/or Rescue facilities. (Other capital expenditures for replacement (non-growth related) vehicles are listed in the CIP.)

Transportation

The County FY2020-2029 CIP identifies anticipated local expenditures of $900,000 on future system level capacity transportation improvements. To determine the Sweetgrass Development's share of the costs, TischlerBise analyzed future Countywide growth (based on our 2012 Cash Proffer Study) and identified that 50 percent of the costs are due to growth, or $450,000. This cost is allocated to future increase in vehicle trips throughout the County (base year trips are 101,790; a 50 percent increase equals 50,895). The cost per trip allocated to new development is $8.00 (truncated) ($450,000 / 59,344).

The Sweetgrass Project is projected to generate 2,664 trips. Costs are projected based on $8.00 per trip. With debt financing, total 20-year costs equal $21,314.

APPENDIX: DEMOGRAPHIC & DATA ASSUMPTIONS

BASE YEAR DATA

The table below summarizes estimates of the base year population, housing units, employment, nonresidential space, and facility factors in Isle of Wight County. These estimated values serve as the basis for the fiscal impact analysis and are used to determine the cost and revenue factors used in the analysis.

Figure 15. Base Year Input Data

		Base Year->	2021
Population [1]	POPULATION		37,945
	POP AND JOBS		47,638
	NON-TOWN POPULATION		26,758
	NON-TOWN POP AND JOBS		27,926
Housing Units by Type [2]	SINGLE FAMILY		12,507
	TOWNHOUSE		730
	APARTMENTS		1,272
	MOBILE HOME		1,847
	TOTAL HOUSING		16,356
	SF UNITS		15,083
Jobs by Type [3]	OFFICE JOBS		2,577
	RETAIL JOBS		1,908
	INDUSTRIAL JOBS		3,930
	INSTITUTIONAL JOBS		1,125
	HOTEL JOBS		94
	SELF-EMPLOYED JOBS		59
	TOTAL JOBS		9,693
	RETAIL, OFFICE, IND JOBS		8,568
Nonresidential Floor Area [2]	OFFICE SF		775,666
	RETAIL SF		954,000
	INDUSTRIAL SF		1,702,812
	INSTITUTIONAL SF		1,472,197
	HOTEL SF		82,907
	TOTAL NR KSF		4,987,582
Vehicle Trips [4]	RESIDENTIAL TRIPS		73,880
	NONRES TRIPS		27,910
	VEHICLE TRIPS		101,790

Facility Factors	[5]	PARK ACRES	3,068
	[5]	FACILITY SF	321,287
Public Safety Factors	[5]	TOTAL SHERIFF CALLS	9,099
	[5]	TOTAL FIRE CALLS	5,608
		TOTAL EMS CALLS	0
	[5]	TOTAL FIRE AND EMS CALLS	5,608
School Factors [9]		ELEM ENROLLMENT	2,811
		MS ENROLLMENT	1,030
		HS ENROLLMENT	1,789
		TOTAL ENROLLMENT	5,630
Fiscal Factors	[6]	CUMUL AV	$4,646,536,085
		SMITHFIELD JOBS	6358
		WINDSOR JOBS	2,167
	[7]	COUNTY ENROLLMENT	5,630
		COUNTY EMPLOYEES	210

[1] Weldon Cooper Center, July 1, 2020 estimate.
[2] Weldon Cooper Center, July 1, 2020 estimate; percentage distribution from US Census ACS, 2015-2019
[3] QCEW - Bureau of Labor Statistics, 2020 Annual Averages, All establishment sizes.
[4] TischlerBise; ITE.
[5] Isle of Wight County
[6] Isle of Wight County, CAFR FY17
[7] Isle of Wight County Public Schools

HOUSEHOLD SIZE

Household size is used to project population over the planning horizon. Figure 16 shows household size assumptions by type of unit, categorized by type of unit included in the analysis.

Figure 16. Household Size

Household Size
Persons per Housing Unit

Type of Unit	*Persons [3]*	*Housing Units [3]*	*PPHU*	*Households [3]*	*PPHH*	
Single Family [1]	29,698	12,551	2.37	11,676	2.54	80%
Multifamily [2]	3,059	1,358	2.25	1,341	2.28	9%
Mobile Homes	3,613	1,769	2.04	1,570	2.30	11%
Total	**36,370**	**15,678**	**2.32**	**14,587**	**2.49**	100%

[1] Includes Single Family Detached, Attached, and Mobile Homes.
[2] Includes Structures with 2+ Units.
[3] U.S. Census Bureau 2015-2019 American Community Survey 5-Yr Estimates

PUBLIC SCHOOL STUDENTS PER HOUSING UNIT

Student generation rates for Isle of Wight Public Schools are from the study "Isle of Wight County Schools Student Yield & Subdivision Analysis" conducted for the school district by Cooperative Strategies in April 2018. It is assumed that age-restricted single family housing will not generate new students. Rates are shown in Figure 17.

Figure 17. Isle of Wight County Public Schools Pupil Yields per Housing Unit

Student Yields

	Elem (PK-3)	*Elem (4-6)*	*Mid (7-8)*	*High (9-12)*	***TOTAL***
Single Family	0.104	0.080	0.059	0.125	**0.368**
Age-Restricted Single Family	0.000	0.000	0.000	0.000	**0.000**
Town Home	0.086	0.048	0.031	0.065	**0.230**
Multifamily (Apartment)	0.156	0.090	0.037	0.105	**0.388**

Note: Figures may not sum to totals shown due to rounding.
Source: Cooperative Strategies, "Isle of Wight County Schools Student Yield & Subdivision Analysis," April 2018.

VEHICLE TRIPS

Vehicle trips are used to project some operating and capital expenditures in the fiscal impact analysis. Average Weekday Vehicle Trip Ends by type of development (or trip generation rates) are from the reference book, *Trip Generation, 10TH Edition*, published by the Institute of Transportation Engineers (ITE), in 2017. A "trip end" represents a vehicle either entering or exiting a development (as if a traffic counter were placed across a driveway). Trip rates have been adjusted to avoid overestimating the number of actual trips because one vehicle trip is counted in the trip rates of both the origination and destination points. A simple factor of 50 percent has been applied to Residential and the Office and Industrial categories. The Retail category has a trip factor of less than 50 percent because this type of development attracts vehicles as they pass-by on arterial and collector roads. For example, when someone stops at a convenience store on their way home from work, the convenience store is not their primary destination.

Trip rates and adjustment factors are shown in the figure. Using trips generated from single family units as an example, the formula is as follows: 12,507 units x 9.44 vehicle trips per unit x 50% adjustment = 59,032. As shown in Figure 18, residential development accounts for an estimated 73 percent of total daily trips and nonresidential development accounts for an additional 27 percent.

Figure 18. Vehicle Trips

Residential Vehicle Trips on an Average Weekday			
Residential Units	*Assumptions*		
Single Family	12,507		
Townhouse	730		
Apartments	1,272		
Mobile Home	1,847		
Average Weekday Vehicles Trip Ends Per Unit [1]			*Trip Factor*
Single Family	9.44		50%
Townhouse	7.32		50%
Apartments	5.44		50%
Mobile Home	9.44		50%
Residential Vehicle Trip Ends on an Average Weekday			
Single Family	59,032		
Townhouse	2,671		
Apartments	3,461		
Mobile Home	8,716		
TOTAL RESIDENTIAL TRIPS	***73,880***		*73%*
Nonresidential Vehicle Trips on an Average Weekday			
Nonresidential Gross Floor Area (1,000 sq. ft.) [2]	*Assumptions*		
Office	776		
Retail	954		
Industrial	1,703		
Institutional	1,472		
Hotel	83		
Average Weekday Vehicle Trip Ends per 1,000 Sq. Ft. [1]		*Trip Factors*	
Office	9.74		50%
Retail	37.75		34%
Industrial	4.96		50%
Institutional	9.74		50%
Hotel	11.94		50%
Nonresidential Vehicle Trips on an Average Weekday			
Office	3,777		
Retail	12,245		
Industrial	4,223		
Institutional	7,170		
Hotel	495		
TOTAL NONRESIDENTIAL TRIPS	***27,910***		*27%*
TOTAL TRIPS	**101,790**		*100%*

[1] Trip rates are from the Institute of Transportation Engineers (ITE) Trip Generation Manual, 2017.

PUBLIC SAFETY COST ALLOCATION APPROACH

Public safety costs are allocated to residential and nonresidential development using a proportionate share methodology.

Proportionate Share Calculation

A proportionate share calculation allocates demand from residential and nonresidential development based on characteristics of population, labor force, and jobs in the County. Based on this analysis and shown in Figure 19, 77 percent demand is from residential development and 23 percent from nonresidential development.

Figure 19. Proportionate Share Factors

Demand Units						
Residential					***Demand Hours/Day***	***Person Hours***
	Population	37,945				
	Residents Not Working		20,693		20	413,860
	Employed Residents		17,252			
	Employed in Isle of Wight County			3,243	14	45,402
	Employed outside Isle of Wight County			14,009	14	196,126
					Residential Subtotal	655,388
					Residential Share	**77%**
Nonresidential						
	Non-working Residents		20,693		4	82,772
	Jobs Located in Isle of Wight County		10,786			
	Residents Employed in Isle of Wight County			3,243	10	32,430
	Non-Resident Workers (inflow commuters)			7,543	10	75,430
					Nonresidential Subtotal	190,632
					Nonresidential Share	**23%**
					Total	846,020

Source: US Census, OnTheMap Application and LEHD Origin-Destination Employment Statistics, 2018

SHERIFF CALLS FOR SERVICE

Using the above proportionate share methodology, Sheriff calls for service per capita and per nonresidential trip are derived. For Sheriff calls for service, self-initiated calls are netted out of the total number both to derive the cost per call for service and to project future calls for service from the development program.

To project future Sheriff calls for service from new development, the data are used to determine a call per person and call per nonresidential trip. *Note: the development program only includes residential development; therefore, only the call per capita is used in the analysis.*

These factors are then applied to projected population from the development program to project demand for Sheriff services using calls for service. (E.g., for every new person in the County, it is estimated that .1906 Sheriff calls for service are generated.)

Figure 20. Isle of Wight County Sheriff Calls for Service Projection Methodology

SHERIFF DATA INPUT AREA

Sheriff Calls for Service Data [1]

		2018	*2021 (estimated)*	
TOTAL CALLS FOR SERVICE		**9,099**	**9,393**	
	% [2]		*pop/nonres trips*	*Call per capita/nonres trip*
Residential	77%	**7,232**	37,945	0.1906
Nonresidential	23%	**2,160**	27,910	0.0774

Calls per Capita	0.1906
Calls per Nonres. Trip	0.0774

[1] Based on information provided by the Isle of Wight Public Safety; Non-self initiated calls. 2021 estimate obtained by dividing 2018 calls by 2018 housing units, then multiplying by 2021 estimated housing units.
[2] Proportionate share calculation; TischlerBise

FIRE AND EMS CALLS FOR SERVICE

Using the above proportionate share methodology, Fire and EMS calls for service per capita and per nonresidential trip are derived.

To project future Fire and EMS calls for service from new development, the data are used to determine a call per person and call per nonresidential trip. *Note: the development program only includes residential development; therefore, only the call per capita is used in the analysis.*

These factors are then applied to projected population from the development program to project demand for Fire and EMS services using calls for service. (E.g., for every new person in the County, it is estimated that .1138 Fire and EMS calls for service are generated.)

Figure 21. Isle of Wight County Fire and EMS Calls for Service Projection Methodology

FIRE/RESCUE DATA INPUT AREA

Fire/Rescue Calls for Service Data [1]

		2020		
TOTAL CALLS FOR SERVICE		**5,608**		
	% [2]		*pop/nonres trips*	*Call per capita/nonres trip*
Residential	77%	**4,318**	37,945	0.1138
Nonresidential	23%	**1,290**	27,910	0.0462

Calls per Capita	0.1138
Calls per Nonres. Trip	0.0462

[1] Based on information provided by the Isle of Wight Public Safety

[2] Proportionate share calculation; TischlerBise

Figure 22. Detailed Demand Projections

Sweetgrass (NVR) SCENARIO ANNUAL DEMAND BASE

		Base Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
	Fiscal Year->	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
	POPULATION	0	243	486	729	972	1,215	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458
	POP AND JOBS	0	243	486	729	972	1,215	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458
	AGE-RESTRICTED, SINGLE-FAMILY DETACHED	0	65	130	195	260	325	390	390	390	390	390	390	390	390	390	390	390	390	390	390	390
	TOWNHOUSE	0	38	75	113	150	188	225	225	225	225	225	225	225	225	225	225	225	225	225	225	225
	HOUSING UNIT TYPE 3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	HOUSING UNIT TYPE 4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	HOUSING UNIT TYPE 5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	HOUSING UNIT TYPE 6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	HOUSING UNIT TYPE 7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	HOUSING UNIT TYPE 8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL UNITS	0	103	205	308	410	513	615	615	615	615	615	615	615	615	615	615	615	615	615	615	615
$0 Sales Per Sq. Ft.	NONRESIDENTIAL TYPE 1 SF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
$0 Sales Per Sq. Ft.	NONRESIDENTIAL TYPE 2 SF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
$0 Sales Per Sq. Ft.	NONRESIDENTIAL TYPE 3 SF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
$0 Sales Per Sq. Ft.	NONRESIDENTIAL TYPE 4 SF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
$0 Sales Per Sq. Ft.	NONRESIDENTIAL TYPE 5 SF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
$0 Sales Per Sq. Ft.	NONRESIDENTIAL TYPE 6 SF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL SF	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NONRESIDENTIAL TYPE 1 JOBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NONRESIDENTIAL TYPE 2 JOBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NONRESIDENTIAL TYPE 3 JOBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NONRESIDENTIAL TYPE 4 JOBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NONRESIDENTIAL TYPE 5 JOBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NONRESIDENTIAL TYPE 6 JOBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL JOBS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RESIDENTIAL TRIPS	0	444	888	1,332	1,776	2,220	2,664	2,664	2,664	2,664	2,664	2,664	2,664	2,664	2,664	2,664	2,664	2,664	2,664	2,664	2,664
	NONRES TRIPS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	VEHICLE TRIPS	0	444	888	1,332	1,776	2,220	2,664	2,664	2,664	2,664	2,664	2,664	2,664	2,664	2,664	2,664	2,664	2,664	2,664	2,664	2,664
0.191	RES SHERIFF CALLS	0	46	93	139	185	232	278	278	278	278	278	278	278	278	278	278	278	278	278	278	278
0.077	NONRES SHERIFF CALLS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL SHERIFF CALLS	0	46	93	139	185	232	278	278	278	278	278	278	278	278	278	278	278	278	278	278	278
0.114	RES FIRE AND RESCUE CALLS	0	28	55	83	111	138	166	166	166	166	166	166	166	166	166	166	166	166	166	166	166
0.046	NONRES FIRE AND RESCUE CALLS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TOTAL FIRE AND EMS CALLS	0	28	55	83	111	138	166	166	166	166	166	166	166	166	166	166	166	166	166	166	166
	ELEM ENROLLMENT	0	5	10	15	20	25	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30
	MS ENROLLMENT	0	1	2	3	5	6	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
	HS ENROLLMENT	0	2	5	7	10	12	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
	TOTAL ENROLLMENT	0	9	17	26	35	43	52	52	52	52	52	52	52	52	52	52	52	52	52	52	52
	ELEM ENROLLMENT (PRE K-3)	0	3	6	10	13	16	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
	ELEM ENROLLMENT (GR 4-6)	0	2	4	5	7	9	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
			5.03	10.05	15.08	20.10	25.13	30.15	30.15	30.15	30.15	30.15	30.15	30.15	30.15	30.15	30.15	30.15	30.15	30.15	30.15	30.15
	ANNUAL MV	$0	$29,545,813	$29,545,813	$29,545,813	$29,545,813	$29,545,813	$29,545,813	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	CUMUL RES AV	$0	$29,545,813	$59,091,625	$88,637,438	$118,183,250	$147,729,063	$177,274,875	$177,274,875	$177,274,875	$177,274,875	$177,274,875	$177,274,875	$177,274,875	$177,274,875	$177,274,875	$177,274,875	$177,274,875	$177,274,875	$177,274,875	$177,274,875	$177,274,875
	CUMUL NONRES AV	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	CUMUL AV	$0	$29,545,813	$59,091,625	$88,637,438	$118,183,250	$147,729,063	$177,274,875	$177,274,875	$177,274,875	$177,274,875	$177,274,875	$177,274,875	$177,274,875	$177,274,875	$177,274,875	$177,274,875	$177,274,875	$177,274,875	$177,274,875	$177,274,875	$177,274,875
	NET CUMUL AV	$0	$29,545,813	$29,545,813	$29,545,813	$29,545,813	$29,545,813	$29,545,813	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
	NON-TOWN POPULATION		243	486	729	972	1,215	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458
	NON-TOWN POP AND JOBS		243	486	729	972	1,215	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458	1,458

TischlerBise
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MEMORANDUM

To: Eric Shirey, General Manager, Land, NVR Inc.

From: Julie Herlands, AICP, Vice President, TischlerBise

Date: February 10, 2023

RE: Fiscal Impact Analysis for Sweetgrass in Isle of Wight County, Virginia//Response to Isle of Wight Capital Impacts Finding

TischlerBise conducted a Fiscal Impact Analysis of the proposed Sweetgrass development in Isle of Wight County, Virginia, for NVR Inc/Ryan Homes for submission to Isle of Wight County as part of the applicant's rezoning request. TischlerBise provided a report dated June 21, 2021, to NVR Inc./Ryan Homes.

The overall finding of the Fiscal Impact Analysis is that the proposed development is fiscally positive to the County in total.[1] TischlerBise's analysis factors in all variable revenues generated by the proposed development compared to all operating and capital costs attributable to the development.

Isle of Wight County has a *Capital Impacts Model* that was developed by TischlerBise.[2] The Model was developed specifically for the County to identify capital impacts eligible for mitigation by cash proffers. Isle of Wight County has recently provided NVR with a summary of the Model's capital impact findings for the Sweetgrass development,[3] which total approximately $2.3 million in capital impacts of which $785,285 is cash proffer eligible.

TischlerBise's fiscal impact analysis also identifies capital cost impacts attributed to the development totaling approximately $2.2 million. However, unlike the *Capital Impacts Model*, which does not include revenue offsets,[4] the TischlerBise **Fiscal Impact Analysis** (as requested by the County as part of the rezoning application) captures all revenues attributable to Sweetgrass and is projected to generate sufficient revenues in total to cover projected operating and capital costs.

[1] The twenty-year cumulative net fiscal impact is a surplus of approximately $20.9 million and an annual net surplus of approximately $1.2 million at the project's buildout.
[2] Model transmitted October 28, 2020.
[3] Printout dated 12/14/2022.
[4] Virginia localities fund most locally funded services (including schools) with property tax revenues, which is a general revenue source (i.e., a discretionary revenue that is appropriated by elected officials during the budget process). Property tax revenues are not typically earmarked for specific purposes (other than a locality's full faith and credit obligation to retire debt where applicable or when levied for special tax districts).

Sweetgrass
Product Selection and Market Analysis

The Sweetgrass Community is setup to serve two different buyer profiles, both of which require an active lifestyle and demand a high quality product.

The "Lifestyle" Ranch section provides first floor owner bedrooms and baths that tailor to the "55 and greater" customer. The new construction supply for this product is restrained which continues to drive up prices. Sweetgrass' customers will primarily come from Isle of Wight, however secondary buyers are expected from the Peninsula and City of Suffolk.

Census data reveals those areas having 215,412 people that is age 55 or older. Migration data tells us that 14,219 of those will desire to move this year.

Last year, there was 2,175 first floor owner bedroom homes sold within those areas. Today there is only 505 first floor owner bedroom homes for sale across the broader market and Isle of Wight County specifically has only 54 active listings today (the majority being new construction).

The Sweetgrass Community will sell over 60 ranch homes each year and that is considering the absorption levels of other communities that serve this buyer such as South Harbor in Isle of Wight County and Church Square in the Town of Smithfield.

The "Towns" section provides a tremendous value for families who have been priced out of the market due to inflation, rising interest rates and increased new home sales prices. Sweetgrass will offer townhomes that come equipped with a garage and 3-4 bedrooms. The renters of Isle of Wight will finally have an option to obtain home ownership. Isle of Wight's average price for a home built after the year 2000 and at least 1500 square feet was $465,533. Sweetgrass Towns will provide relief to such pricing pressure by offering elegant and high quality homes from the upper $200's and lower $300's.

Both products at Sweetgrass have tremendous demand in the marketplace, which will equate to a very busy jobsite and fast buildout.

Sweetgrass Elevations - June 15, 2023

Facing North
LEGACY
AT
SWEETGRASS
Sweetgrass Elevations - June 15, 2023

Facing South
TOWNHOMES
Sweetgrass Elevations - June 15, 2023

Facing South
Sweetgrass Elevations - June 15, 2023

Facing West
View over Park
Sweetgrass Elevations - June 15, 2023

Sweetgrass Elevations - June 15, 2023

Facing East
AES
CONSULTING ENGINEERS
Sweetgrass Elevations - June 15, 2023

Sweetgrass Elevations - June 15, 2023

AES
CONSULTING ENGINEERS
Sweetgrass Elevations - June 15, 2023

Facing West
View of Amenity

Sweetgrass Elevations - June 15, 2023

Sweetgrass Elevations - June 15, 2023

Sweetgrass Elevations - June 15, 2023

Sweetgrass Elevations - June 15, 2023

Sweetgrass Elevations - June 15, 2023

Sweetgrass Elevations - June 15, 2023

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Sweetgrass Elevations - June 15, 2023

Sweetgrass Elevations - June 15, 2023

Sweetgrass Elevations - June 15, 2023

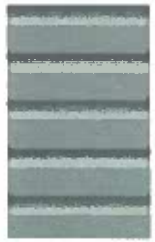
Sweetgrass Elevations - June 15, 2023

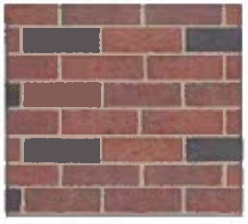
Sweetgrass Elevations - June 15, 2023

Sweetgrass Elevations - June 15, 2023

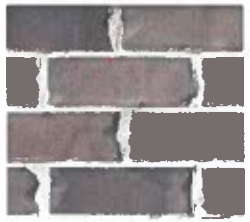
Lake Single Family Detached Color Schemes - Prime, Premium, Premium Plus

Scheme #	Primary Siding (Variform)	Accent Siding (Variform)	Shutter Color	Front Door Paint Color	Brick (GS Salisbury or Equivalent)	Stone (Environmental or Equivalent)	
Lake 1	Dover White	Dover White	Plygem	Sherwin Williams	Savannah Gray	Gray	Prime, Premium, Premium Plus
ESCLB01A - Reflect			Black	Tricorn Black			
ESCLB01B - Inspire			Black	Sundried Tomato			
Lake 2	Flint	Flint	Plygem	Sherwin Williams	Cordoba	Gray	Prime, Premium, Premium Plus
ESLB02A - Reflect			Black	Seaworthy			
ESLB02B - Inspire			Black	Rain			

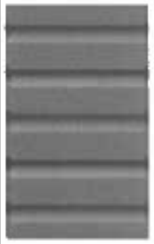
Scheme #	Primary Siding (Variform)	Accent Siding (Variform)	Shutter Color	Front Door Paint Color	Brick (GS Salisbury or Equivalent)	Stone (Environmental or Equivalent)	
Lake 3	Georgian Gray	Dover White	Plygem	Sherwin Williams	Charred Oak	PA Lime	Prime, Premium, Premium Plus
ESLB03A - Reflect			Blue	Web Gray			
ESLB03B - Inspire			Blue	Sequin			
Lake 4	Silver Mist	Silver Mist	Plygem	Sherwin Williams	LaCava	PA Sierra	Prime, Premium, Premium Plus
ESLV04A - Reflect			Blue	Grizzle Gray			
ESLV04B - Inspire			Blue	Salty Dog			
Lake 5	Irish Thistle	Irish Thistle	Plygem	Sherwin Williams	Savannah Gray	PA Sierra	Prime, Premium, Premium Plus
ELSV05A - Reflect			Dark Navy	Naval			
ELSV05B - Inspire			Dark Navy	Cupola Yellow			

Scheme #	Primary Siding (Variform)	Accent Siding (Variform)	Shutter Color	Front Door Paint Color	Brick (GS Salisbury or Equivalent)	Stone (Environmental or Equivalent)	
Lake 6	Spanish Olive	Silver Mist	Plygem	Sherwin Williams	LaCava	Appalachian	Prime, Premium, Premium Plus
ESLV06A - Reflect			Black	Rock Bottom			
ESLV06B - Inspire			Black	Pewter Green			
Lake 7	Stone Mountain Clay	Island Pearl	Plygem	Sherwin Williams	Berkshire	Manor	Prime, Premium, Premium Plus
ESLB07A - Reflect			Peppercorn	Urbane Bronze			
ESLB07B - Inspire			Peppercorn	Still Water			
Lake 8	Sandy Tan	Sandy Tan	Plygem	Sherwin Williams	Olde Columbia	Manor	Prime, Premium, Premium Plus
ESLB08A - Reflect			Gray	Homburg Gray			
ESLB08B - Inspire			Gray	Riverway			

Sweetgrass Elevations - June 15, 2023

Scheme #	Primary Siding (Variform)	Accent Siding (Variform)	Shutter Color	Front Door Paint Color	Brick (GS Salisbury or Equivalent)	Stone (Environmental or Equivalent)	
Lake 9	Natural Almond	Natural Almond	Plygem	Sherwin Williams	Turner Ridge	Dakota	Prime, Premium, Premium Plus
ESLB09A - Reflect			Gray	Oyster Bay			
ESLB09B - Inspire			Gray	Bunglehouse Blue			
Lake 10	Island Pearl	Island Pearl	Plygem	Sherwin Williams	Charred Oak	Appalachian	Prime, Premium, Premium Plus
ESLB10A - Reflect			Black	Slate Tile			
ESLB10B - Inspire			Black	Samovar Silver			
Lake 11	Pewter	Pewter	Plygem	Sherwin Williams	Cordoba	PA Lime	Premium, Premium Plus
ESLB11A - Reflect			Black	Tricorn Black			
ESLB11B - Inspire			Black	Bravado Red			

Scheme #	Primary Siding (Variform)	Accent Siding (Variform)	Shutter Color	Front Door Paint Color	Brick (GS Salisbury or Equivalent)	Stone (Environmental or Equivalent)	
Lake 12	Wedgewood	Wedgewood			Turner Ridge	Carolina	Premium, Premium Plus
ESLB12A - Reflect			Dark Navy	In the Navy			
ESLB12B - Inspire			Dark Navy	Hubbard Squash			
Lake 13	Sagebrook	Silver Mist			Walnut Grove	Carolina	Premium, Premium Plus
ESLB13A - Reflect			Black	Tricorn Black			
ESLB13B - Inspire			Black	Peppercorn			
Lake 14	Twilight Shadow	Twilight Shadow			Walnut Grove	Carolina	Premium, Premium Plus
			Black	Tricorn Black			
			Black	Rainwashed			

Scheme #	Primary Siding (Variform)	Accent Siding (Variform)	Shutter Color	Front Door Paint Color	Brick (GS Salisbury or Equivalent)	Stone (Environmental or Equivalent)	
Lake 15	Bayou	Bayou			Cordoba	PA Lime	
ESLB15A - Reflect			Black	Tricorn Black			Premium, Premium Plus
ESLB15B - Inspire			Black	Mineral Deposit			
Lake 16	Deep Brunswick	Deep Brunswick			LaCava	Appalachian	
ESLB16A - Reflect			Pebblestone Clay	Chocolate Powder			Premium Plus
ESLB16B - Inspire			Pebblestone Clay	Tradewind			
Lake 17	Teak	Dover White			Savannah Gray	Dakota	
ESLB17A - Reflect			Black	Evergreen Fog			Premium Plus
ESLB17B - Inspire			Black	Teal Stencil			
Lake 18	Sedona Red	Sedona Red			Savannah Gray	Appalachian	

Scheme #	Primary Siding (Variform)	Accent Siding (Variform)	Shutter Color	Front Door Paint Color	Brick (GS Salisbury or Equivalent)	Stone (Environmental or Equivalent)
ESLB18A - Reflect			Black	Tricorn Black		
ESLB18B - Inspire			Black	Anonymous		

Premium Plus

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WE
Welcome

June 17, 2022

Isle of Wight County Planning and Zoning
17140 Monument Circle, Suite 101
Isle of Wight VA 23397

Via e-mail:

Re: Sweetgrass Cultural Resources Assessment
Parcel Number 32-01-009 (14096 Benns Church Road) (±294.4 acres)
Isle of Wight County, VA

Dear Sir or Madam:

Thunderbird Archeology, a division of Wetland Studies and Solutions, Inc. (WSSI) has completed a desk-based Cultural Resources Assessment on behalf of NVR, Inc. for the Sweetgrass site located in Isle of Wight County, Virginia (see Attachment). The project area includes +/- 249.4 acres of, generally located northeast of Benns Church Blvd and north of Beechwood Lane.

Our research showed that the project area has not been previously subject to cultural resources investigation and no cultural resources have been previously recorded on the property. We feel that the project area has at least a moderate potential to include historic and/or prehistoric period archeological resources. Additionally, one or more standing buildings on the site may be historic (i.e., 50-years or older). Our research found no evidence or other indications that a cemetery or human burials are present on the property.

In our opinion, any prehistoric period archeological sites that may be identified on the property will not likely be significant (i.e., eligible for listing in the National Register of Historic Places) due to the property's history of agricultural use and the likelihood that such sites have been disturbed by plowing. Although significant historic period archeological sites could be identified within the project area and the historic standing buildings thereon could be deemed significant, we anticipate that any such resources could be avoided or mitigated.

If you have any questions or want to discuss the attached report, feel free to contact me at 703.307.6951 or bsipe@wetlands.com.

Sincerely,

WETLAND STUDIES AND SOLUTIONS, INC.

Boyd Sipe, MA, RPA
Manager – Archeology

Enclosures : Attachment

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Cultural Resources Site Assessment
Sweetgrass (±249.4 acres)
Isle of Wight County, Virginia
WSSI #31100.01

INTRODUCTION

This transmittal presents an evaluation of the potential for locating cultural resources on the ±249.4-acre Sweetgrass project area, located at 14096 Benns Church Boulevard, Smithfield, VA (Exhibit 1). The study area is situated on a low-lying terrace bordering Jones Creek on its north-eastern side (Exhibit 2). The project area appears to be generally low in topographic relief, sloping gradually towards and draining into unnamed tributary streams of the Creek to the northwest and the southeast.

The most recent aerial photography of the project area shows most of the project area under cultivation, with forests in the north-eastern section accounting for roughly 20% of the vegetation cover (Exhibit 3). A sheet-metal-roof square structure is visible near the center of the property. Parcel records indicate two improvements on the property, both categorized "Miscellaneous," one constructed in 1960 and the other in 2010. A review of online historic aerial photography suggests that the central structure predates 1972. The historic aerials also indicate at least two other structures, about 450 ft to the north and north-east of the central building, existed on the property until about 2004. The layout and use of the fields has remained consistent since at least 1972. The 1919 United States Geological Survey (USGS) quadrangle covering the project area indicates that buildings stood in the same location as the ones visible in the 1972 photo. It also shows that another structure, demolished before 1972, was once located between 800 and 1000 ft. east of the currently standing building (Exhibit 4).

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KNOWN CULTURAL RESOURCES IN OR NEAR THE PROJECT AREA

The following inventory of previously recorded cultural resources within and near the project area was established by using the Virginia Department of Historic Resources' (DHR) online Virginia Cultural Resource Information System (V-CRIS), as well as examining cultural resource files and reports at the Thunderbird Archeology office in Gainesville, Virginia.

No previous cultural resources investigations have been conducted of the study area, and no archeological or architectural resources have been recorded within the study area. In total, three archeological site and eight architectural resources have been recorded within an approximate one-mile radius of the study area (Tables 1 and 2). One of the archeological sites, 44IW0242, represents a Middle Woodland period campsite, and has been deemed not eligible for inclusion on the National Register of Historic Places (NRHP). The other two archeological sites have not been formally evaluated. 44IW0113 represents another Woodland period Native American artifact scatter, and 44IW0271 represents the St. Luke's Church and Grounds, where prehistoric Native American artifact scatters were found

mixed with deposits associated with the historic Euro-American and African American church and cemetery. It is cross listed as architectural resource 046-0024, which is described in further detail below.

Table 1: Previously Recorded Archeological Sites within a One-Mile Radius of the Project Area

DHR SITE NUMBER	SITE TYPE	TEMPORAL AFFILIATION	NRHP ELIGIBILITY
44IW0271	Artifact scatter, Artifact scatter, Artifact scatter, Cemetery, Church, Lithic scatter	Antebellum Period, Colony to Nation, Early National Period, Middle Archaic Period, Pre-Contact, Early Woodland, Late Woodland, Antebellum Period, Civil War, Colony to Nation, Contact Period, Early National Period, Reconstruction and Growth, The New Dominion, World War I to World War II	Not Evaluated
44IW0242	Camp	Middle Woodland	DHR Staff: Not Eligible
44IW0113	No Data	Early Woodland, Late Woodland, Middle Woodland	Not Evaluated

Table 2: Previously Recorded Architectural Resources within a One-Mile Radius of the Project Area

DHR RESOURCE NUMBER	RESOURCE NAME	TYPE	TEMPORAL AFFILIATION	NRHP ELIGIBILITY
300-0115	Angel on Gravestone Gravestone, 14477 Benns Church Boulevard	Sculpture/Statue	World War I to World War II (1917 - 1945)	Not Evaluated
046-0024	Newport Parish Church Old Brick Church Saint Luke's Church Saint Luke's Smithfield	Church/Chapel	Contact Period (1607 - 1750)	VLR Listing NRHP Listing NHL Listing This property is subject to an easement held by the Board of Historic Resources
046-5250	Farmhouse, 20041 Brewers Neck Boulevard B. J. Hogue Homeplace	Single Dwelling	Early National Period (1790 - 1829)	DHR Staff: Not Eligible
046-5246	Benns Church	Church/Chapel	World War I to World War II (1917 - 1945)	Not Evaluated

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Table 3: Previously Recorded Architectural Resources within a One-Mile Radius of the Project Area

DHR RESOURCE NUMBER	RESOURCE NAME	TYPE	TEMPORAL AFFILIATION	NRHP ELIGIBILITY
046-5276	House, 19514 Casper Circle	Single Dwelling	World War I to World War II (1917 - 1945)	DHR Staff: Not Eligible
046-5274	House, 14564 Benns Church Blvd W.P. Jordan House	Single Dwelling	Reconstruction and Growth (1866 - 1916)	DHR Staff: Eligible
046-5275	House, 14580 Benns Church Boulevard	Single Dwelling	World War I to World War II (1917 - 1945)	DHR Staff: Not Eligible
046-5054	House, 15150 Benns Church Boulevard (Route 10) Jordan Home #1 Margaret Davis House Charles Driver Jordan House	Single Dwelling	Antebellum Period (1830 - 1860)	The Primary Resource is no longer extant.

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Of the eight previously recorded architectural resources located within a mile of the center of the project area, three have been deemed not eligible for NRHP listing (046-5250, 046-5276, 046-5275) and another has already been demolished (046-054) (Table 2); all represent 20th century farms and houses. Two resources have not been evaluated: 046-5246 (Benns Church) and 300-0115 (Angel on Gravestone). The first of these has as its primary resource the building currently housing Benns United Methodist Church, a brick structure erected in 1926 and added to in 1957 and 1967. Its secondary resource is the Benns Church Cemetery. Resource 300-0115 represents a sculpture of an angel on a gravestone dated to c.1921. The text description on file with DHR gives its location as the Benns Church Cemetery, however, its mapped location in VCRIS places it within Saint Luke's Church and Cemetery (046-0024).

DHR Resource 046-0024 (Saint Luke's Church) is listed on the NRHP, Virginia Landmark Registry (VLR), and as a National Historic Landmark (NHL). It represents a colonial period church building constructed between 1632 and 1657. It has been operated as a museum and a non-profit since 1953. The description of the resource in VCRIS indicates that it has maintained its historic character and feel; this increases the chances that nearby development plans would face greater scrutiny from regulators and the public. However, while the current project area is within less than half a mile of this site, it is separated by intervening forested areas, which diminish the possibility of a detrimental visual effect on the resource. Finally, one architectural resource within a mile of the project area, DHR ID#046-5274 (W.P. Jordan House) has been deemed eligible for NRHP listing. It represents a c.1888 Italianate-style Single Family Dwelling and its outbuildings. It was the home of W.P. Jordan, a member of a prominent family who owned most of the land south

of Benns Church to Suffolk in the 19th century. However, the VCRIS file regarding the resource states that W.P. Jordan himself was not associated with any significant historical events.

ARCHEOLOGICAL SITE PROBABILITY

The following presents an assessment of the probability that archeological sites will occur within the study area; this has not been field verified.

The probability for locating prehistoric sites generally depends on the variables of topography, proximity to water, and internal drainage. Sites are more likely on well-drained landforms of low relief near water. The study area has at least a moderate probability for containing prehistoric resources due to its areas of low-relief topography near water sources. If prehistoric sites are present in plowed upland settings, they are not likely to require work beyond the recordation done at the Phase I level as plowing disturbs the context of the Native American sites and reduces the information potential of a particular site. Prehistoric sites found outside of an upland setting (e.g., floodplain) or in unplowed contexts could require additional work if preserved deposits are identified.

The probability for the occurrence of historic period sites largely depends upon the history of settlement in the area, the topography and the proximity of a particular property to historic roads. Historic maps offer insight into habitation of the vicinity; however, the absence of structures on historic maps does not eliminate the possibility of an archeological site being present within the property, as it was common for properties occupied by tenants, enslaved laborers, and freed African Americans to be excluded from these maps. As previously stated, the USGS map from 1919 shows several no-longer-extant buildings within the project area. The project area also borders US Route 258 (Benns Church Boulevard), which has served as the main road between Smithfield and Benns Church for several centuries. These factors increase the overall likelihood for the occurrence of historic period archeological resources within the study area. In our opinion, these maps, and the presence of known archeological sites near the project area indicate a moderate to high likelihood for the occurrence of historic period archeological sites within the study area.

Archeological sites dating from the 17th -19th century, if present within the study area, will likely require archeological work above the Phase I (Identification)-level; this is particularly true of dwellings that were occupied by enslaved African Americans or tenants, as these site types have been less intensively studied. As noted above, sites of these types are not typically represented on historic maps and are typically only identifiable through field investigations. Twentieth-century sites are not likely to be considered significant or require additional archeological work unless they contain unique, intact cultural materials that would contribute new research information.

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CONCLUSIONS AND RECOMMENDATIONS

If impacts to Waters of the United States are planned in association with the development of the study area, the U.S. Army Corps of Engineers (USACE) may require that a Phase I cultural resources investigation be completed and reviewed by the DHR to comply with Section 106 of the National Historic Preservation Act (NHPA) of 1966 (as amended) in conjunction with obtaining a Clean Water Act Permit. In this scenario, the DHR would review and provide comments to assist the USACE in fulfilling its obligations under the NHPA but will typically defer to the federal agency regarding definition of APEs, eligibility determinations, and requirements for additional investigations.

Finally, as two previously recorded architectural resources are within an approximate one-mile radius of the project area are either eligible for listing, or already listed in the NRHP, an assessment of the direct adverse effects the development of the project area could have on the viewsheds on these resources (i.e., a Viewshed Study) could also be required if the project is subject to review by local, state, or federal agencies; however, if the project is not subject to review by any local, state, or federal agencies, then an assessment of adverse effects on the viewsheds of these resources would not need to be conducted. Isle of Wight County does not uniformly require cultural resources investigations as part of local land-use review. However, if development of the site requires rezoning or other local government review or approval, cultural resources investigations could be requested or potentially required as a condition of approval. Any cultural resources studies conducted for Section 106 review would almost certainly be adequate for local government review should such studies be requested by the county.

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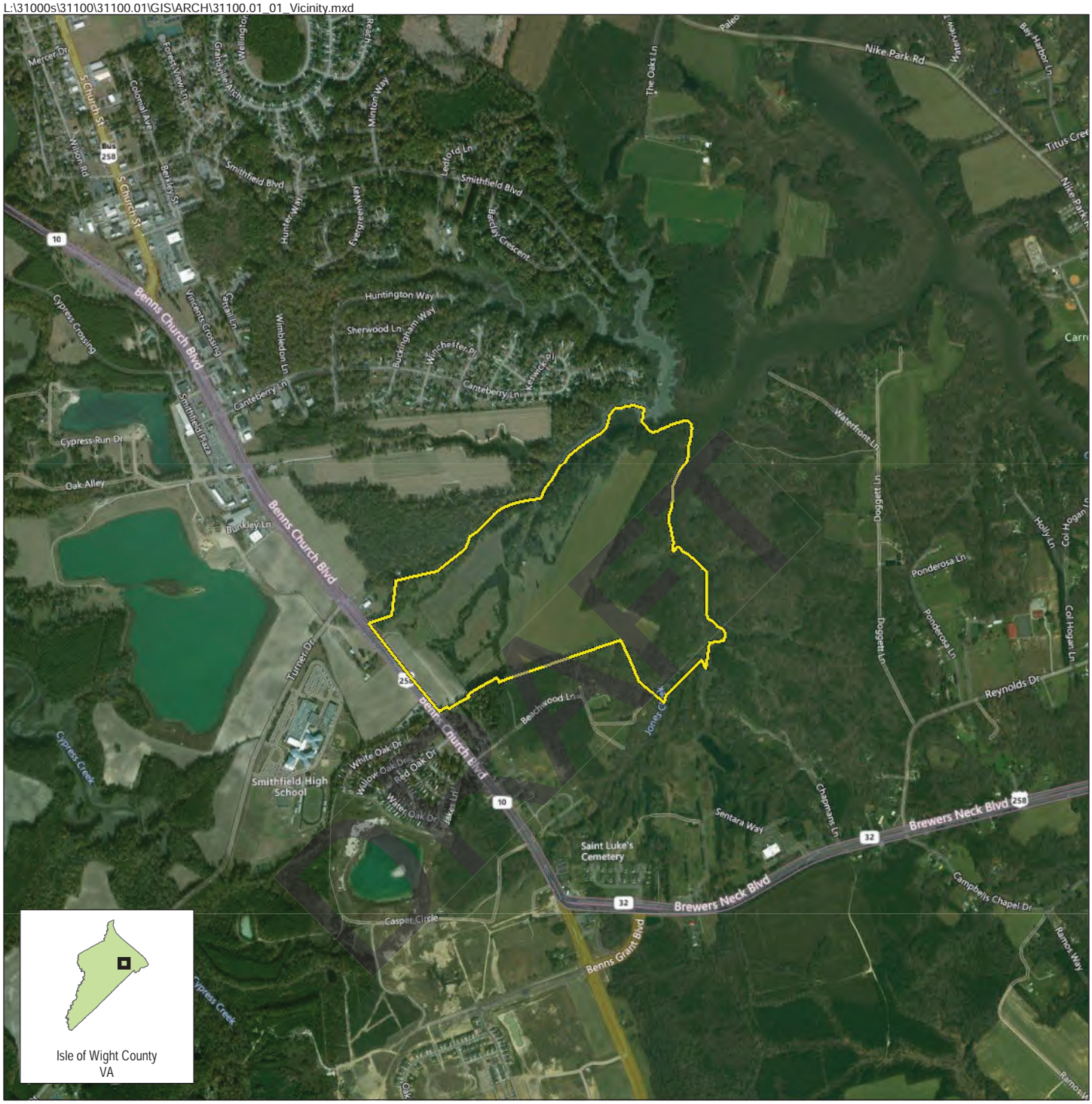

Project Area: ± 249.5 acres

Vicinity Map
Sweetgrass
WSSI #31100.01

NORTH
0 2,000
Feet
Original Scale:
1 " = 2,000 '

Source: Bing Aerial Hybrid

Wetland Studies and Solutions, Inc.
a DAVEY company

Exhibit 1

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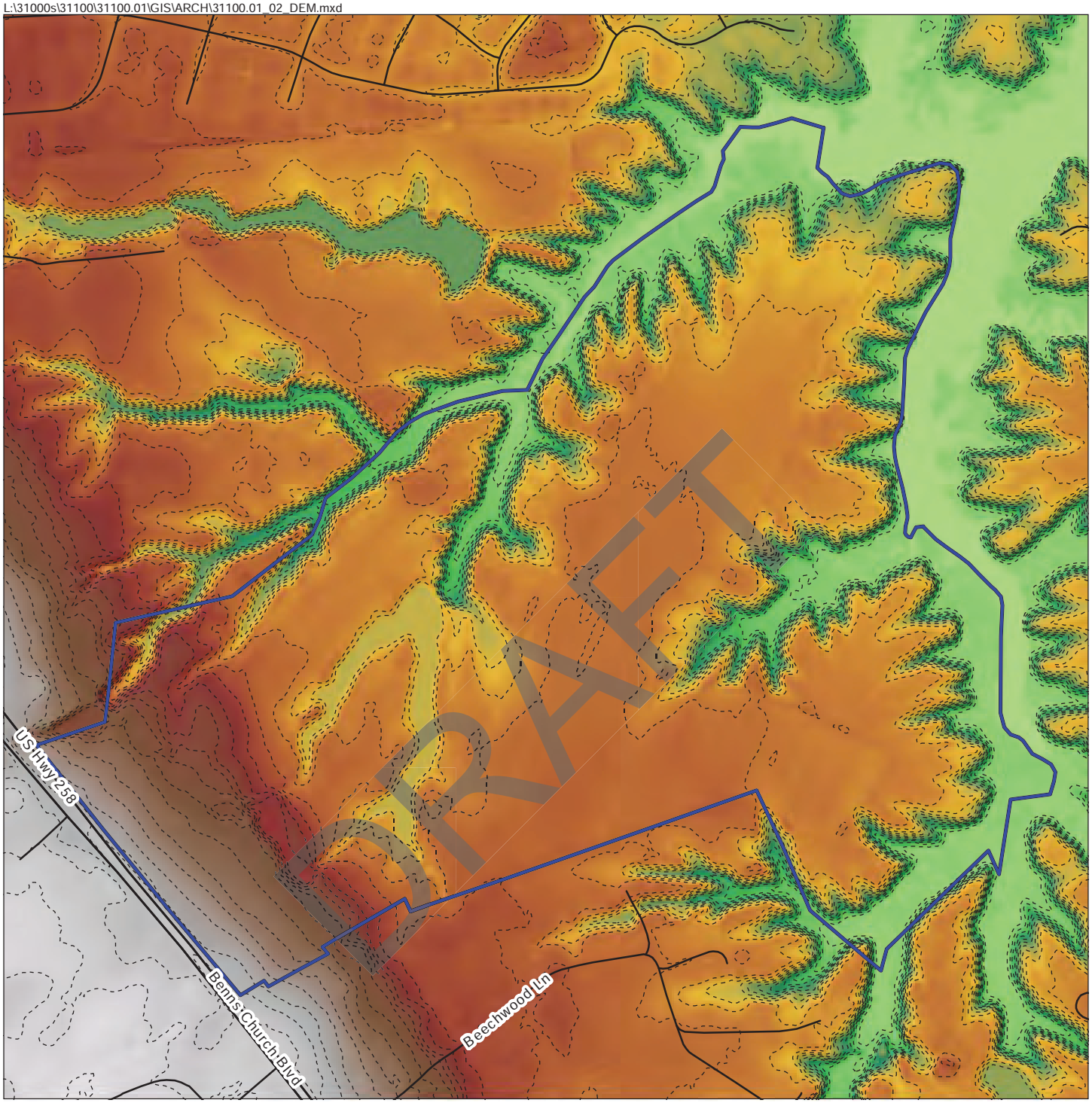

Project Area

2-ft Contours

Elevation (meters)

Value

High : 16.7476

Low : 1.17549e-38

Digital Elevation Model (DEM)
Sweetgrass
WSSI #31100.01

NORTH

0 700

Feet

Original Scale:
1 " = 700 '

Vertical Datum: NAVD88
Source: 2010; USGS

Wetland Studies and Solutions, Inc.
a DAVEY company

Exhibit 2

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Project Area

Spring 2021 Natural Color Imagery
Sweetgrass
WSSI #31100.01

NORTH
0 700
Feet
Original Scale:
1 " = 700 '

Source: VBMP. 2021

Wetland Studies and Solutions, Inc.
a DAVEY company

Exhibit 3

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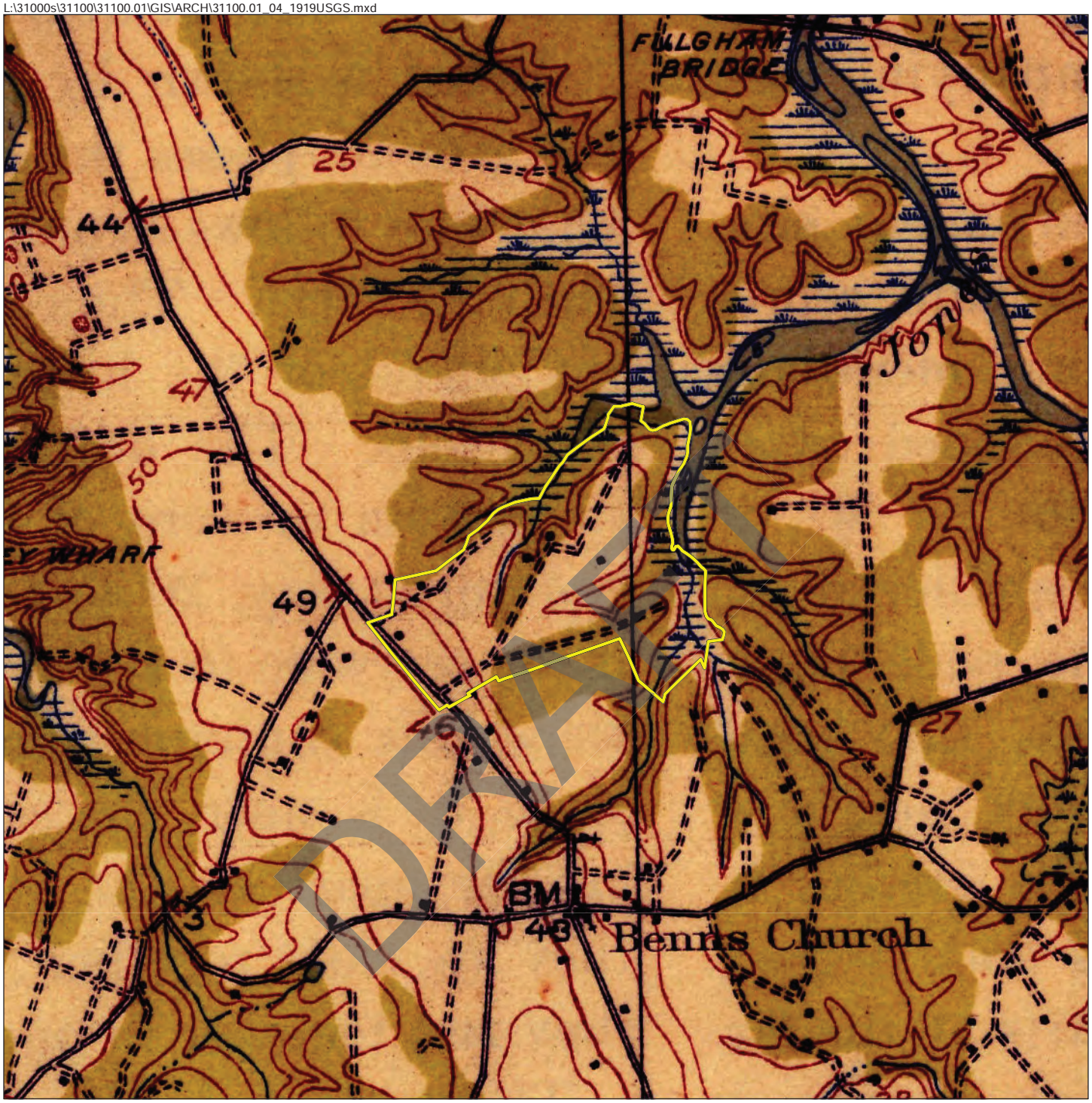

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Project Area

1919 USGS Quad
Sweetgrass
WSSI #31100.01

NORTH
0 2,000
Feet
Original Scale:
1 " = 2,000 '

Benns Church, VA 1919
Latitude: 36°57'1"N
Longitude: 76°35'10"W
Hydrologic Unit Code (HUC): 020802060904
HUC12 Name: Jones Creek-Pagan River
COE Region: Atlantic and Gulf Coastal Plain

Wetland Studies and Solutions, Inc.
a DAVEY company

Exhibit 4

Cultural Resource Forms

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Snapshot

Date Generated: June 02, 2022

Site Name: No Data
Site Classification: Terrestrial, open air
Year(s): 1200 B.C.E - 1606 C.E
Site Type(s): No Data
Other DHR ID: No Data
Temporary Designation: No Data

Site Evaluation Status
Not Evaluated

Locational Information

USGS Quad: BENNS CHURCH
County/Independent City: Isle of Wight (County)
Physiographic Province: No Data
Elevation: No Data
Aspect: No Data
Drainage: No Data
Slope: No Data
Acreage: No Data
Landform: Other
Ownership Status: No Data
Government Entity Name: No Data

Site Components

Component 1

Category: No Data
Site Type: No Data
Cultural Affiliation: Native American
Cultural Affiliation Details: No Data
DHR Time Period: Early Woodland, Late Woodland, Middle Woodland
Start Year: -1200
End Year: 1606
Comments: No Data

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Bibliographic Information

Bibliography:
No Data
Informant Data:
No Data

CRM Events

Event Type: Survey:Phase I/Reconnaissance

Project Staff/Notes:
No Data

Project Review File Number: No Data
Sponsoring Organization: No Data
Organization/Company: Unknown (DSS)
Investigator: MacCord, Howard A.
Survey Date: 6/21/1972
Survey Description:
No Data

Current Land Use	Date of Use	Comments
Other	*No Data*	Wide terrace adjoining spring branch. Large dug away for sand pit.

Threats to Resource: No Data
Site Conditions: Unknown Portion of Site Destroyed
Survey Strategies: Surface Testing
Specimens Collected: No
Specimens Observed, Not Collected: No
Artifacts Summary and Diagnostics:
Pottery and points (VSL #422).
Summary of Specimens Observed, Not Collected:
No Data
Current Curation Repository: No Data
Permanent Curation Repository: No Data
Field Notes: No
Field Notes Repository: No Data
Photographic Media: No Data
Survey Reports: No Data
Survey Report Information:
No Data
Survey Report Repository: No Data
DHR Library Reference Number: No Data
Significance Statement: No Data
Surveyor's Eligibility Recommendations: No Data
Surveyor's NR Criteria Recommendations, : No Data
Surveyor's NR Criteria Considerations: No Data

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Snapshot

Date Generated: June 02, 2022

Site Name: No Data
Site Classification: Terrestrial, open air
Year(s): 300 - 999 C.E
Site Type(s): Camp
Other DHR ID: No Data
Temporary Designation: 44CRI731-5

Site Evaluation Status

DHR Staff: Not Eligible

Locational Information

USGS Quad: BENNS CHURCH
County/Independent City: Isle of Wight (County)
Physiographic Province: Coastal Plain
Elevation: 40
Aspect: No Data
Drainage: James River
Slope: No Data
Acreage: 0.014
Landform: Knoll
Ownership Status: Private
Government Entity Name: No Data

Site Components

Component 1

Category: Domestic
Site Type: Camp
Cultural Affiliation: Native American
Cultural Affiliation Details: No Data
DHR Time Period: Middle Woodland
Start Year: 300
End Year: 999
Comments: No Data

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Bibliographic Information

Bibliography:

No Data

Informant Data:

No Data

CRM Events

Event Type: DHR Staff: Not Eligible

DHR ID: 44IW0242
Staff Name: Kirchen, Roger
Event Date: 10/20/2006
Staff Comment No Data

Event Type: Survey:Phase I/Reconnaissance

Project Staff/Notes:
No Data
Project Review File Number: 2006-0234
Sponsoring Organization: No Data
Organization/Company: Unknown (DSS)
Investigator: Cultural Resources, Invc., Ellen Brady
Survey Date: 9/1/2005
Survey Description:
Phase I- 50 foot interval shovel tests with radials dug at 25 feet intervals around positive shovel tests.

Current Land Use	Date of Use	Comments
Dwelling, single	9/1/2005 12:00:00 AM	*No Data*

Threats to Resource: No Data
Site Conditions: 50-74% of Site Destroyed
Survey Strategies: Subsurface Testing
Specimens Collected: Yes
Specimens Observed, Not Collected: No
Artifacts Summary and Diagnostics:
Mockley Ceramics, primary and secondary chert, quartz and quartzite flakes, quartzite FCR, and plastic
Summary of Specimens Observed, Not Collected:
No Data
Current Curation Repository: CRI-Fredericksburg
Permanent Curation Repository: No Data
Field Notes: Yes
Field Notes Repository: CRI-Fredericksburg
Photographic Media: No Data
Survey Reports: Yes
Survey Report Information:
A Phase I Cultural Resources Survey of Approximately 600 Acres at Benns Church Isle of Wight County, Virginia
Survey Report Repository: CRI-Fredericksburg
DHR Library Reference Number: No Data
Significance Statement: No Data
Surveyor's Eligibility Recommendations: No Data
Surveyor's NR Criteria Recommendations, : No Data
Surveyor's NR Criteria Considerations: No Data

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Snapshot

Date Generated: June 02, 2022

Site Name: St. Luke's Church and Grounds
Site Classification: Terrestrial, open air
Year(s): No Data
Site Type(s): Artifact scatter, Artifact scatter, Artifact scatter, Cemetery, Church, Lithic scatter
Other DHR ID: 046-0024
Temporary Designation: St. Luke's

Site Evaluation Status

Not Evaluated
This property is subject to an easement held by the Board of Historic Resources

Locational Information

USGS Quad: BENNS CHURCH
County/Independent City: Isle of Wight (County)
Physiographic Province: Coastal Plain
Elevation: 40
Aspect: Facing East
Drainage: James River
Slope: 2 - 6
Acreage: 18.500
Landform: Terrace
Ownership Status: Private
Government Entity Name: No Data

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Site Components

Component 1

Category: Funerary
Site Type: Cemetery
Cultural Affiliation: African American, Euro-American
Cultural Affiliation Details: No Data
DHR Time Period: Antebellum Period, Colony to Nation, Early National Period
Start Year: No Data
End Year: No Data
Comments: [2011 Smith]

August 2008: At least one section of the cemetery showed an individual who exhibited some African ancestry.

Component 2

Category: Indeterminate
Site Type: Artifact scatter
Cultural Affiliation: Native American
Cultural Affiliation Details: No Data
DHR Time Period: Middle Archaic Period
Start Year: No Data
End Year: No Data
Comments: August 2008: Native American finds were in disturbed contexts (grave shafts and pipe trenches). A Morrow Mountain projectile point was found.

Component 3

Category: Industry/Processing/Extraction
Site Type: Lithic scatter
Cultural Affiliation: Native American

Cultural Affiliation Details: No Data
DHR Time Period: Pre-Contact
Start Year: No Data
End Year: No Data
Comments: August 2008: Native American finds were in disturbed contexts (grave shafts and pipe trenches). Many undateable artifacts were found but they show that stone tools were being manufactured on site: chunks; initial edging, primary and secondary thinning flakes; a preform; scrapers; fire-cracked rocks.

Component 4

Category: Indeterminate
Site Type: Artifact scatter
Cultural Affiliation: Native American
Cultural Affiliation Details: No Data
DHR Time Period: Early Woodland
Start Year: No Data
End Year: No Data
Comments: August 2008: Native American finds were in disturbed contexts (grave shafts and pipe trenches). Dateable artifacts include Early Woodland pottery from the following periods: Marcey Creek (c. 1,000 B.C. to c. 750 B.C.), Accokeek (c. 900 B.C. to c. 300 B.C.), Popes Creek (c. 500 B.C. to A.D. 300)

Component 5

Category: Indeterminate
Site Type: Artifact scatter
Cultural Affiliation: Native American
Cultural Affiliation Details: No Data
DHR Time Period: Late Woodland
Start Year: No Data
End Year: No Data
Comments: August 2008: Native American finds were in disturbed contexts (grave shafts and pipe trenches). Townsend (A.D. 950 to Contact) pottery found.

Component 6

Category: Religion
Site Type: Church
Cultural Affiliation: Euro-American
Cultural Affiliation Details: No Data
DHR Time Period: Antebellum Period, Civil War, Colony to Nation, Contact Period, Early National Period, Reconstruction and Growth, The New Dominion, World War I to World War II
Start Year: No Data
End Year: No Data
Comments: [2011 Smith] St. Luke's Episcopal Church

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Bibliographic Information

Bibliography:

No Data

Informant Data:

Name: Unknown
Company 1: Historic St. Luke's Restoration, Inc.
Address 1: 14477 Benn's Church Blvd.
City: Smithfield
State: Virginia
ZIP: 23430
Phone 1: 757-357-3367
Owner Relationship: Owner of property

CRM Events

Event Type: Easement: DHR

DHR ID: 44IW0271
Staff Name: Smith, Anthony
Event Date: 3/15/2011
Staff Comment Archaeological work triggered by VDHR historic easement. Excavation of three test units in locations of soil bore tests revealed three intact archaeological features in two units. Excavation of two test units abutting the church foundations revealed disturbed fill (modern) to base of foundation in these locations.

Event Type: Archaeological Monitoring

Project Staff/Notes:

[Record enriched from CRM report "Archaeological Mitigation for a Drainage Trench at St. Luke's Church, Isle of Wight County, Virginia" on 19 June 2014]

Project Review File Number: No Data
Sponsoring Organization: No Data
Organization/Company: DHR Archives Reading Room
Investigator: Alain Outlaw
Survey Date: 7/1/2007
Survey Description:

In July 2007, archaeologists monitored the excavation of a 60' long x 5' wide trench for a new stormwater drainage system which extends from the northwest corner of St. Luke's Church to a nearby pond. The 2' deep trench revealed eleven features. Ten were unmarked graves, and one was a planting hole.

The bones, coffin remains , and personal effects were re-interred in mapped locations, in archaeologically excavated burial shafts and as near as possible to their original graves, but outside the trench corridor. Selected artifacts from the trench were retained for a study collection to be archivally stored and/or exhibited at St. Luke's Church.

Data on burial practices and human osteology were recorded. Unexpectedly, however, archaeological contexts also revealed important architectural information on the building, repair and restoration episodes of the church, as well as a glimpse at the prehistory of these environs.

Current Land Use	Date of Use	Comments
Cemetery	8/1/2008 12:00:00 AM	Church cemetery

Threats to Resource: Development, Other
Site Conditions: Unknown Portion of Site Destroyed
Survey Strategies: Observation, Subsurface Testing
Specimens Collected: Yes
Specimens Observed, Not Collected: Yes
Artifacts Summary and Diagnostics:

Selected artifacts retained for a study collection to be archivally stored and/or exhibited at St. Luke's Church.

Summary of Specimens Observed, Not Collected:

Human remains, coffin remains, and personal effects were reinterred.

Current Curation Repository: St. Luke's Church
Permanent Curation Repository: St. Luke's Church
Field Notes: No
Field Notes Repository: No Data
Photographic Media: No Data
Survey Reports: Yes
Survey Report Information:

CRM report IW-48
DHR File No. 2007-0936

Survey Report Repository: VDHR (Richmond)
DHR Library Reference Number: No Data
Significance Statement: Area immediately surrounding church building already listed on NRHP (1966), expansion of this to include all of church property seems prudent.

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Surveyor's Eligibility Recommendations: No Data
Surveyor's NR Criteria Recommendations, : No Data
Surveyor's NR Criteria Considerations: No Data

Event Type: Other

Project Staff/Notes:
No Data
Project Review File Number: No Data
Sponsoring Organization: No Data
Organization/Company: Unknown (DSS)
Investigator: No Data
Survey Date: No Data
Survey Description:

[2011 Smith] JRIA excavated 1' square test units at three potential soil test bore locations off three corners of St. Luke's Church. The test units off the northeast and northwest corners revealed the edges of apparently linear features oriented east-west and presumably are unmarked burials.

In addition, JRIA excavated a 1' x 4.75' trench against the south wall of the church and a 3.3' x 5' trench against the north wall of the church tower. The trenches were excavated to allow architects to examine the church foundations. The trench against the north church tower wall uncovered the west half of a cellar entrance to a basement under the church tower. Historical records indicate that the basement was added to the church in the late 19th century. The trench againt the south wall of the church discovered a 3'+ wide trench that paralleled the church foundation that was excavated during the 1950's restoration project that enabled brick to be extracted from the face of the below ground foundation and replaced with modern brick while the original salvaged brick was reused elsewhere in the church restoration.

The only artifact recovered during the JRIA testing were modern artifacts and there were not collected.

Current Land Use	Date of Use	Comments
Cemetery	3/15/2011 12:00:00 AM	Expansive active graveyard surrounding church building.
Church	3/15/2011 12:00:00 AM	Active place of worship.

Threats to Resource: Public Utility Expansion
Site Conditions: Intact Cultural Level, Subsurface Integrity, Unknown Portion of Site Destroyed
Survey Strategies: Informant, Subsurface Testing
Specimens Collected: No
Specimens Observed, Not Collected: No
Artifacts Summary and Diagnostics:
No Data
Summary of Specimens Observed, Not Collected:
No Data
Current Curation Repository: No Data
Permanent Curation Repository: No Data
Field Notes: Yes
Field Notes Repository: JRIA
Photographic Media: No Data
Survey Reports: Yes
Survey Report Information:

2012
Matthew Laird, Anthony Smith
Archaeological Testing Associated with a Drainage Installation Project at St. Luke's Church (046-0024/44IW0271), Isle of Wight County, Virginia
---
2011, Matthew Laird, Nicholas Luccketti, Anthony Smith
Archaeological Testing at St. Luke's Church, Isle of Wight County, Virginia

Survey Report Repository: JRIA, DHR
DHR Library Reference Number: IW-062, IW-063
Significance Statement: Area immediately surrounding church building already listed on NRHP (1966), expansion of this to include all of church property seems prudent.
Surveyor's Eligibility Recommendations: Legacy
Surveyor's NR Criteria Recommendations, : A, B, C
Surveyor's NR Criteria Considerations: Birth Place or Grave, Commemorative Property, Moved Property, Reconstructed Property, Significance of less than Fifty Years

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Property Information

Property Names

Name Explanation	Name
Historic	Newport Parish Church
Historic	Old Brick Church
NRHP Listing	Saint Luke's Church
Current	Saint Luke's Smithfield

Property Addresses

Current - 14477 Benn's Church Boulevard Route 10

County/Independent City(s): Isle Of Wight (County)
Incorporated Town(s): *No Data*
Zip Code(s): 23314, 23430
Magisterial District(s): *No Data*
Tax Parcel(s): *No Data*
USGS Quad(s): BENNS CHURCH

Property Evaluation Status

VLR Listing
NRHP Listing
NHL Listing
This property is subject to an easement held by the Board of Historic Resources

Additional Property Information

Architecture Setting: Village
Acreage: 5
Site Description:

1974 Nomination:
The Newport Parish Church is located in the township of Benn's Church, Virginia, not far from Smithfield in Isle of Wight County, and in fact, is often referred to simply as "Saint Luke's Smithfield". Surrounded by a graveyard and a golf course, only part of the former is owned by the Historic Saint Luke's Foundation, and none of the latter. A rather complicated boundary winds through the churchyard, dividing land owned by the church and land owned by the Benn's Church Cemetery, confusingly called Saint Luke's Cemetery.

Land immediately east of the church boundary is used as a golf course and the Foundation has recently purchased 2 acres of land directly behind the church and planted there a stand of pine trees which now contributes significantly to the visual integrity of the site. To the north of the church are a pair of small ponds, and a stream running east-west, a tributary of Jones Creek. A visitors-center building sits to the south and west of Saint Luke's at a distance of perhaps 75 yards. The land between the two is a tree-covered slope falling off towards the church, divided by a dirt road running north-south. Further south is private land used as pasture.

The boundary will include the visitors-center, which is not part of the Landmark of course, but no other buildings than Saint Luke's. Although this will be a site of only about 5 acres, it is laid out in such a way as to present a serene and somewhat bucolic setting for a church whose associations, after all should hearken us back to an era of quiet, rustic charm. From the church, the slope of the hill towards the west and south safeguards our view. To the north, we see the ponds in the near distance, and to the east, a stand of pine trees planted as a screen by the Foundation. All of these features contribute significantly to the integrity of Saint Luke's surroundings.

The grounds are well-maintained near the church by the Foundation, even though a number of the grave lots are in private hands and would otherwise be overgrown.

2010: The church building sits on a level lot covered by grassy lawn as well as mature trees, planting beds, and shrubs. A historic cemetery with a variety of gravestones, tablets, and markers surrounds the church. Although Historic St. Luke’s Restoration, Inc. owns additional acreage in the vicinity, the easement boundaries encompass 1.0 acre and include the historic church and surrounding cemetery. A visitor center with gift shop is situated to the southwest of the church, but outside of the easement property boundaries. Access to the property is made via a brick walkway that leads from the visitor center and parking area to the west elevation of the church building. Three light poles line the brick walkway within the easement boundaries. A formal brick entry area with brick steps, pavers, and metal handrails is located at the west tower entrance. Several garden beds are also located in this area.

Surveyor Assessment:

1936: St. Luke's, or as it was called prior to the Revolution: "The Old Brick Church", was built under the care of Joseph Bridger (died 1686) sometime between 1632 and 1682, in what was then Warrescoyack Parish, later divided in 1642 into Newport and Warrescoyack.

The church is remarkable as the only remaining example of a buttressed Gothic Church of the seventeenth century in America.

The church remained in constant use until about the first quarter of the 18th century when it fell Into disrepair. In 1887 the roof fell in carrying down part of the walls. The building remained in a state of disuse until a restoration was begun in 1890 under the direction of the Rev. David Barr, then rector of the Church. The work was completed about 1897. The present stained glass was set in at this time.

1974 nomination: The Newport Parish Church, more familiarly known as Saint Luke's, is the oldest remaining church of English foundation in the United States. Although there is still some question about the date of the building, research indicates 1632 to be the most likely date of its construction. Its interior appointments are in a later, more Jacobean spirit, now restored, but the fabric of the church places it firmly in the late-medieval English small parish church style. While Saint Luke's is not stylistically coherent, it instead provides examples of various periods of English Gothic architecture. Its entrance for instance, with heavy round arch, is practically

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Romanesque; its brick-traceried lancet window in the east wall suggests high English Gothic, while the crow-stepped gables at either end are suggestive of the Late-Gothic period. In the third storey of the tower, added several decades after the first two, we have a suggestion of the classical style of the English architecture of the late seventeenth century. Saint Luke's belongs as much to the history of Western Architecture as it does to that of early colonial America.

The dating of Saint Luke's has been a challenging task for researchers for some time. Best evidence however places the date at about 1632, with the interior completed only over the course of the next three decades. Colonel Joseph Bridger, who was definitely in the vicinity by 1657, commissioned the Driver brothers to complete the interior after that. The third storey was added to the tower at the west end of Saint Luke's in the late seventeenth century.

With the disestablishment of the Anglican Church in Virginia during the 1780's, Newport Parish Church sank into a decline from which it recovered only in the twentieth century. Its use became intermittent only, over those years.

In 1828, a young deacon renamed the "Old Brick" Saint Luke's, but as Morrison points out, the new name was never validated by consecration or action of the vestry and the most appropriate name remains The Newport Parish Church. The building was again closed four years later.

By the late nineteenth century, the Old Brick had been long-neglected, and during a violent storm in the 1880ts, the roof collapsed and bricks were dislodged from the walls. Several bricks were supposedly found then with the date 1632 incised, settling once and for all the date of the first construction. It didn't.

The roof was rebuilt, but Saint Luke's was neglected again and by 1950 ominous bulges had appeared in the basement walls and the building seemed to be in danger of collapse. A dramatic nationwide appeal was mounted, and sufficient funds were raised to research and restore Saint Luke's to a respectable condition. Headed by James Grote Vanderpool, then Avery Architectural Librarian at Columbia University, an intensive and extended (1953-1957) historical and archeological program was developed to reconstruct much of the interior which had been altered during Georgian and Victorian periods, as well as to stabilize and restore the exterior. The March 1958 issue of the Journal of the Society of Architectural Historians contains an account of the particulars of the work done.

The church and a small amount of land around it is still owned and administered by The Historic Saint Luke's Foundation, which maintains it in excellent condition. The third storey of the tower has recently been filled with de-humidification equipment for the church.

2010 dendrochronology report summary:
Given that the door head and the door lintel have dated to shortly after 1677, and these timbers have been built into the primary brick structure, these dates clearly demonstrate that the church could not have been constructed before this date. Furthermore, there are two additional pieces of supporting evidence which the tree-ring dates support. The first is a date brick of which a poor photograph was published in The American Magazine, Vol. VII, in February 1888. The date is on the side of the brick and was probably scratched in the wet clay by the brickmakers, but not positioned as a publicly visible date. The date had been traditionally interpreted as reading 1632, but a more careful study of the image shows it to be more likely 1682. The brick was removed during a restoration at this time, and was kept in the church, but is now lost.

The other piece of evidence are a number of lead window cames excavated from adjacent to the church in the 1950s restoration. These were unrolled and were found to have a date stamp of 1685, which is consistent with the architectural detailing of the brickwork.

These independent dates are entirely consistent with the dendrochronological dates, when one takes into account between 5 and 10 rings of sapwood missing to the bark edge.

The two dated balusters had no sapwood surviving, and had much earlier last measured ring dates. This does not mean that they are in fact earlier than the rest of the church, but just means that they originated further within the tree when cut out for turning blanks.

The first baluster was taken from the church in May 1845 by a New England visitor and given to the Connecticut Historical Society. The antiquarian John W Barber put a label on it which says: “The banister from the chancel of an ancient church near Smithfield Isle of Wight Co., Virginia, made in England in 1631…” The dendrochronology has here shown that the tree from which the baluster was cut was still growing in at least 1634, and most probably 50 years beyond, and dendro-provenancing has shown that the timber matches with Virginian chronologies, not with English material. The baluster is now in the Museum of Southern Decorative Arts in Winston-Salem.

The second baluster (stc4) is shorter than the first one and was originally a stair baluster. It has been reused upside down in the present communion rail. This had a last measured ring date of 1619, but again it had no sapwood, and clearly about 50 heartwood rings were also lost when converted and turned. There is no reason to think that either balusters could not date to the early 1680s.

All this fits stylistically very well with two other local Virginian churches which date to the 1680s, including the first Bruton Parish Church and the church at Jamestown.

2010 DHR BDR:
Located in Smithfield, Isle of Wight County, Historic St. Luke’s Church has been maintained and operated as a museum/non-profit organization by Historic St. Luke’s Restoration, Inc. since 1953. Historic St. Luke’s Restoration, Inc received a 2005 Save America’s Treasures grant for rehabilitation of the building and donation of an easement is a condition of the grant agreement. Planned rehabilitation work includes repointing and replacement of damaged bricks, repair of interior and exterior woodwork, roof repair, lichen removal, plaster repair, and updates to electrical and security systems.

Designated a National Historic Landmark by the Secretary of the Interior in 1960, St. Luke’s Church stills retains its integrity and form. The property was also individually listed on the Virginia Landmarks Register (1969) and the National Register of Historic Places (1966) for its architectural significance. The architectural evolution of St. Luke’s Church is a distinct and rare example of 17th Century Gothic style architecture in the United States. It is also representative of the religious and political foundations of early America. The property is regularly open to the public for lectures, weddings, tours, and other similar events.

Surveyor Recommendation: *No Data*

Ownership

Ownership Category	Ownership Entity

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Private	*No Data*

Primary Resource Information

Resource Category: Religion
Resource Type: Church/Chapel
NR Resource Type: Building
Historic District Status: *No Data*
Date of Construction: Ca 1682
Date Source: Dendrochronology
Historic Time Period: Contact Period (1607 - 1750)
Historic Context(s): Architecture/Community Planning, Religion
Other ID Number: *No Data*
Architectural Style: Colonial
Form: *No Data*
Number of Stories: 1.0
Condition: Excellent
Interior Plan: Nave
Threats to Resource: None
Cultural Affiliations: *No Data*
Cultural Affiliation Details:

No Data

Architectural Description:

Architecture Summary, 1974 nomination: The Newport Parish Church, or Saint Luke's as it is more familiarly but unofficially known, is the most convincingly Gothic church in America. Erected possibly as early as 1632, this is a small church of the English late-medieval period, with considerable Gothic detailing.

Basically, Saint Luke's is a simple nave plan (29'4 and 3/4" X 65'& 3/4") with a twenty foot square tower at the west end. Its two-foot-thick walls are laid in a rough Flemish bond, including crude tracery in brick, forming pointed lancet windows. The large lancet east wall is a striking exercise in brick tracery. Deep wall buttresses project prominently from three bays of the north and south walls. They have sloping set-offs.

At both the east and west end of the church are crow-stepped gables, while unadorned turrets, corbelled slightly at their bases, decorate the corners of the building.

The tower at the west end of Saint Luke's is one of its most interesting features, with a suggestion on first sight that there may be a suggestion of classical awareness in late 17th century America. The triangular feature over the doorway is a particularly intriguing one which one might think to be a crude example of the forever-used renaissance pediment. However, not only does its heaviness argue against the spirit of the renaissance, but the use of this feature may easily be traced to similar usage in English high-style architecture of the very late sixteenth century.

The shape and depth of the round arch below that triangle, also argues against anything but a traditional outlook by the builders. It is heavy and very three-dimensional (an effect created by cleverly turning the outside wall towards the inside of the arch with moulded bricks) giving the effect more of a Romanesque archivolt than anything classical.

The Newport Parish Church was doubtless planned with a tower but with one of only two storeys, which almost certainly terminated in Gothic crenellation. The quoining of those two storeys, which again could be interpreted as a classical reference, in fact is a feature to be found mixed together with medieval elements in English Architecture as early as the mid-sixteenth century.

Despite these few rebuttals to the arguments of a classical mixture in the tower of Saint Luke's however, it is certainly in fact that. In the third storey of that tower, added in the late seventeenth century, we have something that William Pierson calls ".....precocious.....forming a prophetic prelude of things to come . . . ." A remarkable visual change from the earlier
heavy quoining to much more delicate pilaster strips marks a new awareness of architectural trends acquired by men of increasing cultural pre-occupation. Based upon extensive research compiled by The Historic Saint Luke's Foundation in the 1950's, it seems safe to say that the building program there may be divided into work done before 1657, and work done after that. When compared with the nearby work of the 1660's at Bacon's Castle, which also shows a sense of social ambitiousness, we can see the same cultural self-consciousness in the post-1657 work at Newport Parish Church. The classical pilasters are a limited but definite piece of evidence of that striving.

The interior appointments of Saint Luke's were not added until a number of years after completion of the fabric of the building, and after 1657 Colonel Joseph Bridger commissioned Charles and Thomas Driver to complete the work and add the third storey to the tower. The roof has been rebuilt a number of times and doubtless originally had a steeper, more Gothic, pitch. The tie-beam timber-truss, closed above the collar beam, has also been rebuilt but is based upon the original scheme as verified by research.

Originally, a gallery existed at the west end of the nave, supported by a massive hewn oak beam, and this has been rebuilt, as has been the rood screen in the chancel and the square brick tiles in the floor of the church. The original stained-glass windows were replaced in the nineteenth century and those Victorian windows remain in place today.

While there has been an extensive refitting of the interior, the work has been based upon meticulous research over a period of years and must be considered as 'correct' as humanly possible. This conjectural restoration has not affected the external appearance of the church except for some

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change to the pitch of the roof.

2010 Dendrochronology report: Only two oak timbers remained within the structure at St Luke's Church: the moulded door frame head and lintel above the west door. Although neither of the timbers retained bark edge, both had some sapwood, suggesting that very few rings were lost in the conversion. As such, the dates were entirely consistent with the brick inscribed '1682' (now lost). It is also consistent with the 1685 date found inscribed in lead cames found on the site. Two ex situ balusters, one in the collection of MESDA at Winston-Salem, and the other reused in the present communion rail, were photographed and the sequences dated. Although neither retained any sapwood, the last measured ring dates of 1619 and 1633 were entirely consistent with the presumed early 1680s construction date.

2010 DHR BDR:
Situated in the community of Benn's Church near Smithfield, St. Luke's is a parish church of the late-medieval period with significant gothic detailing. Among its Gothic features are buttresses, quoins, stepped gables, brick-traceried windows, and the medieval tie-beam timber interior roof structure. The church has a simple nave plan with a twenty-foot square three-tiered tower at the west end. Its two-foot thick walls are laid in Flemish and English bond, with brick tracery forming pointed lancet windows. It is thought that a number of years lapsed between construction of the church and completion of its interior architecture. The original temporary forms were replaced with more permanent Jacobean fittings by Colonel Bridger some time in the late 17th Century. Some of these Jacobean interior finishes included Tuscan columns formed from the trunk of a tree and turned balusters of the rood screen and kneeling rail. The design and joinery of the interior architecture is precise and represents highly skilled craftsmanship. Original amber and clear glass windows were replaced in the late 1800's with nineteenth century stained glass. This glass remains today. The building was thoroughly restored in the 1950s, which incorporated replacement of a number of interior features and woodwork.

See BDR for component descriptions.

August 2010

May 2015

Exterior Components

Component	Component Type	Material	Material Treatment
Roof	Gable, Front	Slate	Shingle
Foundation	Solid/Continuous	Brick	Other
Structural System and Exterior Treatment	Masonry	Brick	Bond, Flemish
Windows	Other	Wood	Paired
Windows	Fixed	Stone	Other
Structural System and Exterior Treatment	Other	Brick	Other

Secondary Resource Information

Secondary Resource #1

Resource Category: Funerary
Resource Type: Cemetery
Date of Construction: 1680Ca
Date Source: Date Stone/Cornerstone
Historic Time Period: Contact Period (1607 - 1750)
Historic Context(s): Funerary, Religion
Architectural Style: *No Data*
Form: *No Data*
Condition: Good
Threats to Resource: None
Cultural Affiliations: *No Data*
Cultural Affiliation Details:

No Data

Architectural Description:

Architecture Summary, 1974: In yard surrounding church.

August 2010

May 2015

Current Use: Church/Religious
Historic Religious Affilitation: Other
Ethnic Affiliation: English
Has Marked Graves: True

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Has Unmarked Graves: False
Enclosure Type: None
Number Of Gravestones: 26 - 50
Earliest Marked Death Year: *No Data*
Latest Marked Death Year: *No Data*

Significant Burials

Marked Type	First Name	Last Name	Birth Year	Death Year
Other	Jospeh	Bridger	*No Data*	1686

Historic District Information

Historic District Name: *No Data*
Local Historic District Name: *No Data*
Historic District Significance: *No Data*

CRM Events

Event Type: DHR Staff Site Visit

Project Review File Number: *No Data*
Investigator: Michael J. Pulice
Organization/Company: DHR
Photographic Media: Digital
Survey Date: 11/1/2019
Dhr Library Report Number: *No Data*
Project Staff/Notes:

Exterior photographs taken during brief site visits by DHR's Western Region Preservation Office architectural historian Mike Pulice.
10/30/2019 to Virginia Beach properties
11/1/2019 to St. Luke's Church

Event Type: DHR Staff Site Visit

Project Review File Number: *No Data*
Investigator: Megan Melinat
Organization/Company: DHR
Photographic Media: Digital
Survey Date: 5/28/2015
Dhr Library Report Number: *No Data*
Project Staff/Notes:

Easement staff stewardship visit; complete report available in the easement property file.

Event Type: Easement: DHR

DHR ID: 046-0024
Staff Name: Wendy Musumeci
Event Date: 9/16/2010
Staff Comment

Historic St. Luke's Restoration, Inc. has conveyed an easement over a 1.0-acre portion of the Historic St. Luke's Church property in Isle of Wight County (DHR Easement File No. 046-0024). The easement, recorded on September 16, 2010, was conveyed as a condition of a Save America's Treasures grant.

Located in Smithfield, Isle of Wight County, Historic St. Luke's Church has been maintained and operated as a museum/non-profit organization by Historic St. Luke's Restoration, Inc. since 1953. The building sits on a level lot covered by grassy lawn as well as mature trees, planting beds, and shrubs. A historic cemetery with a variety of gravestones, tablets, and markers surrounds the church. Although the exact date of construction in unknown, Historic Saint Luke's Church, also known as the Newport Parish Church and the Old Brick Church, is one the oldest remaining churches of English foundation in the United States. Situated in the community of Benn's Church near Smithfield, St. Luke's is a parish church of the late-medieval period with significant gothic detailing. Among its Gothic features are buttresses, quoins, stepped gables,

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brick-traceried windows, and the medieval tie-beam timber interior roof structure. The church has a simple nave plan with a twenty-foot square three-tiered tower at the west end. Its two-foot thick walls are laid in Flemish and English bond, with brick tracery forming pointed lancet windows. It is thought that a number of years lapsed between construction of the church and completion of its interior architecture. The original temporary forms were replaced with more permanent Jacobean fittings by Colonel Bridger some time in the late 17th Century. Some of these Jacobean interior finishes included Tuscan columns formed from the trunk of a tree and turned balusters of the rood screen and kneeling rail. The design and joinery of the interior architecture was precise and represented highly skilled craftsmanship. Original amber and clear glass windows were replaced in the late 1800's with nineteenth century stained glass. This glass remains today.

The building was thoroughly restored in the 1950s, which incorporated replacement of a number of interior features and woodwork elements. Designated a National Historic Landmark by the Secretary of the Interior in 1960, St. Luke's Church stills retains its integrity and form. The property was also individually listed on the Virginia Landmarks Register (1969) and the National Register of Historic Places (1966) for its architectural significance. The architectural evolution of St. Luke's Church is a distinct and rare example of 17th Century Gothic style architecture in the United States. It is also representative of the religious and political foundations of early America. The property is regularly open to the public for lectures, weddings, tours, and other similar events.

Event Type: DHR Staff Site Visit

Project Review File Number: *No Data*
Investigator: Wendy Musumeci
Organization/Company: DHR
Photographic Media: Digital
Survey Date: 8/18/2010
Dhr Library Report Number: *No Data*
Project Staff/Notes:
DHR Easement Staff site visit - Baseline Documentation Report

Event Type: NRHP Nomination

DHR ID: 046-0024
Staff Name: James Dillon
Event Date: 10/23/1974
Staff Comment
No Data

Event Type: VLR Listing

DHR ID: 046-0024
Staff Name: VHLC
Event Date: 9/9/1969
Staff Comment
No Data

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: *No Data*
Investigator: Andrew D. Logan
Organization/Company: VA Dept. of Historic Resources
Photographic Media: Film
Survey Date: 7/27/1967
Dhr Library Report Number: *No Data*
Project Staff/Notes:
Update of HABSI survey

Event Type: NRHP Listing

DHR ID: 046-0024
Staff Name: NPS
Event Date: 10/15/1966
Staff Comment
No Data

Event Type: NHL Listing

DHR ID: 046-0024

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Staff Name: NPS
Event Date: 10/9/1960
Staff Comment
No Data

Event Type: Survey:HABS Inventory

Project Review File Number: *No Data*
Investigator: Robert Wiggins
Organization/Company: National Park Service
Photographic Media: Other
Survey Date: 10/1/1958
Dhr Library Report Number: *No Data*
Project Staff/Notes:
No Data

Event Type: HABS/HALS/HAER Documentation

Project Review File Number: *No Data*
Investigator: Finlay F. Ferguson, Jr.
Organization/Company: National Park Service
Photographic Media: Film
Survey Date: 4/26/1934
Dhr Library Report Number: *No Data*
Project Staff/Notes:
HABS No 11-20

Bibliographic Information

Bibliography:

Name: James River Instit for Archaeology
DHR CRM Report Number: IW-063
Record Type: Report
Bibliographic Notes: Archaeological Testing Associated with Drainage Installation Project at St. Luke's Church, Isle of Wight, VA. February 2012. DHR File No. 2007-0278

Record Type: Report
Bibliographic Notes: Oxford Dendrochronology Laboratory Report 2010/28

The Tree-Ring Dating of Timbers from Newport Parish Church (St Luke's or Old Brick Church), Smithfield, Isle of Wight County, Virginia. Dr. D.W.H. Miles, FSA, and M.J. Worthington

Property Notes:
No Data

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Virginia Dept. of Historic Resources

V-CRIS

Virginia Cultural Resource Information System

Legend

- Architecture Resources
- Architecture Labels
- Individual Historic District Properties
- Archaeological Resources
- Archaeology Labels
- DHR Easements
- USGS GIS Place names
- County Boundaries

N

Feet

0 200 400 600 800

1:9,028 / 1"=752 Feet

Title: Architecture Labels **Date: 6/2/2022**

DISCLAIMER:Records of the Virginia Department of Historic Resources (DHR) have been gathered over many years from a variety of sources and the representation depicted is a cumulative view of field observations over time and may not reflect current ground conditions.The map is for general information purposes and is not intended for engineering, legal or other site-specific uses. Map may contain errors and is provided "as-is". More information is available in the DHR Archives located at DHR's Richmond office.

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Property Information

Property Names

Name Explanation	Name
Function/Location	House, 15150 Benns Church Boulevard (Route 10)
Historic	Jordan Home #1
Historic	Margaret Davis House
Historic/Current	Charles Driver Jordan House

Property Evaluation Status

The Primary Resource is no longer extant.

Property Addresses

Current - 15150 Benns Church Boulevard Route 10

County/Independent City(s): Isle Of Wight (County)
Incorporated Town(s): *No Data*
Zip Code(s): 23430
Magisterial District(s): *No Data*
Tax Parcel(s): 32-01-082
USGS Quad(s): BENNS CHURCH

Additional Property Information

Architecture Setting: Rural
Acreage: 103
Site Description:

1937 survey: This property is located 1/2 mile south of Benns Church, 150 yards west of Route 10.

2005 Intensive Survey:
This resource is located on a 103-acre site situated on the west side of Benns Church Boulevard (Route 10/32) south of the village of Benns Church. The area is characterized by farmsteads dating to the 19th century and small mid-20th century dwellings. The site is open with a treestand to the immediate south of the dwelling. A driveway extends west from Benns Church Boulevard toward the dwelling. The driveway is situated to the dwelling's north and bisects the dwelling and shed. It continues to the west beyond the house site. There is a one-and-one-half story shed located to the northwest of the dwelling.

Property Event Type:

Destroyed

Surveyor Assessment:

Start Year: 1857
End Year: 1859
Date Source: Site Visit/Written Data
Type: Original Construction
Notes: This dwelling was erected between 1857 and 1859.

1937 survey:
This tract of land consisted of about 500 acres and was inherited by Margaret Davis from her father. In 1840 she married Charles Driver Jordan. This land was all in virgin timber and they planned to clear up a place and build a nice home. A place was cleared up and two kitchens were built for the workmen and slaves. During this time Charles Jordan and his wife lived with his father near Smithfield. After four years Mrs. Charles Jordan died, leaving one daughter. Mr. Jordan lived in one of the kitchens as a widower, for sixteen years. In 1857 he started a nice home, to be built out of the best materials to be had, in a grove of oak and hickory trees.

In 1858 Charles Jordan married Sophie Ann Cate, a school teacher from New Hampshire, who came to this county as a governess. After the Ware Between the States, Mrs. Jordan had a private school in her yard in one of the old kitchens, this being the first private school in the neighrborhood. After public schools were established she taught one of the first public schools in this section. She first taught in her own yard and received a salary of $30.00 per month; later the county built her a two-room school near Benns Church. Mrs. Jordan was considered a fine teacher and boys and girls from four or five miles came to her school. She also gave lessons on the piano.

From time to time some of this land has been sold, and there is now about 180 acres of land in the present tract, which belongs to the estate of C. S. Jordan. C. S. Jordan was the son of C. D. Jordan. They also had two other children, a boy and a girl. The girl, Mrs. E. A. Morrison, in Suffolk, is the only survivor.

2005 Intensive Survey:
This dwelling is a typical center-passage, single-pile I-house will ell. The I-house has a center-passage plan that gains access to the dwelling through a central hallway flanked by rooms. This building type dates to the period between the eighteenth century and the early twentieth century. The central hallway contains the stair to the upper story or stories and for those dwellings with a basement a stair to this area would be situated under the main stair to the upper story or stories. The plan of the dwelling is one-room deep with most often a parlor and dining room flanking the hall. The upper story or stories comprise a similar configuration with bedrooms above the rooms below. In some cases the area above the main entry has been enclosed containing a small room that served as a small bedroom or was converted in the twentieth-century to an indoor lavatory. The facades of these buildings are symmetrical and are

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usually three- to five-bay, and the building is topped most often by a side gable or hipped roof. Chimneys are situated on the center of the side elevations and fireplaces would be found within each room flanking the hall. Chimneys could be interior or exterior on the side elevations and rise above the common roof. The construction materials used for these buildings range from wood frame, brick, or locally mined stone. Most often they are simple vernacular buildings constructed of wood with wood framing and clad in weatherboard siding. Articulation is minimal and most often comprises a simple boxed cornice on the façade and rear elevation, and cornice returns and a raking cornice on the gable ends. Often found on these dwelling is an ell erected to the rear of the I-house plan containing a service wing for additional space including an indoor kitchen. Most often the ell is wood frame construction topped with a perpendicular gable roof with a gable end chimney or hipped roof with a chimney at the end.

This dwelling was erected by Charles Driver Jordan who had inherited the lands from his wife, Margaret Davis Jordan after her death in 1844. Margaret Davis Jordan had inherited the land from her family in 1836. In 1840 Margaret Davis married Charles Driver Jordan and the couple lived in Smithfield with his father. The lands were comprised of 500 acres and were virgin timber forest. Noted were the erection of two kitchens built for slaves and workman on the lands prior to the construction of the dwelling. Charles Driver Jordan is noted as living in one kitchen after the death of his wife for sixteen years. He began erection of the dwelling in 1857 and used the best material he could obtain on the site of a grove of oak and hickory trees. The plan of the dwelling is similar to other houses owned by the Jordan family in the vicinity of this dwelling. A similar, if not identical dwelling, was situated to the south of this dwelling occupied by another Charles Jordan. In 1858 Charles Driver Jordan married Sophia Ann Cates, a schoolteacher from New Hampshire who had come to Isle of Wight County as a governess. The dwelling was completed in 1859, which included the ell appended to the west. Additional family history notes that Mrs. Sophia Ann Cates Jordan taught private school in one of the kitchens on the house site and after public schools were created in Isle of Wight County, operated a public school in one of the kitchens until a school was built nearby.

The kitchens have since been demolished and the only outbuilding associated with the dwelling is a shed to the northwest. The Jordan, Charles Driver House is eligible for listing in the National Register of Historic Places under Criterion C for its architectural style from the period 1857-1859.

August 2018: This house was torn down in July 2018.

Surveyor Recommendation: Recommended Eligible

Ownership

Ownership Category	Ownership Entity
Private	*No Data*

Associate

Property Associate Name	Property Associate Role
Jordan, Charles Driver	Owner

Primary Resource Information

Resource Category: Domestic
Resource Type: Single Dwelling
NR Resource Type: Building
Historic District Status: *No Data*
Date of Construction: Ca 1857
Date Source: Written Data
Historic Time Period: Antebellum Period (1830 - 1860)
Historic Context(s): Architecture/Landscape, Domestic
Other ID Number: *No Data*
Architectural Style: No Discernable Style
Form: L-Plan
Number of Stories: 2.0
Condition: Demolished
Interior Plan: Central Passage, Single Pile
Threats to Resource: Demolition, Development
Cultural Affiliations: *No Data*
Cultural Affiliation Details:

No Data

Architectural Description:

1937 survey: This two-story, L-shaped, frame single dwelling features a hipped roof constructed of shingles. There are three brick chimneys; one on each end and one in the rear. There are 30 windows; 12 panes 12 x 18" downstairs and 12 panes 12 x 18" upstairs. The shutters have slats and are constructed of wooden pegs. The one-story front porch is approximately 10' x 12' and features square columns. There are six rooms in the house and the approximate ceiling height is 9' 3". The open string stairway features round balusters, handrail, and newel. The four-panel doors are constructed of heart pine. The walls are plastered with baseboards at the bottom.

2005 Intensive Survey:
This dwelling is two-story with a five bay façade topped by a hipped roof. The foundation is a solid brick wall and the structural system is

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frame clad in weatherboard siding. The roof is clad in standing-seam metal and features wide eaves. There are exterior end chimneys on the side elevations of 5-course American bond brick and corbelled bases and shoulders. The windows are 6/6 wood double-hung sash with metal storm windows. The main centrally placed entrance on the façade is double-leaf with two panels. The door is surmounted by a nine-light transom and flanked by sidelights with four lights and a panel. Sheltering the entrance is a one-story one-bay porch with a hipped roof clad in standing-seam metal. The porch roof features a dentiled cornice and is supported by square columns. Appended to the west elevation is a service ell. The ell is two-stories with a solid brick foundation and is wood frame construction clad in weatherboard. The roof is hipped clad in standing-seam metal. There is an exterior end brick chimney on the west elevation of 5-course American bond brick. There is a four panel door on the north elevation and west elevation. Windows punctuate the north, south and west elevations on both stories. Appended to the south elevation of the ell and west elevation of the dwelling is a one-story addition circa 1960. It has a concrete block foundation and is wood frame construction clad in vinyl siding. The roof has a shed form clad in asphalt shingles. There is a metal sliding door on the south elevation off a wood ramp that ascends toward the door from the south. There are metal windows on the west elevation.

The interior of the building is a typical central passage, single pile form. It comprises 2488 square feet of living space. The hall features a half-turn stair with slender balusters and a turned newel, which is situated at the west end of the hall. The rooms flanking the hall are rectangular in shape with fireplace openings on the walls opposite access to the hall. The mantels within the dwelling have been removed and the fireplaces have been filled and converted for stove use. Doors accessing the rooms from the hall are wood with four panels, iron locksets and porcelain door handles. The door and window surrounds are fluted with roundel corner blocks. The flooring is oak covered with wall-to-wall carpeting. The baseboards within the rooms are wide with a bead and the windows in the main rooms on the first story feature wood panels below. The walls are covered with plaster on lathe. There is a double-leaf door under the stair landing accessing the addition. The doors have two panels. There is a door under the stair to a closet with two panels. The ell features a hall from the north wall to the addition. This hall accesses the kitchen situated at the west end of the dwelling. The kitchen floor is covered with early 20th century linoleum with a braided rug pattern. The plaster in this room is missing and the flooring is deteriorated.

The addition appended to the building in the mid-20th century features modern wallboard walls and wall-to-wall carpeting. The space is divided into two areas for a main room and lavatory at the west end. The lavatory fixtures have been removed as well as part of the partition wall. The windows and doors have minimal surrounds.

The second story features a similar plan. An angled stair off the main stair landing accesses the hall within the ell on the second story. Each room has similar features to the first story rooms. There is a lavatory off the ell hallway with early 20th century porcelain fixtures. The walls have been clad in modern wallboard and the flooring has been clad in modern vinyl sheeting.

August 2018: This house was torn down in July 2018.

Exterior Components

Component	Component Type	Material	Material Treatment
Windows	Sash, Double-Hung	Wood	6/6
Porch	1-story, 1-bay	Wood	Columns, Square
Roof	Hipped	Metal	Standing Seam
Chimneys	Exterior End	Brick	Bond, American, 5-course
Foundation	Solid/Continuous	Brick	Bond, Common
Structural System and Exterior Treatment	Frame	Wood	Weatherboard

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Secondary Resource Information

Secondary Resource #1

Resource Category: DSS Legacy
Resource Type: Shed
Date of Construction: 1860Ca
Date Source: Site Visit
Historic Time Period: Antebellum Period (1830 - 1860)
Historic Context(s): Domestic
Architectural Style: No discernible style
Form: Rectangular
Condition: Demolished
Threats to Resource: Demolition, Development
Cultural Affiliations: *No Data*
Cultural Affiliation Details:

No Data

Architectural Description:

2005 Intensive Survey:
This shed dates to the mid-19th century and features a brick pier foundation. The building is mortise and tenon construction with pegged joints. The wood frame building is clad in wide horizontal boards that are not lapped. The roof has a catslide from clad in standing-seam metal. There is a vertical board door on the south elevation. The interior features a divided space with a wood frame wall clad in horizontal boards. The flooring is wide plank and the interior walls are not adorned.

Interior Plan: Undivided Space (non-domestic)

Number of Stories: 1.5

Exterior Components

Component	Component Type	Material	Material Treatment
Structural System and Exterior Treatment	Wood Frame	Wood	Board-and-Batten
Foundation	Piers	Brick	*No Data*

Historic District Information

Historic District Name: *No Data*
Local Historic District Name: *No Data*
Historic District Significance: *No Data*

CRM Events

Event Type: DHR Evaluation Committee: Not Eligible

DHR ID: 046-5054
Staff Name: DHR Evaluation Committee
Event Date: 7/21/2016
Staff Comment

M. Holma presenting:
Charles Driver Jordan House, Isle of Wight County, DHR File Number 046-5054, DHR Project Review File No. 2016-3598
In 2006, the Charles Driver Jordan House was identified as a two-story, five bay I-house with a hipped roof and a rear two-story ell, ca. 1857, situated on approximately 103 acres. The structural system is frame weatherboard, with brick foundation. Windows are 6/6 double-hung sash, though several are not in the window openings, but on floors below the openings. There are two exterior end brick chimneys of five-course American bond on the main house, and one on the rear ell. A one-story, one-bay porch with a hipped roof of standing-seam metal covers the entrance, featuring a dentiled cornice and square columns. The south elevation of the ell was given a one-story addition in 1960, with a concrete block foundation and wood frame construction clad in vinyl siding. A 19th-century, one-and-a-half story shed of wood frame construction stood northwest of the house, on a brick pier foundation. Its catslide roof was covered in standing-seam metal. Two former kitchens for enslaved workers are known to have been demolished on the property; however the property was thought to retain archaeological potential as no disturbance had taken place since then. Mrs. Sophia Ann Cates Jordan, wife of Charles Driver Jordan, taught public school in one of the kitchens until a school was built nearby. The property was evaluated at the local level of significance under Criterion C (Architecture) with a period of significance of 1857-1859. The committee recommended it eligible with 30 points.

Since 2006, much of the property's 103 acres have been subject to gravel and sand mining. Although the dwelling is extant, the historic setting has been lost, as well as the property's archaeology potential. Due to the loss of integrity, the committee recommended that the property is no longer eligible for listing.

Event Type: DHR Evaluation Committee: Deferred

DHR ID: 046-5054
Staff Name: DHR Evaluation Committee
Event Date: 5/18/2006
Staff Comment

Kristin Hill presenting:
Charles Driver Jordan House, Isle of Wight County
The Charles Driver Jordan House is a two-story, five bay I-house with a hipped roof and a rear two-story ell, ca. 1857, situated on approximately 103 acres. The structural system is frame weatherboard, with brick foundation. Windows are 6/6 double-hung sash, though several are not in the window openings, but on floors below the openings. There are two exterior end brick chimneys of five course American bond on the main house, and one on the rear ell. A one-story, one bay porch with a hipped roof of standing seam metal covers the entrance, featuring a dentiled cornice and square columns. The south elevation of the ell was given a one-story addition in 1960, with a concrete block foundation and wood frame construction clad in vinyl siding. A 19th century one-and-a-half story shed of wood frame construction sits northwest of the house, on a brick pier foundation. The catslide roof is covered in standing seam metal. Two former kitchens for slaves and workmen are known to have been demolished on the property. Mrs. Sophia Ann Cates Jordan, wife of Charles Driver Jordan, taught public school in one of the kitchens until a school was built nearby. The property was considered locally significant under Criterion C with a period of significance of 1857-1859. The committee recommended it eligible with 30 points.

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: 2006-0234
Investigator: Kimble David
Organization/Company: Stantec 2034

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Photographic Media: Film
Survey Date: 10/3/2005
Dhr Library Report Number: IW-042
Project Staff/Notes:

for Cultural Resources, Inc.

Aimee Leithoff, Ellen Brady
A Phase I Cultural Resources Survey of Approximately 600 Acres at Benns Church, Isle of Wight County, Virginia
2005
CRI
IW-042

Surveyor's NR Criteria Recommendations: C - Distinctive Characteristics of Architecture/Construction

Phase II Intensive Survey Integrity Recommendations: Design, Feeling, Location, Materials, Setting, Workmanship

Event Type: HABS/HALS/HAER Documentation

Project Review File Number: *No Data*
Investigator: Florence M. Jordan
Organization/Company: National Park Service
Photographic Media: Film
Survey Date: 1/18/1937
Dhr Library Report Number: *No Data*
Project Staff/Notes:

WPA Virginia Historic Inventory Survey #141

Surveyor's NR Criteria Recommendations: C - Distinctive Characteristics of Architecture/Construction

Phase II Intensive Survey Integrity Recommendations: Design, Feeling, Location, Materials, Setting, Workmanship

Bibliographic Information

Bibliography:

Name: Jordan, Annie A.
Record Type: Oral History/Interview
Bibliographic Notes: Benns Church, Virginia.

Record Type: Personal Papers
Bibliographic Notes: Diary of Charles Driver Jordan.

Stuck, Ken, VDOT Environmental, Hampton Roads District
Wednesday 29 August 2018 email correspondence with DHR Archives
[reporting demolition of the house in July 2018]

Property Notes:

Company 1: Benns Church Properties
Address 1: P O Box 500
City: Carrollton
State: Virginia
ZIP: 23314
2005: Owner of property

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Virginia Dept. of Historic Resources

V-CRIS

Virginia Cultural Resource Information System

Legend

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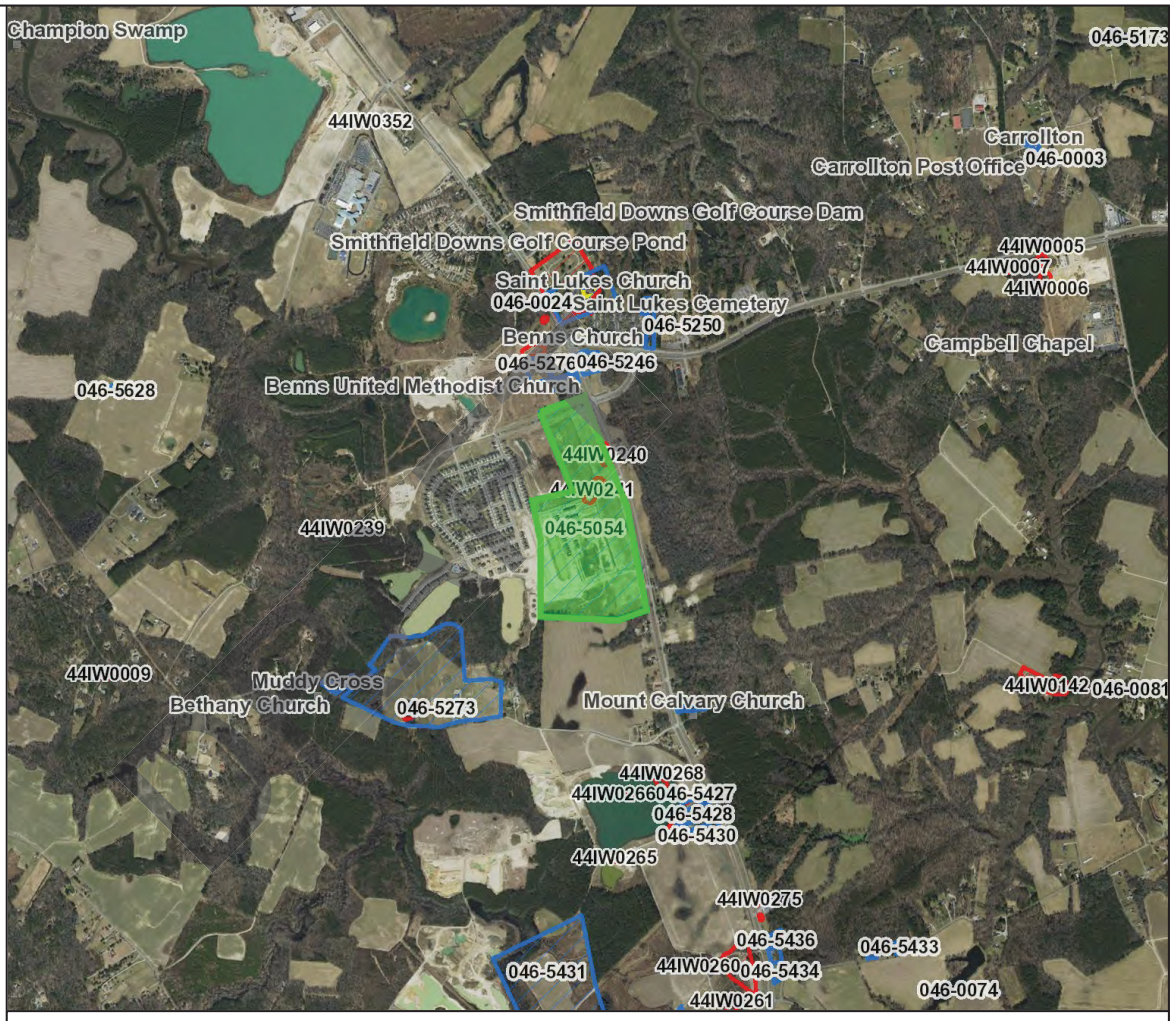

N

Feet

0 600 1200 1800 2400

1:36,112 / 1"=3,009 Feet

Title: Architecture Labels **Date: 6/2/2022**

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Property Information

Property Names

Name Explanation	Name
Historic/Current	Benns Church

Property Evaluation Status

Not Evaluated

Property Addresses

Alternate - State Road 10/32
Current - 14571 Benns Church Boulevard

County/Independent City(s):	Isle of Wight (County)
Incorporated Town(s):	*No Data*
Zip Code(s):	23430
Magisterial District(s):	*No Data*
Tax Parcel(s):	32-01-084
USGS Quad(s):	BENNS CHURCH

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Additional Property Information

Architecture Setting: Village

Acreage: 1

Site Description:

2005:
This building is situated on the southeast corner of the intersection of Benns Church Boulevard (10/32) and Brewers Neck Road (32). The building faces west to Benns Church Boulevard (10/32). The area is characterized by residential properties to the west and commercial properties to the north. The lands to the south are primarily agircutlural. The area has changed over time to accommodate the widening of Benns Church Boulevard (10/32) and Brewers Neck Road (32). The site is generally flat and there are parking lots to the west, north and east.

2005:
To the west of the church is a grave marker. It is a stone slab resting on the ground.

Surveyor Assessment:

2005:
In 1813 George Benn willed the land on which the church stood to the Methodist Convention. This tomb was moved to a spot in the front of the church where the tombstone lies. The brick church was constructed in 1924 and remodeled in 1957 and 1967. This is the oldest Methodist congregation in the area, begun in 1789.

Surveyor Recommendation: *No Data*

Ownership

Ownership Category	Ownership Entity
Private	*No Data*

Primary Resource Information

Resource Category:	Religion
Resource Type:	Church/Chapel
NR Resource Type:	Building
Historic District Status:	*No Data*
Date of Construction:	1924
Date Source:	Site Visit/Written Data
Historic Time Period:	World War I to World War II (1917 - 1945)
Historic Context(s):	Architecture/Community Planning, Religion
Other ID Number:	*No Data*
Architectural Style:	Vernacular
Form:	*No Data*
Number of Stories:	1.0
Condition:	Good

Threats to Resource: None Known

Cultural Affiliations: *No Data*

Cultural Affiliation Details:

No Data

Architectural Description:

2005:
This building is a brick church laid in 6-course American bond. The roof has a gable form with gabled end walls. There is a projecting vestibule on the west elevation. It is also brick construction topped by a gable roof with a gabled brick end wall. The end wall features stretcher bond brick coping. The entrance comprises a double-leaf wood vertical board door with strap hinges. The door is enframed in a rowlock brick blank arch with a rowlock brick surround. The stairs leading to the doors and stoop are brick flanked by brick cheek walls with limestone coping. At the vestibule ends are brick buttresses with limestone caps. There is a date stone situated on the south buttress. The north and south walls have a ribbon window fenestration pattern. The windows are casement wood with stained glass. On the west façade of the main building there is an oculus with stained glass within the gable. The gable end wall is coped in brick stretcher bond. There are stepped buttresses at the building edges. The north and south elevations feature bays divided by stepped brick buttresses. An addition was made in 1957 and additional modifications were made in 1967, which obscure the original east end of the building. The addition retains the general proportion and massing of the original building. The materials are similar and the roof form is also similar. The addition is two stories with a gable roof. The windows on the addition are 6/6 wood double-hung sash.

Exterior Components

Component	Component Type	Material	Material Treatment
Roof	Gable	Slate	Shingle
Structural System and Exterior Treatment	Masonry	Brick	Bond, American, 6-course
Windows	Fixed	Wood	1-light
Foundation	Solid/Continuous	Brick	Bond, American

Secondary Resource Information

Secondary Resource #1

Resource Category: Funerary

Resource Type: Cemetery

Date of Construction: 1924

Date Source: Site Visit/Written Data

Historic Time Period: World War I to World War II (1917 - 1945)

Historic Context(s): Architecture/Community Planning, Religion

Architectural Style: Vernacular

Form: *No Data*

Condition: Good

Threats to Resource: None Known

Cultural Affiliations: *No Data*

Cultural Affiliation Details:

No Data

Architectural Description:

2005:
The grave marker is a stone slab resting on the ground. It reads, “Sacred to the memory of George Benn, Esq. who departed this life on the 9th day of November 1815, Aged 51 years.”

Current Use: *No Data*

Historic Religious Affilitation: *No Data*

Ethnic Affiliation: *No Data*

Has Marked Graves: *No Data*

Has Unmarked Graves: *No Data*

Enclosure Type: *No Data*

Number Of Gravestones: *No Data*

Earliest Marked Death Year: *No Data*

Latest Marked Death Year: *No Data*

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Historic District Information

Historic District Name: *No Data*
Local Historic District Name: *No Data*
Historic District Significance: *No Data*

CRM Events

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: *No Data*
Investigator: David, Kimble
Organization/Company: Unknown (DSS)
Photographic Media: *No Data*
Survey Date: 3/1/2005
Dhr Library Report Number: *No Data*
Project Staff/Notes:

2004-2005-0001

Project Bibliographic Information:

Name: King, Helen Haverty
Record Type: Book
Bibliographic Notes: Historical Notes on Isle of Wight County, Virginia, 1993.

Name: Virginia, Isle of Wight County
Record Type: Tax Records

Bibliographic Information

Bibliography:

No Data

Property Notes:

Name: Unknown
Company 1: Treasurers Benns Church
Address 1: 14571 Benns Church Boulevard
City: Smithfield
State: Virginia
ZIP: 23430
Owner Relationship: Owner of property

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Virginia Dept. of Historic Resources

V-CRIS

Virginia Cultural Resource Information System

Legend

- Architecture Resources
- Architecture Labels
- Individual Historic District Properties
- Archaeological Resources
- Archaeology Labels
- DHR Easements
- USGS GIS Place names
- County Boundaries

N

Feet

0 50 100 150 200

1:2,500 / 1"=208 Feet

Title: Architecture Labels **Date: 6/2/2022**

DISCLAIMER:Records of the Virginia Department of Historic Resources (DHR) have been gathered over many years from a variety of sources and the representation depicted is a cumulative view of field observations over time and may not reflect current ground conditions.The map is for general information purposes and is not intended for engineering, legal or other site-specific uses. Map may contain errors and is provided "as-is". More information is available in the DHR Archives located at DHR's Richmond office.

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Property Information

Property Names

Name Explanation	Name
Function/Location	Farmhouse, 20041 Brewers Neck Boulevard
Current	B. J. Hogue Homeplace

Property Evaluation Status

DHR Staff: Not Eligible

Property Addresses

Current - 20041 Brewers Neck Boulevard

County/Independent City(s): Isle of Wight (County)
Incorporated Town(s): *No Data*
Zip Code(s): 23314
Magisterial District(s): *No Data*
Tax Parcel(s): 33-01-012C
USGS Quad(s): BENNS CHURCH

Additional Property Information

Architecture Setting: Suburban
Acreage: 4.4

Site Description:

2005:
This farmstead is located on the north side of Brewers Neck Boulevard (US Route 10/32) near the intersection with Benns Church Boulevard (US Route 10). The property comprises 4.41 acres. The dwelling faces south to Brewers Neck Boulevard. The area is characterized by late 20th century suburban developments and a golf course. The property is generally flat and is bound by mature trees on the east and west sides.

October 2006:
This farmstead is located on the north side of Brewers Neck Boulevard (US Route 10/32) near the intersection with Benns Church Boulevard (US Route 10). The property comprises 4.41 acres. The dwelling faces south to Brewers Neck Boulevard. The area is characterized by late 20th century suburban developments and a golf course. The property is generally flat and is bound by mature trees on the east and west sides. There is a tidewater marsh situated at the east and north boundary of the property. The area on the east side of the property has been landscaped with low growth and bridges crossing the tidewater marshes. There is an asphalt-paved driveway leading north toward the dwelling from the main roadway, which terminates in a circle. The driveway continues along the west side of the dwelling toward the barn.

2005:
There were no visible secondary resources viewed on the site visit. It is noted that there is a swimming pool and barn on the property.

October 2006:
There is a barn situated north of the dwelling. There is a swimming pool situated immediately north of the dwelling. The barn served as a garage and now serves as a secondary dwelling.

Surveyor Assessment:

2005:
This dwelling is known as Mrs. Hoggie's Homeplace or the B. J. Houge Homeplace. Constructed circa 1800, it is one of the earlier dwellings located within the immediate area. The general surroundings have been adapted for use as a golf course and small suburban housing developments. The dwelling is an example of a center-passage plan common to Isle of Wight County and the 19th century. It was part of a larger tract of land and only the house site remains.

Center-passage plans appeared in Virginia during the first part of the 18th century. The plan comprises a central hall flanked rooms. Most often this form is one-and-one-half stories or two-stories. In some cases the area under the roof served as additional sleeping or storage space. The dwelling plan most often was one or two rooms deep. The façade of the building was symmetrical and comprised three or five bays. The interior rooms on the first story served as living space while upper stories served as bedchambers. In single-pile dwellings of one room deep the rooms flanking the hall served as the dining room and parlor. In earlier examples the interior finishes varied depending on which room served as the best room or parlor. The hall contained the stair to the upper stories and basement, if constructed with an underground space. The upper stories featured the same floor plan as the first story. In some examples a small room would have been added in the hallway on the second story above the entrance. It served as a small unheated space for storage. Chimneys were situated at the ends of the dwelling. The center-passage single-pile plan was popular during the 1800s. The center-passage double-pile plan is seen as early as the Revolutionary War period. The front rooms off the first story hall served as the parlor and dining room, while the rear rooms served as workrooms and a first story chamber. Most often the kitchen was located in the basement, in an ell off the rear or in a separate building. Most often chimneys were situated on the side elevation at the center of each equally planned room’s wall. In a few cases, the chimneys were erected on the interior of the dwelling and one chimney served two fireplaces that were back-to-back. By the mid-19th century the center-passage double-pile dwelling was erected as a symbol of prosperity among the agricultural society.

October 2006:
This dwelling is known as Mrs. Hoggie's Homeplace of the B. J. Hogue Homeplace. Constructed circa 1800 it is one of the earlier dwellings located within the immediate area. The general surroundings have been adapted for use as a golf course and small suburban

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housing developments. The dwelling is an example of a center-passage plan common to Isle of Wight County and the 19th century. It was part of a larger tract of land and only the house site remains.

The property originally comprised approximately 200 acres in the mid-19th century. The original farm parcel was situated immediately east of St. Luke's Church, the oldest continually used church in the United States. The property had a series of owners through the last half of the 19th century including, Groce, Whitehead, Bunkley, Nock, and Jordan. The Jordan and Bunkleys owned numerous acres in the surrounding area. Upon the property's acquisition by W. G. Bunkley, Jr. in 1899, the property had faced bankruptcy and court ordered sale at least twice in the last half of the 19th century. Between the years 1846 and 1899, the property had six owners. W. G. Bunkley, Jr. owned the property from 1899 to 1944. The Hogue family purchased the property in 1944 and it is often called the B. J. Hogue Homeplace for its association with the Hogue family. The Hogue family sold the property in 1966 for development. Prior to the sale of the property, they subdivided the parcel into three tracts: the farm tract, a smaller tract on the west side of the house, and the house tract (which is the current acreage associated with this submission). The largest farm tract was converted for use as a golf course and the smaller tract on the west side of the house was converted for use as a residential subdivision. The Hogue family erected the pool to the north of the dwelling and erected the barn or garage at the north end of the property. The house tract was sold in 1986 to the Smithfield Hotel Corporation and plans were made for the construction of a hotel. The hotel was never constructed and the parcel was sold in 1991 and then again in 1994 to the current owners, Carlton O'Neal. The site is proposed for development, which includes the demolition of the house and associated outbuilding and pool.

The house is an example of a center-passage house, but was most likely a smaller house at one time that was expanded to the current configuration in the mid-19th century. The difference in the appearance of the chimney on the west elevation and the slight asymmetry of the house reflect that the house may have been a smaller building that was enlarged. This is reinforced by the lack of a fireplace on the second story of the room on the west side of the building. Unfortunately, the foundation is so low that an inspection of the underside of the building was unable to be made, which would potentially yield additional information on the building's construction methods.

Throughout American architectural history the enlargement of permanent dwellings has been common practice. The addition of rooms or wings to smaller houses is a tradition that carries forward to the present day. Early sources of additive construction are mostly found adjacent to the existing building's façade or to the rear. In many cases the early additions are made to the rear maintaining the building's façade and general appearance. The addition made to the side of the building in many cases maintained the scale and massing of the earlier building, serving as an added room or rooms and maintaining a unified façade appearance. Many regions of Virginia have varying characteristics of additions that are common to the region and are not featured in other areas of the Commonwealth. For instance, additive construction common in the Eastern Shore of Virginia is unique to that area most likely due to the remote nature of its location. In the case of Isle of Wight County, there are varying types of additive construction that enlarged earlier dwellings. Most common in the 19th century is the addition of a large building adjacent to the earlier dwelling that does not maintain a consistent façade. In some cases the addition is placed so it projects from the earlier building's façade. The newer building usually has a side-passage plan and is linked to the earlier building by an added hallway with stair to the upper story or stories. The newer portion of the dwelling becomes the formal public space within the dwelling, while the older portion is used as chamber or private spaces. Another type of additive construction found in the county is the addition of a building adjacent to the early building where the newer portion could be a separate dwelling. The newer building may have a hall with adjoining rooms and will abut the earlier dwelling connected by doorways to rooms or hallways in the earlier building. In effect the dwelling becomes two joined independent yet attached dwellings in some cases with two halls, two stairs, and in some cases two separate levels, where one must step up or down into the adjacent building. Efforts to combine these types of buildings in a unified dwelling are in many cases not made, where two doors will be found on the façade.

This type of additive construction is common primarily in the 19th century. From most historical accounts of these dwellings, once a property owner achieved a certain financial status or if a property ownership changed, an addition was made. In these cases the addition becomes the primarily living space and the earlier building becomes secondary providing workspaces. In cases of the addition of rooms to the dwelling, the new portion became the formal living space with ornate mantels and wainscoting, for example. For those additions made where a dwelling with its own hall and stair were added, the newer addition became the formal reception area with ornate mantles. In many cases, the earlier building finishes were updated to the style of the later building construction. In effect the house was updated to the current fashion of the time. The interior configuration of the earlier portion was retained in almost all cases. The only changes noted are those with corner stairs adjacent to the fireplace in a one-room plan, which would have been removed in favor of a new hall and stair, added in the new portion.

Most of these modifications and additions occurred from the period of the early to late 19th century. In some cases additions were made within a twenty- to thirty-year period from the earlier building's construction. In those additions made in the post-Civil War period, more of an effort was made to create a unified façade appearance with the updating of the façade with a common roof, articulation and style. Even with the unification of the façade and style, it is still visually evident that an addition was made from asymmetrical facades and the retention of earlier chimneys. The evolution of the dwelling in the additive construction process seems to be an important element of the making of additions in Isle of Wight County. Though there is no established typology for additive construction, it may be rooted in long and important history of the county and the awareness of the age and history of its residents. Many communities share these methods of additive construction and in most cases the retention of the earlier built environment is quite common.

The house retains a general center-passage single-pile form. Center-passage plans appeared in Virginia during the first part of the 18th century. The plan comprises a central hall flanked rooms. Most often this form is one-and-one-half stories or two-stories. In some cases the area under the roof served as additional sleeping or storage space. The dwelling plan most often was one or two rooms deep. The façade of the building was symmetrical and comprised three or five bays. The interior rooms on the first story served as living space while upper stories served as bedchambers. In single-pile dwellings of one room deep the rooms flanking the hall served as the dining room and parlor. In earlier examples the interior finishes varied depending on which room served as the best room or parlor. The hall contained the stair to the upper stories and basement, if constructed with an underground space. The upper stories featured the same floor plan as the first story. In some examples a small room would have been added in the hallway on the second story above the entrance. It served as a small unheated space for storage. Chimneys were situated at the ends of the dwelling. The center-passage single-pile plan was popular during the 1800s. The center-passage double-pile plan is seen as early as the Revolutionary War period. The front rooms off the first story hall served as the parlor and dining room, while the rear rooms served as workrooms and a first story chamber. Most often the kitchen was located in the basement, in an ell off the rear or in a separate building. Most often chimneys were situated on the side elevation at the center of each equally planned room's wall. In a few cases, the chimneys were erected on the interior of the dwelling and one chimney served two fireplaces that were back-to-back. By the mid-19th century the center-passage double-pile dwelling was erected as a symbol of prosperity among the agricultural society.

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This building was evaluated for its eligibility in the National Register of Historic Places. It was considered under the National Register of Historic Places Criteria and Criteria Exceptions. The evaluation included researching the history of the property and an architectural analysis of the current building form. The property does not meet Criteria A (Event) as there is no historical evidence that there was a historic event that occurred on the property. The property does not meet Criteria B (Person) as it is not associated with a person important in history. The property does not meet Criteria C (Architecture) because it is an example of a common domestic building that has been altered over time. The property does not meet Criteria D (Information Potential) since there is no historic evidence that it would yield information that would be potentially important in history. The property also does not meet the Criteria Exceptions. Based upon the documented research and architectural analysis, the property is not recommended eligible for listing in the National Register of Historic Places.

Surveyor Recommendation: Legacy

Ownership

Ownership Category	Ownership Entity
Private	*No Data*

Primary Resource Information

Resource Category: Domestic
Resource Type: Single Dwelling
NR Resource Type: Building
Historic District Status: *No Data*
Date of Construction: Ca 1800
Date Source: Site Visit/Written Data
Historic Time Period: Early National Period (1790 - 1829)
Historic Context(s): Architecture/Community Planning, Domestic, Subsistence/Agriculture
Other ID Number: *No Data*
Architectural Style: Federal/Adamesque
Form: *No Data*
Number of Stories: 2.0
Condition: Good
Interior Plan: Central Passage, Single Pile
Threats to Resource: Demolition, Development
Cultural Affiliations: *No Data*
Cultural Affiliation Details:

No Data

Architectural Description:

2005:
This single-family dwelling was constructed circa 1800. It has a solid brick foundation and is wood frame clad in aluminum siding. The dwelling is topped by a cross-gable roof clad in asphalt shingles. The foundation is generally low and it appears that the building rests upon the ground. The general ground print is cross-shaped. The façade has five bays with a central entrance. There is a three-bay two-story porch dominating the south façade. The porch is topped by a gable roof with a raking cornice and cornice returns. The porch columns are square with minimal capitals. There is a balustrade on the second story that appears to be a replacement. The porch floor is brick on the first story. The windows on the dwelling are 6/6 double-hung sash with storm windows. Shutters flank the end bay windows. The main entrance on the first story is comprised of a wood single-leaf door with six panels. There are four-light and one-panel sidelights flanking the door. On the second story there is a fifteen-light single-leaf door accessing the second story of the porch. The doors have storm doors. The gable end elevations are marked by massive exterior side brick chimneys with single shoulders. The chimneys have corbelled caps. Additions have been made to the rear. They are two-stories and one-story with open decks.

October 2006:
This single-family dwelling was constructed circa 1800 and is an example of a dwelling that has undergone an expansion dating to the 19th century. It has a solid brick foundation that has been parged and is wood frame clad in vinyl siding. The dwelling is topped by a side-gable roof clad in asphalt shingles. The foundation is generally low and it appears that the building rests upon the ground. The general ground print is cross-shaped. The façade has five bays with a central entrance, but the façade is not symmetrical. It initially appears symmetrical, but the door placement is not central and the windows on the west end of the façade are set slightly farther apart than those on the east end of the facade. There is a three-bay two-story porch dominating the south façade, which was likely added in the 20th century. The porch is topped by a gable roof with a raking cornice and cornice returns. The porch columns are square with minimal capitals. There is a balustrade on the second story that appears to be a replacement. The porch floor is brick framed poured concrete on the first story. The windows on the dwelling are 6/6 double-hung sash with storm windows. Shutters flank the end bay windows. The main entrance on the first story is comprised of a wood single-leaf door with six panels. There are four-light and one-panel sidelights flanking the door. The door and sidelights are framed by a Classical surround comprised a cornice supported by fluted pilasters. On the second story there is a fifteen-light single-leaf door accessing the second story of the porch. The doors have storm doors. The gable end elevations are marked by massive exterior side brick chimneys with single shoulders. The chimneys have corbelled caps. The east chimney is 5-course American bond brick and the west chimney has replacement brick laid 8-course American bond consistent with brick found on the addition chimney on the north elevation. Additions have been made to the rear. There is a two story addition abutting the north elevation. There are one-story additions abutting the west elevation and north elevation of the two story addition. There is a chimney situated at west corner of the north elevation. The one story addition on the west elevation of the ell has a shed roof and the roof of the north one-story addition is gabled. The porch on the one-story addition has a shed roof and plain wood posts. The poured

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concrete porch floor continues the apron around the pool. There is a deck applied to the porch on the east end.

The interior comprises a center passage, single-pile plan. The central passage features a steep stair with a plain wood newel and plain wood balusters. The stairs have wood treads and risers and the stairs are steep. The hall features beaded-board wainscoting. There is a small closet under the stair. The living room was inaccessible and currently serves as storage space. The dining room has a wood chair rail and a mid-19th century fireplace surround. The doors within the dwelling are six panel single-leaf and wood. The flooring is pine tongue-and-groove narrow boards. There are baseboards and plain surrounds on the doors and windows. The walls in the main dwelling have been plastered. The ell contains a bedroom, lavatory, kitchen, and breakfast room. The floor is vinyl sheet in the kitchen and the cabinetry dates to the 1970s. The lavatory has porcelain fixtures and a tile floor. The fixtures and tile date to the 1960s. The bedroom has a wall-to-wall carpeted floor and built in closets at the north end. The breakfast room has similar treatment to the kitchen and there is a closet on the west side with a double-leaf wood louvered door. The den or family room is slightly lower than the ell and main dwelling. The family room features wallboard walls, acoustic tile ceiling, and wall-to-wall carpeted floor. There is a corner fireplace at the northwest corner. The second story is situated within the main dwelling and ell. The bedrooms are situated above the living room and dining room. There are closets situated at the north end rooms of the ell and a lavatory on the east side of the hallway leading to the closets. The flooring is similar to the first story flooring. The walls are plastered and features similar baseboards and window and door surrounds. The door to the west bedroom has three panels and is wood and single-leaf. This door has been pegged together unlike other doors within the dwelling. The east bedroom has wall-to-wall carpeting and a similar mantel to the one found in the dining room. The west bedroom does not have a fireplace. The hall features an open stairwell surrounded by similar newels and balusters found the main stair.

Exterior Components

Component	Component Type	Material	Material Treatment
Roof	Gable	Asphalt	Shingle
Chimneys	Exterior side	Brick	Bond, American
Porch	2-story, 3-bay	Wood	Columns, Square
Windows	Sash, Double-Hung	Wood	6/6
Chimneys	Exterior side	Brick	Bond, American, 5-course
Structural System and Exterior Treatment	Frame	Wood	Siding, Vinyl
Foundation	Solid/Continuous	Brick	Bond, American

Secondary Resource Information

Secondary Resource #1

Resource Category: Social/Recreational
Resource Type: Pool/Swimming Pool
Date of Construction: 1980Ca
Date Source: Site Visit
Historic Time Period: The New Dominion (1946 - 1991)
Historic Context(s): Architecture/Community Planning, Domestic, Subsistence/Agriculture
Architectural Style: Post Modern
Form: *No Data*
Condition: Fair
Threats to Resource: Demolition, Development
Cultural Affiliations: *No Data*
Cultural Affiliation Details:

No Data

Architectural Description:

2005:
There is a pool to the north of the dwelling.

October 2006:
The swimming pool is situated north of the dwelling. It is a concrete pit surrounded by a concrete apron.

Secondary Resource #2

Resource Category: Agriculture/Subsistence
Resource Type: Barn
Date of Construction: 1970Ca
Date Source: Site Visit
Historic Time Period: The New Dominion (1946 - 1991)
Historic Context(s): Architecture/Community Planning, Domestic, Subsistence/Agriculture
Architectural Style: Post Modern

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Form: *No Data*
Condition: Fair
Threats to Resource: Demolition, Development
Cultural Affiliations: *No Data*
Cultural Affiliation Details:

No Data

Architectural Description:

2005:
There is a barn situated at the north end of the property.

October 2006:
The barn has been converted for use a dwelling. The barn is one-and-one-half stories with wings on the east and west elevations. There is a one-story addition on the north side of the barn. The building has a concrete foundation and is wood frame clad in weatherboard. The roof is gable clad in standing-seam metal. The windows in the dwelling are comprised of 1/1 and 6/6 wood double-hung sash. Fifteen-light doors have also been placed within window openings and serve as fixed windows. The interior is comprised of numerous rooms connected by wood single-leaf doors. The main room on the south end of the main building is a kitchen and living space. The flooring is clad in vinyl sheets and the walls are modern wood paneling. The west wing has a dirt floor and is unimproved. The east wing comprises a room with a concrete floor covered in wall-to-wall carpeting. The walls are wood paneled. The windows comprise 15-light doors. The north one-story addition comprises a modern lavatory and a room with a carpeted floor. The attic story is unfinished and the roof rafters are visible. The stair to the attic is situated within the main first story and is accessed from the north end. The stairs are enclosed with wood treads and risers.

Interior Plan: Other
Number of Stories: 1.5

Historic District Information

Historic District Name: *No Data*
Local Historic District Name: *No Data*
Historic District Significance: *No Data*

CRM Events

Event Type: DHR Staff: Not Eligible

DHR ID: 046-5250
Staff Name: DHR
Event Date: 5/3/2007
Staff Comment

Project also reviewed by DHR staff archaeologist Joanna Wilson.

Kristin Kirchen presenting:
B.J. Hogue Homeplace, Isle of Wight County, DHR File Number 046-5250, Project Review Number 2002-1728
The resource is a circa 1800, 2 story, 5 bay frame dwelling covered in vinyl siding, with a central passage, single pile plan. It has a side gable roof covered in asphalt shingles. A 2-story frame addition was built on the rear, with 1-story frame additions on the rear addition's north and west elevations. The rear addition has two interior brick chimneys, and the addition on the north elevation of the rear addition has an exterior brick chimney. Secondary resources include a 1970 frame barn and a 1980 swimming pool. It was evaluated as locally significant under Criterion C (Architecture) with a period of significance of ca. 1800. The committee recommended not eligible with 20 points.

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: *No Data*
Investigator: David, Kimble
Organization/Company: Unknown (DSS)
Photographic Media: *No Data*
Survey Date: 10/29/2006
Dhr Library Report Number: *No Data*
Project Staff/Notes:

for CRI, Inc.

Project Bibliographic Information:

Record Type: Deed

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Bibliographic Notes: Isle of Wight County Deed Records

Name: King, Helen Haverty
Record Type: Book
Bibliographic Notes: Historical Notes on Isle of Wight County, Virginia, 1993.

Record Type: Tax Records
Bibliographic Notes: Isle of Wight County, Virginia

Surveyor's NR Criteria Recommendations: C - Distinctive Characteristics of Architecture/Construction

Phase II Intensive Survey Integrity Recommendations: Location, Workmanship

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: *No Data*

Investigator: David, Kimble

Organization/Company: Unknown (DSS)

Photographic Media: *No Data*

Survey Date: 3/1/2005

Dhr Library Report Number: *No Data*

Project Staff/Notes:

2004-2005-0001

Project Bibliographic Information:

Record Type: Deed
Bibliographic Notes: Isle of Wight County Deed Records

Name: King, Helen Haverty
Record Type: Book
Bibliographic Notes: Historical Notes on Isle of Wight County, Virginia, 1993.

Record Type: Tax Records
Bibliographic Notes: Isle of Wight County, Virginia

Surveyor's NR Criteria Recommendations: C - Distinctive Characteristics of Architecture/Construction

Phase II Intensive Survey Integrity Recommendations: Location, Workmanship

Bibliographic Information

Bibliography:

No Data

Property Notes:

Name: Carlton Oneal
Company 1: Bank of Southside VA
City: Smithfield
State: Virginia
ZIP: 23430
Owner Relationship: Owner of property

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Virginia Dept. of Historic Resources

V-CRIS

Virginia Cultural Resource Information System

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Feet

0 50 100 150 200

1:2,500 / 1"=208 Feet

Title: Architecture Labels **Date: 6/2/2022**

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Property Information

Property Names

Name Explanation	Name
Function/Location	House, 14564 Benns Church Blvd
Historic	W.P. Jordan House

Property Evaluation Status

DHR Staff: Eligible

Property Addresses

Alternate - State Route 10/32
Current - 14564 Benns Church Blvd

County/Independent City(s): Isle of Wight (County)
Incorporated Town(s): *No Data*
Zip Code(s): 23314
Magisterial District(s): *No Data*
Tax Parcel(s): 32-01-075A
USGS Quad(s): BENNS CHURCH

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Additional Property Information

Architecture Setting: Rural
Acreage: 1

Site Description:

This dwelling is situated on the west side of Benns Church Blvd (SR 10/32) south of the intersection with Brewers Neck Blvd (SR 32). It is set back approximately 150-feet from the roadway. There is a grass driveway that leads to the north of the dwelling. The site is flat with deciduous trees planted around the site. The dwelling faces east.

There is a garage located northwest of the dwelling. There is a workshop located west of the dwelling. There is a well-situated southeast of the workshop. There is a collapsed shed north of the workshop.

Surveyor Assessment:

Start Year: 1880 ca
End Year: 1880 ca
Date Source: Site Visit
Type: Original Construction

This dwelling features an Italianate style common to the mid-19th century. The Italianate style became popular from 1850 to 1880 and was based upon Italian rural architecture. It was one of the romantic styles of the Picturesque movement. The hallmarks of the Italianate style are bracketed cornices, wide eaves, and a vertical emphasis. Additional articulation was added to window surrounds, the addition of entrance towers, articulated rounded-topped doors, and quoins. Like other styles of the 19th century, the Italianate was adaptable to various settings. It was well suited to narrow urban lots, and could be expanded in open rural settings. Modest Italianate houses such as this dwelling can be found among more prominent farmers of the mid- to late-19th century. The style exhibits the patron's knowledge of architectural style and fashion and is not commonly seen in the rural landscape of Isle of Wight County.

This dwelling was part of the Jordan family land holdings near the village of Benns Church. The Jordan family owned most of the lands south of Benns Church extending from Benns Church to the City of Suffolk boundary. The Jordan family owned numerous houses along Benns Church Boulevard and farmed the lands on either side of the road. The lands to the south of this property are mostly still farmed. There is a small cluster of mid-20th century dwellings in the vicinity of Benns Church.

The village of Benns Church was obliterated when Benns Church Boulevard and Brewer's Neck Boulevard were widened in the mid-20th century. There is a gas station and store located at the intersection of Benns Church Boulevard and Brewer's Neck Boulevard, though these were added in the mid- to late-20th century. The village developed at the Brewer's Neck and Benns Church Boulevards intersection around Benns Church and St. Luke's Church in the 19th century. The area is just south of the Town of Smithfield along roadways that connected Isle of Wight County with the City of Suffolk.

This house and surrounding 132 acres was owned by W. P. Jordan in the late 19th century. He mostly likely received the lands from his family in the 19th century as a part of the subdivision of the family's larger landholdings. He died intestate in 1905 and had numerous debts. To pay the debts the family sold the property to George Thomas. Thomas owned the property until his death in 1917. The property was sold through the 20th century and comprised between 125 and 132 acres at one time. The property was subdivided in the late 20th century and only a one acre site remains surrounding the house.

The property is an example of an Italianate-style house of the late 19th century. It retains architectural features of the period, but is not an exemplary example of the house type. The property does not retain its original acreage as a farmstead. Though owned by a member of the Jordan family, W. P. Jordan is not associated with a historic event in Isle of Wight County. Therefore, the house is not recommended as eligible for listing in the National Register of Historic Places.

Surveyor Recommendation: Legacy

Ownership

Ownership Category	Ownership Entity
Private	*No Data*

Associate

Property Associate Name	Property Associate Role
Jordan, W. P.	Owner

Primary Resource Information

Resource Category: Domestic
Resource Type: Single Dwelling
NR Resource Type: Building
Historic District Status: *No Data*
Date of Construction: Ca 1880
Date Source: Site Visit/Written Data
Historic Time Period: Reconstruction and Growth (1866 - 1916)
Historic Context(s): Architecture/Community Planning, Domestic
Other ID Number: *No Data*
Architectural Style: Italianate
Form: *No Data*
Number of Stories: 2.0
Condition: Good
Interior Plan: Side Passage, Double Pile
Threats to Resource: Deterioration
Cultural Affiliations: *No Data*
Cultural Affiliation Details:

No Data

Architectural Description:

This is a circa 1880 Italianate-style single-family dwelling. It rests on a brick foundation and comprises a wood frame structural system clad in weatherboard. The roof has a low-pitched hipped form clad in standing-seam metal. The roof features a wide cornice with a wide frieze and scrolled brackets. The façade of the dwelling is three-bay with a side-passage plan. The windows on the dwelling are 2/2 wood double hung sash with storm windows. Some windows feature wood louvered shutters, but most shutters are missing. The door is single-leaf wood with four panels. The door is flanked by sidelights and topped by a transom. There is a wrap-around porch on the façade that wraps the north elevation. It features chamfered posts with bracketed capitals and a hipped roof clad in standing-seam metal. There is an interior brick chimney on the south elevation near the east façade. It has a square plan and is brick. The cap features decorative brickwork and is coped in metal. Appended to the west elevation is a one-story addition. It is wood frame clad in weatherboard. A second story addition is mounted on the roof of the one-story addition.

The interior of the dwelling reflects a side-passage double-pile plan. The hall comprises one bay of the three bay façade. The hall is oriented east-west and contains the stair. The stair rises to the second story. The stair features turned newels and balusters. There is decorative scrollwork along the stair. The hallway features two entrances; the east façade and the north elevation. The entrances are the same. There is a living room on the southeast end of the building and has a wide opening and wood fireplace mantel. There is a 15-lgiht door between the living and dining room, situated west of the living room. There is a 15-light single-leaf door at the base of the stair accessing the dining room. The dining room has similar features to the living room, including a similar mantel. There is a door in the dining room on the west wall to the addition. At the west end of the hall is the kitchen. The kitchen has modern wood paneling and a vinyl floor. The cabinetry is mid-20th century. The addition has similar modern wood paneling and the flooring is wall-to-wall carpeting. The ceiling is wood boarded. The walls on the first story are plaster in most areas. Some plaster has been replaced with modern painted wall board. The ceilings have been re-clad in drywall. The baseboards and door surrounds are simple and the flooring is tongue-and-groove oak. The second story comprises bedrooms above the living and dining room, and a small room above the hall. The bedrooms above the living and dining room feature wood mantels. All rooms have simplified door and window surrounds. There is some damage to the plaster on the second story from water intrusion. The walls are plastered on the second story mostly with some replacement drywall in areas. The flooring is tongue-and-groove pine board. The lavatory is situated on the west end of the hall and is contained within the addition above the kitchen. The lavatory features mid-20th century fixtures and vinyl tile flooring.

Exterior Components

Component	Component Type	Material	Material Treatment
Windows	Sash, Double-Hung	Wood	2/2
Roof	Hipped	Metal	Standing Seam
Chimneys	Interior	Brick	Bond, American
Porch	1-story	Wood	Other
Foundation	Solid/Continuous	Brick	Bond, American
Structural System and Exterior Treatment	Frame	Wood	Weatherboard

DRAFT

Secondary Resource Information

Secondary Resource #1

Resource Category: DSS Legacy
Resource Type: Shed
Date of Construction: 1900Ca
Date Source: Site Visit
Historic Time Period: Reconstruction and Growth (1866 - 1916)
Historic Context(s): Architecture/Community Planning, Domestic
Architectural Style: Vernacular
Form: *No Data*
Condition: Deteriorated
Threats to Resource: Development
Cultural Affiliations: *No Data*
Cultural Affiliation Details:

No Data

Architectural Description:

To the north of the workshop is a small shed. It is wood frame clad in vertical board. It has a shed roof clad in standing-seam metal. It is in deteriorated condition and is overgrown with foliage.

Number of Stories: 1

Secondary Resource #2

Resource Category: Domestic
Resource Type: Garage
Date of Construction: 1990Ca
Date Source: Site Visit
Historic Time Period: Reconstruction and Growth (1866 - 1916)
Historic Context(s): Architecture/Community Planning, Domestic
Architectural Style: Post Modern
Form: *No Data*
Condition: Fair
Threats to Resource: Development
Cultural Affiliations: *No Data*
Cultural Affiliation Details:

No Data

Architectural Description:

To the north of the shed is a garage. Constructed circa 1990, it has a wood frame structural system clad in plywood. It features a gable roof clad in asphalt shingles. There is a double-leaf door on the east façade.

Number of Stories: 1

Secondary Resource #3

Resource Category: Agriculture/Subsistence
Resource Type: Workshop
Date of Construction: 1900Ca
Date Source: Site Visit
Historic Time Period: Reconstruction and Growth (1866 - 1916)
Historic Context(s): Architecture/Community Planning, Domestic
Architectural Style: Vernacular
Form: *No Data*
Condition: Fair
Threats to Resource: Development
Cultural Affiliations: *No Data*
Cultural Affiliation Details:

DRAFT

No Data

Architectural Description:

There is a workshop west of the dwelling with a rectangular plan. It features a brick foundation and is wood frame construction clad in wood novelty siding. There is a single leaf door on the east elevation flanked by wood 2-light casement windows. The roof has a catslide form clad in asphalt shingles.

Number of Stories: 1

Secondary Resource #4

Resource Category: Domestic
Resource Type: Well/Well House
Date of Construction: 1890Ca
Date Source: Site Visit
Historic Time Period: Reconstruction and Growth (1866 - 1916)
Historic Context(s): Architecture/Community Planning, Domestic
Architectural Style: Vernacular
Form: *No Data*
Condition: Fair
Threats to Resource: Development
Cultural Affiliations: *No Data*
Cultural Affiliation Details:

No Data

Architectural Description:

There is a brick circular well to the southeast of the workshop. The well is laid in common bond brick and has a concrete cap.

Number of Stories: .5

Historic District Information

Historic District Name: *No Data*
Local Historic District Name: *No Data*
Historic District Significance: *No Data*

CRM Events

Event Type: DHR Staff: Eligible

DHR ID: 046-5274
Staff Name: DHR
Event Date: 10/19/2006
Staff Comment

Kristin Kirchen presenting:
W.P. Jordan House, Isle of Wight County, DHR File Number 046-5274
The house is a circa 1880 2-story, 3-bay Italianate style, side passage, double-pile dwelling. It rests on a brick foundation, and has a frame structure clad in weatherboard. The hipped roof is covered in standing seam metal, and features a wide cornice and frieze with scrolled brackets. The house has 2/2 double-hung windows, some with louvered shutters. A wrap-around 1-story porch covers the north and east sides of the house. It was built by the Jordan family near Benns Church village, part of the extensive Jordan land holdings in this part of Isle of Wight County. The property's original 132 acres were sold piecemeal throughout the 20th century, such that the house now sits on 1 acre. It was evaluated as locally significant under Criterion C with a period of significance of circa 1880, and the committee recommended eligible with 30 points.

DHR strongly encouraged the County to retain this resource in its original location and offer the resource to interested individuals or groups for preservation.

Event Type: Survey:Phase II/Intensive

Project Review File Number: 2006-0234
Investigator: David, Kimble
Organization/Company: Unknown (DSS)

DRAFT

Photographic Media: *No Data*
Survey Date: 8/14/2006
Dhr Library Report Number: IW-42
Project Staff/Notes:

Intensive level survey conducted for Cultural Resources, Inc.

Project Bibliographic Information:

Name: CRI, Inc.
DHR CRM Report Number: IW-42
Record Type: Report
Bibliographic Notes: "A Phase I Cultural Resources Survey of appoximately 600 acres at Benns Church, Isle of Wight County, Virginia."

Prepared by: Aimee J. Leithoff and Ellen M. Bray (PI)

Dated: October 2005

Name: King, Helen Haverty
Record Type: Book
Bibliographic Notes: Historical Notes on Isle of Wight.

Record Type: Deed

Record Type: Tax Records

Surveyor's NR Criteria Recommendations: C - Distinctive Characteristics of Architecture/Construction

Phase II Intensive Survey Integrity Recommendations: Design, Location, Materials, Workmanship

Event Type: DHR Staff: Potentially Eligible

DHR ID: 046-5274
Staff Name: DHR
Event Date: 6/1/2006
Staff Comment

DHR believes that a Phase II evaluation of this property is warranted; the information presented in the Phase I is not sufficient to make a determination of eligibility.

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: 2006-0234
Investigator: David, Kimble
Organization/Company: Unknown (DSS)
Photographic Media: *No Data*
Survey Date: 10/3/2005
Dhr Library Report Number: IW-42
Project Staff/Notes:

Survey conducted for Cultural Resources, Inc.

Project Bibliographic Information:

Name: CRI, Inc.
DHR CRM Report Number: IW-42
Record Type: Report
Bibliographic Notes: "A Phase I Cultural Resources Survey of appoximately 600 acres at Benns Church, Isle of Wight County, Virginia."

Prepared by: Aimee J. Leithoff and Ellen M. Bray (PI)

Dated: October 2005

Name: King, Helen Haverty
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Record Type: Deed

Record Type: Tax Records

Surveyor's NR Criteria Recommendations: C - Distinctive Characteristics of Architecture/Construction

Phase II Intensive Survey Integrity Recommendations: Design, Location, Materials, Workmanship

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Bibliographic Information

Bibliography:

No Data

Property Notes:

Name: Unknown
Company 1: Benns Church Properties
Address 1: P O Box 500
City: Carrollton
State: Virginia
ZIP: 23314
Owner Relationship: Owner of property

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Virginia Dept. of Historic Resources

V-CRIS

Virginia Cultural Resource Information System

Legend

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- Architecture Labels
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N

Feet

0 50 100 150 200

1:2,500 / 1"=208 Feet

Title: Architecture Labels **Date: 6/2/2022**

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Property Information

Property Names

Name Explanation	Name
Function/Location	House, 14580 Benns Church Boulevard

Property Evaluation Status

DHR Staff: Not Eligible

Property Addresses

Current - 14580 Benns Church Blvd
Alternate - 14580 State Road 10/32

County/Independent City(s): Isle of Wight (County)
Incorporated Town(s): *No Data*
Zip Code(s): 23314
Magisterial District(s): *No Data*
Tax Parcel(s): 32-01-075A
USGS Quad(s): BENNS CHURCH

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Additional Property Information

Architecture Setting: Rural
Acreage: 1.5

Site Description:

This dwelling is situated on the west side of Benns Church Blvd (SR 10/32) south of the intersection with Brewers Neck Blvd (SR 32). It is set back approximately 150-feet from the roadway. There is a grass driveway that leads to the north of the dwelling. The site is flat with deciduous trees planted around the site. The dwelling faces east.

A secondary dwelling was erected near the street in front of the earlier dwelling.

Surveyor Assessment:

This is an example of a modest house constructed circa 1930. Located a Benns Church a small village south of Smithfield at the intersection of two roadways, the dwelling was added to this area during a growth period. Earlier dwellings dating to the antebellum period lined the roadways. During the post Civil War period, larger farmsteads were subdivided and newly erected houses were interspersed between the earlier farmhouses. In the early 20th century, the area of Benns Church grew with the addition of schools and small businesses. The intersection had been an important location in Colonial Virginia as the St. Paul's Church and Benns Church located here date to the 17th and 18th centuries respectively.

The style is vernacular Colonial Revival, which gained popularity in the late 19th and early 20th century. It is a simple style that employs minimal articulation and can be adapted to modest houses. The style and form of the dwelling are typical of the period in Isle of Wight County. This building is not recommended as eligible for listing in the National Register of Historic Places.

Surveyor Recommendation: *No Data*

Ownership

Ownership Category	Ownership Entity
Private	*No Data*

Primary Resource Information

Resource Category: Domestic
Resource Type: Single Dwelling
NR Resource Type: Building
Historic District Status: *No Data*
Date of Construction: Ca 1930
Date Source: Site Visit/Written Data
Historic Time Period: World War I to World War II (1917 - 1945)
Historic Context(s): Domestic
Other ID Number: *No Data*
Architectural Style: Vernacular
Form: *No Data*
Number of Stories: 1.0

Condition: Fair
Threats to Resource: Development
Cultural Affiliations: *No Data*
Cultural Affiliation Details:

No Data

Architectural Description:

This dwelling is a one-story building with a concrete block foundation. It is wood frame construction clad in wood novelty siding topped with a side-gable roof clad in standing-seam metal. There is a one-bay, gabled-roof porch on the façade supported by plain wood posts. The roof is clad in standing-seam metal and the porch features cornice returns. The porch shelters the main entrance comprise of a single-leaf wood door with a panel and light. There is a wood frame screened door mounted to the main entrance doorframe. To the south of the entrance is a paired 6/6 wood double-hung sash window. To the north of the entrance is a 2/2 wood double-hung sash window. Wood shutters flank the windows. The north window has a pedimented hood. The roof cornice features cornice returns. To the west of the dwelling is an ell with a gable roof clad in standing–seam metal. The windows on the side elevations are similar to the north window on the façade. On the west elevation, there is a hipped-roof porch with wrought-iron posts. The porch shelters a single-leaf entrance. The porch floor is poured concrete and the porch roof is clad in standing-seam metal.

Exterior Components

Component	Component Type	Material	Material Treatment
Windows	Sash, Double-Hung	Wood	2/2
Foundation	Solid/Continuous	Concrete	Block
Windows	Sash, Double-Hung	Wood	6/6
Roof	Gable, Side	Metal	Standing Seam
Porch	1-story, 1-bay	Wood	Other
Structural System and Exterior Treatment	Frame	Wood	Weatherboard

Secondary Resource Information

Secondary Resource #1

Resource Category: Domestic
Resource Type: Secondary Dwelling
Date of Construction: 1978Ca
Date Source: Site Visit/Written Data
Historic Time Period: The New Dominion (1946 - 1991)
Historic Context(s): Domestic
Architectural Style: Post Modern
Form: *No Data*
Condition: Good
Threats to Resource: Development
Cultural Affiliations: *No Data*
Cultural Affiliation Details:

No Data

Architectural Description:

Constructed in 1978, this dwelling is concrete block construction clad in brick veneer. It features a side-gable roof clad in asphalt shingles. he façade is asymmetrical with a projecting shed-roofed porch supported by turned posts. The entrance on the façade is single-leaf flanked by window openings. The windows to the south are comprised of paired wood double-hung windows with 12/12 sashes. The windows to the north are also 8/8 wood sash with a panel below the lower sash. The windows feature rowlock brick sills. An overhead garage door dominates the south end of the façade.

Number of Stories: 1

Historic District Information

Historic District Name: *No Data*
Local Historic District Name: *No Data*
Historic District Significance: *No Data*

DRAFT

CRM Events

Event Type: DHR Staff: Not Eligible

DHR ID: 046-5275
Staff Name: Kirchen, Roger
Event Date: 6/1/2006
Staff Comment

No Data

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: 2006-0234
Investigator: David, Kimble
Organization/Company: Unknown (DSS)
Photographic Media: *No Data*
Survey Date: 10/3/2005
Dhr Library Report Number: IW-42
Project Staff/Notes:

for Cultural Resources, Inc.

Project Bibliographic Information:

Name: CRI, Inc.
DHR CRM Report Number: IW-42
Record Type: Report
Bibliographic Notes: "A Phase I Cultural Resources Survey of appoximately 600 acres at Benns Church, Isle of Wight County, Virginia."

Prepared by: Aimee J. Leithoff and Ellen M. Bray (PI)

Dated: October 2005

Record Type: Tax Records

Bibliographic Information

Bibliography:

No Data

Property Notes:

Name: Unknown
Company 1: Benns Church Properties
Address 1: P O Box 500
City: Carrollton
State: Virginia
ZIP: 23314
Owner Relationship: Owner of property

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Virginia Dept. of Historic Resources

V-CRIS

Virginia Cultural Resource Information System

Legend

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N

Feet

0 50 100 150 200

1:2,500 / 1"=208 Feet

Title: Architecture Labels **Date: 6/2/2022**

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Property Information

Property Names

Name Explanation	Name
Function/Location	House, 19514 Casper Circle

Property Addresses

Current - 19514 Casper Circle

County/Independent City(s): Isle of Wight (County)
Incorporated Town(s): *No Data*
Zip Code(s): 23314
Magisterial District(s): *No Data*
Tax Parcel(s): 32-01-075B
USGS Quad(s): BENNS CHURCH

Property Evaluation Status

DHR Staff: Not Eligible

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Additional Property Information

Architecture Setting: Rural
Acreage: 2.5
Site Description:

This dwelling is situated on the west side of Benns Church Blvd (SR 10/32) south of the intersection with Brewers Neck Blvd (SR 32). It is set back approximately 300-feet from the roadway. There is a dirt driveway (named Casper Circle) that leads to the north of the dwelling. The site is flat and open with sandy soil. The dwelling faces east.

A large metal warehouse is located west of the dwelling. There are two trailers also situated west of the dwelling and east of the warehouse.

Surveyor Assessment:

This is an example of a modest house constructed circa 1930. Located a Benns Church a small village south of Smithfield at the intersection of two roadways, the dwelling was added to this area during a growth period. Earlier dwellings dating to the antebellum period lined the roadways. During the post Civil War period, larger farmsteads were subdivided and newly erected houses were interspersed between the earlier farmhouses. In the early 20th century, the area of Benns Church grew with the addition of schools and small businesses. The intersection had been an important location in Colonial Virginia as the St. Paul's Church and Benns Church located here date to the 17th and 18th centuries respectively.

The style is vernacular Colonial Revival, which gained popularity in the late 19th and early 20th century. It is a simple style that employs minimal articulation and can be adapted to modest houses. The style and form of the dwelling are typical of the period in Isle of Wight County. The dwelling has been converted to an office. This building is not recommended as eligible for listing in the National Register of Historic Places.

Surveyor Recommendation: *No Data*

Ownership

Ownership Category	Ownership Entity
Private	*No Data*

Primary Resource Information

Resource Category: Domestic
Resource Type: Single Dwelling
NR Resource Type: Building
Historic District Status: *No Data*
Date of Construction: 1931
Date Source: Site Visit/Written Data
Historic Time Period: World War I to World War II (1917 - 1945)
Historic Context(s): Domestic
Other ID Number: *No Data*
Architectural Style: Vernacular
Form: *No Data*

Number of Stories: 1.0
Condition: Good
Threats to Resource: Development
Cultural Affiliations: *No Data*
Cultural Affiliation Details:

No Data

Architectural Description:

This is a one-story wood frame dwelling clad in weatherboard siding. The foundation is brick and the roof is side-gable clad in standing-seam metal. The façade is asymmetrical with a central entrance flanked by window openings. The entrance is comprised of a single-leaf door with storm door. The window opening to the south of the entrance is comprised of paired 6/6 wood double-hung sash windows flanked by shutters. The window to the north of the entrance is comprised of a single 6/6 wood double-hung sash window flanked by shutters. A porch shelters the east façade and is comprised of a shed roof clad in standing-seam metal supported by wrought-iron posts and a concrete floor. Ells were appended to the north and south side elevations. The ell to the south is wood frame construction clad in weatherboard and has a side-gable roof at a lower height than the main dwelling roof. There is a 6/6 wood double-hung sash window on the east façade and a similar window to the south facade. There is a single-leaf entrance on the south elevation containing a three-panel, one-light door. Appended to the west elevation of this ell is a shed-roofed addition. There is a 2/2 window on the south elevation. The north ell comprises a concrete block foundation and is wood frame clad in weatherboard siding. It features 6/6 metal double-hung sash windows and a sliding window. There is a door leading from the west elevation to a wood ramp. Append to the west elevation is an addition with a shed roof extending from the eave of the main roof. It features 6/6 wood double-hung sash windows and an incorporated porch supported by a wood post.

Exterior Components

Component	Component Type	Material	Material Treatment
Windows	Sash, Double-Hung	Wood	6/6
Windows	Sash, Double-Hung	Wood	2/2
Porch	1-story, 1-bay	Wood	Other
Roof	Gable, Side	Metal	Standing Seam
Foundation	Solid/Continuous	Brick	Bond, American
Structural System and Exterior Treatment	Frame	Wood	Weatherboard

Secondary Resource Information

Secondary Resource #1

Resource Category: Industry/Processing/Extraction
Resource Type: Warehouse
Date of Construction: 1990
Date Source: Site Visit
Historic Time Period: *No Data*
Historic Context(s): Domestic
Architectural Style: Post Modern
Form: *No Data*
Condition: Good
Threats to Resource: Development
Cultural Affiliations: *No Data*
Cultural Affiliation Details:

No Data

Architectural Description:

To the west of the dwelling is a large metal warehouse with a rectangular plan. The warehouse is topped by a low-pitched metal clad gable roof. There is a single –leaf door on the north elevation and an oversized double-leaf sliding door on the south elevation. There is an overhead garage doors are located on the east elevation. Situated between the warehouse and dwelling are two mobile trailers.

Number of Stories: 1

Historic District Information

Historic District Name: *No Data*
Local Historic District Name: *No Data*
Historic District Significance: *No Data*

DRAFT

CRM Events

Event Type: DHR Staff: Not Eligible

DHR ID: 046-5276
Staff Name: Kirchen, Roger
Event Date: 6/1/2006
Staff Comment

No Data

Event Type: Survey:Phase I/Reconnaissance

Project Review File Number: 2006-0234
Investigator: David, Kimble
Organization/Company: Unknown (DSS)
Photographic Media: *No Data*
Survey Date: 10/3/2005
Dhr Library Report Number: IW-42
Project Staff/Notes:

for Cultural Resources, Inc.

Project Bibliographic Information:

Name: CRI, Inc.
DHR CRM Report Number: IW-42
Record Type: Report
Bibliographic Notes: "A Phase I Cultural Resources Survey of appoximately 600 acres at Benns Church, Isle of Wight County, Virginia."

Prepared by: Aimee J. Leithoff and Ellen M. Bray (PI)

Dated: October 2005

Record Type: Tax Records

Bibliographic Information

Bibliography:

No Data

Property Notes:

Name: Unknown
Company 1: Benns Church Properties
Address 1: P O Box 500
City: Carrollton
State: Virginia
ZIP: 23314
Owner Relationship: Owner of property

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Virginia Dept. of Historic Resources

V-CRIS

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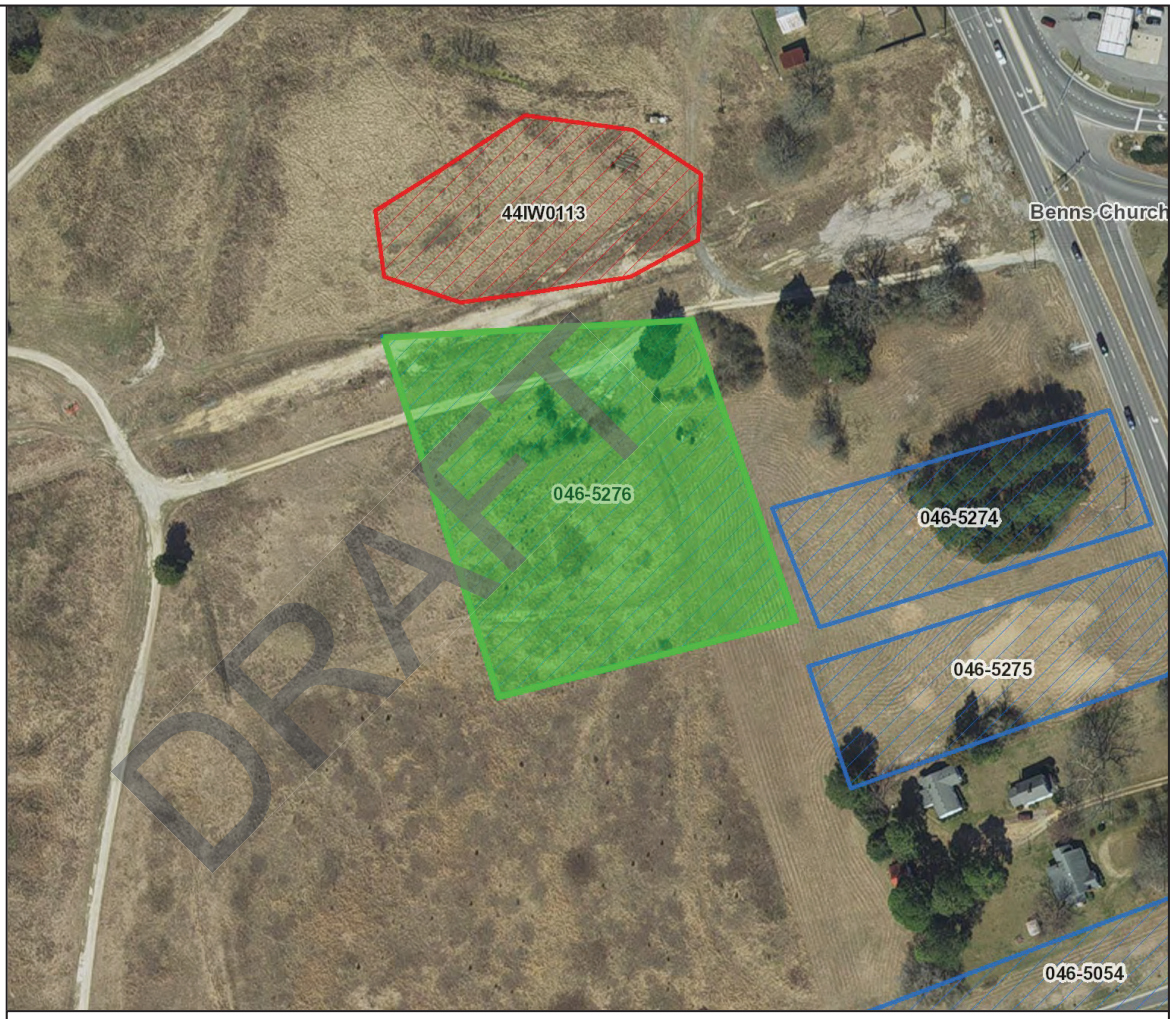

N

Feet

0 50 100 150 200

1:2,500 / 1"=208 Feet

Title: Architecture Labels **Date: 6/2/2022**

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Property Information

Property Names

Name Explanation	Name
Descriptive	Angel on Gravestone
Function/Location	Gravestone, 14477 Benns Church Boulevard

Property Evaluation Status

Not Evaluated

Property Addresses

Current - 14477 Benns Church Boulevard Route 258

County/Independent City(s): Isle Of Wight (County)
Incorporated Town(s): *No Data*
Zip Code(s): 23314
Magisterial District(s): *No Data*
Tax Parcel(s): *No Data*
USGS Quad(s): BENNS CHURCH

Additional Property Information

Architecture Setting: Town
Acreage: *No Data*
Site Description:

Located in the Benns Church cemetery, near a golf club, with overhanging trees or branches nearby.

Surveyor Assessment:

Start Year: 1921 ca
End Year: 1921
Date Source: Site Visit
Type: Original Construction

Surveyor Recommendation: *No Data*

Primary Resource Information

Resource Category: Social/Recreational
Resource Type: Sculpture/Statue
NR Resource Type: Object
Historic District Status: *No Data*
Date of Construction: Ca 1921
Date Source: Site Visit
Historic Time Period: World War I to World War II (1917 - 1945)
Historic Context(s): Funerary
Other ID Number: *No Data*
Architectural Style: *No Data*
Form: *No Data*
Number of Stories: *No Data*
Condition: Poor
Threats to Resource: Deterioration
Cultural Affiliations: *No Data*
Cultural Affiliation Details:

No Data

Architectural Description:

Inscriptions: On Gravestone Front: "Marion E. Briggs Daughter of WlJl & Florence Briggs Sept.25, 1911 Sept.28, 1921." Back of Gravestone: "Our darling one has gone before. To greet us on the blissful shore"
Dimensions: Base: H:3' W:1.5' Depth:1.5'
Sculpture: H:1.5' W:6" Depth:8"
The sculpture depicts a small angel standing, head bowed, arms down, holding a swag below her waist. The angel stands PL leg straight, PR leg

DRAFT

bent and back.

Secondary Resource Information

Historic District Information

Historic District Name: *No Data*
Local Historic District Name: *No Data*
Historic District Significance: *No Data*

CRM Events

Event Type: Other

Project Review File Number: *No Data*
Investigator: Gwaltney, Heather
Organization/Company: Unknown (DSS)
Photographic Media: *No Data*
Survey Date: 10/18/1995
Dhr Library Report Number: *No Data*
Project Staff/Notes:
SOS! Survey

Bibliographic Information

Bibliography:

No Data

Property Notes:

Name: Heather Gwaltney
Address 1: 6067 Beechland Road
City: Elberon
State: Virginia
ZIP: 23846
Phone 1: 804-294-3235
Surveyor Notes: SOS! Survey Volunteer
Owner Relationship: Informant

Name: Richard Austin
Title: Curator
Address 1: 14477 Benns Church Boulevard
City: Smithfield
State: Virginia
ZIP: 23430
Phone 1: 804-357-3367
Surveyor Notes: Richard Austin s the contact person, Benns Church is the owner/administrator.
Owner Relationship: Owner of property

DRAFT

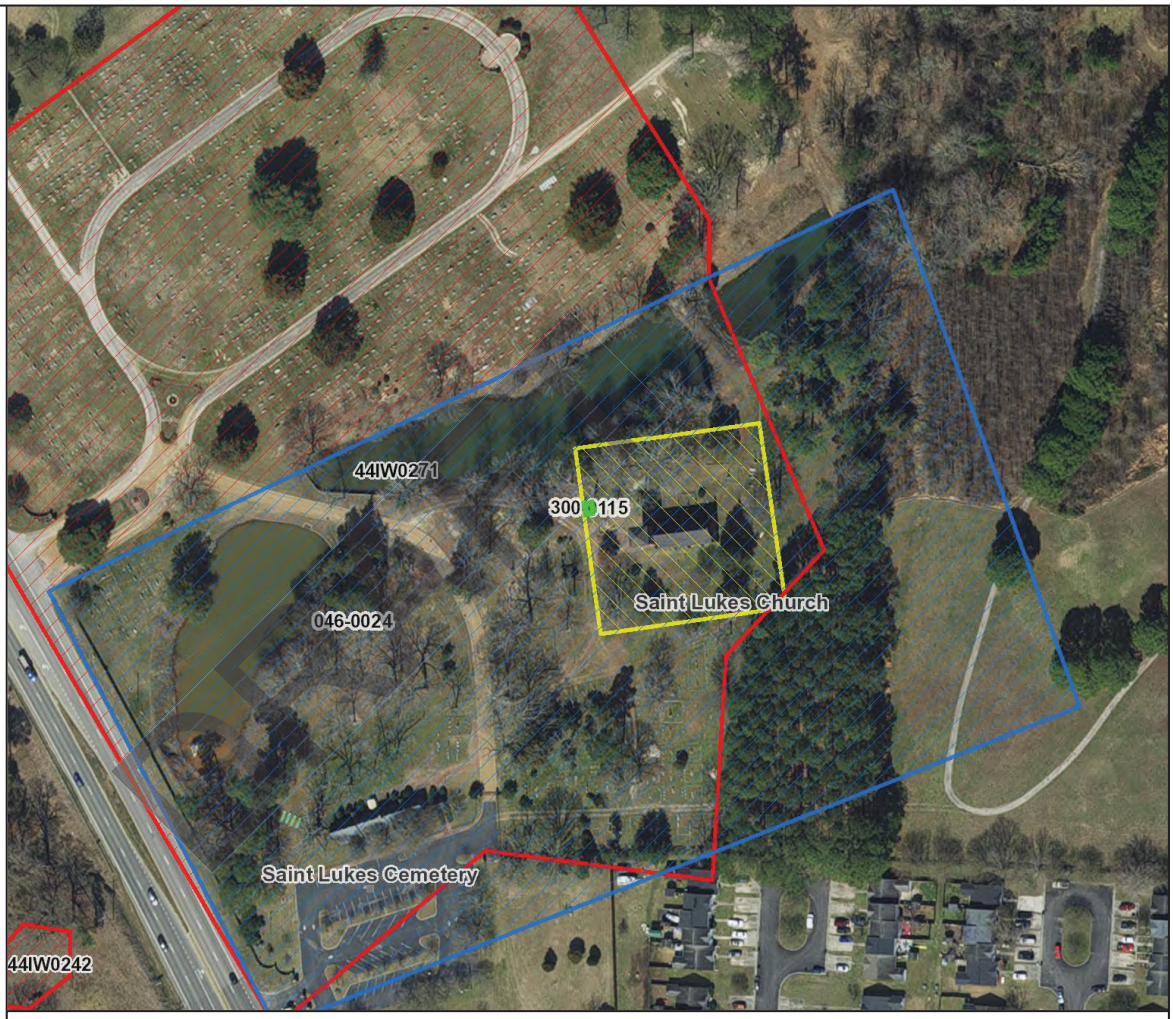
Virginia Dept. of Historic Resources

V-CRIS

Virginia Cultural Resource Information System

Legend

- Architecture Resources
- Architecture Labels
- Individual Historic District Properties
- Archaeological Resources
- Archaeology Labels
- DHR Easements
- USGS GIS Place names
- County Boundaries



N

Feet

0 50 100 150 200

1:2,500 / 1"=208 Feet

Title: Architecture Labels **Date: 6/2/2022**

DISCLAIMER:Records of the Virginia Department of Historic Resources (DHR) have been gathered over many years from a variety of sources and the representation depicted is a cumulative view of field observations over time and may not reflect current ground conditions.The map is for general information purposes and is not intended for engineering, legal or other site-specific uses. Map may contain errors and is provided "as-is". More information is available in the DHR Archives located at DHR's Richmond office.

Notice if AE sites:Locations of archaeological sites may be sensitive the National Historic Preservation Act (NHPA), and the Archaeological Resources Protection Act (ARPA) and Code of Virginia §2.2-3705.7 (10). Release of precise locations may threaten archaeological sites and historic resources.

COMMONWEALTH of VIRGINIA

DEPARTMENT OF TRANSPORTATION
23116 Meherrin Road
COURTLAND, VIRGINIA 23837

July 19, 2023

Amy Ring
Planning and Zoning Department
Isle of Wight County
P. O. Box 80
Isle of Wight, VA 23397

RE: Sweetgrass (formerly Yeoman Farm) – Chapter 527
Benn's Church Boulevard (Route 10/258)
Isle of Wight County

In accordance with §15.2-2222.1 of the Code of Virginia and the Virginia Traffic Impact Analysis Regulations, 24 VAC 30-155 (also known as Chapter 527), the Traffic Impact Study prepared by Vanasse Hangen Brustlin, Inc. (VHB) dated December 17, 2019, along with a supplemental memorandum dated March 25, 2023 and other modified application materials was submitted to the Virginia Department of Transportation (VDOT) for review on June 23, 2023.

Our Evaluation Report is attached to assist the County in their decision making process regarding this rezoning application. The Evaluation Report summarizes the key findings and includes our comments on the accuracy of the methodologies, assumptions, and conclusions presented in the analysis.

It is requested that VDOT's comments be included in the official public records, and to have both this letter and the VDOT Evaluation Report placed in the official file for the subject case. VDOT will make these documents available to the public through various means, including posting them to the VDOT website.

If you have any questions, please contact me at (757) 346-3084 or Jason Fowler@vdot.virginia.gov.

Sincerely,

Jason Fowler, P.E.
Area Land Use Engineer
Virginia Department of Transportation
Franklin Residency

EVALUATION REPORT
Of
Chapter 527 Traffic Impact Analysis

1) We concur with the proposed trip generation rates as provided in the submitted study based on the following development schedule:

Phase 1 Use	No. of Units	Units
Single Family Detached Housing	390	dwelling units
Multi-Family Housing (Low-Rise)	225	dwelling units
Strip Retail Plaza < 40k	18	1000 sq. ft. GLA
General office	55	1000 sq. ft. GLA

The proposed uses have the potential to generate 7,021 daily, 535 AM peak hour, and 732 PM peak hour trips on the roadway network. As outlined in the study, these trips are reduced by allowable pass-by and internal capture rates to represent new trips on the roadway network (6,685 daily, 521 AM peak, and 692 PM peak).

2) The trip generation has been reduced from the original 2019 study. There is no proffer that restricts traffic to the numbers used in the study, or otherwise limits the higher traffic generating uses that are allowed by-right with the zoning. Therefore the potential exists for the development to generate substantially more traffic than what is used in the analysis.

3) This is the 2nd TIA memorandum submitted (June 2021), in which trip generation and models have been adjusted. The original TIA has not been amended to incorporate the changes as submitted. The models are still based upon the original 2018 traffic counts, with 2026 and 2032 still used as the Build and Build +6 scenario. Additionally, the Synchro & SimTraffic models were not submitted for review.

4) The proposed 40’ public right of way serving the front residential may be insufficient to incorporate all of the required street design elements (pedestrian facilities, drainage structures, etc.).

5) The provided stubs in the concept plan are required per the SSAR regulations to be built to the property line.

6) Final design will be in accordance with the VDOT Road Design Manual. While it is understood that the development plan sheets submitted are not for construction, the following comments have been provided as a result of a preliminary review of the conceptual plans:

    - Pavement Markings and Sign details need to be submitted on a separate sheet for review in the site plan assembly.

- Construction site plans need to be submitted and include but are not limited to; intersection geometrics, lane configurations, transitions, turn lane warrants, corner radii, intersection site distances, right of way etc.

- AutoTurn analyses of study intersections need to be submitted to this office for review. The AutoTurn analysis will need to include a design vehicle of the largest type to be utilized for this site. This will ensure vehicle clearance as well as curb/median clearances are met.

- Sight distance for entrances and intersections must be evaluated for compliance in accordance with Appendix F of the VDOT Road Design Manual. Refer to Table 2-7.

- VDOT will have final approval of the design and construction of traffic signals, timings, and all equipment used for signal modifications. Intersection modifications and traffic signal design and phasing plans will need to be submitted for review and meet or exceed Eastern Region Operations standards and specifications. All design and construction costs will be the sole responsibility of the developer. A final traffic signal inspection will be completed by Department personnel. All punch list items resulting from this inspection will need to be corrected and re-inspected before the Department will assume responsibility of the traffic signal.

- Any right-of-way acquisition, as well as signal relocation or upgrades that are required for the recommended improvements shall be obtained, designed, and paid for by the developer.

Residential Pipeline Projects as of 10/14/22*

Projects listed below are either currently under construction or have not yet started.

SUBDIVISION NAME & DWELLING TYPE	NUMBER OF UNITS	DATE APPROVED	STATUS
Red Oaks MHP Phase II	191	1978	Dormant
Timber Preserve (aka Crown Creek) SFD	340	1986	Dormant
Cypress Creek PH 6 & 7 (Smithfield) SFD	194	1988	Under Construction
Mallory Point/Scott's Farm (Smithfield) SFD/SFA	812	2021	Dormant
Benns Grant Apartments	240	2009	Under Construction
St. Luke's Village SFD/SFA	179	2005	Dormant
Bridge Point Commons Apartments & Condos	350	2008	Dormant
Brewer's Station Apartments	162	2014	Under Construction
Brewers Station SFD & SFA	88	2014	Dormant
The Crossings Condos	210	2002	Under Construction
Archer's Meade SFD	63	2014	Dormant
South Harbor (Age Restricted) SFD & SFA	340	2020	Under Construction
The Park at Battery (Smithfield) Condos	150	2020	Dormant
Cambridge Villas (Windsor) SFD	212	2010	Dormant
The Heritage Apartments	12	2019	Under Construction
Windsor Station (Windsor)	60	2022	Dormant
James River Crossing (Bartlett Estates)	52	2022	Dormant
TOTAL UNITS	**3655**		
Units Under Construction	**1158**		
Remaining Units Approved but Dormant	**2497**		
2017-21 Avg. Building Permit/Year for Houses**	**230**		

*List includes major subdivisions only & not infill

**All new dwelling units incl. infill lots & family member lots comprising approx. 25% of permits

RESOLUTION NUMBER PC-23-11

ISLE OF WIGHT COUNTY PLANNING COMMISSION
A RESOLUTION TO PRESENT A REPORT AND RECOMMENDATION TO THE BOARD OF SUPERVISORS FOR CONDITIONAL ZONING REQUEST ZA-06-19 FOR APPROXIMATELY 250 ACRES OF TAX MAP NUMBER 32-01-009 ON BENNS CHURCH BOULEVARD (RTE. 10) FROM RURAL AGRICULTURAL CONSERVATION TO CONDITIONAL -PLANNED DEVELOPMENT - MIXED USE TO ALLOW UP TO 390 AGE RESTRICTED SINGLE FAMILY DETACHED RESIDENCES, 225 UNRESTRICTED TOWNHOME RESIDENCES, AND FIVE ACRES OF COMMERCIAL USES

WHEREAS, NVR, Inc., applicant, and Henry Layden, special trustee for the William Grover Yeoman, III Trust, property owner have requested Conditional Zoning (ZA-06-19) for approximately 250 acres of tax map number 32-01-009 located on Benns Grant Boulevard (Rte. 10) from the Rural Agricultural Conservation zoning district to the Conditional - Planned Development - Mixed Use zoning district to allow up to 390 age-restricted single family detached residential units, 225 residential townhomes, and approximately five acres of commercial uses to include up to 18,000 square feet of retail and commercial uses and up to 55,000 square feet of office uses; and

WHEREAS the procedural requirements for the consideration of this request by the Planning Commission have been met.

NOW, THEREFORE, BE IT RESOLVED by the Planning Commission of Isle of Wight County, that:

Section 1. Findings.

_____ A. The Isle of Wight County Planning Commission finds that the proposed amendment to conditional zoning is reasonable and warranted due to a change in circumstances affecting the property and has considered the following factors and finds that the proposed rezoning does not conflict with:

1. the existing use and character of property within the County;

2. the Comprehensive Plan;

3. the suitability of the property for various uses;

4. the trends of growth or change;

5. the current or future requirements of the community as to land for various purposes as determined by population and economic studies and other studies;

6. the transportation requirements of the community;

7. the requirements for airports, housing, schools, parks, playgrounds, recreation areas and other public services;

8. the conservation of natural resources;

9. the preservation of floodplains;

10. the preservation of agricultural and forestal land;

11. the conservation of properties and their values; and

12. the encouragement of the most appropriate use of land throughout the County.

_____ B. The Isle of Wight County Planning Commission does not find that the proposed zoning map amendment is reasonable based on the consideration of the factors listed herein.

Section 2. Recommendation to Board of Supervisors.

The Planning Commission recommends to the Board of Supervisors that the request ZA-6-19 be:

___ a. Granted as submitted, and that the Board of Supervisors adopt the proposed Ordinance without modification.

___b. Denied, and that Board of Supervisors not adopt the proposed Ordinance.

___c. Granted with the proffered conditions set forth on the attached proffer statement, and that the Board of Supervisors adopt the proposed Ordinance with such conditions.

DATE: _____

READ AND PASSED:_____
Chairman, Isle of Wight County Planning Commission

TESTE:_____
Secretary, Isle of Wight County Planning Commission

Approved as to Form:

_____
Robert W. Jones, Jr., County Attorney

Isle of Wight County Schools
PREPARING STUDENTS FOR COLLEGE, CAREER AND LIFE

TO: Amy Ring, Director, Community Development
FROM: Dr. Theo Cramer, Superintendent
DATE: September 25, 2023
RE: Sweetgrass Project Revision: Conditional Zoning Request ZA-6-19; 14096 Benns Church Blvd., Smithfield, VA 23430, Tax Parcel # 32-01-009

Isle of Wight County Schools will see a significant impact from the proposed Sweetgrass development. Using the Tischler Bise Capital Impacts Model from the county, the residential units will generate additional students in the northern end of the county. The division recently rezoned the Sweetgrass area to Hardy Elementary School. Fortunately, Hardy Elementary, along with Westside Elementary, Smithfield Middle and Smithfield High have building space for the additional students.

However, there will be impacts on Isle of Wight County Schools from the enrollment increase. While the buildings may have space for the added students, the current staffing configuration does not. The projected elementary student increase will necessitate hiring at least 1 general education teacher for Hardy Elementary. An additional dedicated bus and driver is also required as the current transportation situation will not accommodate more elementary students.

Our current special education population is approximately 15% of our overall student population. Projecting with those figures, Smithfield High School will need an additional special education teacher and instructional assistant. We also expect to add a special needs bus, driver and assistant for the development.

Other impacts the division will realize include purchasing:

- Teaching resources needed for additional classrooms, teachers and students including but not limited to textbooks, instructional resources and technology resources.
- Furniture to accommodate increased enrollment.

There is the potential for other impacts, as well. IWCS must adhere to the Virginia Standards of Quality regarding class size:

"(i) 24 to one in kindergarten with no class being larger than 29 students; if the average daily membership in any kindergarten class exceeds 24 pupils, a full-time teacher's aide shall be assigned to the class; (ii) 24 to one in grades one, two, and three with no class being larger than 30 students; (iii) 25 to one in grades four through six with no class being larger than 35 students; and (iv) 24 to one in English classes in grades six through 12." § 22.1-253.13:2.

Depending on the grade levels of the new students and their course of study, there may be further staffing needs throughout the division.

In conclusion, Isle of Wight County Schools anticipates a significant financial impact from the proposed development.

Amy Ring

From: Tammie Clary <tclary@smithfieldva.gov>
Sent: Monday, October 16, 2023 10:51 AM
To: Amy Ring
Subject: RE: Sweetgrass PD-MX Conditional Zoning application

Caution: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Good Morning,

Below please find comments from the TOS Planning Commission on the proposed Sweetgrass project:

1. They believe it is a better plan than before; however, they would like to see more green space in the front of the development, removing the rear load dwellings near Recreational Area 2.
2. They would prefer greater side yard setbacks, and greater widths for the lots.
3. They are not in favor of the three house repeat.
4. They would like to see consideration to the roadways, accounting for on street parking on both sides of the street, while still allowing for two-way travel lanes.
5. They would like the opportunity to provide additional comments as the plan progresses.

Please let me know if you have any questions or concerns.

Thank you.

Best,

TAMMIE CLARY
Community Development & Planning Director
Town of Smithfield, Virginia
310 Institute St, Smithfield, VA 23430
1-(757)-365-4200

From: Amy Ring <aring@isleofwightus.net>
Sent: Wednesday, September 13, 2023 11:46 AM
To: Tammie Clary <tclary@smithfieldva.gov>
Subject: Sweetgrass PD-MX Conditional Zoning application

Caution: This email originated from outside of the organization. Do not click links or open attachments unless you recognize the sender and know the content is safe.

Good Morning, Tammy,

You may have received a letter from us recently in regard to the upcoming public hearing for the proposed Sweetgrass conditional Planned Development-Mixed Use project on Route 10 adjacent to the Sherwin Williams paint store. As you recall, you all submitted comments on it previously, and it has since gone through several iterations since 2019. I'll be sending you the narrative, proffer statement, FIA, and TIA for your information via the Wetransfer site due to file size, should you choose to make comment. The staff report will be posted with the agenda next Wednesday evening. Have a good rest of the week, Amy

Amy M. Ring, AICP
Community Development Director
PO BOX 80, Isle of Wight, VA 23397
(757) 365-6210

Amy Ring

From: Christopher A. Morello
Sent: Monday, October 16, 2023 2:23 PM
To: Amy Ring
Cc: Kristi Sutphin
Subject: Comments: ZA-06-19 Conditional Rezoning request

Good afternoon, Amy –

Economic Development supports this conditional rezoning request and Sweetgrass' introduction of new housing that includes more affordable ownership options, hopefully many priced at less than $300,000 when completed. Up to 615 total units represents a potentially strong boost to small businesses in the county, as well. Ideally, the commercial space will be leased to tenants with services important to residents of the Sweetgrass community.

We note the concept plan's positive land use approach of placing commercial buildings close to Benns Church and most parking out of street view. In the Retail Center Design guidelines, an interesting façade is submitted as a sample for the retail. The office building sample, however, is architecturally incongruent with the retail aesthetic, monolithically brick & glass, and looks "dated." We'd recommend change consistent with the retail design and the spirit of the guidelines/standards, as written.

Please let us know if you have any questions about these comments.

- **Chris**

Christopher A. Morello (Chris) | Isle Biz Rocks !
Director, Isle of Wight County Economic Development
Cell: (757) 345-1048 | *Desk:* (757) 356-1969
Chris on LinkedIn | Email Chris

Local Roots, Global Reach

COOPERATIVE STRATEGIES

COMPLETE FINANCIAL & DEMOGRAPHIC PLANNING FOR EDUCATION

ISLE OF WIGHT COUNTY SCHOOLS
2022-23 HOUSING STUDY
OCTOBER, 2023

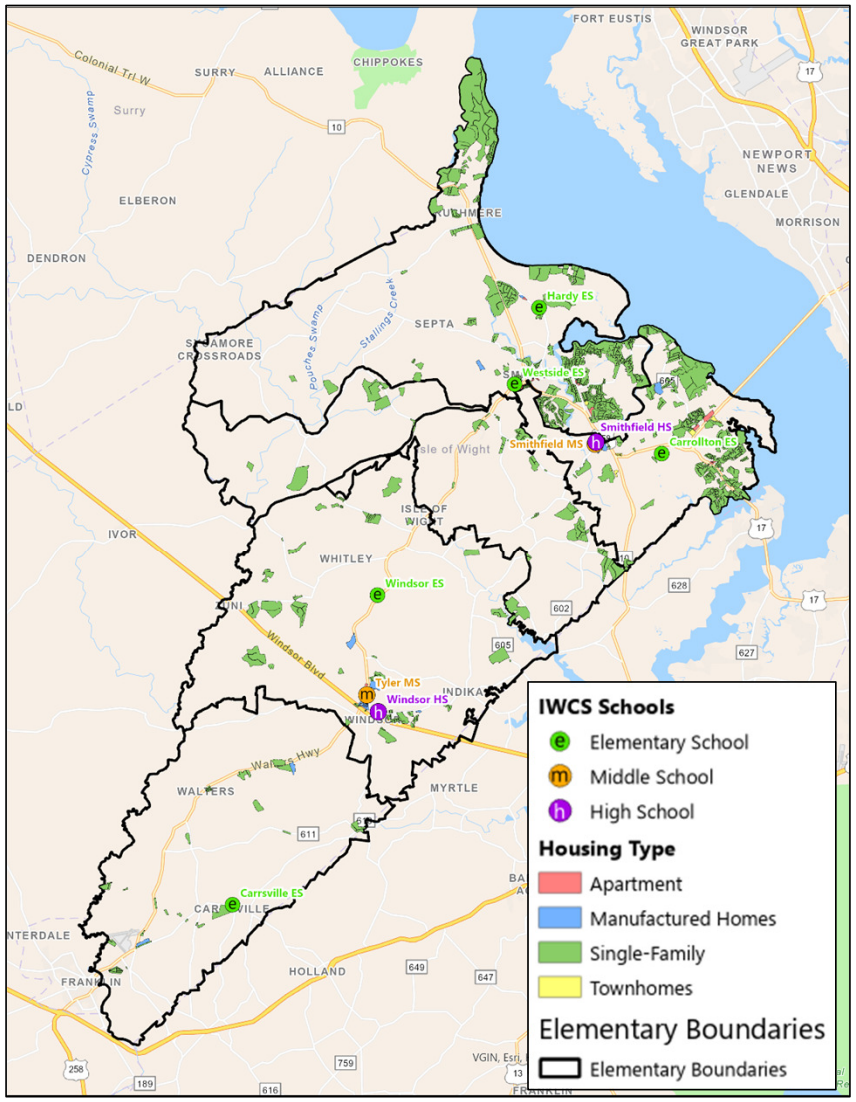
▶ SUBDIVISION YIELD ANALYSIS

INTRODUCTION

Measures the impact that housing has on student enrollment

Study is based on student yields

- Ratio of students divided by housing units
- 5 students / 10 homes = 0.5 students/unit



▶ SUBDIVISION YIELD ANALYSIS

EXISTING HOUSING

Housing Type	Units	22-23 Students	22-23 Yield
Apartment	1,121	379	0.338
Manufactured Home	1,174	427	0.364
Single Family Home	8,380	2,888	0.345
Townhome	577	172	0.298
Total	**11,252**	**3,866**	**0.344**

▶ SUBDIVISION YIELD ANALYSIS

K-3 Yield by Boundary	Apartment	Manufactured Home	Single Family Home	Townhome
Carrollton/Westside 4-6	0.09	0.12	0.13	0.09
Carrsville ES	-	0.07	0.12	-
Hardy ES/Westside 4-5	-	-	0.04	-
Hardy ES/Westside 4-6	0.15	0.06	0.07	0.16
Windsor ES	0.09	0.12	0.10	-
Windsor ES/Westside 6	-	-	0.05	-
K-3 Subtotal	**0.11**	**0.10**	**0.09**	**0.09**

5-6 Yield by Boundary	Apartment	Manufactured Home	Single Family Home	Townhome
Carrollton/Westside 4-6	0.03	0.04	0.07	0.05
Carrsville ES	-	0.03	0.03	-
Hardy ES/Westside 4-5	-	-	0.01	-
Hardy ES/Westside 4-6	0.03	0.04	0.04	0.04
Windsor ES*	0.05	0.03	0.04	-
Windsor ES/Westside 6	-	-	0.04	-
5-6 Subtotal	**0.04**	**0.03**	**0.05**	**0.05**

*5th only

4th Grade Yield by Boundary	Apartment	Manufactured Home	Single Family Home	Townhome
Carrollton/Westside 4-6	0.02	0.04	0.04	0.02
Carrsville ES	-	0.02	0.02	-
Hardy ES/Westside 4-5	-	-	0.01	-
Hardy ES/Westside 4-6	0.03	0.03	0.02	0.05
Windsor ES	0.05	0.03	0.03	-
Windsor ES/Westside 6	-	-	0.01	-
4th Subtotal	**0.02**	**0.03**	**0.03**	**0.03**

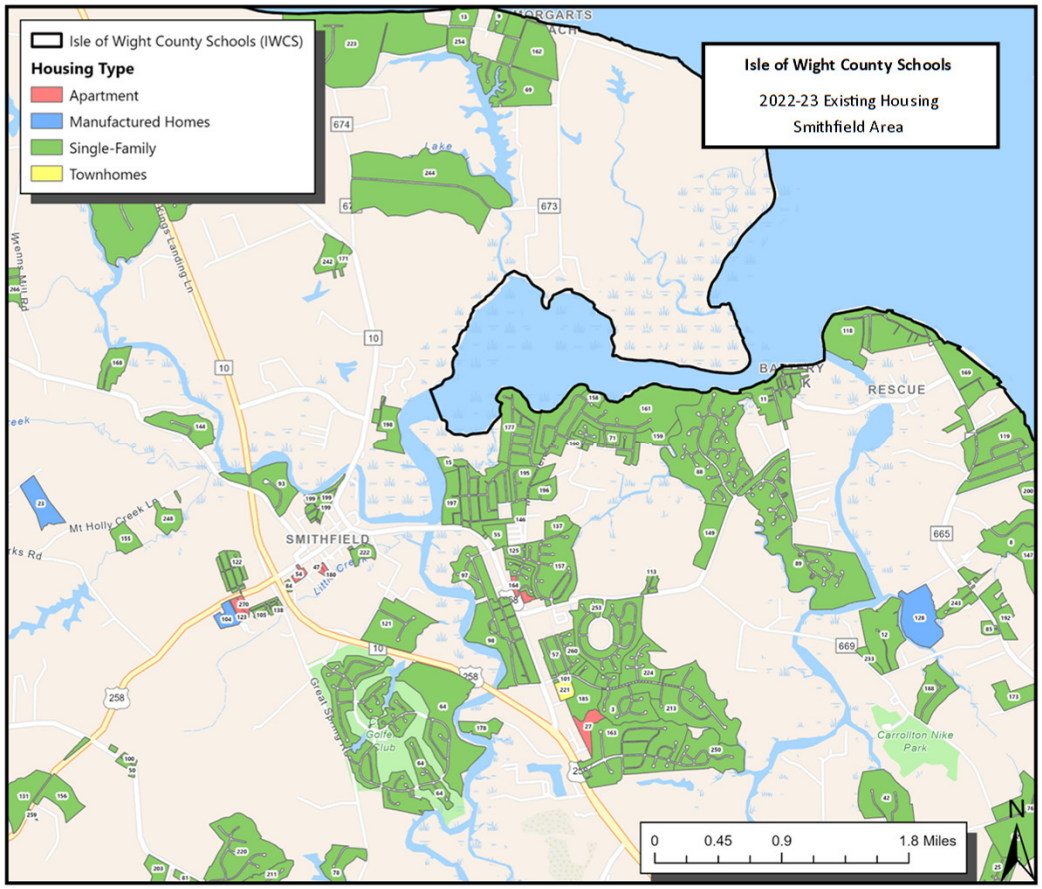
Middle & High School Yield by Boundary	Apartment	Manufactured Home	Single Family Home	Townhome
Optional MS**	-	-	0.05	-
Smithfield MS**	0.06	0.06	0.05	0.04
Tyler MS***	0.06	0.10	0.07	-
Middle Subtotal	**0.06**	**0.08**	**0.06**	**0.04**
Optional HS	-	-	0.09	-
Smithfield HS	0.10	0.12	0.12	0.09
Windsor HS	0.14	0.11	0.10	-
High Subtotal	**0.10**	**0.11**	**0.12**	**0.09**

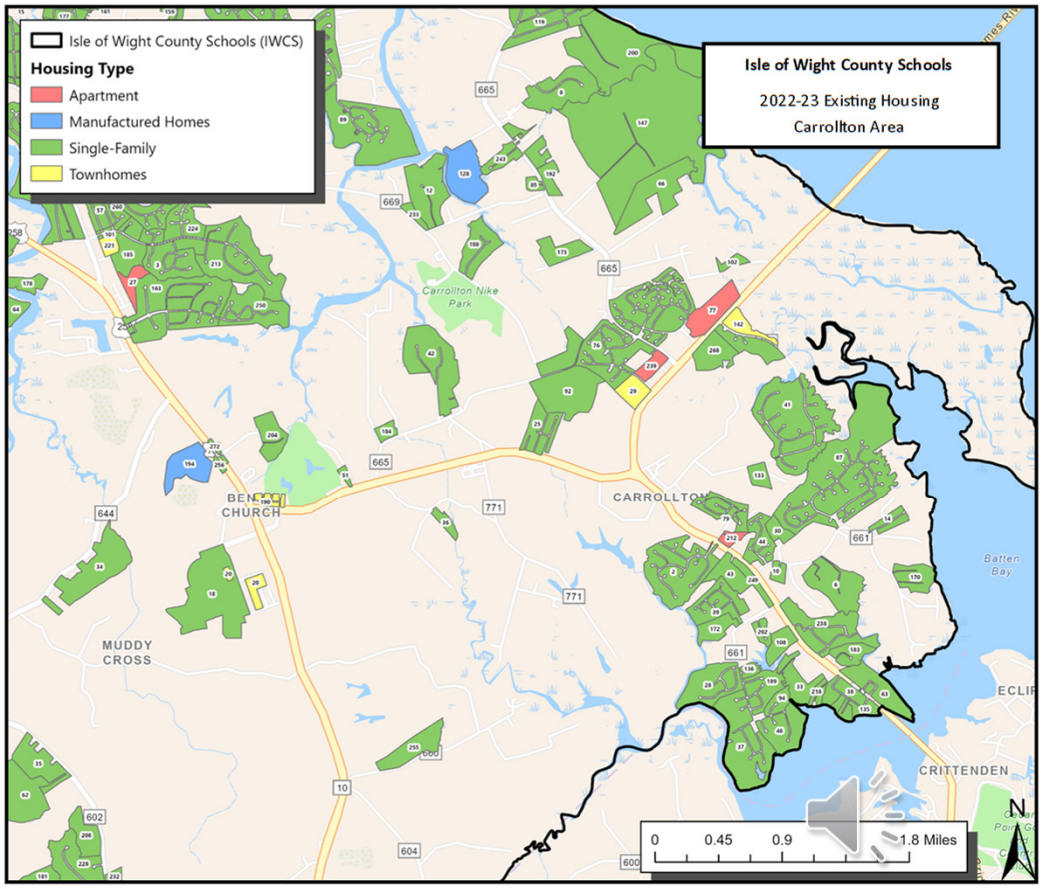
**7th-8th only

***6th-8th

▶ SUBDIVISION YIELD ANALYSIS

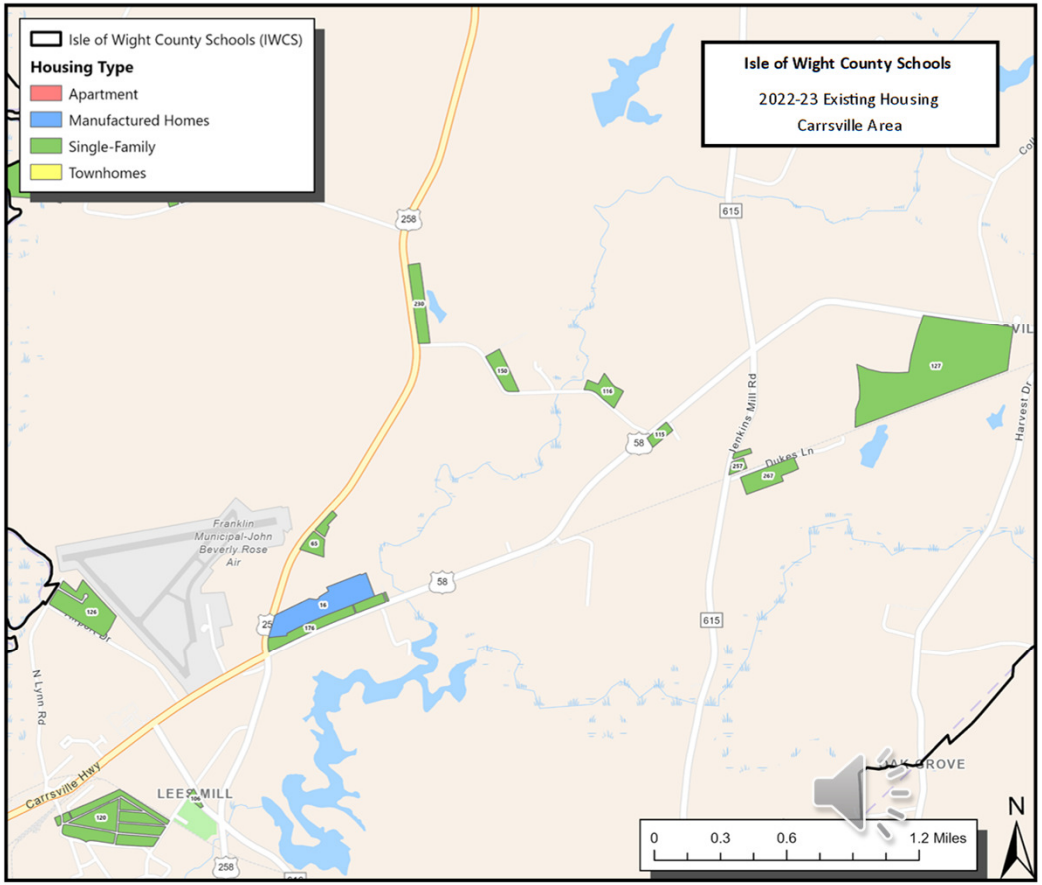
EXISTING HOUSING





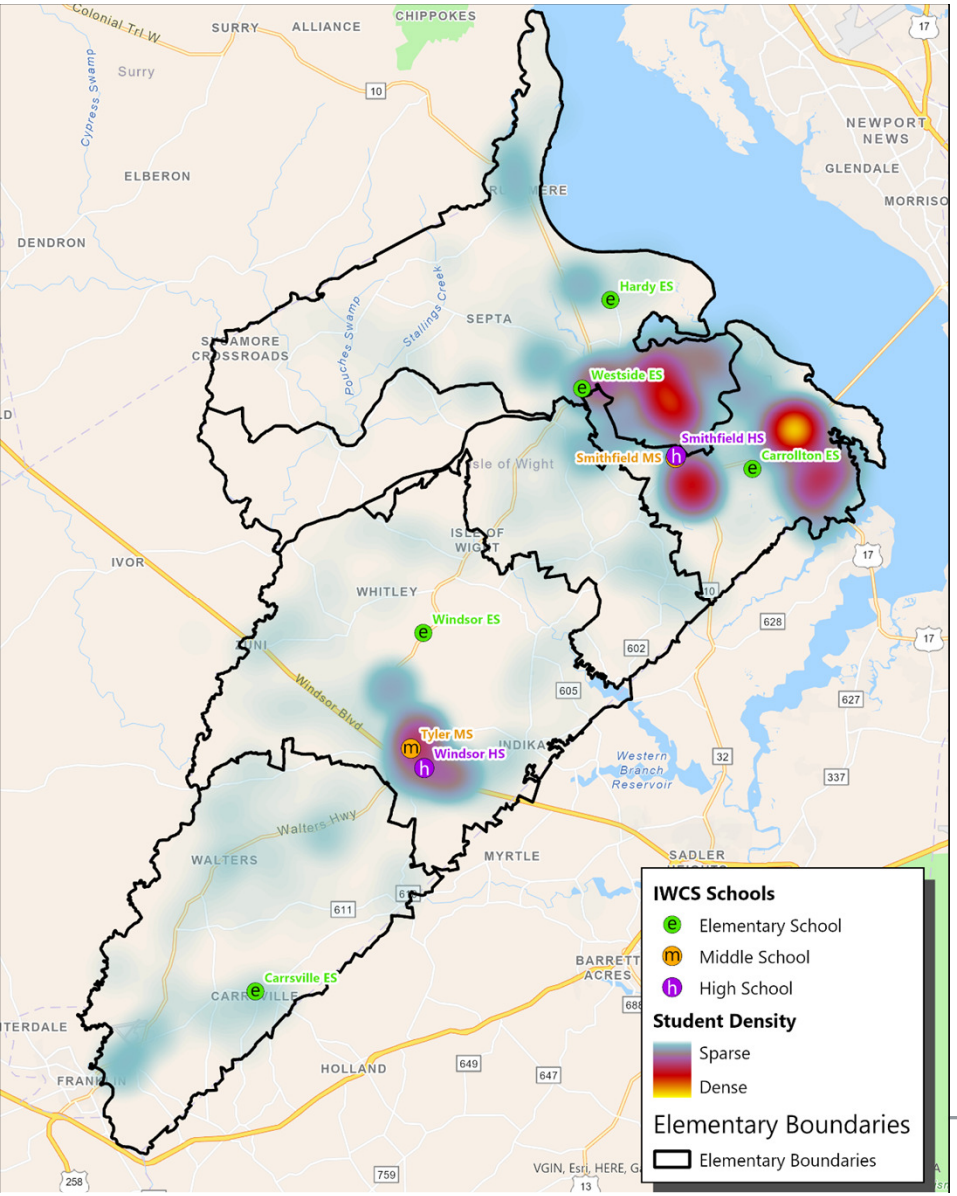
▶ SUBDIVISION YIELD ANALYSIS

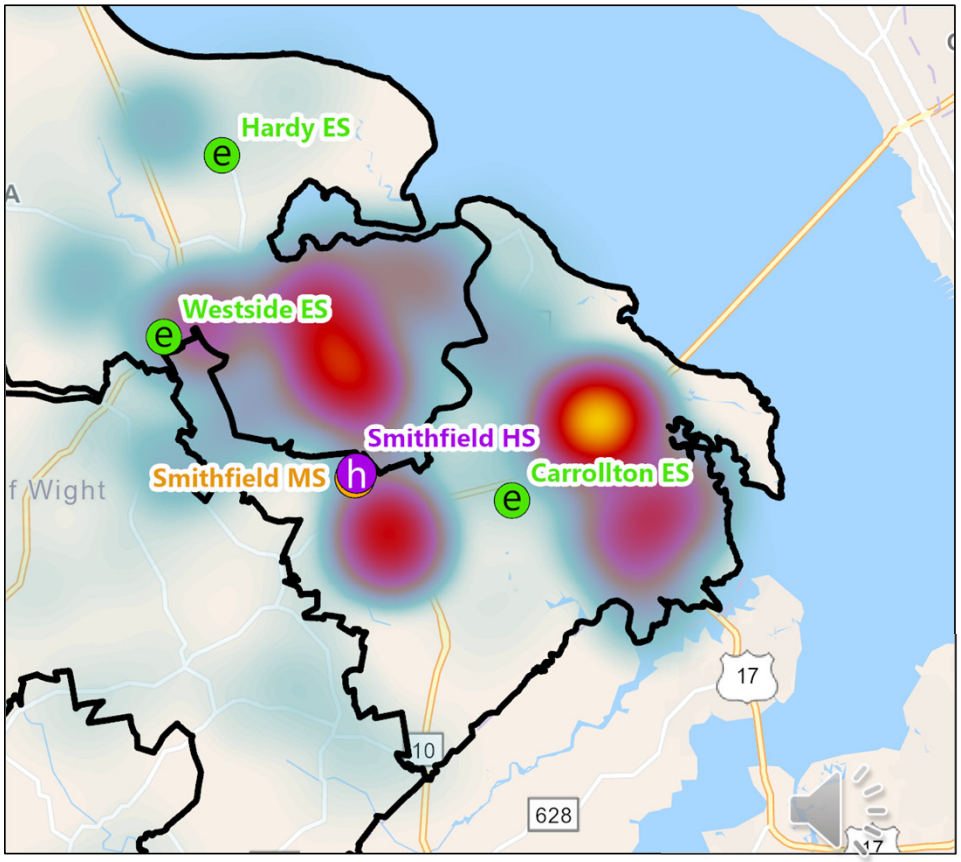
EXISTING HOUSING



▶ SUBDIVISION YIELD ANALYSIS

STUDENT DENSITY





▶ SUBDIVISION YIELD ANALYSIS

HOUSING DEVELOPMENTS

	Development Information					Student Potential							
	Map ID	Name	Type	Status	Units	ES Boundary	MS/HS Boundary	K-3	4	5-6	7-8	9-12	K-12
Active & Planned Developments	1	The Park at Battery	Condo/Townhome	Approved	150	Hardy ES/Westside 4-6	Smithfield MS/HS	14	4	8	6	13	45
	2	Mallory Point/Scott's Farm	Single-Family	Under Design	614	Hardy ES/Westside 4-6	Smithfield MS/HS	58	17	30	34	71	210
			Duplex		198	Hardy ES/Westside 4-6	Smithfield MS/HS	22	5	8	12	20	67
	3	Timber Preserve	Single-Family	Approved	340	Carrollton/Westside 4-6	Smithfield MS/HS	32	9	17	19	39	116
	4	Benn's Grant	Apartments	Under Construction	240	Carrollton/Westside 4-6	Smithfield MS/HS	27	6	10	14	24	81
	5	St. Luke's Village	Single-Family	Approved	179	Carrollton/Westside 4-6	Smithfield MS/HS	17	5	9	10	21	62
	6	Brewer's Station	Single-Family	Under Construction	99	Carrollton/Westside 4-6	Smithfield MS/HS	9	3	5	6	11	34
	7	The Crossings	Single-Family	Under Construction	262	Carrollton/Westside 4-6	Smithfield MS/HS	25	7	13	15	30	90
	8	Archer's Meade	Single-Family	Under Design	63	Carrollton/Westside 4-6	Smithfield MS/HS	6	2	3	4	7	22
	9	Cypress Creek Phase 6	Single-Family	Under Construction	61	Hardy ES/Westside 4-6	Smithfield MS/HS	6	2	3	3	7	21
	10	Bridge Point Commons	Apartments	Under Design	350	Carrollton/Westside 4-6	Smithfield MS/HS	39	9	14	21	35	118
	Active & Planned Subtotal				**2,556**	-		**255**	**69**	**120**	**144**	**278**	**866**
Proposed	11	The Grange at 10Main	Single-Family	Future	58	Hardy ES/Westside 4-6	Smithfield MS/HS	5	2	3	3	7	20
		The Grange at 10Main	Apartments/Duplex		246	Hardy ES/Westside 4-6	Smithfield MS/HS	28	6	10	15	25	84
	12	Sweetgrass	Single Family	Future	225	Hardy ES/Westside 4-6	Smithfield MS/HS	21	6	11	13	26	77
	13	Kemp's Village East at Carrollton	Condo/Townhome	Future	35	Carrollton/Westside 4-6	Smithfield MS/HS	3	1	2	1	3	10
	Proposed Subtotal				**564**	-		**57**	**15**	**26**	**32**	**61**	**191**

As of Spring 2023:

Active & Planned:

+ 255 K-3
+ 69 4th
+ 120 5-6
+ 144 7-8
+ 278 9-12

Proposed:

+ 57 K-3
+ 15 4th
+ 26 5-6
+ 32 7-8
+ 61 9-12

▶ SUBDIVISION YIELD ANALYSIS

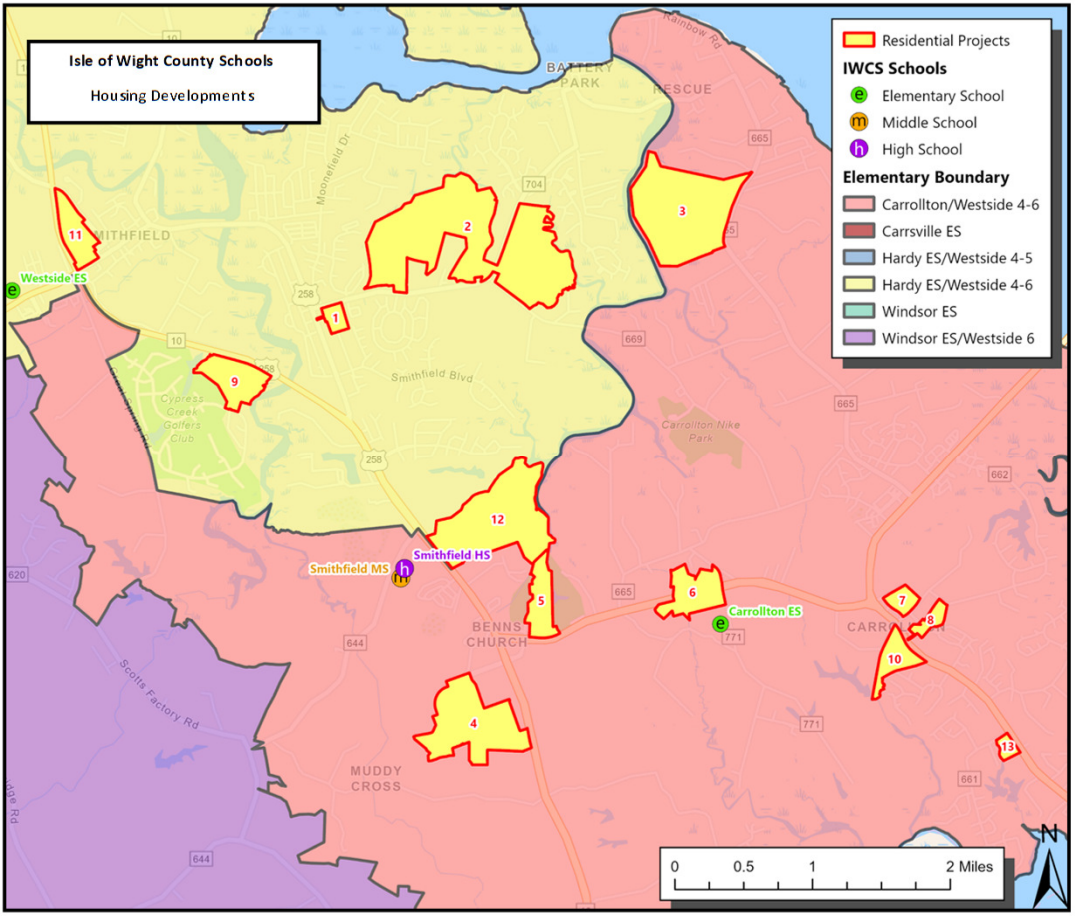
IMPACT TO SCHOOLS

School	Oct 31 Enrollment*	Capacity	Utilization	+ Housing Development	Future Utilization
Carrollton Elementary (PreK-3)	563	674	84%	158	107%
Carrsville Elementary (PreK-5)	246	310	79%		79%
Hardy Elementary (PreK-4)	639	1,011	63%	196	83%
Westside Elementary (4-6)	742	849	87%	188	110%
Windsor Elementary (PreK-5)	610	735	83%		83%
Georgie Tyler Middle (6-8)	366	535	68%		68%
Smithfield Middle (7, 8)	602	634	95%	176	123%
Smithfield High (9-12)	1,305	1,560	84%	339	105%
Windsor High (9-12)	524	875	60%		60%
TOTAL	**5,597**	**7,183**	**78%**	**1,057**	**93%**

*PK enrollment includes VPI, PK SPED, SPED intensive support, & PK Peer Models

▶ SUBDIVISION YIELD ANALYSIS

HOUSING DEVELOPMENTS



Development Concentration:

- Northern Carrollton boundary
- South to mid Hardy boundary

Heavily Impacted Schools:

- Carrollton ES
- Hardy ES
- Westside 4-6
- Smithfield MS
- Smithfield HS

Student Potential by Boundary & Grade Configuration	
Carrollton/Westside 4-6	158
Carrsville ES	0
Hardy ES/Westside 4-5	0
Hardy ES/Westside 4-6	154
Windsor ES	0
Windsor ES/Westside 6	0
K-3 Subtotal	**312**
Carrollton/Westside 4-6	42
Carrsville ES	0
Hardy ES/Westside 4-5	0
Hardy ES/Westside 4-6	42
Windsor ES	0
Windsor ES/Westside 6	0
4th Subtotal	**84**
Carrollton/Westside 4-6	73
Carrsville ES	0
Hardy ES/Westside 4-5	0
Hardy ES/Westside 4-6	73
Windsor ES*	0
Windsor ES/Westside 6	0
5-6 Subtotal	**146**
Optional MS	0
Smithfield MS	176
Tyler MS	0
Middle Subtotal	**176**
Optional HS	0
Smithfield HS	339
Windsor HS	0
High Subtotal	**339**
Total	**1,057**

▶ SUBDIVISION YIELD ANALYSIS

FACILITIES IDEAS

K-6/7-8 Option (requires redistricting)						
School	**23-24 Enrollment**	**Capacity**	**Utilization**	**+ Housing Development**	**Future Utilization**	**Facilities Considerations**
Carrollton Elementary (PreK-6)	2,926	3,579	82%	542	97%	Additions, or construct Westside ES larger than current, or construct new North side elementary
Carrsville Elementary (PreK-6)						
Hardy Elementary (PreK-6)						
Windsor Elementary (PreK-6)						
Westside Elementary (PreK-6)						
Georgie Tyler Middle (7-8)	840	1,169	72%	176	87%	Continue to track enrollment trends
Smithfield Middle (7-8)						
Smithfield High (9-12)	1,824	2,435	75%	339	89%	Continue to track enrollment trends
Windsor High (9-12)						
TOTAL	**5,590**	**7,183**	**78%**	**1,057**	**93%**	-

▶ SUBDIVISION YIELD ANALYSIS

FACILITIES IDEAS

K-5/6-8 Option (requires redistricting)						
School	**23-24 Enrollment**	**Capacity**	**Utilization**	**+ Housing Development**	**Future Utilization**	**Facilities Considerations**
Carrollton Elementary (PreK-5)	2,523	2,730	92%	469	110%	Construct new North side elementary
Carrsville Elementary (PreK-5)						
Hardy Elementary (PreK-5)						
Windsor Elementary (PreK-5)						
Westside Elementary (6-8)	1,243	2,018	62%	249	74%	-
Georgie Tyler Middle (6-8)						
Smithfield Middle (6-8)						
Smithfield High (9-12)	1,824	2,435	75%	339	89%	Continue to track enrollment trends
Windsor High (9-12)						
TOTAL	**5,590**	**7,183**	**78%**	**1,057**	**93%**	-

▶ SUBDIVISION YIELD ANALYSIS

FACILITIES IDEAS

K-3/4-6/7-8 Option (requires redistricting)						
School	**23-24 Enrollment**	**Capacity**	**Utilization**	**+ Housing Development**	**Future Utilization**	**Facilities Considerations**
Carrollton Elementary (PreK-3)	1,681	1,995	84%	312	100%	Addition(s), or construct new North side elementary
Carrsville Elementary (PreK-3)						
Hardy Elementary (PreK-3)						
Windsor Elementary (4-6)	1,245	1,584	79%	230	93%	Addition, or construct Westside ES larger than current
Westside Elementary (4-6)						
Georgie Tyler Middle (7-8)	840	1,169	72%	176	87%	Continue to track enrollment trends
Smithfield Middle (7-8)						
Smithfield High (9-12)	1,824	2,435	75%	339	89%	Continue to track enrollment trends
Windsor High (9-12)						
TOTAL	**5,590**	**7,183**	**78%**	**1,057**	**93%**	-

▶ SUBDIVISION YIELD ANALYSIS

FACILITIES IDEAS

K-4/5-7/8-9/10-12 Option (requires redistricting)						
School	**23-24 Enrollment**	**Capacity**	**Utilization**	**+ Housing Development**	**Future Utilization**	**Facilities Considerations**
Carrollton Elementary (PreK-4)	2,107	1,995	106%	396	125%	Construct new elementary
Carrsville Elementary (PreK-4)						
Hardy Elementary (PreK-4)						
Windsor Elementary (5-7)	1,228	1,584	78%	234	92%	Addition, or construct Westside ES larger than current
Westside Elementary (5-7)						
Georgie Tyler Middle (8-9)	941	1,169	80%	173	95%	Addition(s)
Smithfield Middle (8-9)						
Smithfield High (10-12)	1,314	2,435	54%	254	64%	-
Windsor High (10-12)						
TOTAL	**5,590**	**7,183**	**78%**	**1,057**	**93%**	-

COOPERATIVE STRATEGIES

COMPLETE FINANCIAL & DEMOGRAPHIC PLANNING FOR EDUCATION

THANK YOU

WE APPRECIATE YOUR TIME

PLANNING REPORT

APPLICATION:

Application of Elizabeth K. Russell, property owner, for a height exception to Section 4-2006.A of the Zoning Ordinance for a proposed single-family dwelling, to be located at 9615 Old Stage Highway on property with tax map number 13-01-048C which will exceed the maximum height of 35 feet by eight feet, eight inches for a total height of 43 feet, 8 inches.

ELECTION DISTRICT:

D1

LOCATION:

The property is located at 9615 Old Stage Highway. The jurisdictional limits of the Town of Smithfield is approximately 0.4 miles to the south. Hardy Elementary School is located approximately 1 mile to the northwest, and the parcel is located on the bank of the Pagan River. The current use of the property is single-family residential.

BACKGROUND:

In June 2020, the applicant constructed a two-story single-family dwelling on the parcel. In September 2023, the applicant applied for building and zoning permits to construct a large expansion to the existing single-family dwelling. During site plan review, staff advised the applicant that the proposed 43 foot, eight inch tall tower feature would exceed the maximum height limit for the Rural Agricultural Conservation (RAC) zoning district by eight feet, eight inches.

DESCRIPTION:

The applicant is requesting a building height exception in accordance with Section 5-2000.D.5 for a single-family dwelling, to exceed the maximum building height of thirty-five (35) feet for the RAC zoning district. A copy of the applicant's narrative and building elevations is included with this staff report.

COMPREHENSIVE LAND USE PLAN:

The future recommended land use designation for the subject property is Rural Agricultural Conservation (RAC) and Environmental Conservation (EC). The

role of the RAC designation is to maintain and conserve rural character and farmlands, and to provide for a full range of agricultural and farming activities and related uses, along with some low-density residential development. EC encompasses familiar wetland types such as marshes, rivers, streams, resource protection areas, and a protective buffer around those features. It also includes large areas of forested wetlands which often are not as discernable as wetlands. Due to their important environmental role and unsuitability for development, floodplains and steep slopes are also included. Preserving the environment including protecting wetlands, wildlife, and tree preservation are extremely important.

ORDINANCE REVIEW:

The property is zoned Rural Agricultural Conservation (RAC), and Section 4-2006.A of the Zoning Ordinance limits building heights to 35 feet or three stories, whichever is less. The property is in the Chesapeake Bay Preservation Area overlay district, which contains a RPA and RPA buffer area. The owner is not proposing any impacts to the RPA buffer area.

An exception to the height limitation under Section 5-2000.D.5 can be granted by the Board of Supervisors with a recommendation by the Planning Commission with or without reasonable conditions.

AGENCY REVIEW:

This application did not require outside agency or departmental review.

STAFF CONCLUSIONS:

Based on an analysis of this application, staff finds the following strengths and weaknesses:

Strengths:

1. The proposed structure is not visible from Old Stage Highway and may have limited visibility from across different points of the Pagan River.

Weaknesses:

1. The proposed building height exceeds the maximum height permitted in Section 4-2006.A of the Zoning Ordinance.
2. The property owner has the ability to meet the Zoning Ordinance requirement and granting approval would provide a special privilege not

otherwise enjoyed by other property owners.

STAFF RECOMMENDATION:

Staff recommends denial of the request due to the ability of the property owner to meet the Zoning Ordinance requirements without an exception.

ATTACHMENTS:

Description	Type	Upload Date
Application and Narrative	Cover Memo	10/31/2023
Proposed Site Plan	Backup Material	10/31/2023
Site Images	Backup Material	10/31/2023
Location Map	Backup Material	10/31/2023
Land Use Map	Backup Material	10/31/2023
Zoning Map	Backup Material	10/31/2023

RIDDICK & POPE, PC
ATTORNEYS AND COUNSELORS AT LAW

William H. Riddick, III
wriddick@rplawva.com

Ashby Leigh Pope
apope@rplawva.com

RECEIVED
OCT 11 2023
By: CBD

28843
Exc-11-23

October 10, 2023

Amy Ring
Director of Community Development
Monument Circle
Isle of Wight, VA 23397

RE: Application of Elizabeth K. Russell
Height exception

Dear Amy:

I represent Elizabeth K. Russell. Attached hereto is her application for a height exception for a personal residence along with all of the requisite copies. Please review this and set if for a hearing before the Planning Commission at the earliest opportunity.

Please let me know if you require anything further.

Yours very truly,

William H. Riddick, III

Local Roots, Global Reach
ISLE OF WIGHT
COUNTY, VIRGINIA
DEPARTMENT OF COMMUNITY DEVELOPMENT

APPLICATION FOR EXCEPTIONS

This application should be used to petition for an exception for certain uses which, because of their unique characteristics, but which may, under the right set of circumstances and conditions be acceptable.

A. APPLICATION FOR (CHECK ALL THAT APPLY):

[ ] Chesapeake Bay Preservation Area Ordinance Exception

[ ] Newport Development Service Overlay District Exception

[ ] Highway Corridor Overlay District Exception

[ ] Signage Exception

[ ] Subdivision Ordinance Waiver

[x] Other (please list) RAC Zoning Height Exception

The proposal is a request to Section (s)_____of the Chesapeake Bay Preservation Area Ordinance, the Isle of Wight County Zoning Ordinance, or the Isle of Wight County Subdivision Ordinance.

Proposed Use or Activity: single family residential

B. APPLICATION INFORMATION:

Applicants Name: Elizabeth K. Russell

Address: 9615 Old Stage Highway, Smithfield, VA 23430

Email: brussell@holidayice.com Phone: 757 544-1000

Property Owners Name: Elizabeth K. Russell

Address: 9615 Old Stage Highway, Smithfield, VA 23430

C. **PROJECT DESCRIPTION:**

Project Name: Russell residence

Property Address (if any): 9615 Old Stage Highway, Smithfield, VA 23430

Comprehensive Plan Designation: Rural Agricultural Conservation & Environmental Conservation

The exception will apply to 13.58 acres out of 13.58 total acres

Tax Parcel Identification # 13-01-048C Number of acres to be effected: 13.58

Proposed Utilities (check all that apply): Public Water__Private Well X

Public Sewer_____Private Septic X

NOTICE: THE ATTACHED CHECKLIST MUST BE COMPLETED, CERTIFIED, AND SUBMITTED OR THE APPLICATION WILL BE CONSIDERED INCOMPLETE.

Remit Application to: Isle of Wight County Central Permitting, 17140 Monument Circle, Suite 100
P. O. Box 80, Isle of Wight, Virginia 23397

Elizabeth Russell 10-5-23

Applicant Signature **Date**

Owner Signature *if different* **Date**

FOR OFFICE USE ONLY:

Complete Application Received On: 10/16/23 Fees Paid: _____

Tax Query: [ ] Current [ ] Delinquent Distribution Date: _____

Posted/Date to Post: _____

AGENCIES REFERRALS:

_____Department of Conservation & Recreation
_____Economic Development
_____Emergency Services
_____General Services
_____Environmental Planner
_____Health Department
_____Transportation Manager
_____Commission of Revenue
_____Other _____

_____Inspections
_____Sheriff's Office
_____Town of Smithfield
_____Town of Windsor
_____VDOT
_____Schools
_____Budget & Finance
_____County Attorney

Verified By: CK Date: 10/16/23

COUNTY OF ISLE OF WIGHT
DISCLOSURE OF REAL ESTATE HOLDINGS

Applicant: Elizabeth K. Russell

Address: 9615 Old Stage Highway, Smithfield, VA 23430

REAL ESTATE HOLDINGS TO BE AFFECTED

Location or Address	Description
9615 Old Stage Highway, Smithfield, VA 23430	13.58 acres

OTHER OWNERS OF AFFECTED REAL ESTATE
(Not Required for Corporation whose stock is traded on a national or local stock exchange or having more than 500 shareholders.)

Name of Individuals Corporation/PartnershipBusiness Association	Address

Does any member of the Isle of Wight County Planning Commission or governing body have any interest in such property, either individually, by ownership of stock in a corporation owning such land, partnership, as the beneficiary of a trust, or the settlor of a revocable trust, or whether a member of the immediate household of any member of the Planning Commission or governing body has any such interest? xxXxxx No

If yes, names of members:

I do solemnly swear that the foregoing statement(s) and attachments(s), if any, are complete, correct, and true.

Applicant: Elizabeth K. Russell (Printed or Typed Name) Applicant: Elizabeth Russell (Signature) Date: 10-5-23

Commonwealth of Virginia
County of Isle of Wight

Subscribed and sworn to before me William H. Riddick III,
A Notary Public in and for the County of Isle of Wight, Commonwealth of Virginia, this 5th day of October, 2023.

Notary Public

My Commission Expires 3-31-2025

WILLIAM H. RIDDICK, III NOTARY PUBLIC MY COMMISSION NUMBER 150494 COMMONWEALTH OF VIRGINIA

STATEMENT OF REASONS FOR EXCEPTION APPLICATION

James F. Russell and Elizabeth K. Russell are the owners of a tract of land identified as Tax Map Parcel No. 13-01-048 containing 310.70 acres. From that parcel they subdivided a separate home site containing 13. 58 acres identified as Tax Map Parcel No. 13-01-048C which is located on a private driveway which is approximately 4200 feet from Old Stage Highway. The home site is not readily visible from Old Stage Highway. The Russells are proposing the construction of a timber frame single family dwelling, a copy of the elevations of which is attached with this application. The design of the home includes a stair tower which is an integral and important part of the overall design. It is an important structural component of the home and not just aesthetic although it is also very important to the overall appearance of the home. The height of the tower is 43' 8". The Russells are seeking a building height exception to permit the construction of the dwelling with the tower height of 43' 8" which exceeds the maximum permitted height of 35" by 8' 8".

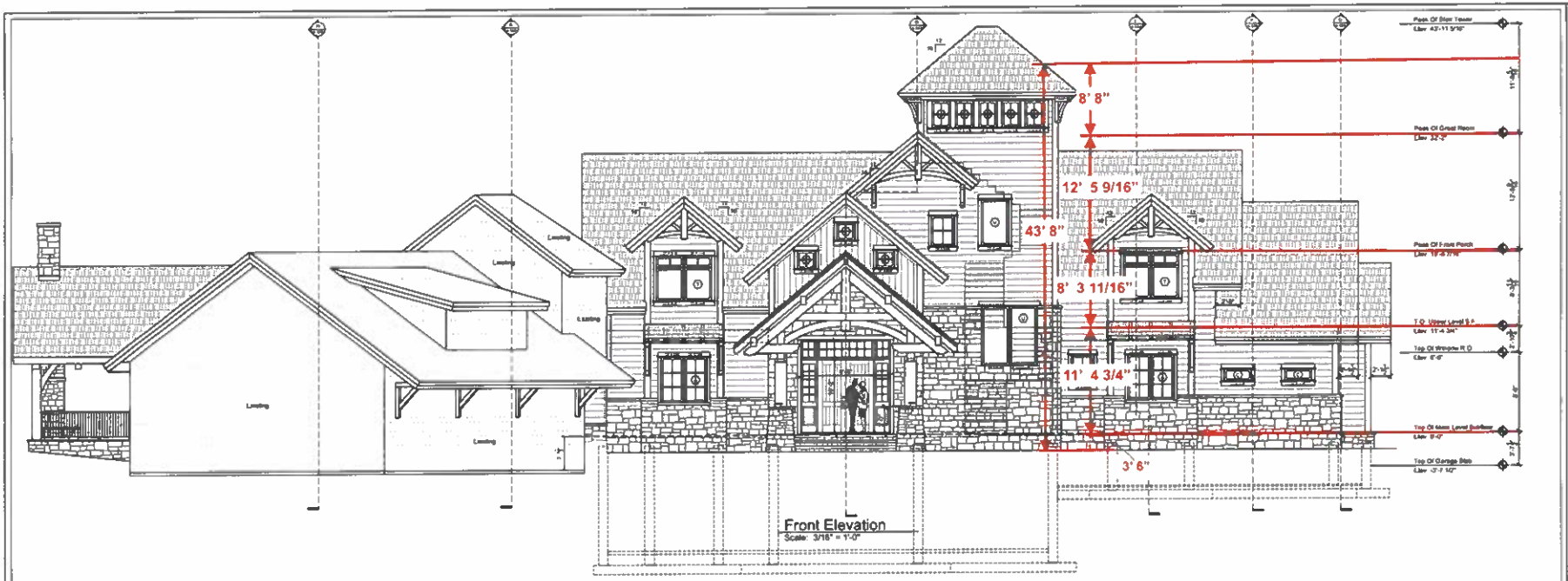
This home site is very remote and not readily visible to the public. The home site is not in close proximity to any other dwellings. A aerial view of the site is attached which shows the location of the homesite and its remoteness from other properties. The tower design is integral to the overall design of the home and the appearance will not negatively affect any other property owner or the vicinity in general. There are no other adjacent property owners as the home site is completely surrounded by other property owned by them and the Pagan River.

NARRATIVE DESCRIPTION OF PROPERTY

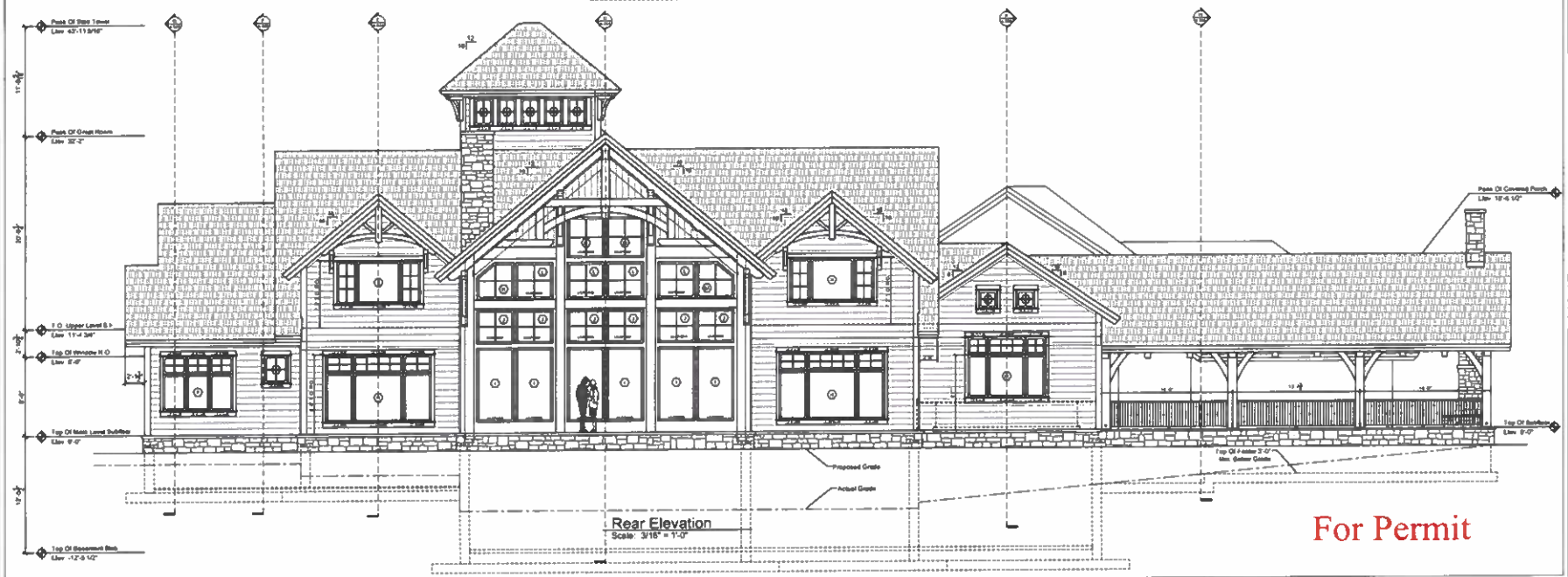
OWNER: ELIZABETH K. RUSSELL

TAX MAP NO.: 13-01-048C

The property which is the object of this application for a building height exception is identified as Tax Map Parcel No.: 13-01-048C The parcel is composed of 13.58 acres and is located off of Old Stage Highway north west of the Town of Smithfield in the Hardy Magisterial District. The address of the property is 9615 Old Stage Highway, Smithfield, VA 23430. The property is zoned RAC. The last deed in the chain of title is recorded as Instrument No. 180004538 in the Clerk's Office for the Circuit Court of Isle of Wight County, Virginia



Front Elevation
Scale: 3/16" = 1'-0"



Rear Elevation
Scale: 3/16" = 1'-0"

For Permit

StreamLine Timber Frame

ADDRESS
999 Harvestwood Rd SE
Floyd, VA 24091
phone 540.230.5805
www.streamlinetimberframe.com

A Timber Frame Home For:
The Russell Family
9615 Old Stage Highway, Smithfield, VA 23430

SEAL

PROJECT INFO
PROJECT NUMBER

DATE
9-1-23

Submission	Date
Review	1-10-23
For Permit	7-20-23
Revisions	7-28-23
Permit	9-1-23

SHEET NUMBER
A-401

© 2023 StreamLine Timberworks

ntary School
's Choice Marker
674
Nikita's Hair Salon
Little Zion Baptist Church
TWiLL Studio Productions
10
Barn
Lineage Logistics
ee Ln
10
River Oaks Ln
Pagan River
37°00'21.74" N 76°37'12.80" W elev

PG 08 NOV.15.2018

THIS DEED OF GIFT IS EXEMPT FROM RECORDATION TAX PURSUANT TO VIRGINIA CODE §58.1-810

CONSIDERATION:	$ -0-
GRANTEE'S ADDRESS:	1200 PROGRESS ROAD SUFFOLK, VA 23434
THIS INSTRUMENT PREPARED BY:	WILLIAM H. RIDDICK, III (VSB#24217) BARLOW & RIDDICK, PC P. O. BOX 190
Portion of Tax Map # 13-01-048	SMITHFIELD, VA 23431

THE EXISTENCE OF TITLE INSURANCE IS UNKNOWN TO THE PREPARER.
THIS DEED WAS PREPARED WITHOUT THE BENEFIT OF A TITLE EXAMINATION.

THIS DEED OF GIFT, made and entered into this 18th day of October, 2018, by and between **JAMES F. RUSSELL, JR.** and **ELIZABETH K. RUSSELL,** husband and wife, Grantors, parties of the first part, and **ELIZABETH K. RUSSELL,** Grantee, party of the second part.

WITNESSETH:

That for and in consideration of the sum of One Dollar ($1.00), cash in hand paid by Grantee to Grantors, and in further consideration of the love and affection that the parties have for one another, Grantors do hereby give, grant and convey with GENERAL WARRANTY and ENGLISH COVENANTS OF TITLE unto the said Grantee, the following described real estate:

All of that certain lot, piece or parcel of land, situate, lying and being in Hardy Magisterial District, County of Isle of Wight, State of Virginia, shown and identified as PARCEL 1, containing 13.58 acres on a certain plat of survey entitled "FAMILY TRANSFER PLAT PROPERTY OF JAMES F. RUSSELL, JR. ELIZABETH K. RUSSELL TO BE CONVEYED TO ELIZABETH K. RUSSELL LOCATED ON OLD STAGE HIGHWAY HARDY MAGISTERIAL DISTRICT, ISLE OF WIGHT COUNTY, VIRGINIA SCALE: 1" = 200', REVISED 10-9-2018", which plat is recorded in the Clerk's Office of the Circuit Court of Isle of Wight County, Virginia as Instrument No. Inst. 180004537, reference to which plat is here made for a complete metes and bounds description of the property hereby conveyed.

Also conveyed herewith is a perpetual easement of right-of-way fifty feet (50') in width, shown and identified as "50.0' Proposed Ingress/Egress Easement", for ingress and egress to and from the property hereby conveyed and Old Stage Highway (Rt. 10), all as shown on the plat aforesaid. Said easement of right-of-way shall be constructed in compliance with Section 3.2.4.4 of the Isle of Wight County Subdivision Ordinance.

Together with all and singular the buildings and improvements, if any, thereon, rights and privileges, tenements, hereditaments, rights of way, easements and appurtenances unto the said land belonging or in anywise appertaining.

Being a part of the same real estate conveyed to Grantors by deed of LNB Investments, LLC, dated June 20, 2018, and recorded in the Clerk's Office aforesaid as Instrument No. 180002461.

This conveyance is expressly subject to the Isle of Wight County Subdivision Ordinance provision prohibiting the transfer of the property to a person other than the immediate family for which it is created for a period of 5 years following the date of subdivision, approval except as provided for in Section 3.2.4.A.9.

Grantee, by accepting this deed, does hereby covenant and agree to maintain the private road to be located in the easement of right-of-way hereby conveyed so as to ensure vehicular ingress and egress to and from the property hereby conveyed and Old Stage Highway.

This conveyance is made expressly subject to the restrictions, conditions, rights-of-way, and easements, if any, contained in the instruments constituting the chain of title to the property conveyed herein, and to matters visible upon inspection.

Whenever used herein, the singular shall include the plural, the plural the singular, and the use of any gender shall include all other genders.

WITNESS the following signatures and seals:

_____(SEAL)
James F. Russell, Jr.,

Elizabeth Russell (SEAL)
Elizabeth K. Russell

COMMONWEALTH OF VIRGINIA
COUNTY OF ISLE OF WIGHT, to-wit:

The foregoing instrument was acknowledged before me this 18th day of October, 2018, by James F. Russell, Jr and Elizabeth K. Russell.

Karen E Riddick
Notary Public

My commission expires: 10/31/2019

KAREN E. RIDDICK NOTARY PUBLIC No. 218003 Expires Oct. 31, 2019 COMMONWEALTH OF VIRGINIA

To: Barlow + Riddick PC

INSTRUMENT # 180004538
RECORDED IN THE CLERK'S OFFICE OF
ISLE OF WIGHT COUNTY ON
NOVEMBER 15, 2018 AT 03:09PM

SHARON N. JONES, CLERK
RECORDED BY: KST

Isle of Wight, Virginia

generated on 10/5/2023 11:19:36 AM CDT

Parcel

Parcel ID	Alt. PIN	Parcel Address	AV - Tot. Lnd & Improv.	Data as of
13-01-048	1398	9615 OLD STAGE HWY, SMITHFIELD	$253,800	7/27/2023

Property Owner Information

Property Owner	RUSSELL JAMES F JR & ELIZABETH K
Property Owner Address	9615 OLD STAGE HWY SMITHFIELD VA 23430
Transfer Date	06/26/2018
Document No.	180002461
Document Reference No.	

Location Information

Tax Group Code	40	Routing No.	
Township No.	001,	Legal Desc.	ADJ J C NELSON PLAT I#190004302
Parcel Address	9615 OLD STAGE HWY, SMITHFIELD		
Legal Acreage	310.7000		

Parcel Information

Property Class Code	AGR/UNDEV 100 UP ACR
Neighborhood Code	1
Neighborhood Factor	.00
Neighborhood Type	B

Assessment Information

Current AV - Total Land	$179,400	Adj. Factor Applied	0.00
Current AV - Total Improv.	$74,400	Average AV/Acre	$0
AV - Tot. Lnd & Improv.	$253,800	Appraisal Date	7/26/2022
Reason for Change Code	LU		
Prior AV - Total Land	$167,500		
Prior AV - Total Improv.	$74,400		

Isle of Wight, Virginia

generated on 10/5/2023 11:19:54 AM CDT

Parcel

Parcel ID	Alt. PIN	Parcel Address	AV - Tot. Lnd & Improv.	Data as of
13-01-048C	24893	9615 OLD STAGE HWY, SMITHFIELD	$628,600	7/27/2023

Property Owner Information

Property Owner	RUSSELL ELIZABETH K
Property Owner Address	9615 OLD STAGE HWY SMITHFIELD VA 23430
Transfer Date	11/15/2018
Document No.	180004538
Document Reference No.	

Location Information

Tax Group Code	40	Routing No.	
Township No.	001,	Legal Desc.	PARCEL 1 RUSSELL PROPERTY PLAT I#180004537
Parcel Address	9615 OLD STAGE HWY, SMITHFIELD		
Legal Acreage	13.5800		

Parcel Information

Property Class Code	SINGLE FAMILY SUBURB
Neighborhood Code	1
Neighborhood Factor	.00
Neighborhood Type	B

Assessment Information

Current AV - Total Land	$338,200	Adj. Factor Applied	0.00
Current AV - Total Improv.	$290,400	Average AV/Acre	$0
AV - Tot. Lnd & Improv.	$628,600	Appraisal Date	8/9/2022
Reason for Change Code	24		
Prior AV - Total Land	$338,200		
Prior AV - Total Improv.	$131,400		

ISLE OF WIGHT
COUNTY, VIRGINIA

SUBMITTAL CHECKLIST FOR EXCEPTION APPLICATIONS

****Both checklist and application required upon submission to central permitting or application will notbe accepted****

In accordance with Section 5002, *Exceptions,* of the Chesapeake Bay Preservation Area Ordinance, and in accordance with Section 6-1015, *Exceptions*, Section 6-2011, *Exceptions*, and Section 9-1013, *Exceptions*, of the Isle of Wight County Zoning Ordinance, the following information shall be submitted for an exception application. Please note that it is the applicant's responsibility to ensure that the application is in compliance with all Federal, State and County regulations.

No application for an exception shall be certified as complete unless the following information is provided. ***The required number of copies may be increased or reduced with permission of the Zoning Administrator, depending on the review needs.*** Applicant(s) must have their signature(s) notarized on the disclosure of real estate holdings.

- ☒ **Ten (10) copies of the following**
  - ☒ original, executed application
  - ☒ a statement of the reasons for seeking an exception
  - ☒ narrative description of the property which shall include the tax parcel identification number
  - ☒ full size concept plan of the site to show all existing and proposed physical improvements and such otherinformation as is necessary to clearly indicate to the reviewing body that adequate provisions have been made for compliance with all standards for that particular use, the extent of the property to beso used on a given parcel or parcels, and information defining the requested exceptions. The plan shall be prepared by the appropriate authorized design professional licensed to practice in Virginia. No person shall prepare or certify design elements of site plans which are outside the limits of their professional expertise and license. Such document shall be drawn to scale and shall include the following information:
    - A vicinity map at a scale of no less than one (1) inch equals two thousand (2,000) feet
    - Title of drawing
    - Date of drawing
    - Existing wood line
    - North arrow
    - Scale bar
    - Current zoning of parcel(s), including tax map number(s) and owner(s)

- Current zoning of adjacent parcel(s), including tax map number(s) and owner(s)
- Street names including route number and width(s) of the right-of-way(s)

☒ **One (1) original executed application**

☒ **One (1) digital copy of ALL application documents**

☒ **One (1) reduced 11"x17" copy of concept plan**

☒ **Application fee submitted with the application. Checks should be made payable to treasurer, Isle of Wight, County**

☐ **<u>For CBPA Exception applications</u>, a major water quality impact assessment which meets the criteria in Section 4003 of the Chesapeake Bay Preservation Area Ordinance must be submitted at the time of application.**

☐ Other information may be necessary to demonstrate compliance with all other applicable federal, state and County standards and regulations.

☒ All real estate taxes must be paid and current at the time of submittal; otherwise, the submittal willbe refused at the counter. Proof of the most recent tax payment to the County must accompany the application.

Please note that additional information on the site layout may be requested by the Zoning Administrator during the review process in order to more effectively review the application and prepare the staff reports for the appropriate reviewing body.

I, the undersigned, certify that this application is complete, accurate and contains all required and requested information, documents, and other submittals, and that all statements made herein are, to the best of my knowledge, true and correct. I further certify that I have exercised due diligence to obtain the most recent, complete, and correct information available. I understand that any section not completed in its entirety may delay the processing of this application.

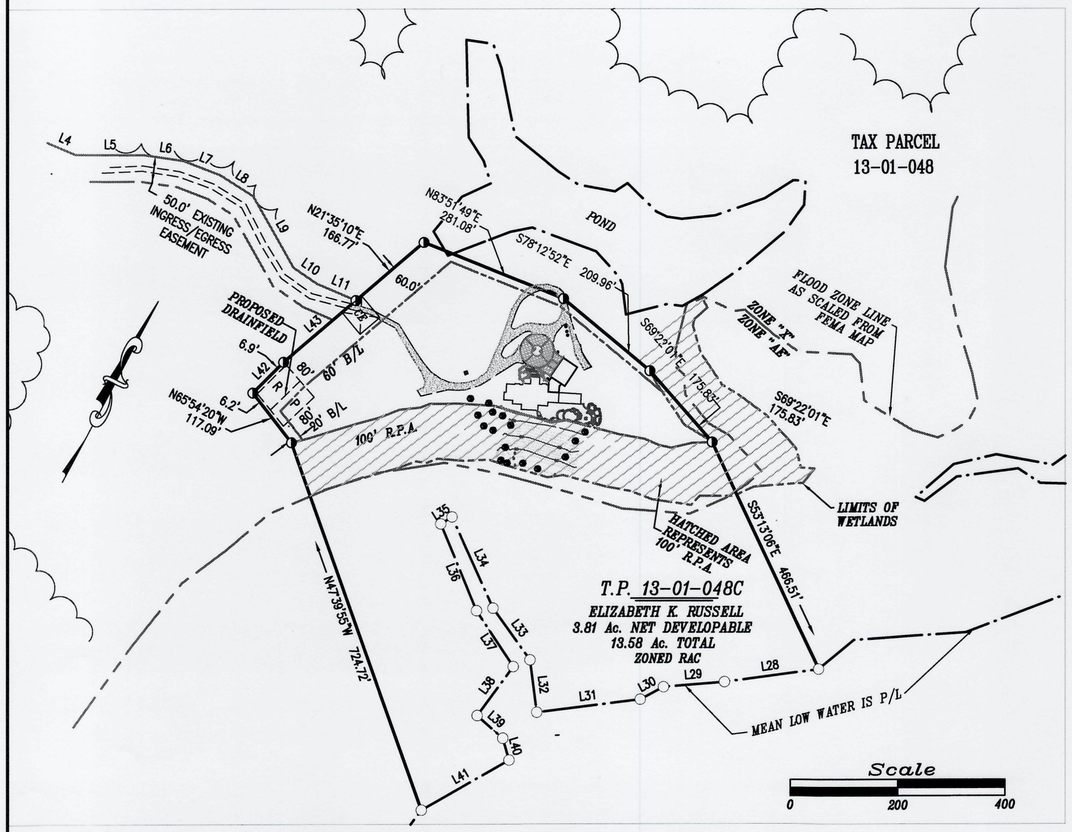
William H Riddick III

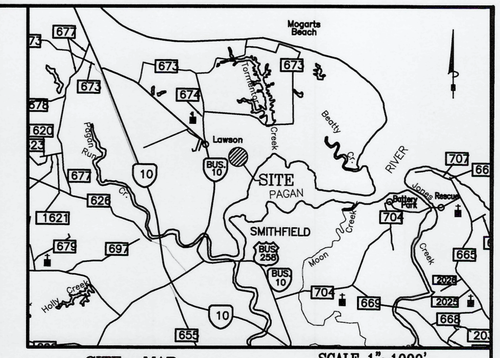
Printed or Typed Name

Signature

10-10-2023

Date





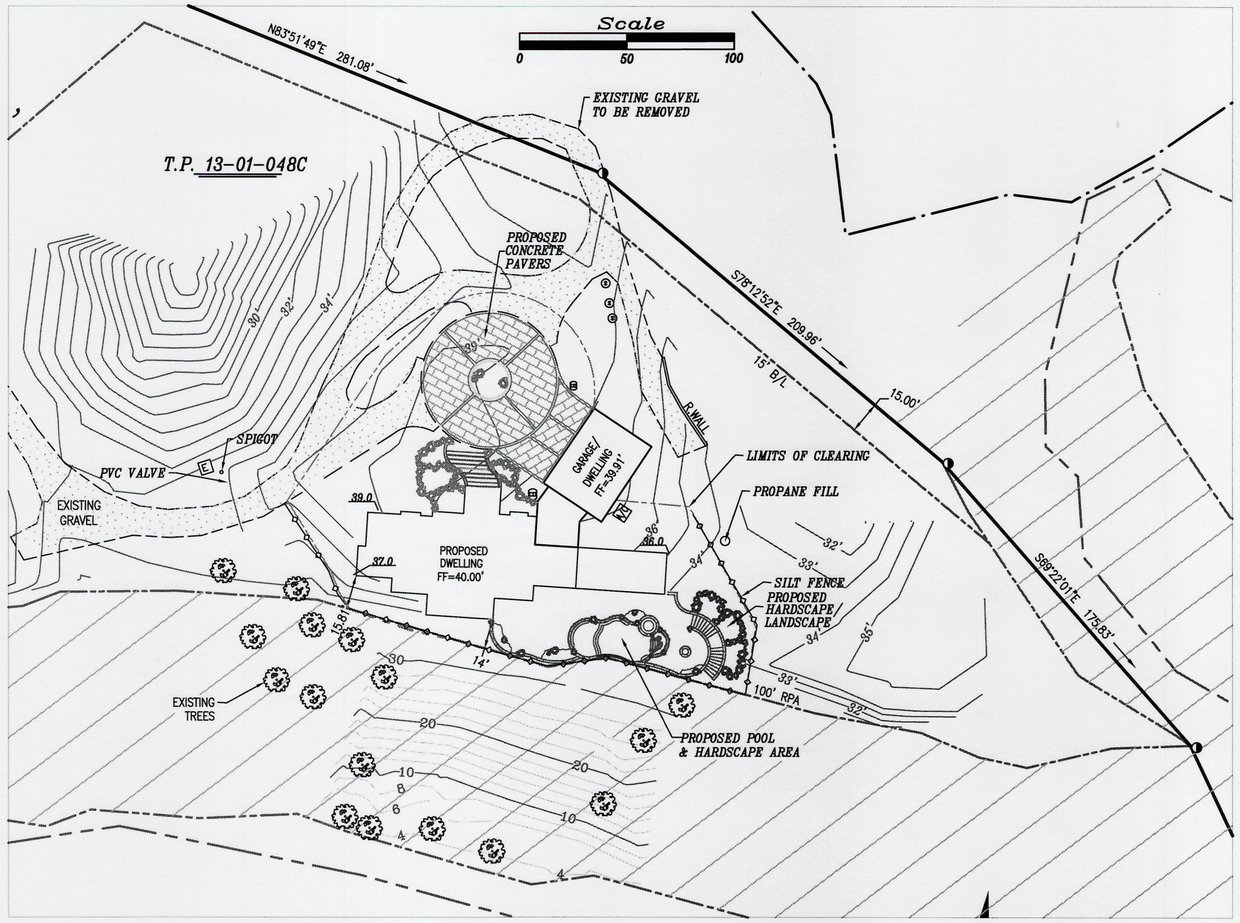
SITE MAP SCALE 1"=1000'

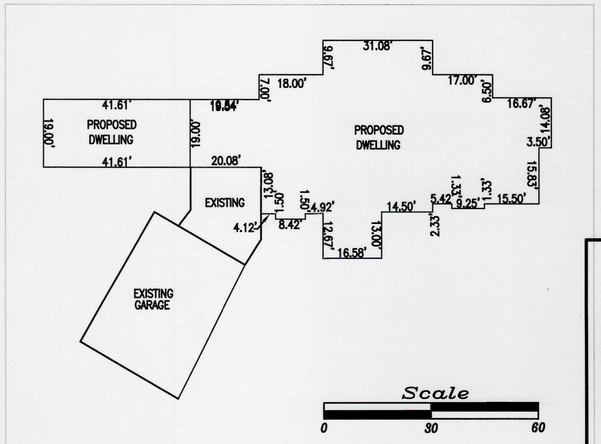
IMPERMEABLE SURFACE AREA

PROPOSED DWELLING FOOTPRINT	4,664 S.F.
EXISTING DRIVEWAY	+11,893 S.F.
PROPOSED CONCRETE PAVERS	+3,990 S.F.
EXISTING GARAGE	+1,830 S.F.
EXISTING CONCRETE	+346 S.F.
PROPOSED POOL & HARDSCAPE	+3,344 S.F.
TOTAL IMPERVIOUS	26,067 S.F.
TOTAL AREA	÷ 591,544.80 S.F.
TOTAL PERCENTAGE	4.40%

4.40% OF LOT COVERED BY IMPERVIOUS AREA.

24,490± S.F. LIMITS OF CLEARING/DISTURBANCE.





SETBACKS:
FRONT = 60'
SIDE =15'/20'
REAR =100' R.P.A. OR 35'

OWNER –
ELIZABETH K. RUSSELL
9615 OLD STAGE HIGHWAY
SUFFOLK, VIRGINIA 23434
TEL. NO. 757-544-1000

REFERENCE – IN#180002461, PLAT IN#170002407

LEGEND:
PL – DENOTES ADJOINING PROPERTY LINE
◑ – DENOTES IRON FOUND
–o–o– – DENOTES SILT FENCE
CE – DENOTES 12' X 70' CONSTRUCTION ENTRANCE
○ – DENOTES COMPUTED POINT
CE – DENOTES 12' X 70' CONSTRUCTION ENTRANCE
H/C – DENOTES H.V.A.C. UNIT
22.7 – DENOTES PROPOSED GRADE ELEVATION
E – DENOTES ELECTRIC BOX

THIS PROPERTY LIES WITHIN THE CHESAPEAKE BAY PRESERVATION AREA, ALL NEW STRUCTURES SHALL BE LOCATED OUTSIDE OF THE RESOURCE PROTECTION AREA AND ITS 100' BUFFER AREA UNLESS THE BOARD OF SUPERVISORS ALLOWS MODIFICATION OF THE 100' BUFFER AREA.

LOT WILL BE SERVICED BY AN EXISTING COMMUNITY WELL.

IF THERE IS NO EFFLUENT FILTER ON THE SEPTIC TANK, THIS SITE IS SUBJECT TO SEPTIC PUMP-OUT OR INSPECTION ONCE EVERY FIVE YEARS.

LIMITS OF WETLANDS WERE DELINEATED BY JASON BARNEY, BARNEY ENVIRONMENTAL, INC. ON JANUARY 11, 2018 AND CONFIRMED BY THE ARMY CORPS ON JANUARY 18, 2018

THE BUILDER/CONTRACTOR SHALL PROVIDE FOR POSITIVE DRAINAGE OF THE SITE WITHOUT NEGATIVELY IMPACTING ADJACENT PROPERTIES.

THE BUILDER/CONTRACTOR SHALL EXECUTE AN AGREEMENT IN LIEU OF AN EROSION AND SEDIMENT CONTROL PLAN IN CONJUNCTION WITH APPROVAL OF THIS SITE PLAN.

THE BUILDER/ CONTRACTOR SHALL EXECUTE AN AGREEMENT IN LIEU OF A STORMWATER PLAN IN CONJUNCTION WITH APPROVAL OF THIS SITE PLAN.

THE BUILDER/CONTRACTOR SHALL VERIFY GRADES ON SITE PRIOR TO CONSTRUCTION.

CONTRACTOR TO VERIFY DWELLING DIMENSIONS, INCLUDING CHANGES AUTHORIZED BY CONTRACTOR OR OWNERS, AS STAKED BY SURVEYOR ON THE GROUND. CONTRACTOR TO VERIFY ALL GRADES.

THIS SURVEY HAS BEEN COMPLETED WITHOUT THE BENEFIT OF A TITLE SEARCH. THEREFORE, THIS SURVEY IS SUBJECT TO ANY EASEMENT OF RECORD, LAND TRANSACTIONS AND OTHER PERTINENT FACTS WHICH A TITLE SEARCH MIGHT DISCLOSE.

THE PARCEL 1 SHOWN ON THIS PLAT APPEARS TO BE LOCATED IN ZONE "X/AE" AS SHOWN ON THE FLOOD INSURANCE RATE MAP, COMMUNITY-PANEL NUMBER 510303 0070 E, DATED 12-02-2015, & ZONE "X/AE" AS SHOWN ON THE FLOOD INSURANCE RATE MAP, COMMUNITY-PANEL NUMBER 510303 0088 E, DATED 12-02-2015

NO VEGETATION IN THE RPA CAN BE REMOVED OR DISTURBED.
NO HEAVY EQUIPMENT, STAGING, AND/OR DISTURBANCE IS ALLOWED IN THE RPA.
NO LEVELING OR SOIL IS ALLOWED IN THE RPA.
THE SILT FENCE CANNOT ENTER THE RPA.

SITE PLAN
PROPERTY OF
ELIZABETH K. RUSSELL
LOCATED AT 9615 OLD STAGE HIGHWAY
HARDY MAGISTERIAL DISTRICT
ISLE OF WIGHT COUNTY, VIRGINIA
SCALE 1"= 200' JUNE 14, 2023

COMMONWEALTH OF VIRGINIA
EDWARD C. (MO) CANADA, III
Lic. No. 002965
9-21-23
LAND SURVEYOR

CANADA LAND & MARINE SURVEYING
1212 S. Church Street Smithfield, VA 23430
PHONE : 757-357-2911

DRAWN BY: ECC | JOB #S18-33-IW

Entrance at 9615 Old Stage Highway

Entrance looking North toward Hardy Elementary School

Entrance looking South toward Smithfield Packing Plant

Approximately ½ mile down the driveway with first view of Pagan River

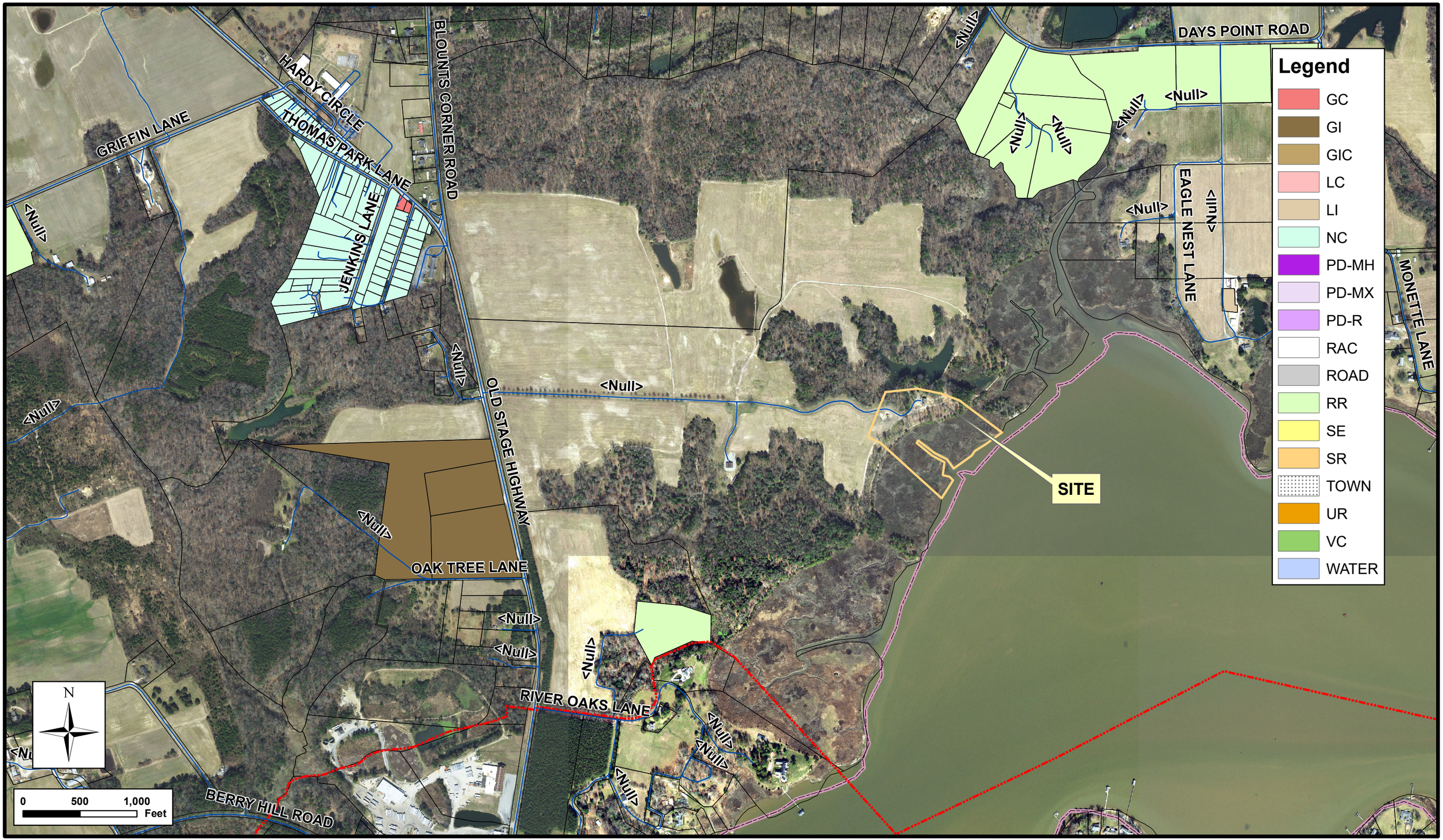
Site of proposed home expansion overlooking the Pagan River

Site of proposed home expansion overlooking the Pagan River

EXC-11-23 Height Exception Request - Location Map

EXC-11-23 Land Use Map

EXC-11-23 Zoning Map



PLANNING REPORT

APPLICATION:

Application of Carrollton Ventures, LLC, applicant and owner, for an exception to Section 6-2010.A.1.b, Section 6-2010.A.1.c, and Section 6-2010.A.3 of the Zoning Ordinance, Newport Development Service Overlay (NDSO) District regulations, for the property located on Carrollton Boulevard with Tax Map Number 34-01-108. The purpose of the application is to allow for an exception to the NDSO design standards for building facades, building materials, and building entryway design elements.

ELECTION DISTRICT:

D2

LOCATION:

The property is located at 15411 Carrollton Boulevard (Route 17) with tax map parcel number 34-01-108. The property is bounded to the west by Carrollton Boulevard, to the south by the State Farm Insurance Agency business and the Clayton Auto Parts salvage yard, and to the north by residential uses.

BACKGROUND:

The property previously served two residential homes but is currently vacant. On March 20, 2008, the property was rezoned to Conditional-General Commercial (C-GC) in which only a small number of permitted uses were allowed by the conditional zoning. On June 26, 2019, the Board of Supervisors approved an amended proffer statement that expanded permitted uses generally consistent with the GC zoning district, except for the following uses: club, crisis center, modular classroom, nursing home, rehabilitation service, construction sales and service, contractor office and storage facility, land and garden services, marina, motor vehicle repair service/major, motor vehicle repair service/minor, taxidermy, and amateur radio tower.

In December 2022, the applicant submitted a site plan application to establish and construct a miniwarehouse commercial use, specifically the SAWCO South Self Storage facility. In reviewing the application, staff communicated to the applicant that the two storage unit buildings that are visible from the public right-of-way along Carrollton Boulevard must meet NDSO architectural standards. Per Section

6-2010 of the Zoning Ordinance, the applicant's proposed building elevations for these two storage unit buildings do not meet the architectural criteria for all nonresidential uses within the NDSO district.

DESCRIPTION:

The applicant would like to construct the two highway-facing storage unit buildings with metal siding, similar in design to the existing SAWCO Self Storage located at 15111 Carrollton Boulevard. As a result, the applicant requests an exception to the architectural and design criteria of the NDSO district. The request is for an exception to the following ordinance requirements:

- Section 6-2010.A.1.b – states that facades in excess of two hundred (200) horizontal feet in length shall incorporate vertical elements and material changes in the architectural design which break the visual monotony of the continuous façade as well as installing recesses and projections.
- Section 6-2010.A.1.c. – states that facades in excess of one hundred (100) horizontal feet, that face public streets and vehicle moving areas, excluding loading areas, shall have architectural features such as arcades, entry areas, awnings, and arches or similar enhancements of no less than fifty percent (50%) of their horizontal length of the façade.
- Section 6-2010.A.3 – states that the exterior of buildings, to include accessory buildings, shall be built utilizing one (1) or more of the following: brick, decorative block, stone, stucco, natural wood siding, or cementious siding. Alternative materials that provide an equivalent appearance and durability of the above may be approved by the zoning administrator. The use of either concrete block, flat or corrugated metal or vinyl siding walls is prohibited for new development or expansions of existing development within the NDSO district. Vinyl siding may be utilized as trim accents or the exterior of buildings. These requirements shall not apply to a building façade which is not visible from the public right-of-way as approved by the zoning administrator.

COMPREHENSIVE LAND USE PLAN:

The parcel's recommended future land use designation is Business and Employment. The 2020 Comprehensive Plan states that building design which promotes the character and values stated in the Newport Development Service Overlay District (DSD) regulations is encouraged. Architectural guidelines are recommended for non-residential structures to ensure compatible and positive aspects of the district's visual experience from the arterial roadways. Buildings should reflect an individual design that considers site location, conditions, intended

use, and the character/building mass of the surrounding properties.

ORDINANCE REVIEW:

The intent of the NDSO district regulations is to reduce incompatible and adverse impacts on the visual experience from the highway and provide continuity of site design within the proposed development.

When granting an exception, the Board of Supervisors must consider the following:

- Such exception shall be no less beneficial to the residents or occupants of the development, as well as the neighboring property, that would be obtained under the applicable regulation;
- That the exception is reasonable because of the high level of design and construction that will be incorporated into the development;
- That the exception will result in design and construction that is in accordance with accepted engineering and building standards.

AGENCY REVIEW:

Should the exception be approved, a revised site plan must be submitted for technical review. Because the exception requests only effect building design, distribution to outside departments and agencies for review was not necessary. Planning and Zoning staff did perform an analysis and made the following findings:

- A portion of the storage unit buildings would be visible from Route 17 with the six (6)-foot wooden fence or masonry wall that is required for street-facing property lines in the supplementary use regulations for miniwarehouses. Only two storage unit buildings would be visible and could be treated with veneer to meet the ordinance requirements.
- The proposed office building does meet the NDSO architectural guidelines for all nonresidential uses.
- The proposed landscape plan maintains several large trees within the frontage zone that will help to shield the view of the neighboring properties and Carrollton Boulevard.
- There is not a high level of design present with the proposed metal buildings.
- Building plans have not yet been submitted. Prior to being permitted, the plans must be in accordance with all applicable building codes.

STAFF CONCLUSIONS:

Based on an analysis of the project, staff identified the following strengths and weaknesses for the proposed uses:

Strengths:

1. The proposed use is consistent with the County's future recommended land use plan.
2. The storage unit buildings will be partially screened by a required wooden fence or masonry wall, and existing trees within the landscape frontage zone

.

Weaknesses:

1. The proposed storage unit building facades will not meet NDSO requirements for nonresidential uses.
2. The proposed development is new construction and has the ability to meet the design requirements.
3. The property owner has the ability to meet the Zoning Ordinance requirement and granting approval would grant him a special privilege not otherwise enjoyed by other property owners.

STAFF RECOMMENDATION:

Based on the analysis above, staff recommends denial of the application, because it does not meet all of the criteria for an exception approval set forth in Section 6-2011 of the Zoning Ordinance.

ATTACHMENTS:

Description	Type	Upload Date
Application	Backup Material	10/31/2023
Narrative and Exhibits	Backup Material	11/17/2023
Location Map	Backup Material	10/31/2023
Zoning Map	Backup Material	10/31/2023
Land Use Map	Backup Material	10/31/2023
Site Plan	Backup Material	10/31/2023
Site Images	Backup Material	11/1/2023

Local Roots, Global Reach
ISLE OF WIGHT
COUNTY, VIRGINIA
DEPARTMENT OF COMMUNITY DEVELOPMENT

APPLICATION FOR EXCEPTIONS

This application should be used to petition for an exception for certain uses which, because of their unique characteristics, but which may, under the right set of circumstances and conditions be acceptable.

A. APPLICATION FOR (CHECK ALL THAT APPLY):

[ ] Chesapeake Bay Preservation Area Ordinance Exception

[X] Newport Development Service Overlay District Exception

[ ] Highway Corridor Overlay District Exception

[ ] Signage Exception

[ ] Subdivision Ordinance Waiver

[X] Other (please list) Article VI

The proposal is a request to Section (s)_____of the Chesapeake Bay Preservation Area Ordinance, the Isle of Wight County Zoning Ordinance, or the Isle of Wight County Subdivision Ordinance.

Proposed Use or Activity: Construct Minwarehouse Facility

B. APPLICATION INFORMATION:

Applicants Name: Carrollton Ventures, LLC

Address: P. O. Box 245, Carrollton, VA 23314

Email: Wcsawyer21@gmail.com Phone: 757-870-1982

Property Owners Name: Same as above

Address: _____

C. **PROJECT DESCRIPTION:**

Project Name: Sawco South Self Storage

Property Address (if any): _____

Comprehensive Plan Designation: _____

The exception will apply to 8.028 acres out of 8.028 total acres

Tax Parcel Identification # 34-01-108 Number of acres to be effected: 8.028

Proposed Utilities (check all that apply): Public Water X Private Well _____

Public Sewer _____ Private Septic _____

NOTICE: THE ATTACHED CHECKLIST MUST BE COMPLETED, CERTIFIED, AND SUBMITTED OR THE APPLICATION WILL BE CONSIDERED INCOMPLETE.

Remit Application to: Isle of Wight County Central Permitting, 17140 Monument Circle, Suite 100
P. O. Box 80, Isle of Wight, Virginia 23397

WC Sawyer 9/27/23

Applicant Signature **Date**

_____

Owner Signature *if different* **Date**

FOR OFFICE USE ONLY:

Complete Application Received On: _____ Fees Paid: _____

Tax Query: [ ] Current [ ] Delinquent Distribution Date: _____

Posted/Date to Post: _____

AGENCIES REFERRALS:

_____Department of Conservation & Recreation
_____Economic Development
_____Emergency Services
_____General Services
_____Environmental Planner
_____Health Department
_____Transportation Manager
_____Commission of Revenue
_____Other _____

_____Inspections
_____Sheriff's Office
_____Town of Smithfield
_____Town of Windsor
_____VDOT
_____Schools
_____Budget & Finance
_____County Attorney

Verified By: _____ Date: _____

COUNTY OF ISLE OF WIGHT
DISCLOSURE OF REAL ESTATE HOLDINGS

Applicant: Carrollton Ventures, LLC

Address: P. O. Box 245, Carrollton, VA 23314

REAL ESTATE HOLDINGS TO BE AFFECTED

Location or Address	Description
T. P. 34-01-108	ADJ O S OWENS PLAT ATTACHED TO DB 372 PG 393 PLAT I#230000749

OTHER OWNERS OF AFFECTED REAL ESTATE

(Not Required for Corporation whose stock is traded on a national or local stock exchange or having more than 500 shareholders.)

Name of Individuals Corporation/PartnershipBusiness Association	Address
N/A	

Does any member of the Isle of Wight County Planning Commission or governing body have any interest in such property, either individually, by ownership of stock in a corporation owning such land, partnership, as the beneficiary of a trust, or the settlor of a revocable trust, or whether a member of the immediate household of any member of the Planning Commission or governing body has any such interest? Yes No X

If yes, names of members:

I do solemnly swear that the foregoing statement(s) and attachments(s), if any, are complete, correct, and true.

Applicant: W. C.Sawyer (Printed or Typed Name) Applicant: W C Sawyer (Signature) Date: 9/27/23

Commonwealth of Virginia
County of Isle of Wight

Subscribed and sworn to before me Melissa Vick.
A Notary Public in and for the County of Isle of Wight, Commonwealth of Virginia, this 27th day of Sept, 2023.

Melissa Vick
Notary Public

My Commission Expires 8/31/26

Melissa Vick
Notary Public
Reg #8023579
Commonwealth of Virginia
My Commission Expires 8/31/2026

Local Roots, Global Reach

ISLE OF WIGHT
COUNTY, VIRGINIA

SUBMITTAL CHECKLIST FOR EXCEPTION APPLICATIONS

****Both checklist and application required upon submission to central permitting or application will notbe accepted****

In accordance with Section 5002, *Exceptions,* of the Chesapeake Bay Preservation Area Ordinance, and in accordance with Section 6-1015, *Exceptions*, Section 6-2011, *Exceptions*, and Section 9-1013, *Exceptions*, of the Isle of Wight County Zoning Ordinance, the following information shall be submitted for an exception application. Please note that it is the applicant's responsibility to ensure that the application is in compliance with all Federal, State and County regulations.

No application for an exception shall be certified as complete unless the following information is provided. ***The required number of copies may be increased or reduced with permission of the Zoning Administrator, depending on the review needs.*** Applicant(s) must have their signature(s) notarized on the disclosure of real estate holdings.

☐ **Ten (10) copies of the following**

- ☑ original, executed application
- ☑ a statement of the reasons for seeking an exception
- ☑ narrative description of the property which shall include the tax parcel identification number
- ☑ full size concept plan of the site to show all existing and proposed physical improvements and such otherinformation as is necessary to clearly indicate to the reviewing body that adequate provisions have been made for compliance with all standards for that particular use, the extent of the property to beso used on a given parcel or parcels, and information defining the requested exceptions. The plan shall be prepared by the appropriate authorized design professional licensed to practice in Virginia. No person shall prepare or certify design elements of site plans which are outside the limits of their professional expertise and license. Such document shall be drawn to scale and shall include the following information:
  - A vicinity map at a scale of no less than one (1) inch equals two thousand (2,000) feet
  - Title of drawing
  - Date of drawing
  - Existing wood line
  - North arrow
  - Scale bar
  - Current zoning of parcel(s), including tax map number(s) and owner(s)

- Current zoning of adjacent parcel(s), including tax map number(s) and owner(s)
- Street names including route number and width(s) of the right-of-way(s)

☑ **One (1) original executed application**

☑ **One (1) digital copy of ALL application documents**

☑ **One (1) reduced 11"x17" copy of concept plan**

☑ **Application fee submitted with the application. Checks should be made payable to treasurer, Isle of Wight, County**

☐ **<u>For CBPA Exception applications</u>, a major water quality impact assessment which meets the criteria in Section 4003 of the Chesapeake Bay Preservation Area Ordinance must be submitted at the time of application.**

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I, the undersigned, certify that this application is complete, accurate and contains all required and requested information, documents, and other submittals, and that all statements made herein are, to the best of my knowledge, true and correct. I further certify that I have exercised due diligence to obtain the most recent, complete, and correct information available. I understand that any section not completed in its entirety may delay the processing of this application.

W. C. Sawyer

Printed or Typed Name

W C Sawyer

Signature

9/27/23

Date

SAWCO SOUTH SELF STORAGE

REQUEST FOR EXCEPTIONS

October 17, 2023

Tax Map Parcel(s):	34-01-108
Acreage:	8.028 acres
Zoning:	Conditional-General Commercial (C-GC)
Proposed Use:	Miniwarehouse and Outdoor Storage of Motors Vehicles, Trailers, and Recreational Vehicles

Narrative:

This request from Sawco South Self Storage is for exceptions to the following sections of the Isle of Wight County Zoning Ordinance as follows:

1. Article VI, Section 6-2000 Newport Development Service Overlay (NDSO) District, specifically Section 6-2010 (A)(1)(b)and (c), 6-2010 (A)(3) and 6-2010 (A)(5);

The property is located on the east side of Carrollton Boulevard (Rt. 10) south of Sugar Hill Road (Rt. 661) and is currently vacant and partially wooded. The property is located in the Newport Development Service District and has roughly 540 linear feet of frontage along Carrollton Boulevard.

The site is located between Clayton Auto Parts, Inc. (junkyard) and Sharon Vincent's insurance office on the southeast side and single-family residential on the northwest side, and to the rear of the site.

The proposed use will consist of a brick mini warehouse office building located on the property's frontage, facing Carrollton Boulevard. The office will be located behind the required 50' minimum visual buffer, and has been designed to meet the architectural requirements of Section 6-2010(A)(2) of the NDSO to include windows of not less than 50% of the horizontal length of the building facade facing Carrollton Boulevard. (See site plan and office rendering.)

Exception Request:

1. Article VI, Section 6-2010 (A)(1)(b) and (c), 6-2010 (A)(3) and 6-2010(A)(5): The applicant is requesting an exception, for the remainder of the site containing the mini-storage units, to Section 6-2010(A)(1)(b) and (c) requiring architectural recesses and entryway enhancement features, 6-2010 (A)(3) regarding building materials, and 6-2010(A)(5) building entryway design elements.

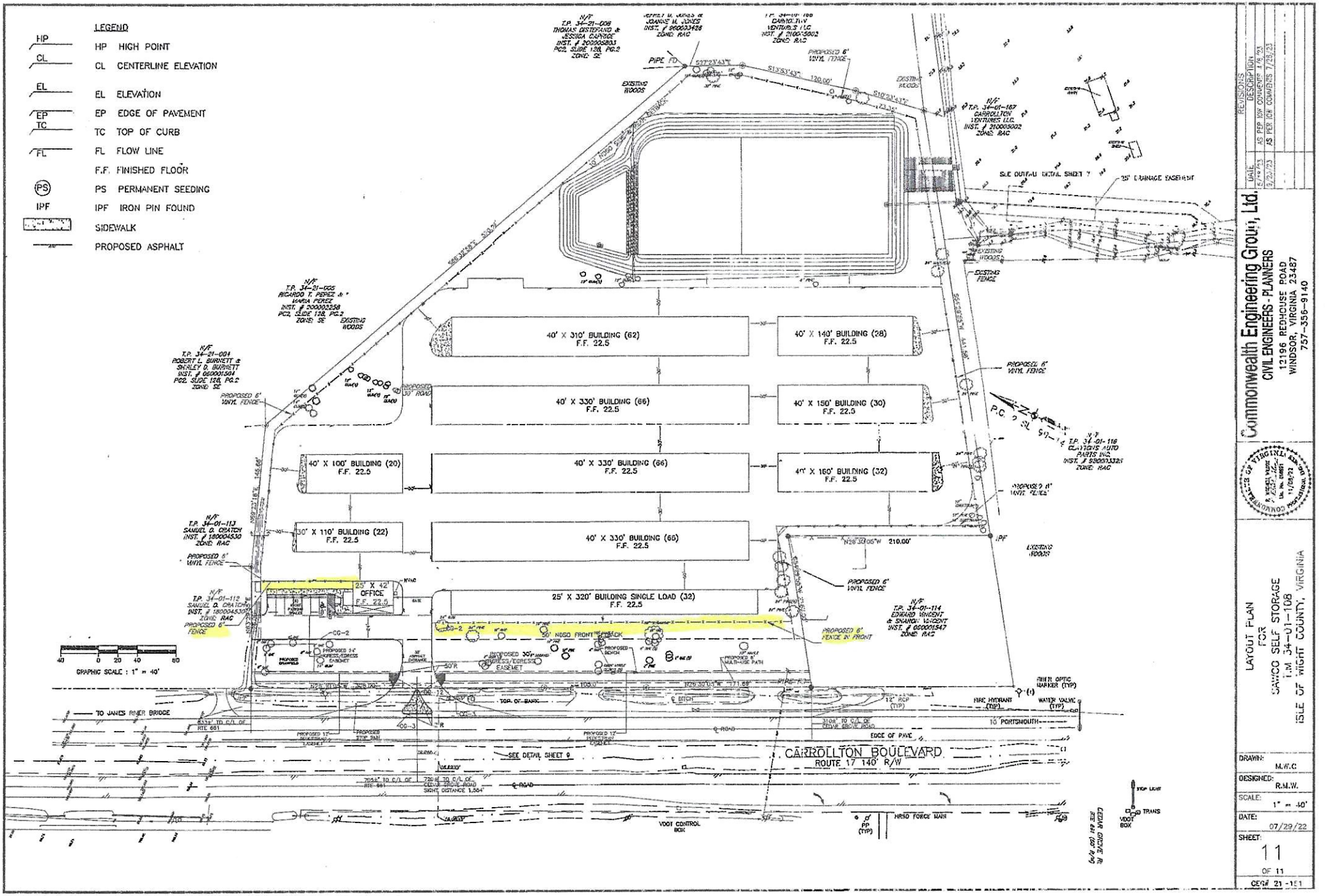
The applicant proposes a 6' fence to be located 17' behind the 50' minimum visual buffer with landscaping to screen the first 2 mini-storage units that would otherwise be seen from the road. The proposed fencing will be white vinyl and will be tall enough to cover all except the top 2' of the 2 storage units in question, screening the units from Carrollton Boulevard (see line of sight exhibit). The 6' fencing will continue along the side and rear property lines adjacent to the residential, junkyard and insurance office. Currently, the insurance office is partially fenced along its perimeter and the junkyard is completely fenced. The applicant proposes to work with the property owners to connect to the existing fencing where possible.

Landscaping will be planted along the fence consistent with the requirements of the screening and foundation zone and will consist of a minimum of 10 new trees and 46 shrubs. This is in addition to the required plantings within the 50' minimum visual buffer, which will not be disturbed with the exception of the approved vehicular entrance and required utilities. The site is designed with the office building and parking to be located in the western corner of the site's frontage to preserve as much of the existing vegetation within the 50' buffer as possible. A minimum of 20 mature trees will be preserved along with existing underbrush further screening the site. Additionally, 4 mature trees will be preserved between the 50' buffer and the foundation and screening zone. The applicant believes that preservation of the existing tree buffer, the proposed fence, and the screening and foundation zone plantings will visually enhance and soften the site allowing it to maintain its vegetative landscape with emphasis placed on the design elements of the proposed office building constructed in accordance with NDSO architectural requirements.

The 6' fence will be recessed where it extends behind the office building and Sherry Vincent's office building, and landscaped accordingly. (See attached fence/landscape rendering.)

Attachment(s):

- Site Plan
- Office Rendering
- Fence/Landscape Rendering
- Line of Sight Exhibit
- Photos



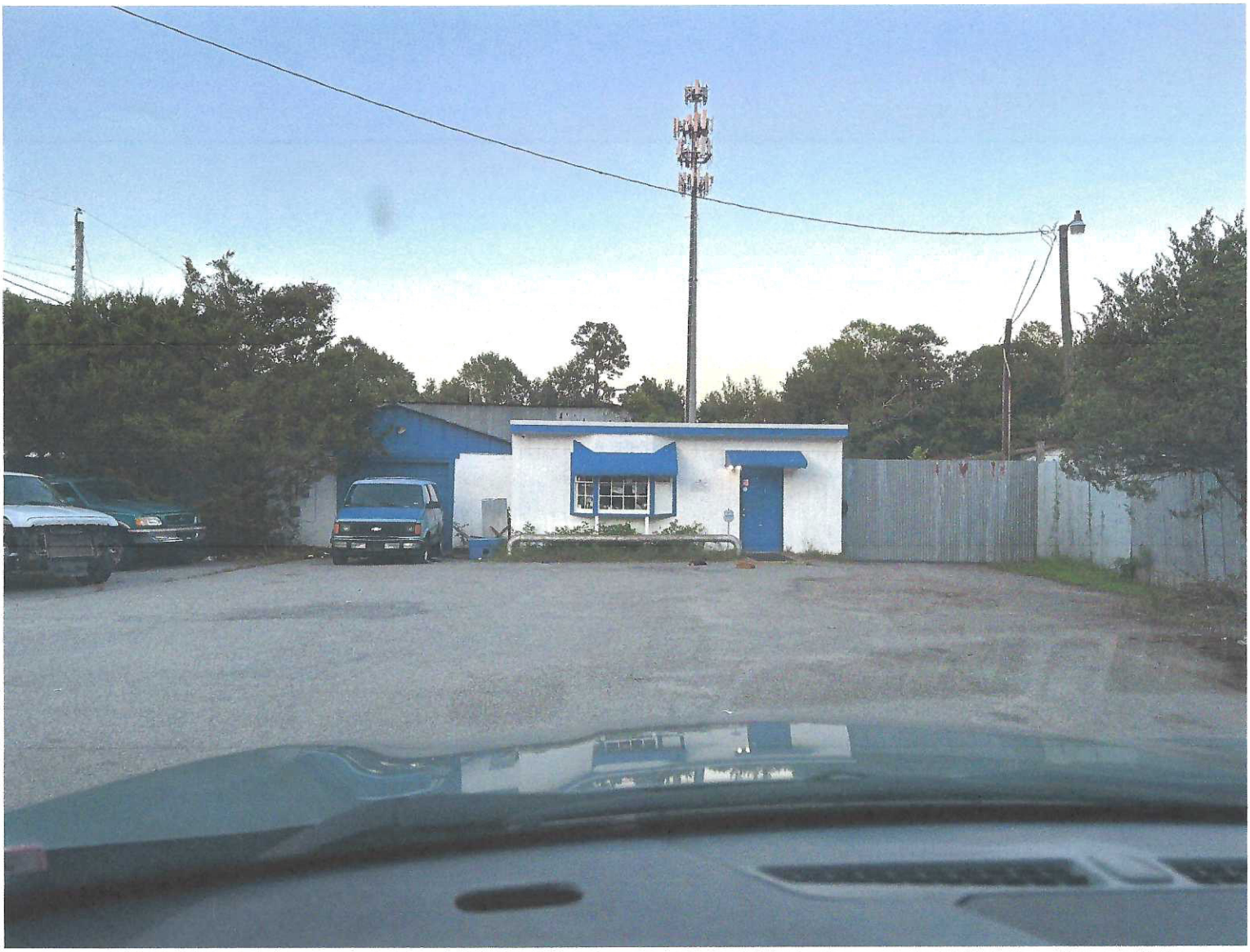
REVISIONS

DATE	DESCRIPTION
5/19/23	AS PER IOW COMMENTS 4/6/23
9/26/23	AS PER IOW COMMENTS 7/28/23

Commonwealth Engineering Group, Ltd.
CIVIL ENGINEERS - PLANNERS
12196 REDHOUSE ROAD
WINDSOR, VIRGINIA 23487
757-356-9140

LAYOUT PLAN
FOR
SAWCO SELF STORAGE
T.M. 34-01-108
ISLE OF WIGHT COUNTY, VIRGINIA

DRAWN: M.W.C.
DESIGNED: R.M.W.
SCALE: 1" = 40'
DATE: 07/29/22
SHEET: 11 OF 11
CEG# 21-151

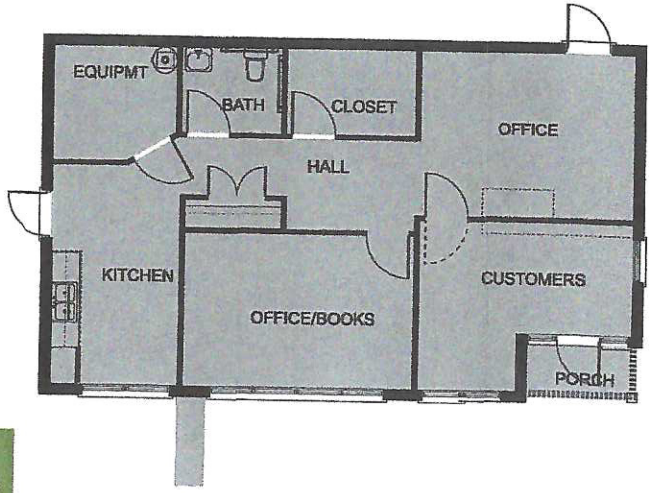


TREND MICRO
Email Defender cannot work. If you keep seeing this message, click here for more details.

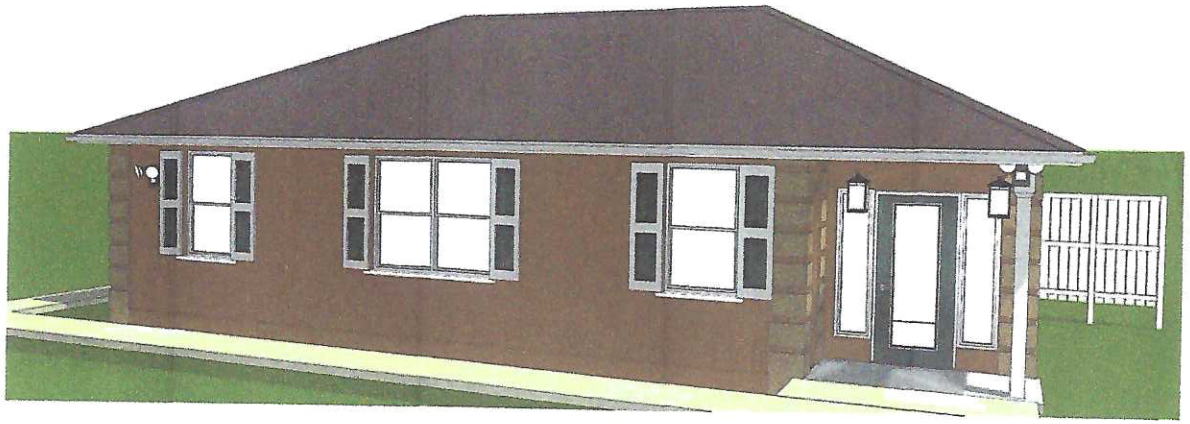
PHOTO EXISTING SAWCO OFFICE - (Similar Building)

AREA SCHEDULE	
NAME	AREA
OFFICE BUILDING	1018 SF
FRONT PORCH	32 SF
TOTAL SQ FT	1050 SF

3D ARTIST RENDERING LEFT



MAIN FLOOR OVERVIEW
SCALE: 1/4" = 1'-0"



3D ARTIST RENDERING FRONT

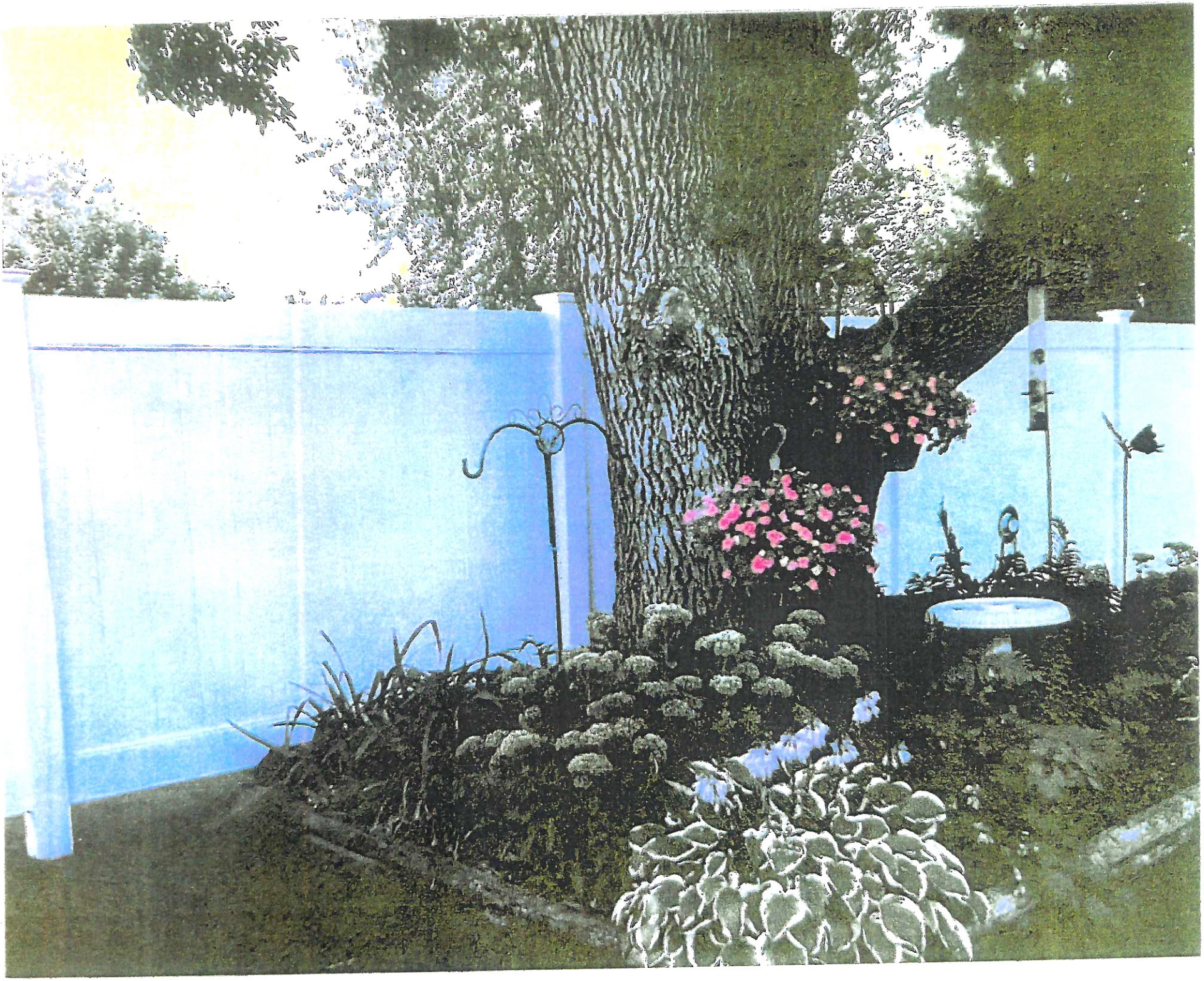
SAWCO SELF STORAGE SOUTH

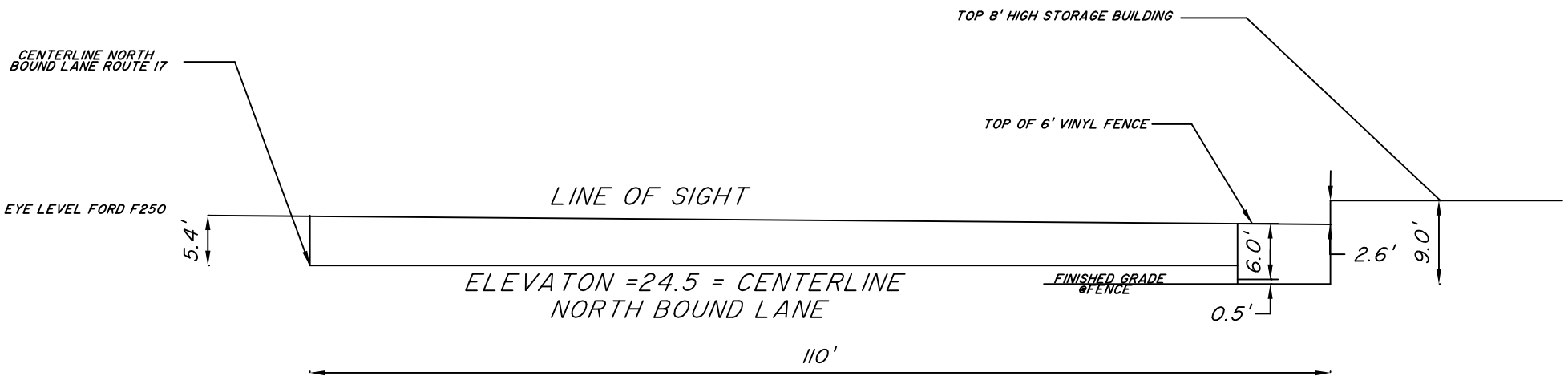
PAGE: 1/5 COVER PAGE
APPROVED:
CHECKED BY:

FLETCHER & ASSOCIATES
4098 Princess Berkeley
Williamsburg, VA. 23188
(757) 508-3156
Email: FandAassoc@gmail.com

SOFTPLAN ARCHITECTURAL DESIGN SOFTWARE

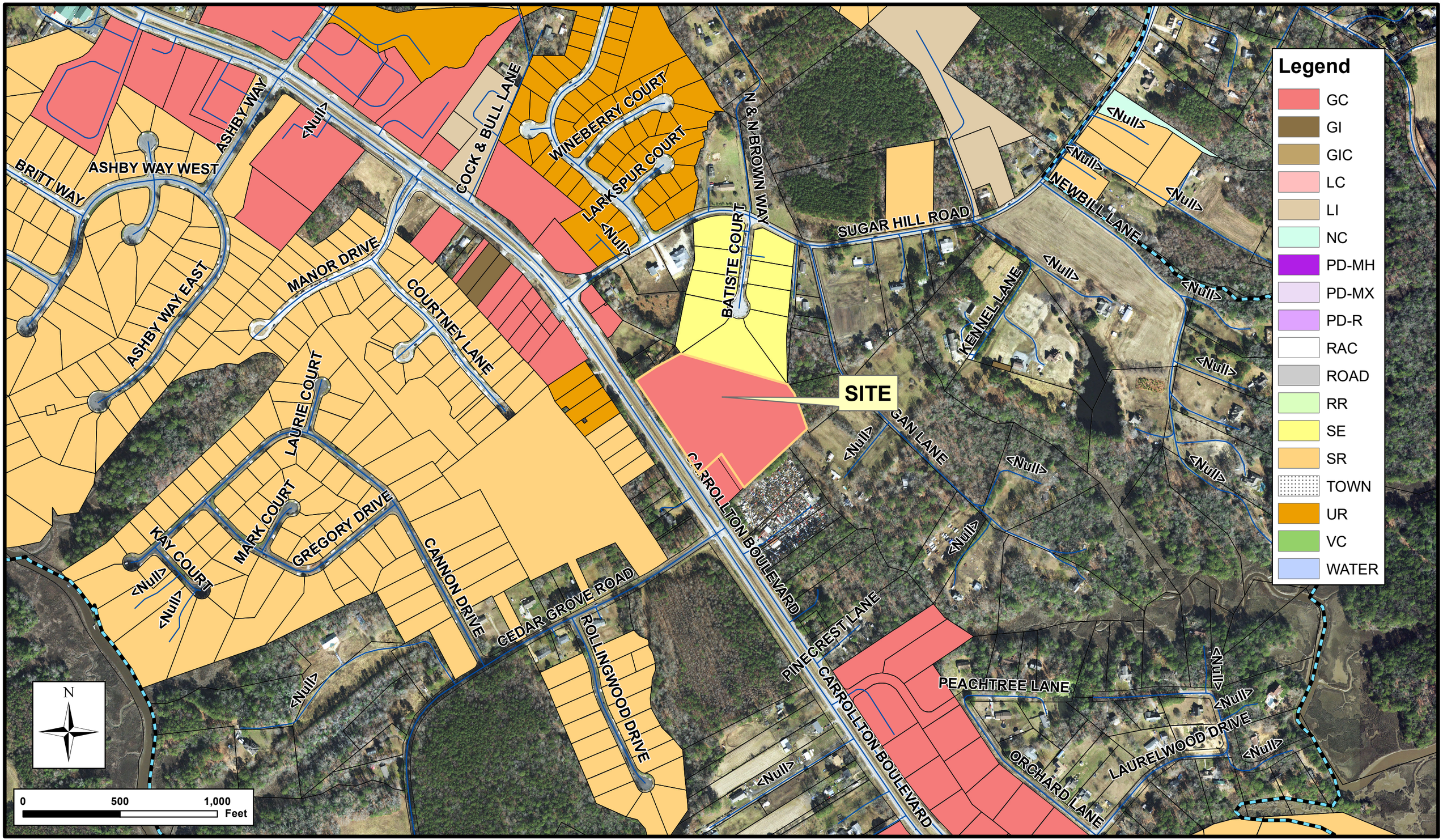
SAWCO SELF STORAGE SOUTH



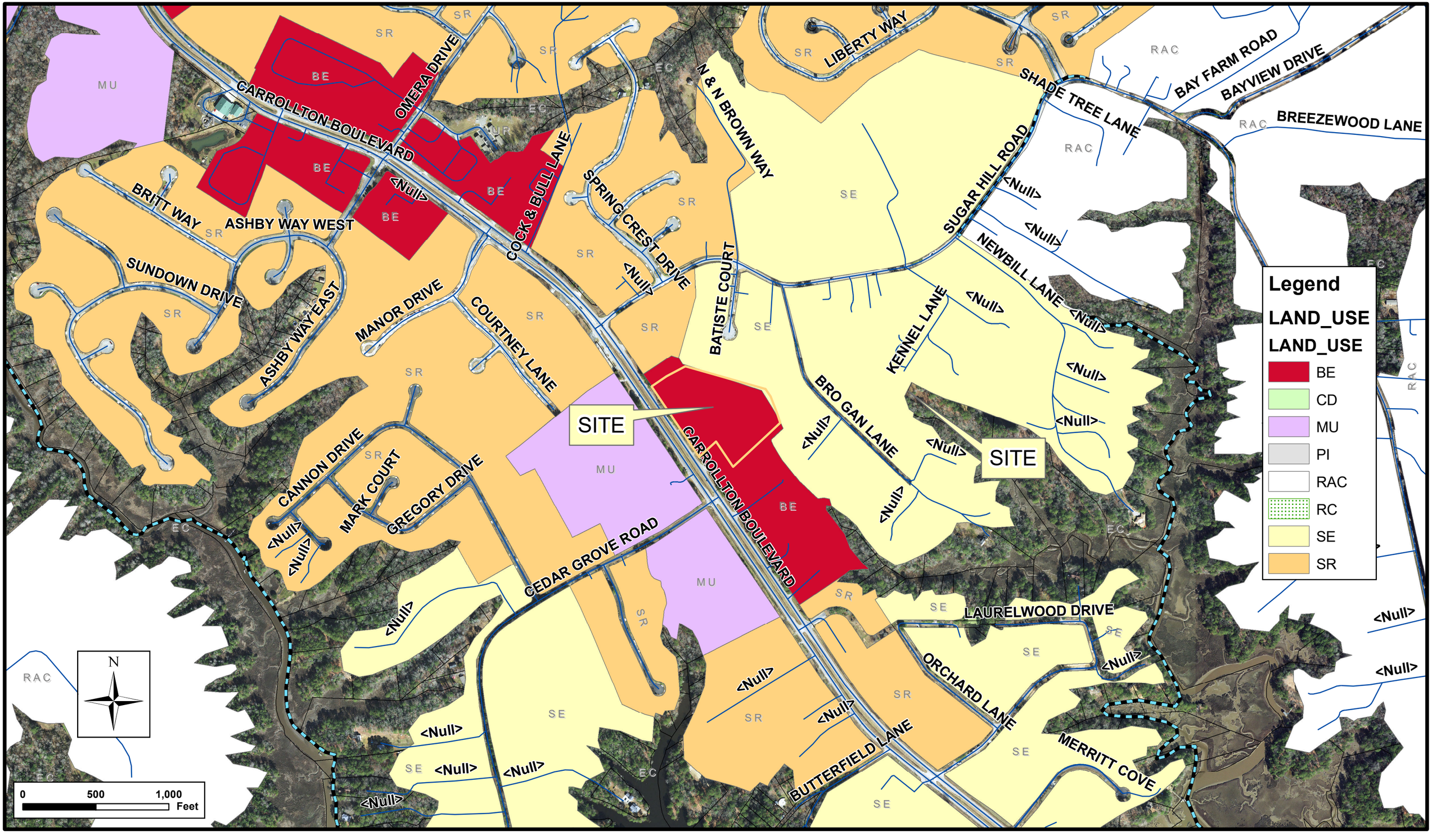

TOP 8' HIGH STORAGE BUILDING
CENTERLINE NORTH BOUND LANE ROUTE 17
TOP OF 6' VINYL FENCE
LINE OF SIGHT
EYE LEVEL FORD F250
5.4'
6.0'
2.6'
9.0'
ELEVATON =24.5 = CENTERLINE NORTH BOUND LANE
FINISHED GRADE @FENCE
0.5'
110'

EXC-10-23 NDSO Exception Request - Location Map

EXC-10-23 Zoning Map



EXC-10-23 Land Use Map



LEGEND

HP HP HIGH POINT

CL CL CENTERLINE ELEVATION

EL EL ELEVATION

EP EP EDGE OF PAVEMENT

TC TC TOP OF CURB

FL FL FLOW LINE

F.F. FINISHED FLOOR

PS PS PERMANENT SEEDING

IPF IPF IRON PIN FOUND

SIDEWALK

PROPOSED ASPHALT

N/F T.P. 34-21-006 THOMAS DISTEFANO & JESSICA CAPRICE INST. # 200005803 PC2, SLIDE 128, PG.2 ZONE: SE

JEFFREY D. JONES & JOANNE M. JONES INST. # 960003428 ZONE: RAC

I.P. 34-01-168 CARROLLTON VENTURES LLC INST. # 210005002 ZONE: RAC

PIPE FD

S27°23'43"E 68.00'

S13°53'43"E 120.00'

S10°23'43"E 23.35'

PROPOSED 6' VINYL FENCE

EXISTING WOODS

10' NDSO SIDE & REAR SETBACK

S66°32'58"E 570.26'

N/F T.P. 34-01-167 CARROLLTON VENTURES LLC. INST. # 210005002 ZONE: RAC

EXISTING BARN

EXISTING SHED

SEE OUTFALL DETAIL SHEET 7

25' DRAINAGE EASEMENT

EXISTING FENCE

S54°29'55"W 441.58'

N/F T.P. 34-21-005 RICARDO T. PEREZ & MARIA PEREZ INST. # 200002258 PC2, SLIDE 128, PG.2 ZONE: SE

N/F T.P. 34-21-004 ROBERT L. BURNETT & SHIRLEY D. BURNETT INST. # 060001504 PC2, SLIDE 128, PG.2 ZONE: SE

PROPOSED 30' ROAD

40' X 310' BUILDING (62) F.F. 22.5

40' X 140' BUILDING (28) F.F. 22.5

40' X 330' BUILDING (66) F.F. 22.5

40' X 150' BUILDING (30) F.F. 22.5

40' X 100' BUILDING (20) F.F. 22.5

40' X 330' BUILDING (66) F.F. 22.5

40' X 160' BUILDING (32) F.F. 22.5

30' X 110' BUILDING (22) F.F. 22.5

40' X 330' BUILDING (66) F.F. 22.5

25' X 42' OFFICE F.F. 22.5

HVAC

(6) 9'X20' PARKING SPACES

25' X 320' BUILDING SINGLE LOAD (32) F.F. 22.5

GATE

N/F T.P. 34-01-112 SAMUEL D. CRATCH INST. # 180004530 ZONE: RAC

N/F T.P. 34-01-113 SAMUEL D. CRATCH INST. # 180004530 ZONE: RAC

N63°29'55"E 125.00'

N69°23'18"E 145.66'

PROPOSED 8' VINYL FENCE

PROPOSED 6' VINYL FENCE

PROPOSED DRAINFIELD

PROPOSED 24' INGRESS/EGRESS EASEMET

30' ASPHALT ENTRANCE

50' NDSO FRONT SETBACK

PROPOSED 30' INGRESS/EGRESS EASEMET

PROPOSED BENCH

PROPOSED 8' MULTI-USE PATH

N26°30'05"W 306.00'

105.0'

N26°30'05"W 171.69'

N26°30'05"W 210.00'

N53°29'55"E 157.00'

PROPOSED 8' VINYL FENCE IN FRONT

N/F T.P. 34-01-114 EDWARD VINCENT & SHARON VINCENT INST. # 060001547 ZONE: RAC

IPF

PIPE FD

FIBER OPTIC MARKER (TYP)

FIRE HYDRANT (TYP)

WATER VALVE (TYP)

12" RCP (TYP)

TOP OF BANK

℄ DITCH

℄ ROAD

EDGE OF PAVE

TO JAMES RIVER BRIDGE

533±' TO C/L OF RTE 661

310±' TO C/L OF CEDAR GROVE ROAD

TO PORTSMOUTH

PROPOSED 12' PEDESTRIAN EASEMET

PROPOSED STOP SIGN

SEE DETAIL SHEET 9

CARROLLTON BOULEVARD

ROUTE 17 140' R/W

705±' TO C/L OF RTE 661

720±' TO C/L OF CEDAR GROVE ROAD SIGHT DISTANCE 1,584'

VDOT CONTROL BOX

PP (TYP)

HRSD FORCE MAIN

STOP LIGHT

TRANS

VDOT BOX

CEDAR GROVE RD RTE 661 (50' R/W)

N/F T.P. 34-01-116 CLAYTONS AUTO PARTS INC. INST. # 980003325 ZONE: RAC

P.C. 2 SL. 99-14

PROPOSED 6' VINYL FENCE

PROPOSED 6' VINYL FENCE

PROPOSED 6' VINYL FENCE

EXISTING WOODS

EXISTING WOODS

EXISTING WOODS

GRAPHIC SCALE : 1" = 40'

40 0 20 40 80

REVISIONS

DATE	DESCRIPTION
5/18/23	AS PER IOW COMMENTS 4/6/23
9/20/23	AS PER IOW COMMENTS 7/28/23

Commonwealth Engineering Group, Ltd.
CIVIL ENGINEERS - PLANNERS
12196 REDHOUSE ROAD
WINDSOR, VIRGINIA 23487
757-356-9140

COMMONWEALTH OF VIRGINIA R. MITCHELL WILSON Lic. No. 016681 11/08/22 PROFESSIONAL ENGINEER

LAYOUT PLAN
FOR
SAWCO SELF STORAGE
T.M 34-01-108
ISLE OF WIGHT COUNTY, VIRGINIA

DRAWN: M.W.C.

DESIGNED: R.M.W.

SCALE: 1" = 40'

DATE: 07/29/22

SHEET: 11 OF 11

CEG# 21-151

Front of Site along Route 17 (Suffolk to the right, Smithfield to the left)

Facing South toward Suffolk

Northern edge of Site

Southern Edge of Site by Sherry Vincent Insurance Agency

Site Facing North toward Smithfield