

January 21, 2021

Ms. Camylyn Lewis, P.E., CFM North Branch, Senior Engineer III County of Fairfax Department of Land Development Services (LDS) 12055 Government Center Parkway, Suite 659 Fairfax, Virginia 22035-5503

TNT Project Number: 1561

Reference: Water Quality Impact Assessment No.: 3276-WQ-004-3

Subject: Response Letter, Woodside Estates, Section 3, Lot 16A; 8747 Brook Road; Tax Map No.:

020-3-03-0016A; Dranesville District

Dear Ms. Lewis,

On behalf of the Applicant for the above-mentioned project, please find TNT Environmental, Inc. (TNT) responses for the requested information regarding the Water Quality Impact Assessment submitted May 24, 2020, and revised August 4, 2020:

## Pertaining to Water Quality Impact Assessment Application

1. Water Quality Impact Assessment, Sheet 1

The existing conditions should match with the approved grading plan. If the existing conditions (as they are onsite today) do not match with the approved grading plan this should be explained in the WQIA. A sealed plat is required for the exception application under CBPO 118-6-9, the plan/plat submitted with the WQIA should match the plan submitted for the exception application.

Please ensure that the Plat / Plan Meets the requirements of ZO 9-011, paragraph 2, and includes the following:

- a) Separate existing condition and proposed condition plats.
- b) The existing condition plat shall show existing contours, existing impervious areas, turf areas and forested or tree cover areas.
- c) The proposed condition plat shall show proposed contours proposed land uses and impervious areas, field verified RPA, 50 feet seaward RPA, floodplain delineation and floodplain levels, proposed SWM facilities, utilities and easements, and sewage disposal system active and reserve locations
- d) setback, building block restriction lines
- e) Impervious area analysis existing versus proposed with breakdown of impervious areas within and outside RPA
- f) Limits of clearing and grading, Erosion and sediment control measures, tree save protection measures.

Response: The enclosed plan contains the items outlined above. Please note that no proposed contours are shown as the proposed improvements will be largely at grade.

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1. A recent comparison of the County GIS and the grading plan subsequent to the 2012 exception identifies impervious area beyond that approved with the 2012 exception.

Response: All existing impervious area within the RPA, as of the date of this application, have been approved via the 2012 exception. An additional 475 sq feet of impervious surface, specifically a wood deck underlain by gravel, has been constructed since the 2012 exception; however, this deck is outside of the RPA and was not part of a civil plan submission. The only additional impervious area within the RPA is show on the enclosed grading plan and is that of the proposed 184 square feet of driveway extension. Refer to Section 118-3-2 for details regarding the existing conditions of the site. Table 1 Impervious Area Analysis on the WQIA Map, dated 1/15/2020 has been revised to reflect the patio acreage.

## 2. Page 3,

i. Clarify the statement "Though Best Management Practices are not required to meet the requirements of Chapter 124 of the County code (the land disturbance is less than 2,500 square feet and is exempt per 124-1-7.4), the proposed revegetation will offset the water quality detriment as demonstrated by the Virginia Runoff Reduction Computations in Appendix VI, summarized as follows:

Pre-developed condition

• 0.269 acres of managed turf is proposed to be disturbed/converted.

Post-developed condition: with the driveway turn-around

- 0.0193 acres of forest/Open Acres
- 0.0034 acres around the disturbed area for the turn-around will be re-instated as turf
- 0.042 acres of impervious area will become the turn around."

## Response: Language has been added to Page 3, Section E

3. Page 6, paragraph 1

For clarity regarding the 330 square feet, please reference the water quality computations in Appendix VI.

## Response: Referenced on Page 6, paragraph 2.

4. Appendix IV VRRM Spreadsheets

Adjacent to the Pre-developed Land Cover, and the Post-Re Development Land Cover, please clarify the acres and the square feet by adding a note to the sheet; do not alter the VRRM spreadsheet itself.

**Response: Revised VRRM sheet enclosed** 

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## 5. Appendix VII.

Sheet 1 of 2, Lot 16A, Section 3 Woodside Estates. The RPA certification states that there is major floodplain on the lot. A correct RPA certification should be provided with the Plan/Plat.

## Response: Enclosed on WQIA plan

If you have any questions, please feel free to contact us at any time at (703) 466-5123.

Sincerely,

TNT ENVIRONMENTAL, INC.

Jillian S. Moore, PWS, PWD, ISA-CA

Senior Wetland Scientist

Jillian@TNTenvironmentalinc.com

Avi M. Sareen, PWD, ISA-CA

Principal/President

<u>Avi@TNTenvironmentalinc.com</u>

## **Enclosures:**

• Water Quality Impact Assessment Request 118-6-9, dated January 21, 2021



## WATER QUALITY IMPACT ASSESSMENT 118-6-9 8747 BROOK ROAD FAIRFAX COUNTY, VIRGINIA

**TNT PROJECT NO.: 1561** 

**FOR** 

MR. YESHI EDWIN

**MAY 24, 2019; REVISED JANUARY 21, 2021** 



May 24, 2019

Revised: January 21, 2021

Mr. Yeshi Edwin 8747 Brook Road McLean, VA 22102

TNT Project #: 1561

Reference: Water Quality Impact Assessment Request per 118-6-9

Woodside Estates, Section 3, Lot 16A; 8747 Brook Road; Dranesville District

Latitude: 38°56'58.67"N, Longitude: 77°14'48.09"W

Dear Mr. Edwin:

TNT Environmental, Inc. (TNT) is pleased to present this Water Quality Impact Assessment (WQIA) report for the above-referenced project in general accordance with TNT Proposal Number 2253, dated April 16, 2019. The purpose of the WQIA is to ensure protection of the Resource Protection Areas consistent with the goals, objects, and requirements of Chapter 118, Article 4 of the Fairfax County Chesapeake Bay Preservation Ordinance through (1) the identification of the impacts of proposed development or redevelopment on water quality on lands within RPAs, (2) the assurance that, where development or redevelopment does take place within RPAs, that it will be located on those portions of a site in a manner that will be least disruptive to the natural functions of RPAs; and (3) the requirement of mitigation measures which will address water quality protection.

## **PROJECT SITE DESCRIPTION**

The project site is approximately 1.07 acres of land located southeast of Brook Road in Fairfax County, Virginia (*Figure 1: Project Location Map*). The project site is further identified by physical address 8747 Brook Road and Fairfax County Map #: 0203-03-0016A. Based on a review of County GIS data, the project site is improved by an existing residential structure and is zoned R-1. A perennial stream and its associated Resource Protection Area (RPA) are located along the western portion of the property (*Figure 2: USGS Topographic Map*).

A prior WQIA was prepared, submitted and approved for the development of the lot in 2012 (3276-WRPA-002-1 and 3276-WQ-002-1).

## **SECONDARY INFORMATION REVIEW**

Secondary Information entails the background research and review of recorded data and/or mapping associated with the project site. Resources reviewed include but are not limited to the following:

• U. S. Geological Survey (USGS) Topographic Map, Falls Church Quadrangle, 2016

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- U. S. Fish and Wildlife Service (USFWS), National Wetlands Inventory (NWI) Online Mapper, http://wetlands.fws.gov/mapper\_tool.htm
- Natural Resources Conservation Service (NRCS), Electronic Field Office Technical Guide, Fairfax County Soils, www.nrcs.usda.gov/technical/efotg/
- Available aerial photography and GIS data

The USGS Falls Church (2016) quadrangle map shows elevations of approximately 300 feet above mean sea level (MSL). The property is located within the Middle Potomac-Catoctin River watershed and identified as Hydrologic Unit Code (HUC) 02070008. The NWI does not depict any wetland features within the project site boundaries; however, a riverine system is shown crossing the western corner of the property.

The soil survey indicates that the site is underlain primarily by Codorus and Hatboro soils, 0 to 2 percent slopes, occasionally flooded (30A) and Glenelg silt loam, 15 to 25 percent slopes (39D).

## Water Quality Impact Assessment Components per Section 118-3-2

The proposed project meets the general performance criteria for Resource Protection Areas as outlined in Section 118-3-2 and detailed below:

- a) Approximately 73% of the overall property is situated within the RPA; of which 5,966 square feet of improvements currently exist within the RPA. Existing development within the RPA is includes the primary residence, detached garage and driveway, which equates to 17% of the RPA. Additional construction proposed within the RPA include creation of pervious surface in the form of a driveway turn-around and an impervious 3-foot high retaining wall, resulting in an increase of 330 square feet of RPA disturbance (0.5% increase to RPA disturbance). The encroachment into the RPA buffer is the minimum necessary to provide construction access to safely construct the proposed turnaround. No more land shall be disturbed than is necessary to provide for the proposed development activities.
- b) Existing vegetation onsite is maintained as a lawn with landscaped shrubs with some areas of trees occurring outside of the limits of disturbance. The proposed design does not call for any removal of indigenous vegetation within the property. The encroachment into the RPA buffer shall be revegetated with tree canopy. The proposed planting area is equal to that area which is disturbed within the RPA.
- c) The proposed redevelopment translates to a net increase of 0.5% impervious area (184 square feet associated with retaining wall and driveaway) within the RPA buffer, as compared to the existing condition.
- d) The proposed activities are below 2,500 square feet of land disturbance and are not subject to the requirements of Chapter 104 of the Fairfax County Code.
- e) Stormwater runoff shall be controlled by the use of super silt fencing as depicted on the enclosed WQIA. Per VRRM, no additional load reduction is required. Refer to enclosed VRRM spreadsheets, Appendix VI for the impervious calculations.
- f) No impacts to wetlands or Waters of the U.S. are proposed for the proposed project.
- g) No onsite sewage disposal systems will be used for the proposed activities.
- h) No agricultural activities are being conducted or proposed on this property.

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## Water Quality Impact Assessment Components per Section 118-4-3

- a) Based on Fairfax County GIS an unnamed tributary to Rocky Run parallels the western property boundary. No contiguous wetlands were observed. A site-specific RPA delineation has been conducted by others and is shown on the attached Water Quality Impact Assessment Map and was approved for use during the 2012 review of the overall site development application (3276-WRPA-002-1 and 3276-WQ-002-1). Approximately 73% of the existing site is situated within the site-specific RPA (refer to Appendix IV WQIA Map, revised June 29, 2020)
- b) Activities proposed within the RPA include creation of a 184 square foot driveway turn-around and accompanying retaining wall. The additional driveway turn-around area will be constructed of porous pavers. Specifically, 330 square feet of the RPA will be disturbed to provide for the temporary work zone, as required by Fairfax County, to complete the proposed project. All work will be conducted immediately adjacent to the existing structure. No disruption or clearing of any vegetation (other than existing lawn) will occur as a result of the proposed project (refer to Appendix IV WQIA Map, revised June 29, 2020). The project will take approximately two to four weeks to complete.
- c) The existing driveway is too narrow for larger delivery trucks to turn around in and backing out of the driveway on to Brook Road is unsafe due to roadway speeds and lines of sight. Additionally, the applicant has already incurred property damage by delivery vehicles attempting various turnaround movements onsite as shown on enclosed photographs 3 and 4. The standard UPS truck is between 24' and 28' in length. The applicant has looked into putting a turnaround in front of the existing house and also closer to Brook Road. Widening of the existing driveway is not feasible as it would require the complete reconstruction of the garage entryways. In conversation with County staff, placing the turnaround as shown is the least environmentally damaging practicable alternative. Refer to Appendices V for previously considered alternatives that would result in greater encroachment to RPA.
- d) No disruption, fill, or clearing of any wetlands is proposed. No impacts to hydrology is proposed.
- e) Proposed RPA encroachment shall be mitigated per CBPO 118-3-3(f) as discussed below and depicted on the enclosed WQIA Map. Though Best Management Practices are not required to meet the requirements of Chapter 124 of the County code (the land disturbance is less than 2,500 square feet and is exempt per 124-1-7.4), the proposed revegetation will offset the water quality detriment as demonstrated by the Virginia Runoff Reduction Computations (see Appendix VI) and summarized below in Table 1.

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Table 1 - VRRM Spreadsheet Summary

Type of Land Cover	Total (acres)	Total %
Pre-Development Co	onditions	
Forest/Open	0	0
Managed Turf (existing yard)	0.03	71%
Impervious Cover	0.01	29%
Total	0.04	100%
Post-Development C	onditions	
Forest/Open (proposed conversion from turf to forest)	0.02	51%
Managed Turf (area to remain as turf)	0.003	9%
Impervious Cover (proposed turn-around)	0.02	40%
Total	0.04	100%

By replacing existing areas of maintained/mowed lawn with trees, a greater amount of precipitation will be captured. Specifically, per VRRM, by providing 845 square feet (0.02 ac) reforestation within the RPA, the Total TP load will be reduced from the current predevelopment load. Specifically, the predevelopment load of TP is 1.09 lb/yr and the Post-Development load is 0.98 lb/yr, thus providing a TP reduction of 0.11 lb/yr. Further, the applicant has proposed porous pavers for the turnaround area which is designed to allow stormwater drainage to the sub-grade for filtration, groundwater recharge, and reduction in over-all runoff. The relatively small area being disturbed (330 SF) should be considered *de minimus* and is unlikely to have a measurable impact to water quality.

- f) The proposed project complies with the applicable performance criteria of Chapter 118 as discussed above and below.
- g) The applicant is required to meet additional performance criteria under Section 118-6-6 for RPA buffer encroachments as discussed below.

## Water Quality Impact Assessment Components per Section 118-6-6

a) On October 3, 2012, an exception was approved for the subject lot by the Chesapeake Bay Preservation Ordinance (CBPO) Exception Review Committee (ERC): Resource Protection Area Exception # 3276-WRPA-002-1 and Water Quality Impact Assessment # 3276-WQ-002-1 to construct the existing primary structure, driveway, and garage. The total approves impervious of the property came to 8,558 square feet (5,966 square feet within the RPA). Sometime after completion of the approved plant, an additional 475 square feet of gravel base was laid under a wood deck in the back yard (outside of the RPA), increasing the overall impervious of the

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property to 9,217 square feet; however, no increase to impervious area within the RPA occurred. As decks do not require permits, no plans were submitted to the County for approval. Since 2012, and with people utilizing internet-based businesses for commerce and deliveries, it has become apparent that development did not consider the safety and practicality issues that have arrived due to the narrow driveway entrance. In May 2019, a submission was made to the County for the request to construct additional parking spaces at the entrance to the driveway (#3276-WQ-003-1) to provide space access of larger vehicles. This request entailed approximately 1,816 sf of RPA encroachment to install up to four new parking spaces adjacent to Brook Road. On July 29, 2019, the County noted that the applicant would be required to resubmit the application under CBPO Section 118-6-9 given the nature of the previously authorized RPA encroachments for the overall lot redevelopment. Since then, the applicant has redesigned and reduced the RPA encroachment to a 330 sf. In lieu of four new parking spaces, the applicant is requesting the build of a 10-foot x 18-foot (184 sf) driveway turn-around adjacent to the existing garage. The turn-around will be limited to areas of existing lawn and fitted with pervious pavers. Additionally, a small (50 SF) retaining wall will be necessary to support the turnaround area and reduce the need to expand the limits of construction to tie into existing grades onsite.

The requested exception to the criteria is the minimum necessary to afford relief. The parcel in question (46,770 SF) is constrained by approximately 34,331 SF of land within the RPA. The RPA buffer encompasses approximately 73% of the property. This constraint drastically reduces the total available buildable area onsite; however, the design of the existing house and associated structures, including the proposed driveway turn around, has reduced the pre-July 2012 impervious area within the seaward 50' buffer by 1,743 sf.

As noted, the applicant previously proposed additional parking areas and a turnaround where the driveway ends at Brook Road. This design resulted in more RPA encroachment and was discarded. The applicant also reviewed the feasibility of creating a turnaround in front of the existing house, but this too resulted in additional RPA encroachments due to the existing grades onsite. Additionally, this location would have resulted in encroachment into the seaward 50' of the RPA buffer.

- b) Granting the requested exception will not confer upon the applicant any special privileges that are denied by this part to other property owners who are subject to its provisions and who are similarly situated. The applicants here are not requesting nor would receive any special privilege denied to other similarly situated property owners, who could also conduct the required analyses and, if warranted, be considered for an exception and waiver.
- c) This exception request is in harmony with the purpose and intent of Chapter 118 and is not of substantial detriment to water quality. The requested exception is limited to areas of herbaceous maintained lawn and incorporates plantings of shrub and tree canopy within areas that are also currently consisting of maintained lawn. Therefore, the proposed revegetated area will maximize water quality protection, mitigate the effects of the buffer encroachment, and provide greater canopy coverage than the area of encroachment into the

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buffer area currently provides. The relatively small area being disturbed (330 SF) should be considered *de minimus* and is unlikely to have a measurable impact to water quality.

- d) This exception request is not based on conditions or circumstances that are self-created or self-imposed. The request is to alleviate hazardous back-up conditions for delivery vehicles and others on to Brook Road which has been designed and constructed by others. The existing driveway is too narrow for larger delivery trucks to turn around in, thus requiring vehicles to back out of the driveway on to an arterial road with no shoulder and poor lines of sight. The issue the applicant is seeking to address have been caused by others, and therefore this exception is not based on conditions or circumstances that are self-created or self-imposed.
- e) Reasonable and appropriate conditions are imposed, as warranted, that will prevent the allowed activity from causing a degradation of water quality. Specifically, activities proposed within the RPA include use of porous pavers for the turnaround area, while revegetating areas within the RPA that lack canopy cover. The relatively small area being disturbed (330 SF) should be considered *de minimus* and is unlikely to have a measurable impact to water quality.
- f) The applicant is required to meet additional performance criteria for RPA buffer area establishment as discussed below in Section 118-6-9.

## Water Quality Impact Assessment Components per Section 118-6-9

The proposed project complies with the applicable performance criteria of Section 118-6-9 General Resource Protection Area Encroachment Request. The exception meets the required findings listed in Section 118-6-6. Furthermore, where practicable, a vegetated area that will maximize water quality protection, mitigate the effects of the buffer encroachment, and is equal to the area of encroachment into the buffer area shall be established elsewhere on the lot. Specifically, the 330 square feet of disturbed area that will be needed to accommodate the installation of the 184 sq feet of new impervious area associated with the driveway turn-around within the RPA required revegetation at a density of 100 overstory trees per acre (2" DBH), 200 understory trees per acre (1" DBH), and 1,089 shrubs per acre (1 gallon). Per CBPO 118-3-3(f), for 330 square feet of disturbed area within the RPA buffer, planting requirements would be:

- i. 100 overstory trees/ac = 1 overstory tree
- ii. 200 understory trees/ac = 2 understory tree
- iii. 1,089 shrubs/ac = 9 shrubs

To further prevent the increase of pollution, as discussed above in Section 118-4-3e, the applicant will provide an additional 515 square feet of plantings for a total of 845 square feet (refer to water quality computations in Appendix VI). The proposed vegetated area will maximize water quality protection, mitigate the effects of the buffer encroachment, reduce total Phosphorous load from pre-

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development conditions, and is approximately 40% greater than the area of encroachment into the buffer area. The planting schedule is below for ease of reference and is depicted on the WQIA site drawing, dated November 3, 2020.

## **Table 2 – Planting List**

Common Name	Scientific Name Size (DBH)			Quantity
Ov				
Willow Oak Quercus phellos 2"				2
	l		Subtotal	2
Und	lerstory Trees			
American Hornbeam	Carpinus caroliniana	1"		2
Downy Serviceberry	Amelanchier arborea	1"		2
			Subtotal	4
	Shrubs			
Northern Spicebush	Lindera benzoin	1 Gallon		5
Hazel Alder	Alnus serrulata	1 Gallon		4
Maple-Leaved Viburnum	Viburnum acerifolium	1 Gallon		4
Southern Arrowwood	Viburnum dentatum	1 Gallon		4
Silky Dogwood	Cornus amomum	1 Gallon		4
			Subtotal	21
			Total	27

TNT would like to thank you for the opportunity to provide you with this Water Quality Impact Assessment. We look forward to assisting you further with this project and other environmental concerns you may have. If you have any questions, please feel free to contact us at any time at (703) 466-5123.

Sincerely,

TNT ENVIRONMENTAL, INC.

Jillian S Moore, PWD, PWS, ISA-CA

Senior Wetland Scientist

Jillian@TNTenvironmentalinc.com

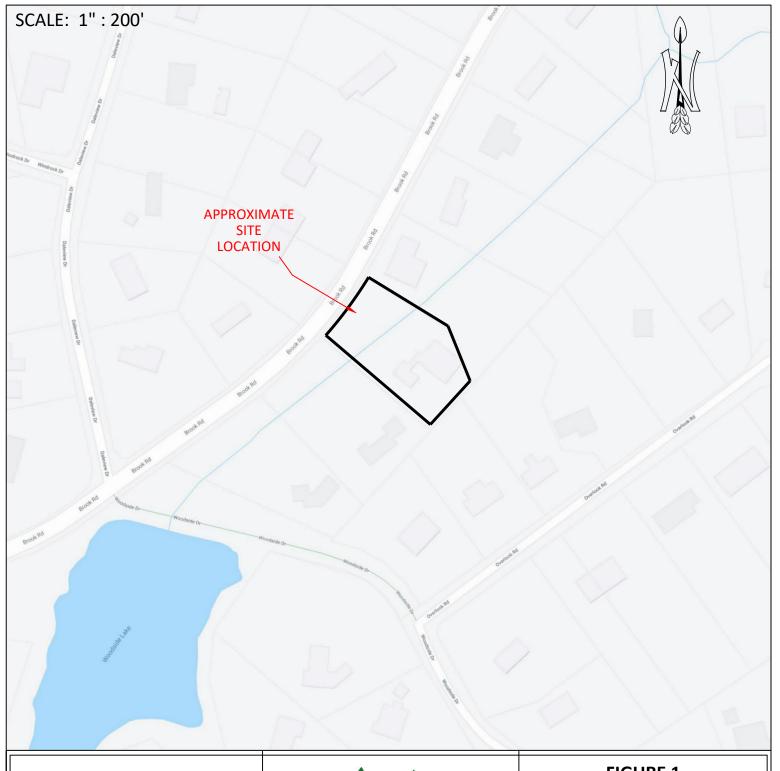
Avi M. Sareen, PWD, PWS, ISA-CA

Principal/President

Avi@TNTenvironmentalinc.com

## **APPENDIX I**

# VICINITY MAP & USGS TOPOGRAPHIC MAP



WATERQUALITYIMPACT **ASSESSMENT** 

8747BROOKROAD

FAIRFAX COUNTY, VA

AUGUST 2020

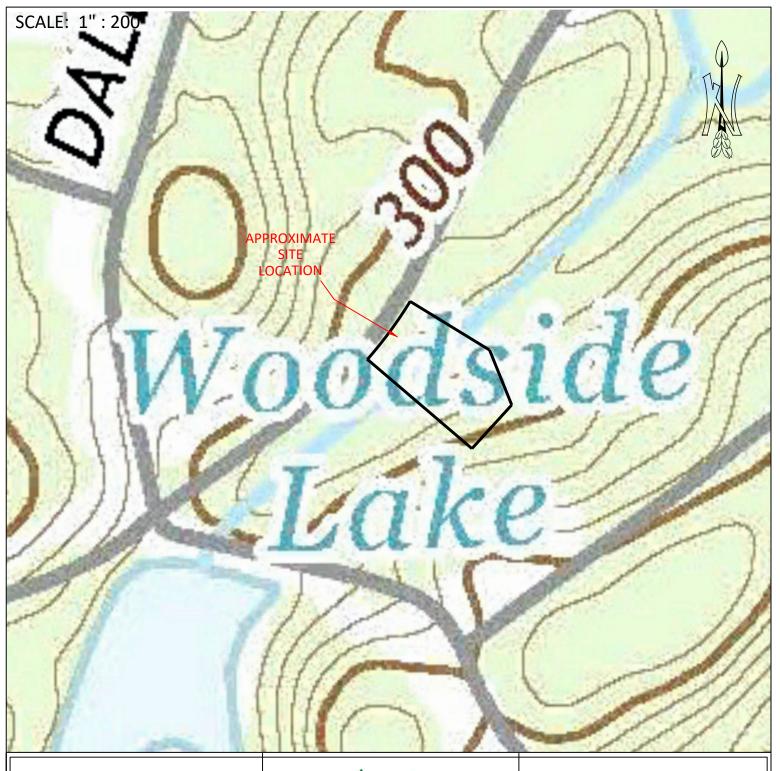


**4455 BROOKFIELD CORPORATED DRIVE SUITE 100 CHANTILLY, VIRGINIA 20151**  FIGURE 1

SITE LOCATION MAP

**SOURCE: GOOGLE MAPS** 

TNT PROJECT NO: 1561



WATERQUALITYIMPACT **ASSESSMENT** 

8747BROOKROAD

FAIRFAX COUNTY, VA

**AUGUST 2020** 



**4455 BROOKFIELD CORPORATED DRIVE SUITE 100 CHANTILLY, VIRGINIA 20151**  FIGURE 2

**TOPOGRAPHIC MAP** 

SOURCE: FALLS CHURCH, VA USGS QUAD MAP (2016)

TNT PROJECT NO: 1561

## **APPENDIX II**

# NATIONAL WETLAND INVENTORY MAP & NRCS SOILS MAP

# PISITAL WELDLIFE SERVICE

## U.S. Fish and Wildlife Service

# National Wetlands Inventory

## 8747 Brook Road



May 14, 2019

## Wetlands

Estuarine and Marine Deepwater

Estuarine and Marine Wetland

Freshwater Emergent Wetland

Freshwater Forested/Shrub Wetland

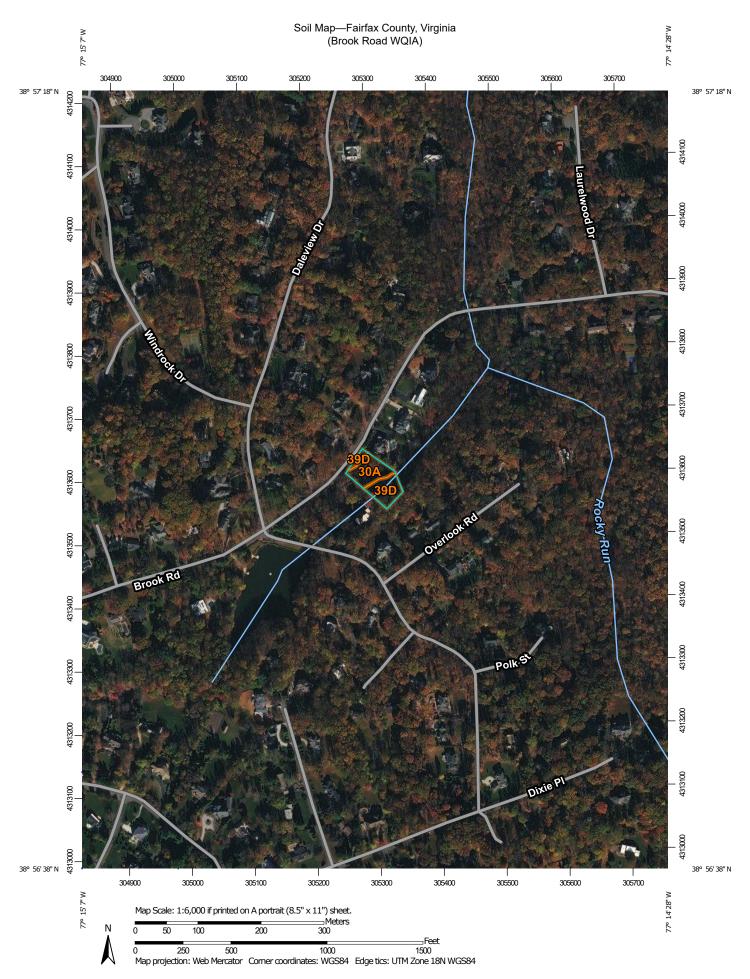
Freshwater Pond

Lake

Other

Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.



#### MAP LEGEND

## Area of Interest (AOI)

Area of Interest (AOI)

#### Soils

Soil Map Unit Polygons



Soil Map Unit Points

#### Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Stony Spot

Very Stony Spot

Spoil Area

Wet Spot
 Other

△ Other

Special Line Features

#### **Water Features**

Streams and Canals

#### Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

#### Background

Aerial Photography

#### MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12.000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Fairfax County, Virginia Survey Area Data: Version 16, Aug 28, 2018

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 3, 2015—Feb 22, 2017

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## **Map Unit Legend**

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
30A	Codorus and Hatboro soils, 0 to 2 percent slopes, occasionally flooded	0.5	49.6%
39D	Glenelg silt loam, 15 to 25 percent slopes	0.5	50.4%
Totals for Area of Interest		1.1	100.0%

## **APPENDIX III**

## **PHOTOGRAPHS**

8747 BROOK DRIVE PHOTOGRAPHIC LOG

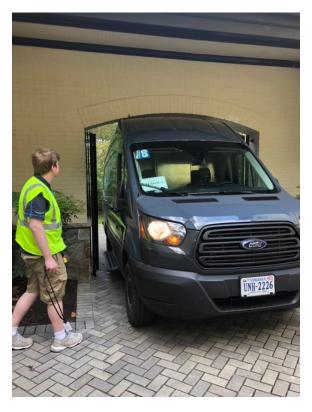


**Photograph 1:** View to the east showing location of proposed parking spots and driveway improvements within RPA.



**Photograph 2:** View to the east showing location of existing driveway and proposed planting area within RPA.

8747 BROOK DRIVE PHOTOGRAPHIC LOG



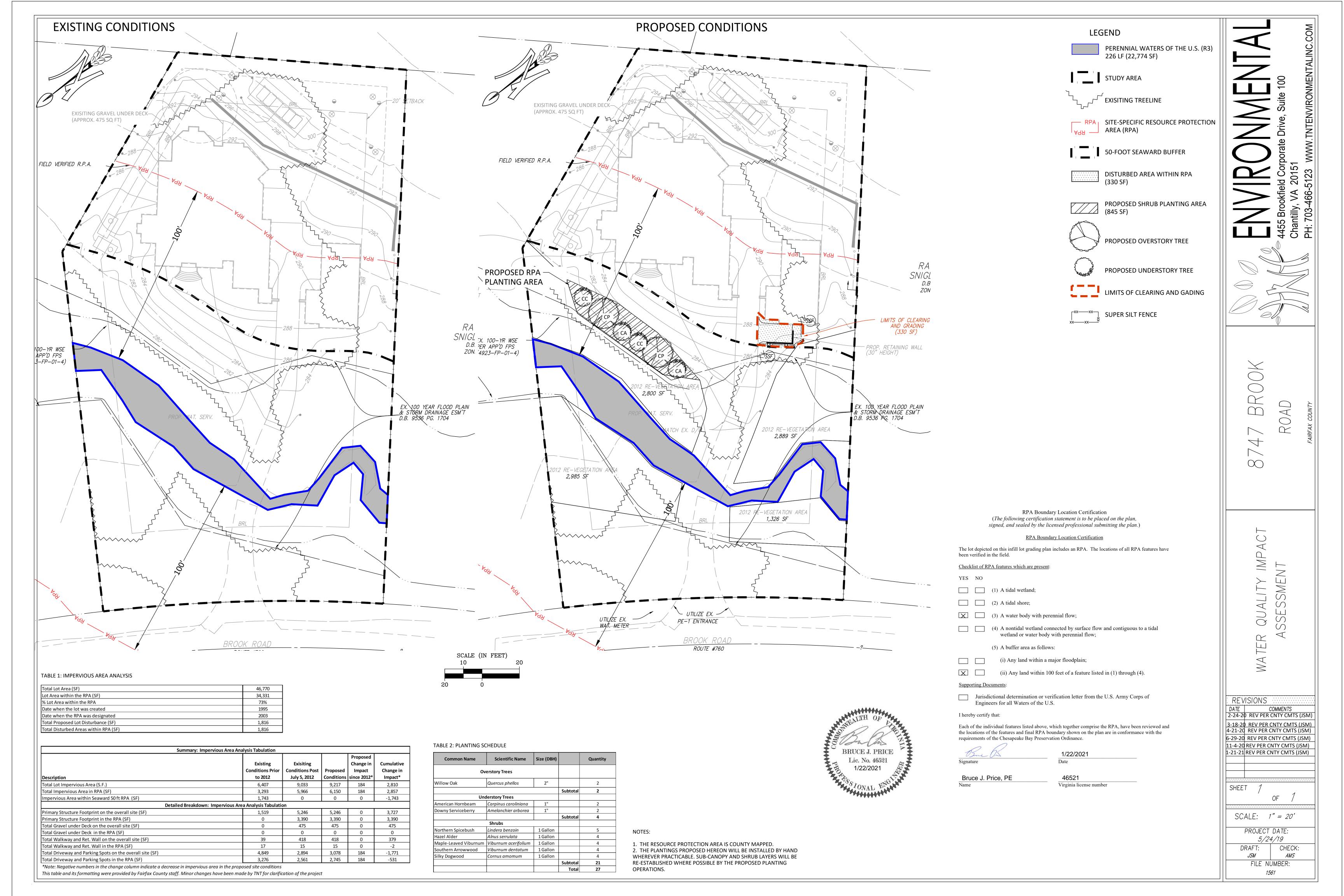
**Photograph 3:** Photograph showing a stuck delivery truck onsite.



**Photograph 4:** Photograph showing a stuck delivery truck onsite.

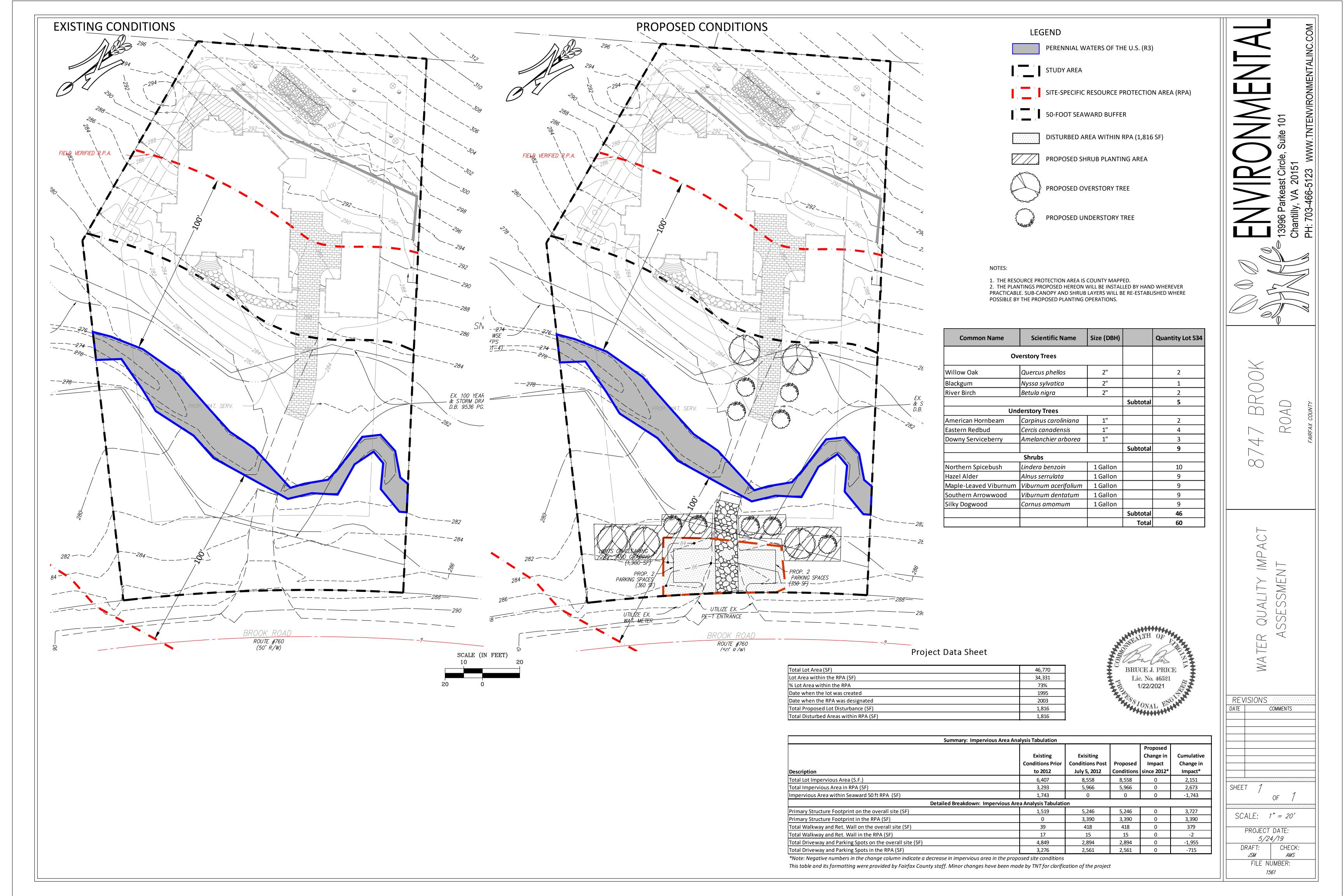
## **APPENDIX IV**

WATER QUALITY IMPACT ASSESSMENT MAP (REVISION DATE JANUARY 2021



## **APPENDIX V**

## **ALTERNATIVES**



## **APPENDIX VI**

## **VRRM SPREADSHEETS**

#### DEQ Virginia Runoff Reduction Method Re-Development Compliance Spreadsheet - Version 3.0

BMP Design Specifications List: 2013 Draft Stds & Specs

## **Site Summary**

Total Rainfall (in):	43
Total Disturbed Acreage:	0.01

#### **Site Land Cover Summary**

#### Pre-ReDevelopment Land Cover (acres)

	A soils	B Soils	C Soils	D Soils	Totals	% of Total
Forest/Open (acres)	0.00	0.00	0.00	0.00	0.00	0
Managed Turf (acres)	0.00	0.00	0.00	0.03	0.03	71
Impervious Cover (acres)	0.00	0.00	0.00	0.01	0.01	29
	_	_	_	<u> </u>	0.04	100

=0.0034 ac

#### Post-ReDevelopment Land Cover (acres)

	A soils	B Soils	C Soils	D Soils	Totals	% of Total
Forest/Open (acres)	0.00	0.00	0.00	0.02	0.02	51
Managed Turf (acres)	0.00	0.00	0.00	0.00	0.00	9
Impervious Cover (acres)	0.00	0.00	0.00	0.02	0.02	40
* Forest/Open Space areas must be protected in accordance with the Virginia Runoff Reduction Method				0.04	100	

**Site Tv and Land Cover Nutrient Loads** 

	Final Post-Development (Post-ReDevelopment & New Impervious)	Post- ReDevelopment	Post- Development (New Impervious)	Adjusted Pre- ReDevelopment
Site Rv	0.43	0.36	0.95	0.48
Treatment Volume (ft³)	59	44	14	58
TP Load (lb/yr)	0.04	0.03	0.01	0.04

Pre- ReDevelopment TP Load per acre (lb/acre/yr)	Final Post-Development TP Load per acre (lb/acre/yr)	Post-ReDevelopment TP Load per acre (lb/acre/yr)
1.09	0.98	0.83

Total TP Load Reduction Required (lb/yr)	0.00	-0.01	0.01
Total TP Load Reduction Required (ID/yl)	0.00	-0.01	0.01

=0.0022

	Final Post-Development Load (Post-ReDevelopment & New Impervious)	Pre- ReDevelopment
TN Load (lb/yr)	0.26	0.28

## **Site Compliance Summary**

Maximum % Reduction Required Below Pre-ReDevelopment Load	10%

Total Runoff Volume Reduction (ft <sup>3</sup> )	0
Total TP Load Reduction Achieved (lb/yr)	0.00
Total TN Load Reduction Achieved (lb/yr)	0.00
Remaining Post Development TP Load (lb/yr)	0.04
Remaining TP Load Reduction (lb/yr) Required	0.00

=0.0022 lb/yr

\*\*No further TP load reduction required (Required - Achieved < 0.005 lb/yr)

(Remaining TP load reduction < 0.005)

## **Drainage Area Summary**

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
Forest/Open (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Managed Turf (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Impervious Cover (acres)	0.00	0.00	0.00	0.00	0.00	0.00
Total Area (acres)	0.00	0.00	0.00	0.00	0.00	0.00

## **Drainage Area Compliance Summary**

	D.A. A	D.A. B	D.A. C	D.A. D	D.A. E	Total
TP Load Reduced (lb/yr)	0.00	0.00	0.00	0.00	0.00	0.00
TN Load Reduced (lb/yr)	0.00	0.00	0.00	0.00	0.00	0.00

## **Drainage Area A Summary**

## **Land Cover Summary**

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest/Open (acres)	0.00	0.00	0.00	0.00	0.00	0
Managed Turf (acres)	0.00	0.00	0.00	0.00	0.00	0
Impervious Cover (acres)	0.00	0.00	0.00	0.00	0.00	0
_	_	_			0.00	

## **BMP Selections**

Practice	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	BMP Treatment Volume (ft <sup>3</sup> )	TP Load from Upstream Practices (lbs)	Untreated TP Load to Practice (lbs)	TP Removed (lb/yr)	TP Remaining (lb/yr)	Downstream Treatment to be Employed
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Total Impervious Cover Treated (acres)	0.00
Total Turf Area Treated (acres)	0.00

Total TP Load Reduction Achieved in D.A. (lb/yr)	0.00
Total TN Load Reduction Achieved in D.A. (lb/yr)	0.00

## **Drainage Area B Summary**

## **Land Cover Summary**

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest/Open (acres)	0.00	0.00	0.00	0.00	0.00	0
Managed Turf (acres)	0.00	0.00	0.00	0.00	0.00	0
Impervious Cover (acres)	0.00	0.00	0.00	0.00	0.00	0
					0.00	

## **BMP Selections**

Practice	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	BMP Treatment Volume (ft <sup>3</sup> )	TP Load from Upstream Practices (lbs)	Untreated TP Load to Practice (lbs)	TP Removed (lb/yr)	TP Remaining (lb/yr)	Downstream Treatment to be Employed	
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Total Impervious Cover Treated (acres)	0.00
Total Turf Area Treated (acres)	0.00
Total TP Load Reduction Achieved in D.A. (lb/yr)	0.00
Total TN Load Reduction Achieved in D.A. (lb/yr)	0.00

## **Drainage Area C Summary**

## **Land Cover Summary**

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest/Open (acres)	0.00	0.00	0.00	0.00	0.00	0
Managed Turf (acres)	0.00	0.00	0.00	0.00	0.00	0
Impervious Cover (acres)	0.00	0.00	0.00	0.00	0.00	0
					0.00	

## **BMP Selections**

Practice	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	BMP Treatment Volume (ft³)	TP Load from Upstream Practices (lbs)	Untreated TP Load to Practice (lbs)	TP Removed (lb/yr)	TP Remaining (lb/yr)	Downstream Treatment to be Employed
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Total Impervious Cover Treated (acres)	0.00
Total Turf Area Treated (acres)	0.00

Total TP Load Reduction Achieved in D.A. (lb/yr)	0.00
Total TN Load Reduction Achieved in D.A. (lb/yr)	0.00

## **Drainage Area D Summary**

## **Land Cover Summary**

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest/Open (acres)	0.00	0.00	0.00	0.00	0.00	0
Managed Turf (acres)	0.00	0.00	0.00	0.00	0.00	0
Impervious Cover (acres)	0.00	0.00	0.00	0.00	0.00	0
					0.00	

## **BMP Selections**

Practice	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	BMP Treatment Volume (ft <sup>3</sup> )	TP Load from Upstream Practices (lbs)	Untreated TP Load to Practice (lbs)	TP Removed (lb/yr)	TP Remaining (lb/yr)	Downstream Treatment to be Employed	
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Total Impervious Cover Treated (acres)	0.00
Total Turf Area Treated (acres)	0.00
Total TP Load Reduction Achieved in D.A. (lb/yr)	0.00
Total TN Load Reduction Achieved in D.A. (lb/yr)	0.00

## **Drainage Area E Summary**

## **Land Cover Summary**

	A Soils	B Soils	C Soils	D Soils	Total	% of Total
Forest/Open (acres)	0.00	0.00	0.00	0.00	0.00	0
Managed Turf (acres)	0.00	0.00	0.00	0.00	0.00	0
Impervious Cover (acres)	0.00	0.00	0.00	0.00	0.00	0
					0.00	

## **BMP Selections**

Practice	Managed Turf Credit Area (acres)	Impervious Cover Credit Area (acres)	BMP Treatment Volume (ft <sup>3</sup> )	TP Load from Upstream Practices (lbs)	Untreated TP Load to Practice (lbs)	TP Removed (lb/yr)	TP Remaining (lb/yr)	Downstream Treatment to be Employed
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Total Impervious Cover Treated (acres)	0.00
Total Turf Area Treated (acres)	0.00

Total TP Load Reduction Achieved in D.A. (lb/yr)	0.00
Total TN Load Reduction Achieved in D.A. (lb/yr)	0.00

## **Runoff Volume and CN Calculations**

	1-year storm	2-year storm	10-year storm
Target Rainfall Event (in)	0.00	0.00	0.00

Drainage Areas	RV & CN	Drainage Area A	Drainage Area B	Drainage Area C	Drainage Area D	Drainage Area E
CN		0	0	0	0	0
RR (ft <sup>3</sup> )		0	0	0	0	0
	RV wo RR (ws-in)	0.00	0.00	0.00	0.00	0.00
1-year return period	RV w RR (ws-in)	0.00	0.00	0.00	0.00	0.00
	CN adjusted	0	0	0	0	0
	RV wo RR (ws-in)	0.00	0.00	0.00	0.00	0.00
2-year return period	RV w RR (ws-in)	0.00	0.00	0.00	0.00	0.00
	CN adjusted	0	0	0	0	0
10-year return period	RV wo RR (ws-in)	0.00	0.00	0.00	0.00	0.00
	RV w RR (ws-in)	0.00	0.00	0.00	0.00	0.00
	CN adjusted	0	0	0	0	0