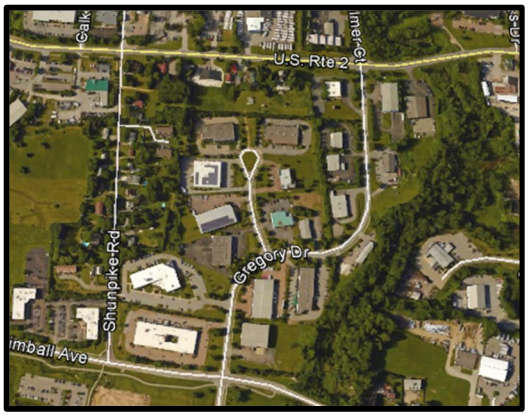


Image Via Google Earth

GREEN TREE PARK
STORMWATER NARRATIVE

TCE# 03-108 | SOUTH BURLINGTON, VERMONT

Date:
August 10, 2016

Prepared For:
Green Tree Park Association
29 Church Street, 3rd Floor
Burlington, VT 05401

Prepared By:
Andrew G. Mills, P.E.

TRUDELL CONSULTING ENGINEERS

478 BLAIR PARK ROAD, WILLISTON, VT 05495 | 802 879 6331 | WWW.TCEVT.COM

Attachment 1: Narrative, Location Map, and Soils Map
Green Tree Park – South Burlington

1) Introduction

TCE is writing on behalf of Green Tree Park Association and the City of South Burlington to apply for an Individual Stormwater Discharge Permit (INDS) for the above referenced project. The majority of the project is currently covered under an expired discharge permit (3409-9010). This application also seeks to consolidate Lot 5 of Green Tree Park, which is currently covered by 3869-9010.R, to be covered by this application. Lot 2, which is covered by 3409-9010.1, has elected to not be consolidated under this application and will remain under that separate permit. The impervious associated with Lot 2 has been removed from this NOI but Lot 2 is still mentioned in the associated manner of discharge as it is still connected to the drainage network and treatment systems.

Secondly, this application seeks to correct the eventual receiving water for stormwater runoff draining to S/N 005. As previously permitted, the receiving water for S/N 005 was indicated as Muddy Brook when in actuality it is draining to Potash Brook, which is listed as impaired. Due to this change and through conversations with DEC, it was determined that the best course of action for re-permitting this project was to apply for an INDS permit to cover the entire project although the vast majority of the site drains to Muddy Brook which is not listed as impaired. The applicants are applying for an INDS permit under the assumption that the portion of the project which does not drain to an impaired water will not be subject to any current or future additional requirements for impervious surfaces draining to impaired waters.

Thirdly, it is of note that at some point after the issuance of the original permits for this project, the east/west portions of Shunpike Road were renamed as Kimball Avenue. The appropriate manners of discharge have been revised as necessary to reflect these road name changes.

Finally, please note that the previously permitted discharge points (S/Ns) would be referred to as Points of Interest (POI)s under the current permitting methodology. For the sake of consistency, this narrative will continue to refer to these points as S/Ns of the same number.

2) Project Description

Green Tree Park is an existing 13 lot commercial subdivision located in South Burlington. The park received Discharge Permit # 1-0546 on December 6, 1987. There were two distinct discharge points in the permit. S/N 001 connected to an existing drainage system on Shun Pike Road and S/N 002 was the discharge from a sedimentation/detention basin. Both discharges were to Muddy Brook.

Development on Lot #1 resulted in an additional discharge point on the west side of the site that drains to Potash Brook, and development of Lots 11, 12, and 13 resulted in two additional discharge points to Muddy Brook. Additionally, other lots (including some of the Gregory & Daughters Industrial Park, to which this project connected) contribute stormwater to the pipe network discharging into the detention basin at S/N 002.

The original permit was for the entire park, but since the actual build-out was not known at the time of the permit, estimates were made of the discharge from each lot, and those estimates were incorporated in the park permit as limits. Subsequent applications for development in the park have incorporated the limits in the design, and as those lots were developed, stormwater designs were prepared that met the established parameters. At this time all the lots have been developed.

On March 28, 2006 stormwater permit #3409-9010 was issued for the park, with the City of South Burlington as co-permittee. Additionally, Lot 5 was developed since the last permit was issued, and all impervious area on this lot is covered by permit #3869-9010, which this application intends to supersede and cover under 3409-9010, the overarching park permit. Lot 2 was redeveloped recently, with the expansion impervious area covered under #3409-9010.1 (formerly 3409-9015). The portion of Lot 2 previously covered by the overarching permit 3409-9010 has recently been consolidated under 3409-9015's renewal permit 3409-9010.1 and removed from the Park inspection and permitting network, as Lot 2's owners do not wish to consolidate and join the association. The infiltration trench detailed in the original design was installed since the last permit renewal on Lot #10. Lot 1 has added about 3000 sf of impervious for new parking on the northwestern corner of the building. Finally, this NOI is intended to include the drainage improvements proposed by DuBois & King Inc. on the attached proposed Drainage Maintenance Plan for Lot 11 and installed recently. To alleviate a drainage problem at the face of the building the project created a shallow paved swale 6' off of the face of the building with catch basins spaced throughout the swale to capture and convey stormwater to the treatment area via 12" storm pipes. The roof leaders were proposed to be extended down into the catch basins.

3) Existing Conditions

As indicated above, all lots have been developed at this time. The site primarily consists or roads, parking areas, buildings, and other hardscapes as well as grassed areas. Runoff is directed to the discharge points via overland flow and various drainage networks. The discharge points are located as shown on the attached plan titled "STORM".

The primary soils on site are a mixture of Hydrologic Soil Groups (HSG) A (Adams and Windsor loamy sands) and HSG D (Vergennes clay), see the attached soil map for more information. Slopes on site are primarily between 3 and 12%.

4) Existing Stormwater System

S/N001 – This drainage network picks up storm drainage from the majority of Lot 1 and approximately 500 feet of Gregory Drive. Connection is made to the storm drains in Shun Pike Road with eventual discharge to a grassed swale leading to Muddy Brook.

Discharge to grassed swale to Muddy Brook

Lot #1 – CB's 1B and 1C on the north side of the building are in good condition and connect to CB 1 on Gregory Drive. On the west side of the buiding there is another catch basin and some roof drains that connect to a small detention pond, with an underdrain line leading to a culvert under Shun Pike Road that discharges to the west, eventually entering Potash Brook (noted as S/N 005). There are some small new impervious areas on this lot that were added since the last authorization.

Lot 1 – Detention pond to S/N 005

S/N 002 – This drainage network picks up stormwater from Lots 2, 3, 4, 5, 6, 7, 8, 9, and 10; some drainage from Lots 2 & 3 of the Gregory & Daughters Industrial Park along Gregory Drive; and Green Tree Drive and portions of Gregory Drive (both in and outside of Green Tree Park). The piping terminates in a detention basin with eventual discharge to Muddy Brook.

Typical CB on Gregory Drive

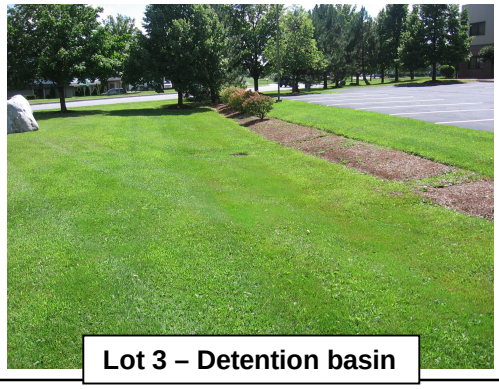
Detention Pond at S/N 002 with direction of storm flow piping

S/N 002 over riprap leading to Muddy Brook

Lot # 2 – There is one catch basin on the south side of the building and a storm manhole that connects the roof drain which drain impervious covered under the 9010 permit. These lead to a detention basin on the lots eastern edge. Flow from the basin connects to CB 4 in Green Tree Drive. A recent expansion of this building and its stormwater appurtenances which discharge to the Green Tree system is covered under permit #3409-9015's renewal permit 3409-9010.1. Lot 2 does not intend to consolidate under the overall Park permit, and thus their 9010 portion was consolidated under their 9015 renewal permit 3409-9010.1. Their lot is to be completely removed from the Green Tree Park Association permitting and inspections per this NOI.

Lot 2 – Detention Basin

Lot #3 – There is a drain in a depressed loading area on the west side of the building that connects to a catch basin located in a small detention area on the east side of the parking lot. This connects to CB 4 in Green Tree Drive.



Lot 3 – Detention basin

Lot #4 – There are two CB's in the north parking lot and loading area that are directed to a detention basin that connects to a storm manhole and into CB 12 on Green Tree Drive.

Lot 4 – Detention Basin

Lot #5 – This lot was undeveloped at the time of issuance of the last overall park permit, but has been developed and is connected to the Green Tree system. All impervious area on this lot is currently covered by permit #3869-9010. This application seeks to supersede this permit and cover Lot 5 under 3409-9010. A network of four CB's around the building connect to a detention basin at the front of the lot near Green Tree Drive, which outlets to STMH 12

Lot 5 – Detention Basin

Lot #6 – Stormwater from the roof is directed to a storm manhole and then to a detention basin, which then drains to a storm manhole and connects to CB 12 in Green Tree Drive. A catch basin in the front of the building also connects to this network.

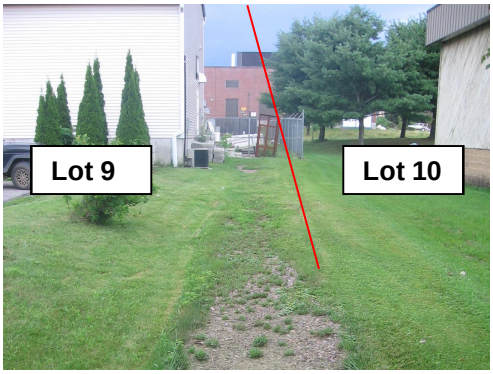
Lot 6 – Detention Basin

Lot #7 – There is a catch basin on the north side of the lot leading to a detention basin. The balance of the impervious surface is directed to this detention basin by grading. Storm flow from the basin is directed to a grassed swale and is eventually picked up in CB 8A off Gregory Drive.

Lot 7 – Detention basin

Lot # 8 – CB 14 in Green Tree Drive collects some flow from the paved areas. The balance of the storm flow is directed over grassed areas to the same swale from Lot #7 and eventually picked up in CB 8A. There are no storm structures on the lot.

Lot # 9 - All storm flow is directed to a small, depressed area between Lots 9 & 10, picked up in a catch basin and directed to CB 7 in Gregory Drive.



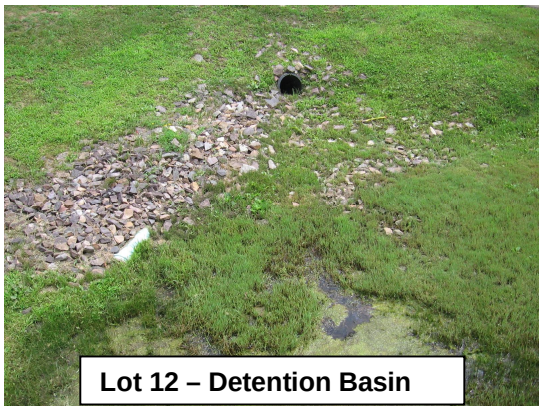
Lot #10 – The site drains toward the southeast into the swale from Lot #7. There is one catch basin located next to the loading area that connects to CB 8A via a recently installed infiltration trench.

S/N 003 – This area collects Lots 11, 12, and part of 13 and drains to a retention area with three stone check dams After passing through the check dams, the storm flow is directed overland to a discharge to Muddy Brook.

Stone check dams in swale – S/N 003

Lot #11 - This lot is graded to drain to the south and to the east. The easterly flow is over grassed areas toward Muddy Brook, and the check dams detain the southerly flow.

Lot #12 – Drainage from the west side of Lot #12 is picked up in a catch basin and directed to a detention basin on the north side of the lot. The discharge from the basin is directed to the swale having the stone check dams located on Lot #11. The outlet to the pond appears to act as an overflow. There appears to be an underdrain in the pond (discharge pipe found at outlet location), so the intent of the pond may have been to detain and filter through the bottom.



Lot 12 – Detention Basin

S/N 004 – This discharge point collects storm flow from the majority of Lot #13. The flow is directed to a detention pond at the southeast corner of the lot with eventual discharge overland to Muddy Brook.

Lot #13 – Runoff from the west side of the building is collected by catch basins and directed to the swale containing the stone check dams on Lot #11 (S/N 003). The majority of the lot flows over grassed areas to a detention pond with discharge to Muddy Brook.

Lot 13 – Detention Basin – S/N 004

Variations from existing permit:

Lot 5 was developed since the last permit was issued, and all impervious area on this lot is covered by permit #3869-9010. This application seeks to supersede this permit and cover Lot 5 under this INDS NOI.

Lot 2 was redeveloped recently, with the expansion impervious area covered under #3409-9015. Lot 2 does not intend to consolidate under the overall Park permit, and thus their 9010 portion has been consolidated under their 9010.1 permit. Their lot is to be completely removed from the Green Tree Park Association permitting and inspections per this NOI.

The infiltration trench detailed in the original design was installed on Lot #10

Lot 1 has added about 3000 sf of impervious for new parking on the northwestern corner of the building.

Lot 11 has added drainage improvements per the plan and description in this NOI. The consultant heading up this project has been in contact with the State separately.

5) Proposed Stormwater System

The only changes proposed with this application are associated with the portion of Lot 1 draining to S/N 001 in the Potash Brook watershed. As Potash Brook is impaired, in order to be covered under an INDS this portion of the site must be retrofitted to the extent possible under the May 5, 2004 Engineering Feasibility Analysis memo. Under this memo, sites must attempt to meet three treatment criteria from the VSWMM, Recharge, Channel Protection, and Water Quality, in that order.

The soils in the existing lawn area were assessed by TCE for the feasibility of a structural infiltration practice and were found to be inadequate for such a practice. While the soils are indicated as HSG A loamy sands, that is only the case to a depth of approximately 18", at which point a dense clay is encountered. It was therefore determined that surface practices would be utilized to meet the recharge and water quality standards. This area is proposed to be retrofitted with a grass channel and non-rooftop disconnect to satisfy the recharge and water quality standards. The Channel Protection standard is waived as there is less than 1 acre of impervious draining to this receiving water.

The remainder of the site will continue to be treated as originally permitted.

i) Impervious Area

The following table summarizes the impervious areas within the site. The area of the buildings, parking lots, and roads were determined from a high resolution orthophotograph during application for the original 9010 permit and are listed below:

Lot #1	2.49 acres*	Lot #2	1.46 acres**
Lot #3	1.26 acres	Lot #4	1.03 acres
Lot #5	1.14 acres***	Lot #6	0.97 acres
Lot #7	1.07 acres	Lot #8	0.45 acres
Lot #9	0.77 acres	Lot #10	0.35 acres
Lot # 11	1.21 acres	Lot #12	1.23 acres
Lot #13	0.78 acres		
Gregory Drive	1.19 acres	Green Tree Drive	0.54 acres

Total Green Tree Park Contributing impervious area w/ Roads 14.48 acres

** This is an increase from 2.42 acres in existence at the time of the last application*
*** Lot 2 had 1.46 acres originally, new expansion area is covered under #3409-9015. This area has been removed by consolidation under their own 9015renewal/9010.1 permit, as they do not want to join the Green Tree Park Association.*
**** Lot 5 has 1.14 acres currently covered under #3869-9010, figure shown is this value to be combined under 3409-9010*

ii) Receiving Body

The receiving waters are Potash Brook and Muddy Brook.

iii) Cold/Warm Fish Habitat Designation

The receiving waters are classified as a cold water fish habitat per Appendix A of the Vermont Water Quality Standards.

iv) Demonstration of Compliance

Compliance with the treatment standards are demonstrated at S/N 001. The remainder of the discharges at the other S/Ns are not proposed to be altered with this application and may or may not meet current standards.

(a) Water Quality Treatment Standard

S/N 005: The Water Quality treatment standard for the site is achieved via a grass channel and non-rooftop disconnect. Pretreatment for the channel is provided by a stone diaphragm.

(b) Groundwater Recharge Treatment Standard

S/N 005: The Groundwater Recharge treatment standard is achieved via a grass channel and non-rooftop disconnect.

(c) Channel Protection Standard

S/N 005: The Channel Protection Standard is waived for this S/N as the impervious area draining to the receiving water is less than 1 acre.

(d) Overbank Flood Protection Standard (Qp10)

Not applicable.

(e) Extreme Flood Protection Standard (Qp100)

Not applicable.

v) Offset Information

As this is an existing project, no offset calculations or fees are required.

Green Tree Park Location Map

Vermont Agency of Natural Resources

vermont.gov

LEGEND

Town Boundary

NOTES

448.0 0 224.00 448.0 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere 1" = 735 Ft. 1cm = 88 Meters

THIS MAP IS NOT TO BE USED FOR NAVIGATION

Custom Soil Resource Report
Soil Map

Map Scale: 1:3,590 if printed on A portrait (8.5" x 11") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- 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
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- 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 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

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

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
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: Chittenden County, Vermont
Survey Area Data: Version 18, Sep 25, 2015

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

Date(s) aerial images were photographed: Aug 28, 2010—Oct 8, 2011

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

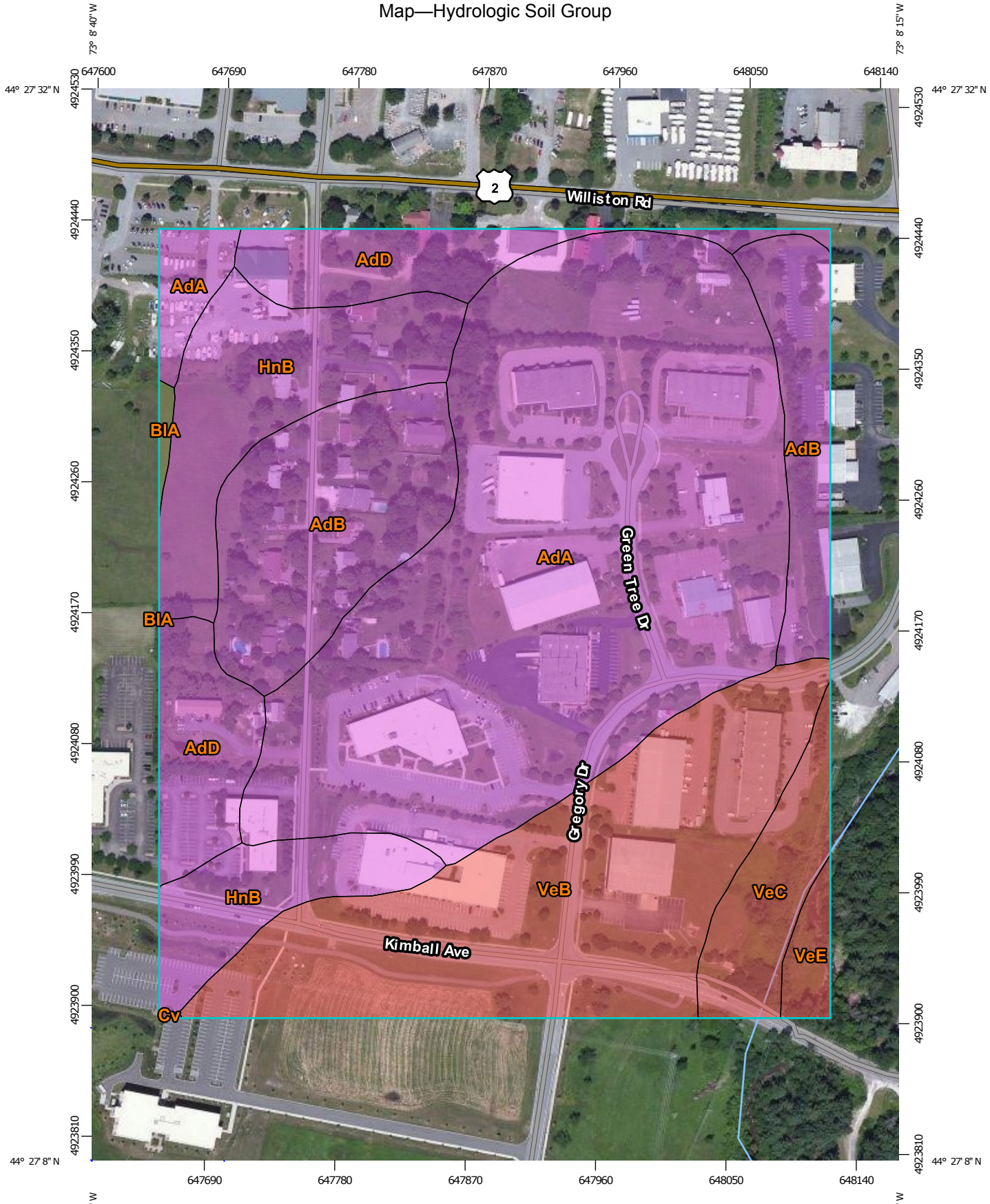
Chittenden County, Vermont (VT007)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
AdA	Adams and Windsor loamy sands, 0 to 5 percent slopes	25.8	41.3%
AdB	Adams and Windsor loamy sands, 5 to 12 percent slopes	8.5	13.6%
AdD	Adams and Windsor loamy sands, 12 to 30 percent slopes	5.0	8.1%
BlA	Belgrade and Eldridge soils, 0 to 3 percent slopes	0.2	0.2%
Cv	Covington silty clay	0.0	0.0%
HnB	Hinesburg fine sandy loam, 3 to 8 percent slopes	7.6	12.3%
VeB	Vergennes clay, 2 to 6 percent slopes	12.2	19.6%
VeC	Vergennes clay, 6 to 12 percent slopes	2.4	3.8%
VeE	Vergennes clay, 25 to 60 percent slopes	0.7	1.1%
Totals for Area of Interest		**62.4**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used.



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N

Meters
0 50 100 200 300

Feet
0 150 300 600 900

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 18N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Lines

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Soil Rating Points

- A
- A/D
- B
- B/D
- C
- C/D
- D
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

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- Aerial Photography

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Table—Hydrologic Soil Group

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BlA	Belgrade and Eldridge soils, 0 to 3 percent slopes	C/D	0.2	0.2%
Cv	Covington silty clay	D	0.0	0.0%
HnB	Hinesburg fine sandy loam, 3 to 8 percent slopes	A	7.6	12.3%
VeB	Vergennes clay, 2 to 6 percent slopes	D	12.2	19.6%
VeC	Vergennes clay, 6 to 12 percent slopes	D	2.4	3.8%
VeE	Vergennes clay, 25 to 60 percent slopes	D	0.7	1.1%
Totals for Area of Interest			**62.4**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher