Greystone Estates
Greystone Drive
Richmond, Vermont 05477

NOI #3477-9050
KAS #806190233

DRAFT ENGINEERING FEASIBILITY ANALYSIS

January 11, 2024

Prepared for:

GERA
Greystone Drive,
Richmond, Vermont 05477

and

Town of Richmond
PO Box 285
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Prepared by:

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1.0 Introduction

On behalf of Greystone Estates Residents Association (GERA) and the Town of Richmond, KAS Inc. (KAS) has been contracted to develop an Engineering Feasibility Analysis (EFA) for the Greystone Estates neighborhood located in Richmond, Vermont (Site). This EFA has been prepared in accordance with the Vermont Department of Environmental Conservation (VTDEC) General Permit 3-9050 (GP), effective December 1, 2020. GERA and the Town of Richmond are required to prepare this EFA as the Site is subject to the 3-acre provision of the GP. The goal of the EFA is to assess the feasibility of implementing "best fit" stormwater treatment practice (STP) retrofits at the Site with the goal of meeting the Redevelopment Standard per the 2017 Vermont Stormwater Management Manual Rule and Design Guidance. The GP specifies that the entire impervious surface of the "3-acre Site" is considered a "redeveloped surface". The redevelopment standard states that STPs shall be designed to capture and treat 50% of the water quality volume (WQv) from the "redeveloped impervious surface".

Section 4.1 of the 3-9050 GP discusses the EFA, and Subpart 4.1.C states the maximization criteria, which is a list of criteria/activities that would deem a location not feasible for meeting the redevelopment standard. Through the development of this EFA, it has been determined that it will be feasible to provide STP retrofits for Greystone Drive and the residences to meet the redevelopment standard at approximately 50% of the total WQv.

1.1 Site Description and History

The Site is a 22-lot residential subdivision off of Cochran Road in Richmond, Vermont, which is a residential hillside development situated on foothills/mountains on the south side of Cochran Road and the Winooski River. A majority of the residential lots (16 lots) are accessible directly from Greystone Drive, 3 lots are accessible from Apple Tree Lane, and another 3 lots are accessible from Highland Drive. Apple Tree Lane, Highland Drive, and Greystone Drive are all Town Roads. At the time of this EFA, 20 of the lots have been developed with single-family residences and associated driveways, parking, and utilities. Only Lots 11 and 12 have yet to be developed as of December 31, 2023. The subdivision has been built up in Phases over the years with construction originally starting in the late 1990s. The first residence was construction prior to or during 1999 with all subsequent residences built thereafter. Lots 14 and 15 were the most recent residential lots to be developed. One common lot is utilized for a communal wastewater disposal system for multiple residences including Lots 13 through 18, Lot 20, and Lot 21. If Lots 11 and 12 were ever to be developed, these lots would also utilize the communal wastewater disposal system. The remaining lots have individual wastewater disposal systems either on their own lot or as part of grouped systems on nearby lots. All developed lots have their own onsite potable water supply consisting of drilled wells. For each of the developed lots, a majority of the usable flatter terrain and locations with good soils conditions have been occupied with residential structures, parking, and onsite wastewater disposal systems.

Below the Site is a horse farm, which was the existed retained lot after the subdivision of the Greystone Estates community. The horse farm is not considered to be part of the Greystone Estates Subdivision, and the impervious area for the farm has been excluded from this EFA. The only connection to the existing farm property is a drainage easement for Greystone Estates associated with a drainage channel, which collects runoff for a majority of the subdivision and the undeveloped land above the subdivision. A majority of the Site is conveyed to the Winooski River via the collection channel and a culvert under Cochran Road. The collection channel is fed by an existing wet pond that collects runoff from a portion of the Site. The remaining runoff from the Site is conveyed to an existing drywell at the intersection of Greystone Drive and Cochran Road, which has an overflow that conveys runoff to the Winooski River through a small ditch.

The steep mountainous terrain combined diversions and other impacts from the hillside developed have previously resulted in areas of significant erosion and slope failures along ravines traversing though the project Site. In 2015 a gulley starting in "Lot 8" experienced significant slope, utility, and road damage from large quantities of runoff overwhelming existing stormwater culverts. The Town through a FEMA grant stabilized this area and upgraded stormwater infrastructure with KAS providing engineering design and construction inspection services for the project. Other lots and locations within the subdivision have also experienced significant erosion and/or slope stability issues over the years. GERA has worked diligently over the years at great expense to various property owners to mitigate ongoing erosion issues. KAS has been providing stormwater inspection services for the Site since 2019. Overall, the Site has been observed to be relatively stable over the last 4 years, and has survived recent large scale rain events without experiencing significant erosion issues. Given the constrained nature of this hillside development, the stabilization of the Site and mitigation of major erosion issues is a credit to the work done by the GERA residences.

2.0 Existing Stormwater Conditions

Based on parcel data, the area subject to analysis is approximately 109.66 acres with a total impervious coverage of 8.22 acres. The numbers exhibit a total increase since the initial NOI was issued. The total area acreage increased to accommodate a boundary line adjustment to Lot 15, and an impervious coverage increase due to the development of Lot 14 with a single-family residence, and development of Lot 15 driveway and single-family residence. As of the date of the EFA, information was gathered during a site visit on August 22, 2023, flow up visits, and multiple annual stormwater inspections prior to this report.

Existing impervious at the Site consists of Greystone Drive, Highland Drive, Apple Tree Lane, residences, driveways, patio/walkways, and outbuildings. Since the time the Initial Notice of Intent (INOI) was filed for this Site, additional impervious has been added due to the development of Lot 14 and Lot 15. A breakdown of the impervious coverage can be found in Table 1:

Table 1: Existing Impervious Cover Breakdown

	Building Rooftops	Porches/ Walkway	Town Roadways	Private Driveways	Total Impervious
Area (acres)	1.36	0.31	3.66	2.89	8.22

2.1 Topography and Soil Conditions

The Study Area is considerably constrained by steep to very steep slopes ranging from 15% to 60%, which greatly limits the ability to locate STP retrofits. The steep slopes are located in the majority of the project area with the exception of the developed portions such as the roadways, communal wastewater system, and residential development plateaus. The developed flatter portions of the Site (less than 15%) are developed with residences, driveways, lawns, and on-site wastewater disposal systems.

The National Resources Conservation Service (NRCS) Web Soil Survey characterizes the subsurface soils around a majority of the site as a sandy loam and very rocky. Per the NRCS Web Soil Survey, the Site includes soils with hydraulic ratings of A, B, and D soils. The majority of the Site is classified as "D" rated soils and is forested. Refer to the Table 2 below for a list of soil types and associated hydraulic soil ratings located within the Site area. The general NRCS soil classification appeared to be relatively consistent with observations made during the soil test pit investigation, except in locations with fill. The NRCS Soil Survey Data has been included in Appendix B.

Table 2: NRCS Soil Type

MAP UNIT SYMBOL	MAP UNIT NAME	HYDRAULIC SOIL RATING
CbD	Cabot silt loam, 3 to 25 percent slopes, very stony	D
CsE	Colton and Stetson soils, 30 to 60	A
Gpi	Pits, sand and Pits, gravel	No Rating
Hf	Hadley very fine sandy loam	B
HIB	Hartland very fine sandy loam, frequently flooded	B
HIE	Hartland very fine sandy loam, 25 to 60 percent slopes	B
LyD	Lyman-Marlow complex, 5 to 30 percent slopes, very rocky	D
LyE	Lyman-Marlow complex, 30 to 60 percent slopes, very rocky	D
MyB	Munson and Raynham silt loams, 2 to 6	C/D
PsE	Peru fine sandy loam, 12 to 20 percent slopes	A
StC	Stetson gravely fine sandy loam, 12 to 20 percent slopes	A
Wo	Winooski very sine sandy loam	C

2.2 Existing Stormwater Management

The project Site has been sectioned into fifteen (15) basins (Appendix A: Stormwater Overview Plan). The various basins were created based on topography, existing stormwater infrastructure, and discharge points. While most of the basins can be seen and identified within the study area mapping, there is a large mountainous basin that drains into the site from the west and south. This mountainous offsite area contributes a large amount of water that flows through the Site and ultimately to the outfall locations. The following is a summary of the drainage patterns for the four stormwater outfalls that currently or previously discharged directly to the Winooski River:

- Outfall SW1 (SN001) is located on the northwestern portion of the Site, which represents the area of the Site that discharge directly to the collection channel on the horse farm property owned by Ms. Krista Kemp. The contributing area to this outfall includes Basins D, I, J, K, L, M, N, and O, and consists of three separate drainage ravines that collect both onsite and offsite flow to the collection channel. This outfall consists of a total drainage area of 60.681 acres with 4.435 acres of onsite impervious coverage. The basins include approximately 9 residences with associated driveways, Highland Drive, Apple Tree Lane, and the upper portion of Greystone Drive. These basins eventually discharge to the north to Winooski River after being entering the collection channel and being conveyed under Cochran Road via a culvert.

- Outfall SW2 (SN002) is located on the north side of the Site, which is the outfall for basins E, F, G and H. This outfall consists of a drainage area of 31.639 acres with 2.109 acres of impervious coverage, and is the outfall from the existing wet pond outlet structure. The basins include approximately 6 residences with associated driveways and the middle section of Greystone Drive. The basis discharge via sheet flow to grass and stone lined ditches, three culverts, and into two drainage ravines that discharge into an existing wet pond. The settling pond discharges into an existing collection channel, which flows into the Winooski River. One of the ravines received extensive restoration work in 2015, which also included slope stabilization work paid for by a private residence.

- Outfall SW3 (SN003) is located on the northwestern side of the intersection of Greystone Drive and Cochran Road, which outlets for basins A and B. The outfall consists of a drainage area of 2.459 acres with 0.241 acres of impervious coverage. The basins include one residence and small portion of Greystone Drive. The basins discharge via sheet flow into the abutting farm property at the base of the Site.

- Outfall SW4 (SN004) is located on the northeastern portion of the Site at the intersection of Greystone Drive and Cochran Road, which is the discharge location for basin C. The outfall consists of a drainage area of 7.585 acres with 1.174 acres of impervious coverage. The basin includes 3 residences and a portion of Greystone Drive. The basins discharge via sheet flow from the residences and driveways to roadside ditches along Greystone Drive. The roadside ditches are rock lined and vegetated, and outlet to a large existing dry well located at the southeast side of the intersection. The dry well has a newly installed overflow, which is directed into a small stormwater network underneath Cochran Road and discharges via a swale to the Winooski River. The drywell has been observed over many years by KAS Engineer, Stephen Diglio, P.E., and the overflow is only engaged during very large flood events.

- There are small portions of Lot 1 and Lot 19 that drain offsite and are not included in the basins going to the designated outfalls SN001 to SN004. The impervious cover for these areas is 0.261 acres and has been accounted for in the total impervious calculations.

3.0 Engineering Feasibility Assessment

3.1 Site Assessment for SW1 Outfall (SN001) Contributing Impervious Area

The project team conducted a site visit on August 22, 2023 along with multiple annual stormwater inspections from 2020 to 2023. KAS engineer, Mr. Stephen Diglio, P.E., lives in close proximity to the Site and visits regularly after larger rain events to determine if there has been any significant erosion. Existing information and data for the Site has been collected over the years including aerial mapping and additional field data for site utilities, topography, impervious surface extents, stormwater infrastructure, and outfall locations were collected. This data was compiled and updated the Site map for the purposes of conducting this study, evaluating the feasibility of STP retrofits, and for the development of STP conceptual designs.

During the August 2023 site visit, the project team identified locations to be vetted for stormwater retrofits, and to confirm the adequacy of numerous simple disconnect areas. Of the STP locations vetted, four were considered adequate for structural retrofits of existing features. Along with these four STP locations, eighteen (18) simple disconnections were identified around the residential properties and roadways. Refer to the Stormwater Overview Plan in Appendix A for additional information, and locations of recommended STP practices and other vetted STP locations.

Prior to the visit, the project team contacted DigSafe to locate utilities near the STP locations that were selected for further vetting. During the visit, two test pits were completed to determine soil types and groundwater depths. Test pit TP23-1 was dug in the vicinity of the existing dry well on the southeast side of the intersection of Greystone Drive and Cochran Road. Test Pit TP23-1 consisted of well drained loamy sand and sand, and no seasonal high groundwater was encountered until a depth of 130" below the surface. Based on the results, TP23-1 confirmed the suitable for infiltration for the existing dry well. Test pit TP23-2 was dug on the northwestern portion of the Site approximately 120 feet prior to the inlet of Culvert 7 under Greystone Drive, and consisted of silt loam and clayey silt with seasonal high groundwater within 12" of the surface. TP 23-2 confirmed that this location was unsuitable for infiltration practices. During the site visit, additional survey data was collected for design purposes, which included limited topography, utility locations, catch basin/manhole rim and invert elevations, and ground shots to confirm drainage patterns.

Of the **8.22 acres** of onsite impervious subject to the redevelopment standard per the GP, approximately **4.87 acres** of impervious was determined to be feasible for treatment by four STP retrofit practices, which is **50.49%** of the total site WQv or 59.25% of the Sites total impervious. Consequently, assuming that the Vermont Department of Environmental Stormwater Program agrees with the results and conceptual designs presented in this study, the ability to meet the required redevelopment standard for the Site appears to be feasible.

3.1 Site Assessment for Outfall SW1 (SN001) Contributing Impervious Area

In total, two locations for potential structural practices were vetted within the drainage area contributing to Outfall SW1 for possible STPs. Unlike the proposed structural retrofits in other outfalls that utilized existing structures, Filter Strips were designed in the two vetted locations to utilize the existing topography instead. In addition, numerous locations that meet the requirements of Simple Disconnects or Disconnections to Filter Strips have been identified. Of the total 4.435 acres of onsite impervious area conveyed to this outfall, approximately 1.502 acres was determined to be feasible for STP retrofits that can adequately treat the contributing WQv.

Recommended STP Retrofit – Filter Strips

The project team identified a location off the west side of Greystone Drive (near Lot 19) before the inlet for culvert 7 near the end of Greystone Drive. Test pit TP23-2 determined that this area was unsuitable for an infiltration practice. However, the geometry of this vegetated area is suitable for a Disconnection to a Filter Strip. Pretreatment of the WQv will be provided by a vegetated roadside swale with a series of 5 check dams, which will pretreated and meter out the WQv flow to the filter strip. After the check dams, a minimum 20' wide level spreader will be provided, which will evenly distribute the WQV flow of 0.22 cubic feet per second (CFS) over a vegetated filter strip with adequate treatment length. Minor grading of this area may also be required. The impervious area and water quality volume treated by this proposed STP retrofit is 0.733 acres and 0.061 acre-feet, respectively. Flow events that exceed the WQv flow will be able to pass through the check dams, level spreader, and filter strip at non-erosive velocities.

The project team identified a vegetated location off the east side of Greystone Drive (near Lot 21), which is adequate for a Disconnection to a Filter Strip.

Pretreatment of the WQv will be provided by a vegetated roadside swale and a check dam prior to the level spreader. A minimum 13' wide level spreader will be provided, which will evenly distribute the WQV flow of 0.17 cubic feet per second (CFS) over a vegetated filter strip with adequate treatment length. Minor grading of this area may also be required. The impervious area and water quality volume treated by this proposed STP retrofit is 0.143 acres and 0.012 acre-feet,

respectively. Flow events that exceed the WQv flow will be able to pass through the check dam, level spreader, and filter strip at non-erosive velocities.

Recommended STP Retrofit – Simple Disconnects

Along with the proposed filter strip, 17 simple disconnects are proposed, which are existing onsite areas that already meet simple disconnect requirements. The Simple disconnects are compliant vegetated areas that accept and treat runoff from rooftops, various porches, driveways, and roadways. The soil ratings in the disconnect locations are ratings as A or D by the NRCS soil index and range from 3 feet to 85 feet depending on the slope and length of impervious surface leading to the simple disconnection.

The simple disconnects are spread out through this basin and span multiple lots. The following is a list of lots that would have a simple disconnection within the property boundary and how many there would be:

- Lot 10 would have one simple disconnection.
- Lot 12 would have one simple disconnection.
- Lot 16 would have three simple disconnections.
- Lot 18 would have one simple disconnection.
- Lot 20 would have three simple disconnections.
- Lot 21 would have three simple disconnections.
- Lot 22 would have six simple disconnections.
- The Greystone Drive right of way would have seven simple disconnections.

3.2 Site Assessment for Outfall SW2 (SN002) Contributing Impervious Area

Recommended STP Retrofit – Wet Pond

During the August 22, 2023 site visit, the existing wet pond was evaluated for adequacy to meet the redevelopment standard for the contributing impervious area from the site. Due to the high amount of stormwater runoff passing through this point (including offsite runoff from the mountain above the subject site), groundwater elevation, and topographic constraints, there are severe limitations with the types of potential STPs that can be accommodated at this location. In addition, the established existing wet-pond already has established aquatic vegetation, which is already providing adequate water quality treatment. The existing outfall structure also appears to be sufficient to provide adequate water quality treatment for the contributing basins. The outfall from the wetpond is labeled Outfall SW-2 (SN002). The existing wetpond receives an estimated 2.109 acres of impervious coverage from the site. The existing pond is estimated to be able to provide a little over 1,000 cubic feet additional WQv treatment than what is required to meet the redevelopment standard for the impervious area conveyed to this STP. There is also some capacity to expand the existing wetpond if needed.

The existing wet pond has two drainage ravines that come together at the wetpond, which enter from the south from the east and west. The drainage ravine entering on the west side of the wetpond already has an adequately sized sediment forebay. This forebay was added by a prior engineer as a result of the significant erosion that occurred in 2015 to help protect the wetpond.

The drainage ravine on the east side of the wetpond lacks a forebay. To bring the wetpond into compliance with current standards to the extent possible, a properly sized sediment forebay will be added to pretreat the runoff conveyed to the wetpond from the east ravine. Please note that there in not sufficient room available to add a safety bench for this wetpond. However, access to the wetpond is restricted by very steep terrain to the south, east, and west, and there is an electric fence to the north to prevent access from the horse farm.

3.3 Site Assessment for Outfall SW3 (SN003) Contributing Impervious Area

Recommended STP Retrofit – Simple Disconnects

Outfall SW3 consists primarily of runoff from impervious cover on Lot 2, which includes approximately 0.114 acres of impervious coverage. Based on the small amount of area within the basin, one simple disconnect STP locations was identified. The simple disconnects include runoff from the single-family residence rooftop, walkways, and driveway (for a total of 0.078 acres), which sheet flow over vegetated areas with slopes less than 15%.

3.4 Site Assessment for Outfall SW4 (SN004) Contributing Impervious Area

Recommended STP Retrofit – Dry Well

An existing drywell is located near the southeast corner of the intersection of Greystone Drive and Cochran Road. The existing drywell previously had no outfall. However, major rain events that overwhelmed the existing drywell were causing infrequent ponding issues on Cochran Road. The major flood events included Tropical Storm Irene and the localized major flood event in 2015. In 2016, the Town of Richmond added an overflow to the existing drywell to mitigate the ponding issues during major rain events. KAS has been observing this dry well since 2015, and this drywell has had no issues completely infiltrating storm events that well exceed the WQv storm event. During the recent major flooding event in July 2023, the drywell was observed to have infiltrated the entire prolonged rain event, and later was subjected to standing water after rising floodwaters from the Winooski River inundated the area. Consequently, based on many years of observed performance by KAS engineer, Stephen Diglio, P.E., it has been concluded that the existing drywell is more than adequate to completely infiltrate storm events that well exceed the WQv.

The soil class is rated as "B" soil by the NRCS and covers the entire drywell, which was confirmed from the test pit dug on August 22, 2023. The depth to groundwater was observed to be 130" below grade in this location. Roadside ditches along Greystone Drive along with cross culverts convey runoff from the onsite drainage basins to the drywell. To bring the existing drywell in conformance with the current standards to the extent possible, KAS proposed to add a sediment forebay to provide adequate pre-treatment prior to the existing drywell. The retrofit drywell would infiltrate the WQv from 1.163 acres of impervious coverage conveyed to this outfall from the Site.

4.0 Impact Fee Analysis

As part of the 3-acre rule, Greystone Estates is classified under the redevelopment water quality treatment standard (WQTS) of the VSWMM, which requires the project to treat 50% of the calculated WQv using properly designed STPs to satisfy the GP requirements when feasible. Sites that cannot meet the GP requirement utilizing STPs are subject to impact fees.

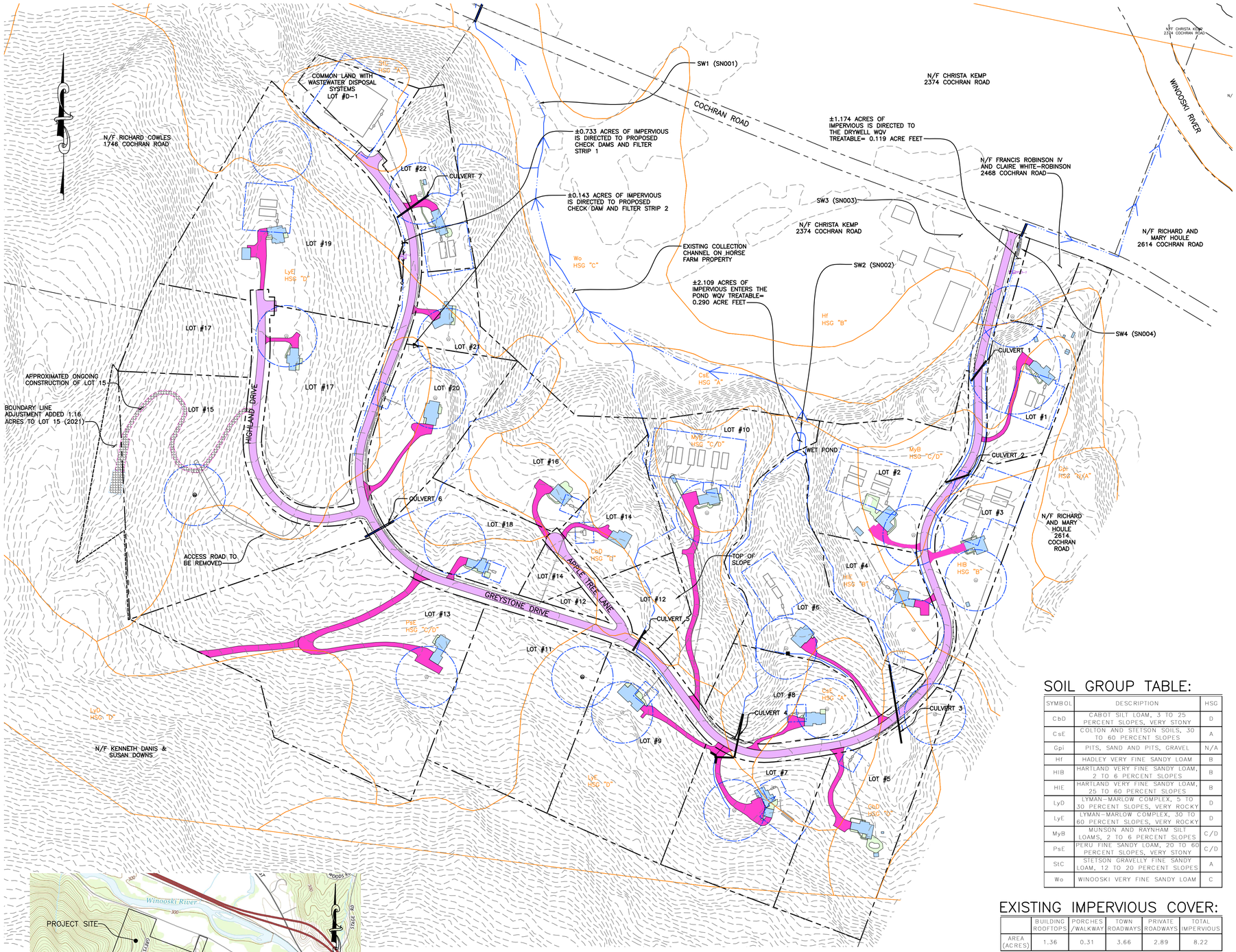
The WQv was calculated for each basin and the entire Site area. The WQv of the entire site is roughly 46,757 cubic feet; however, utilizing the redevelopment standard treatment reduction of 50%, results in a total 23,379 cubic feet of impervious runoff that will require treatment (Appendix D: Standard Compliance Workbook). Based on this EFA, it has been determined that it is feasible to treat 23,610 cubic feet of WQv from 8.22 acres of existing impervious area, which is equivalent to 50.49% of the WQv from the entire site. Based on the proposed stormwater designs meeting the 50% requirement, an impact fee would not be required. With no impact fee that leaves just a permit and administrative fee of $7309.20.

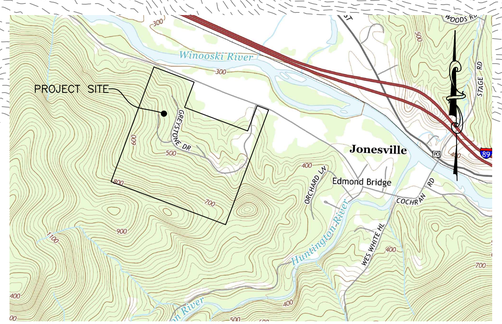
5.0 Conclusion/Recommendations

In conclusion, the project team has evaluated the study area and determined that approximately 4.87 acres are feasible to treat when implementing four structural STP retrofits and eighteen simple disconnects that comply with the redevelopment standard, which is approximately 59.25% of the 8.22 acres subject to the GP. The project team recommends that the 4 outlined STP retrofits be approved for final design as well as the proposed simple disconnect locations and included in a GP application.

Appendix A

Impervious Delineation Map
Site Plan
Stormwater Drainage Basin Overview Map
Details Sheet





IMPERVIOUS DELINEATION MAP
SCALE: 1"=160'

IMPERVIOUS DELINEATION MAP
SCALE: 1"=160'

GRAPHIC SCALE
160' 0 80' 160' 320'
1 INCH = 160FEET

PROJECT INFORMATION:

APPLICANTS:
GREYSTONE ESTATES RESIDENTS ASSOCIATION, INC.
PO BOX 673
RICHMOND, VT 05477

TOWN OF RICHMOND
PO BOX 285
RICHMOND, VT 05477

SITE:
GREYSTONE ESTATES
GREYSTONE DRIVE
RICHMOND, VT 05477

TOTAL AREA OF IMPERVIOUS: ±8.22 ACRES

LOT INFORMATION:

LOT 1: N/F CHARLES & CHERYL OWENS
95 GREYSTONE DRIVE
SPAN NO: 519-163-11124

LOT 2: N/F ERIK & VICKI HEMMETT
200 GREYSTONE DRIVE
SPAN NO: 519-163-11706

LOT 3: N/F EZRA HALL & DANIELLE BLAIS-HALL
205 GREYSTONE DRIVE
SPAN NO: 519-163-10499

LOT 4: N/F JEFFREY & GRETA SLOAN
250 GREYSTONE DRIVE
SPAN NO: 519-163-11430

LOT 5: N/F ALLEN & AMANDA REPP
345 GREYSTONE DRIVE
SPAN NO: 519-163-11152

LOT 6: N/F STEVEN ALEXANDER & MEGAN BRUNOVSKY
320 GREYSTONE DRIVE
SPAN NO: 519-163-11151

LOT 7: N/F EARL & DIANE WESTER
435 GREYSTONE DRIVE
SPAN NO: 519-163-11628

LOT 8: N/F KEVIN KENNEDY
400 GREYSTONE DRIVE
SPAN NO: 519-163-11153

LOT 9: N/F GARY MARGOLIS & PENNY SHTULL
445 GREYSTONE DRIVE
SPAN NO: 519-163-10889

LOT 10: N/F JEFFREY GONZALEZ & JANESSA REDFERN
480 GREYSTONE DRIVE
SPAN NO: 519-163-11154

LOT 11: N/F PETER & STACEE BAKO
575 GREYSTONE DRIVE
SPAN NO: 519-163-11155

LOT 12: N/F CANEEL LLC.
20 APPLE TREE LANE
SPAN NO: 519-163-11148

LOT 13: N/F PIERRE BERNIER & KIMBERLY MOORE
665 GREYSTONE DRIVE
SPAN NO: 519-163-11157

LOT 14: N/F CANEEL LLC.
70 APPLE TREE LANE
SPAN NO: 519-163-11149

LOT 15: N/F KENNETH DANIS & SUSAN DOWNS
65 HIGHLAND DRIVE
SPAN NO: 519-163-11161

LOT 16: N/F TIMOTHY & HEATHER FOWLER
100 APPLE TREE LANE
SPAN NO: 519-163-11146

LOT 17: N/F THOMAS & MARY ELLEN (TRS) BEDNAR
135 HIGHLAND DRIVE
SPAN NO: 519-163-11162

LOT 18: N/F GEORGE YOUNG & EILEEN BURGIN
630 GREYSTONE DRIVE
SPAN NO: 519-163-11156

LOT 19: N/F JAMES & DIANNE PREVO
200 HIGHLAND DRIVE
SPAN NO: 519-163-11163

LOT 20: N/F CARTER FAMILY TRUST & DOLORES CARTER
730 GREYSTONE DRIVE
SPAN NO: 519-163-11158

LOT 21: N/F JOAN & GARY HOLMAN 2018 REVOCABLE TRUST
830 GREYSTONE DRIVE
SPAN NO: 519-163-11159

LOT 22: N/F DAVID & ELIZABETH LYNN
900 GREYSTONE DRIVE
SPAN NO: 519-163-11160

LOT 23: N/F GERA COMMON LAND
1000 GREYSTONE DRIVE
SPAN NO: 519-163-11147

ROADWAY: N/F TOWN OF RICHMOND
GREYSTONE DRIVE
SPAN NO: NOT APPLICABLE

SOIL GROUP TABLE:

SYMBOL	DESCRIPTION	HSG
CbD	CABOT SILT LOAM, 3 TO 25 PERCENT SLOPES, VERY STONY	D
CsE	COLTON AND STETSON SOILS, 30 TO 60 PERCENT SLOPES	A
Gpi	PITS, SAND AND PITS, GRAVEL	N/A
Hf	HADLEY VERY FINE SANDY LOAM	B
HfB	HARTLAND VERY FINE SANDY LOAM, 2 TO 6 PERCENT SLOPES	B
HfE	HARTLAND VERY FINE SANDY LOAM, 25 TO 60 PERCENT SLOPES	B
LyD	LYMAN-MARLOW COMPLEX, 5 TO 30 PERCENT SLOPES, VERY ROCKY	D
LyE	LYMAN-MARLOW COMPLEX, 30 TO 60 PERCENT SLOPES, VERY ROCKY	D
MyB	MUNSON AND RAYNHAM SILT LOAMS, 2 TO 6 PERCENT SLOPES	C/D
PsE	PERU FINE SANDY LOAM, 20 TO 60 PERCENT SLOPES, VERY STONY	C/D
StC	STETSON GRAVELLY FINE SANDY LOAM, 12 TO 20 PERCENT SLOPES	A
Wo	WINOOSKI VERY FINE SANDY LOAM	C

EXISTING IMPERVIOUS COVER:

	BUILDING ROOFTOPS	PORCHES /WALKWAY	TOWN ROADWAYS	PRIVATE ROADWAYS	TOTAL IMPERVIOUS
AREA (ACRES)	1.36	0.31	3.66	2.89	8.22

GENERAL NOTES:

1. BASE MAP DEVELOPED FROM VCGI ORTHOIMAGERY, PARCEL DATA, VERMONT NATURAL RESOURCE ATLAS, "THE PROPOSED SUBDIVISION OF GREYSTONE" BY JH STUART, DATED FEBRUARY 1994 APPROVED UNDER VTDEC PERMIT #EC-4-1854.
2. LISTED PROPERTY OWNERS OBTAINED FROM VTANR NATURAL RESOURCE ATLAS – TOWN OF RICHMOND 2020 GRAND LIST.
3. ALL IMPERVIOUS DELINEATION AREAS AND PROPERTY LINES ARE CONSIDERED APPROXIMATE.
4. THIS MAP IS NOT A BOUNDARY SURVEY AND SHALL NOT BE CONSTRUED AS ONE.
5. ALL UTILITIES ARE BASED ON THE BEST AVAILABLE INFORMATION, PROVIDED BY CLIENT, FIELD LOCATED (GPS), AND SHALL FIELD VERIFIED
6. BEARING SHOWN ARE BASED UPON VERMONT GRID NORTH USING VTVRS CORS STATION.
7. THE LOCATION OF EXISTING UNDERGROUND UTILITIES AND IMPROVEMENTS SHOWN ARE BASED ON RESEARCH, UTILITY PLANS PROVIDED BY OTHERS, AND/OR SURFACE EVIDENCE ENCOUNTERED AND WERE OBTAINED IN A MANNER CONSISTENT WITH THE ORDINARY STANDARD OF PROFESSIONAL CARE AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR THE DESIGN ENGINEER. ADDITIONAL UTILITIES NOT SHOWN MAY EXIST. ENGINEER SHALL BE NOTIFIED IF ANY DISCREPANCIES ARE ENCOUNTERED. ACTUAL LOCATION OF UNDERGROUND UTILITIES MAY VARY. DIGSAFE MUST BE CONTACTED PRIOR TO ANY EXCAVATION. CALL 1-888-DIG SAFE (344-7233) OR CALL 811.

LEGEND

EXISTING	PROPOSED	
		SUBJECT SITE PROPERTY LINE
		ABUTTER PROPERTY LINE
		GUARDRAIL
		APPROXIMATE DRAINAGE FLOW PATH
		IMPERVIOUS SURFACE – ROOF
		IMPERVIOUS SURFACE – PATIO/DECK/WALKWAY
		IMPERVIOUS SURFACE – DRIVEWAY
		IMPERVIOUS SURFACE – ROADWAY
		WATERSHED BOUNDARY
		ISOLATION ZONE
S		SEWER LINE
FM		FORCE MAIN
		CONTOURS
		TREELINE
		SOIL TYPE
		WELL

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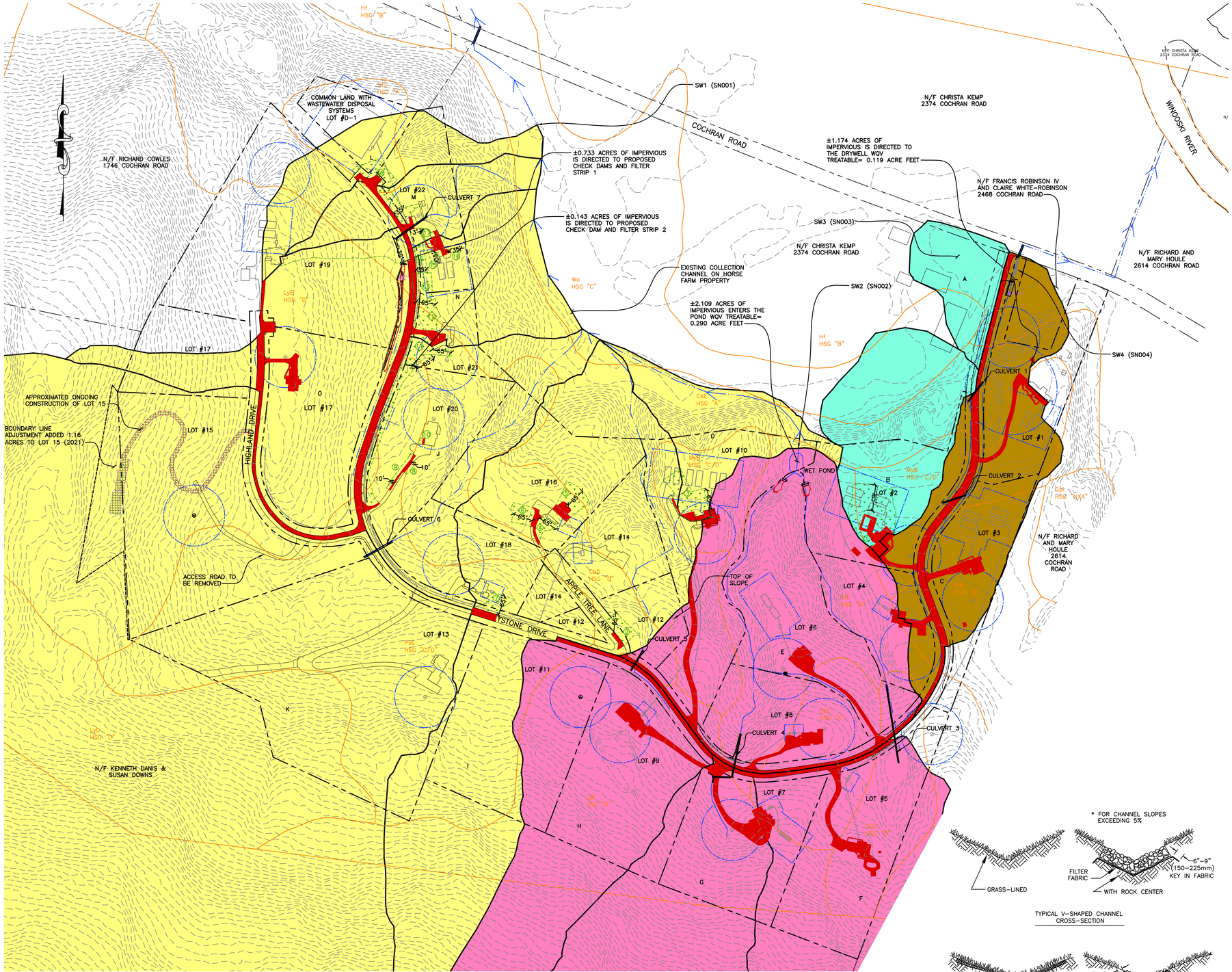
DRAFT

GREYSTONE ESTATES
STORMWATER GENERAL PERMIT 3-9050
IMPERVIOUS DELINEATION MAP
GREYSTONE DRIVE
RICHMOND, VERMONT

DRAWN: TB/RH
CHECKED: SJD
DATE: 1/10/2024
SCALE: AS NOTED
JOB NO.: 806190233
SHEET:

ID.1



CONCEPTUAL SITE PLAN
SCALE: 1"=160'

GRAPHIC SCALE
160' 0 80' 160' 320'
1 INCH = 160FEET

LEGEND

EXISTING	PROPOSED	
		SUBJECT SITE PROPERTY LINE
		ABUTTER PROPERTY LINE
		GUARDRAIL
		APPROXIMATE DRAINAGE FLOW PATH
		WATERSHED BOUNDARY
		ISOLATION ZONE
S		SEWER LINE
FM		FORCE MAIN
		SLOPE
		TREELINE
		STORMWATER PRACTICE
		SOIL TYPE
		SIMPLE DISCONNECTS
W		WELL
		IMPERVIOUS TREATED
14		SIMPLE DISCONNECT NUMBER

GENERAL NOTES

1. BASE MAP DEVELOPED FROM VCGI ORTHOIMAGERY AND PARCEL DATA, AND OBSERVATIONS DURING ANNUAL STORMWATER INSPECTIONS AND SITE VISIT ON AUGUST 22, 2023.
2. SUBDIVISION LAYOUT AND LOT NUMBERS ARE IN ACCORDANCE WITH "THE PROPOSED SUBDIVISION OF GREYSTONE" BY JH STUART, DATED FEBRUARY 1994 APPROVED UNDER VTDEC PERMIT #EC-4-1854.
3. LISTED PROPERTY OWNERS OBTAINED FROM VTANR NATURAL RESOURCE ATLAS – TOWN OF RICHMOND 2020 GRAND LIST.
4. ALL UTILITIES ARE BASED ON THE BEST AVAILABLE INFORMATION, PROVIDED BY CLIENT, FIELD LOCATED (GPS), AND SHALL FIELD VERIFIED
5. ALL IMPERVIOUS DELINEATION AREAS AND PROPERTY LINES ARE CONSIDERED APPROXIMATE.
6. THIS MAP IS NOT A BOUNDARY SURVEY AND SHALL NOT BE CONSTRUED AS ONE.
7. ROUGHLY 0.39 ACRES OF IMPERVIOUS HAS BEEN ADDED FROM LOT 15
8. ALL DESIGN AND LAYOUTS DEPICTED ON THESE DRAWINGS ARE SUBJECT TO CITY AND STATE APPLICATION PERMIT REVIEW AND THEREFORE SUBJECT TO CHANGE ACCORDINGLY PENDING THOSE REVIEWS.

POTENTIAL PRACTICE LOCATIONS

1. DRYWELL
   DRAINAGE AREA = ±7.642 ACRES
   IMPERVIOUS = ±1.163 ACRES
   HYDRIC SOIL GROUP B
   WQV = ±0.119 ACRE-FEET OR 5184 CUBIC FEET
2. CHECK DAMS/FILTER STRIP 1
   DRAINAGE AREA = ±9.765 ACRES
   IMPERVIOUS = 0.733 ACRES
   HYDRIC SOIL GROUP A AND D
   TV = ±0.061 ACRE-FEET OR 2657 CUBIC FEET
3. CHECK DAMS/FILTER STRIP 2
   DRAINAGE AREA = ±0.470 ACRES
   IMPERVIOUS = ±0.143 ACRES
   HYDRIC SOIL GROUP A AND D
   TV = ±0.012 ACRE-FEET OR 523 CUBIC FEET
4. WET POND
   DRAINAGE AREA = ±31.639 ACRES
   IMPERVIOUS = ±2.109 ACRES
   HYDRIC SOIL GROUP B
   WQV = ±0.290 ACRE-FEET OR 12633 CUBIC FEET
5. SIMPLE DISCONNECTIONS
   TOTAL AREA = ±2.907 ACRES
   IMPERVIOUS = ±0.719 ACRES
   TV = ±0.060 ACRE-FEET

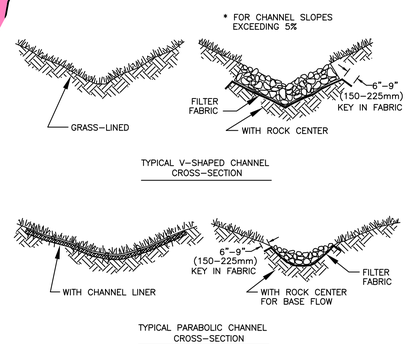
TOTAL TV = ±0.542 ACRE-FEET

STORMWATER NOTES

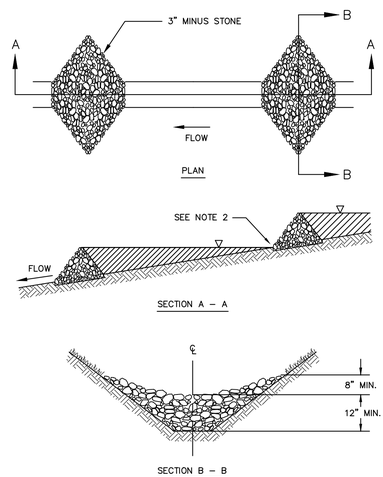
- TOTAL SITE ACREAGE 109.66 (108.50 WITHOUT THE 1.16 ACRE BOUNDARY ADJUSTMENT INCLUDED)
- TOTAL OF 8.22 ACRES OF IMPERVIOUS
- ROUGHLY 4.87 ACRES OF IMPERVIOUS WILL BE TREATED
- ROUGHLY 59.25% OF IMPERVIOUS CAN BE TREATED WHICH EQUATES TO 50.49% OF THE WQV TREATED

FEE

50% OF EXISTING WQV = ±0.5367 ACRE-FEET
WATER QUALITY VOLUME TREATED = ±0.542 ACRE-FEET



TYPICAL DRAINAGE SWALE DETAIL
SCALE: N.T.S.



STONE CHECK DAM DETAIL
SCALE: N.T.S.

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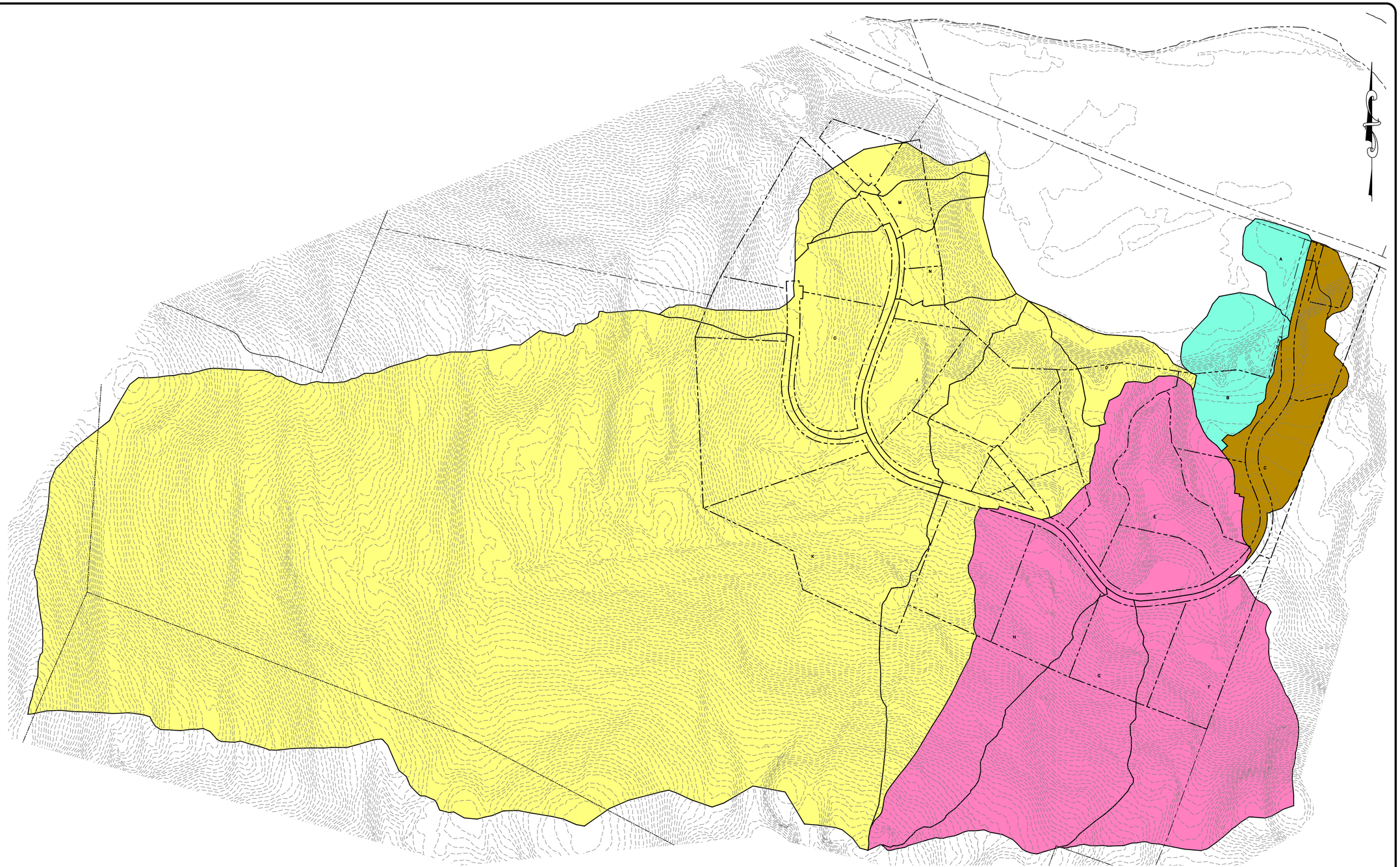
GREYSTONE ESTATES
STORMWATER GENERAL PERMIT 3-9050
SITE PLAN
GREYSTONE DRIVE
RICHMOND, VERMONT

DRAWN	TB/RH
CHECKED	SJD
DATE	1/10/2024
SCALE	AS NOTED
JOB NO.	806190233
SHEET	SP.1



WATERSHED OVERVIEW MAP

SCALE: 1"=220'

GRAPHIC SCALE

220' 0 110' 220' 440'

1 INCH = 220FEET

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GREYSTONE ESTATES

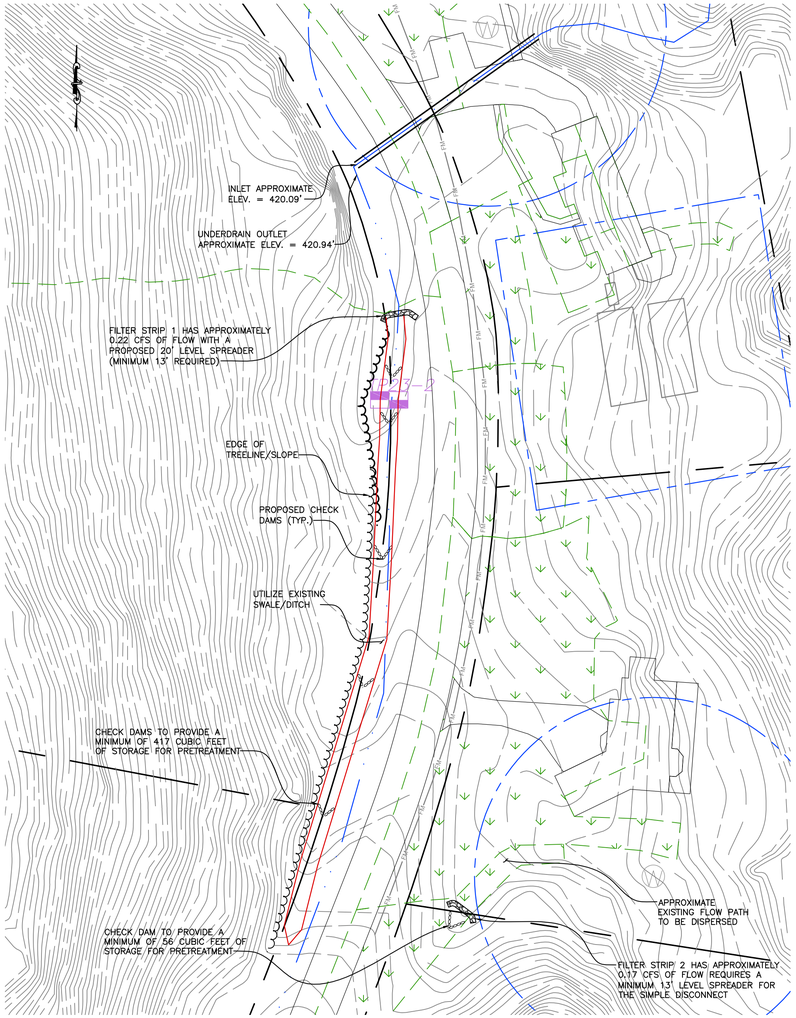
STORMWATER GENERAL PERMIT 3-9050

STORMWATER DRAINAGE BASIN OVERVIEW MAP

GREYSTONE DRIVE

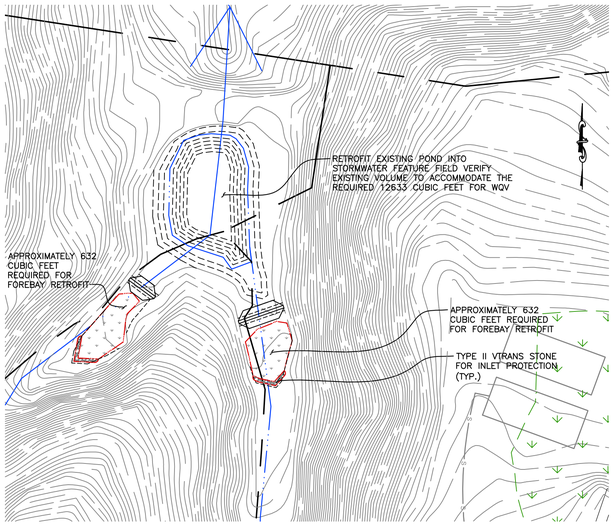
RICHMOND, VERMONT

DRAWN	RH
CHECKED	SJD
DATE	1/10/2024
SCALE	AS NOTED
JOB NO.	806190233
SHEET	SW.1



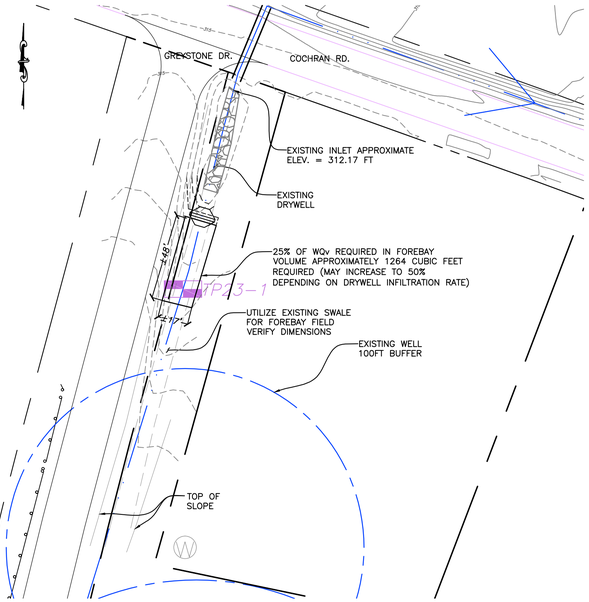
CHECK DAM AND FILTER STRIP

GRAPHIC SCALE
40' 0 20' 40' 80'
1 INCH = 40 FEET



WET POND

GRAPHIC SCALE
40' 0 20' 40' 80'
1 INCH = 40 FEET

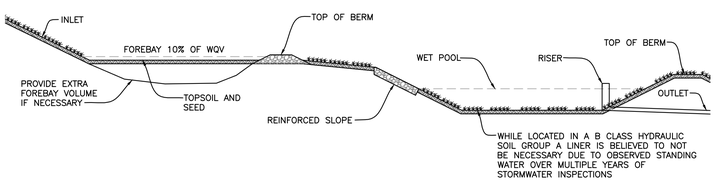


DRYWELL

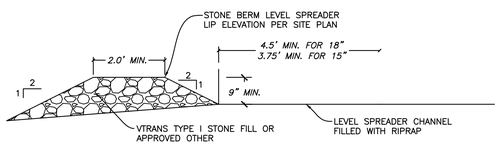
GRAPHIC SCALE
40' 0 20' 40' 80'
1 INCH = 40 FEET

GENERAL CONSTRUCTION NOTES:

1. WHERE DISCREPANCIES EXIST BETWEEN STATE LAWS, LOCAL ORDINANCES, UTILITY COMPANY REGULATIONS, MANUFACTURER RECOMMENDATIONS, AND THESE PLANS, THE MOST STRINGENT SHALL APPLY.
2. A COMPREHENSIVE SURVEY OF UNDERGROUND UTILITIES WAS NOT CONDUCTED. EXISTING UTILITY LOCATIONS, SIZES, MATERIALS, AND DEPTHS ARE APPROXIMATE ONLY. THE CONTRACTOR SHALL FIELD VERIFY ALL UTILITY CONFLICTS. ALL DISCREPANCIES SHALL BE REPORTED TO THE ENGINEER. CONTACT "DIG-SAFE" AT LEAST 72 HOURS PRIOR TO ANY SUBSURFACE CONSTRUCTION AT 811.
3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL WORK NECESSARY FOR COMPLETE AND OPERABLE FACILITIES AND UTILITIES.
4. ANY CONFLICTS OR INCONSISTENCIES WITH THE PLANS OR SPECIFICATIONS SHALL BE BROUGHT TO THE IMMEDIATE ATTENTION OF THE ENGINEER.
5. ENGINEER ASSUMES NO RESPONSIBILITY FOR THE CONTINUED PROPER USE OR MAINTENANCE OF THE PROJECT SYSTEMS.
6. EROSION AND SEDIMENT CONTROL MEASURES SHALL BE CONSTRUCTED PRIOR TO BEGINNING ANY OTHER LAND DISTURBANCES. THE DEVICES SHALL NOT BE REMOVED UNTIL THE DISTURBED.
7. ALL DISTURBED AREAS OF THE SITE SHALL BE SEEDED OR STABILIZED WITH EROSION CONTROL MATERIALS, SUCH AS STRAW MULCH, JUTE MESH, OR EXCELSIOR WITHIN 14 DAYS OF FINAL GRADING. IF CONSTRUCTION HAS BEEN SUSPENDED, OR SECTIONS COMPLETED, AREAS SHALL BE SEEDED IMMEDIATELY AND STABILIZED WITH EROSION CONTROL MATERIALS. MAINTENANCE SHALL BE PERFORMED AS NECESSARY TO ENSURE CONTINUED STABILIZATION.
8. CONTRACTOR IS RESPONSIBLE FOR BEDROCK EXCAVATION IF NECESSARY FOR INSTALLATION OF ALL SUBSURFACE UTILITIES.



WET POND DETAIL
SCALE: N.T.S.



LEVEL SPREADER DETAIL
NTS

LEGEND

EXISTING	PROPOSED	
		SUBJECT SITE PROPERTY LINE
		ABUTTER PROPERTY LINE
		GUARDRAIL
		APPROXIMATE DRAINAGE FLOW PATH
		IMPERVIOUS SURFACE – ROOF
		IMPERVIOUS SURFACE – PATIO/DECK/WALKWAY
		IMPERVIOUS SURFACE – DRIVEWAY
		IMPERVIOUS SURFACE – ROADWAY
		WATERSHED BOUNDARY
		ISOLATION ZONE
S		SEWER LINE
FM		FORCE MAIN
		CONTOURS
		TREELINE
		SOIL TYPE
		WELL

PRACTICE NOTES

- TOTAL SITE ACREAGE 108.50 (109.66 WITH 1.16 ACRE BOUNDARY ADJUSTMENT INCLUDED)
- TOTAL OF 8.22 ACRES OF IMPERVIOUS
- ROUGHLY 4.87 ACRES OF IMPERVIOUS WILL BE TREATED
- ROUGHLY 59.25% OF IMPERVIOUS CAN BE TREATED WHICH EQUATES TO 50.49% OF THE WQV TREATED
- LIDAR CONTOURS CONFLICT WITH GATHERED INFORMATION, FEATURES SUCH AS THE SWALE AT THE START OF GREYSTONE DRIVE OR THE SWALE BEING UTILIZED IN THE CHECK DAM FEATUERE MAY NOT BE PROPERLY REPRESENTED

POTENTIAL PRACTICE LOCATIONS

1. DRYWELL
   DRAINAGE AREA = ±7.642 ACRES
   IMPERVIOUS = ±1.163 ACRES
   HYDRIC SOIL GROUP B
   WQV = ±0.119 ACRE-FEET OR 5184 CUBIC FEET
2. CHECK DAMS/FILTER STRIP 1
   DRAINAGE AREA = ±9.765 ACRES
   IMPERVIOUS = 0.733 ACRES
   HYDRIC SOIL GROUP A AND D
   TV = ±0.061 ACRE-FEET OR 2657 CUBIC FEET
3. CHECK DAMS/FILTER STRIP 2
   DRAINAGE AREA = ±0.470 ACRES
   IMPERVIOUS = ±0.143 ACRES
   HYDRIC SOIL GROUP A AND D
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   DRAINAGE AREA = ±31.639 ACRES
   IMPERVIOUS = ±2.109 ACRES
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5. SIMPLE DISCONNECTIONS
   TOTAL AREA = ±2.907 ACRES
   IMPERVIOUS = ±0.719 ACRES
   TV = ±0.060 ACRE-FEET

TOTAL TV = ±0.542 ACRE-FEET

WET POND NOTES

- TWO FOREBAYS SIZED TO 10% OF THE WQv
- TYPICALLY A MINIMUM OF 6 TO 8 FEET OF HEAD IS NEEDED IN A WET POND MODIFICATIONS MAY BE REQUIRED
- AT LEAST 25% OF THE WQV MUST BE PROVIDED IN A "DEEP WATER ZONE" WHERE THE DEPTH IS AT LEAST 4' BUT NO MORE THAN 8'
- THE EXISTING POND APPEARS TO NOT HAVE A SAFETY BENCH, BUT IS ALSO IN A LOCATION WHERE TRAVEL SHOULD BE VERY INFREQUENT.
- ESTIMATED VOLUME PUTS THE EXISTING POND AT A MAXIMUM (INCLUDONG EXTEDNED DETENTION TIME) OF 13,962 CUBIC FEET
- WHEN THE REQUIRED WQV IS MET IN THIS APPROXIMATED POND 46.8% WOULD BE MET WITHIN THE EXTENDED DETENTION PORTION.

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DETAIL SHEET
GREYSTONE DRIVE
RICHMOND, VERMONT

DRAWN	RH
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DATE	1/10/2024
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JOB NO.	806190233
SHEET	SW.1

EROSION PREVENTION AND SEDIMENT CONTROL (EPSC) SEQUENCING AND NOTES

THE TOTAL AREA OF DISTURBANCE IS APPROXIMATELY 0.3 ACRES.

1. SITE INVENTORY

1.1. TOPOGRAPHY

THE STUDY AREA IS CONSIDERABLY CONSTRAINED BY STEEP TO VERY STEEP SLOPES RANGING FROM 2% TO 60%, WHICH GREATLY LIMITS THE ABILITY TO LOCATE STP RETROFITS. THE STEEP SLOPES ARE LOCATED IN THE MAJORITY OF THE PROJECT AREA WITH THE EXCEPTION OF THE DEVELOPED PORTIONS SUCH AS THE ROADWAYS, COMMUNAL WASTEWATER SYSTEM, AND RESIDENTIAL DEVELOPMENT PLATEAUS. THE PLATEAUS CONSIST OF THE RESIDENCE, DRIVEWAY, LAWN, AND ON-SITE WASTEWATER DISPOSAL SYSTEM.

1.2. DRAINAGE WATERWAYS, BODIES OF WATER, AND PROXIMITY TO NATURAL OR MANMADE WATER FEATURES

EXISTING CONDITIONS: DUE TO THE SIZE OF THE PROJECT SITE IT HAS BEEN SECTIONED INTO FIFTEEN (15) BASINS. THE VARIOUS BASINS TOPOGRAPHY CONSIST OF, EXISTING STORMWATER INFRASTRUCTURE, AND DISCHARGE POINTS WITH A LARGE MOUNTAINOUS SECTION THAT DRAINS INTO THE SITE FROM THE WEST AND SOUTH. THIS MOUNTAINOUS OFFSITE AREA CONTRIBUTES A LARGE AMOUNT OF WATER THAT FLOWS THROUGH THE BASINS AND ULTIMATELY THE OUTFALLS. FROM THESE BASINS RUNOFF IS DIRECTED THROUGH SHEET FLOW OR IS CHANNELIZED AND ULTIMATELY DIRECTED TO THE WINOOSKI RIVER:

PROPOSED CONDITIONS: THE PROPOSED CONDITIONS ARE VERY SIMILAR TO THE EXISTING AS ALL THE STRUCTURAL PRACTICES SEEK TO RETROFIT EXISTING FEATURES FOR TREATMENT. THESE INCLUDE AN EXISTING SETTLING POND, DRYWELL, SWALE, AND MULTIPLE SECTIONS OF FLAT GRASS SECTIONS. THE EXISTING RUNOFF WILL NOT BE DIVERTED FROM ANY ORIGINAL OUTFALL AND WILL INSTEAD BE CAPTURED AND TREATED BEFORE ULTIMATELY EXITING THE SITE.

2. EROSION PREVENTION AND SEDIMENT CONTROL

THE EROSION CONTROL NARRATIVE IS MEANT AS A PERFORMANCE GUIDELINE FOR PREVENTING EROSION AND CONTROLLING SEDIMENT TRANSPORT. THE PRINCIPLES OUTLINED IN THIS NARRATIVE CONSIST OF APPLYING MEASURES THROUGHOUT CONSTRUCTION OF THE PROJECT IN ORDER TO MINIMIZE SEDIMENT TRANSPORT TO THE RECEIVING WATERS. THE MEASURES INCLUDE STABILIZATION AND STRUCTURAL PRACTICES, STORM WATER CONTROLS AND OTHER POLLUTION PREVENTION PRACTICES. THEY HAVE BEEN PROPOSED BY THE DESIGNER AS A BASIS FOR PROTECTING RESOURCES AND WILL NEED TO BE BUILT BASED ON THE SPECIFIC MEANS AND METHODS OF THE CONTRACTOR. REFER TO THE LOW RISK SITE HANDBOOK AND APPROPRIATE DETAIL SHEETS FOR SPECIFIC GUIDANCE AND CONSTRUCTION DETAILING.

ALL MEASURES SHALL BE REGULARLY MAINTAINED AND SHALL BE CHECKED FOR SEDIMENT BUILD-UP. SEDIMENT SHALL BE DISPOSED OF AT AN APPROVED SITE WHERE IT WILL NOT BE SUBJECT TO EROSION.

2.1. MARK SITE BOUNDARIES

SITE BOUNDARIES AND AREAS CONSTRUCTION EQUIPMENT CAN ACCESS SHALL BE DELINEATED. PROJECT DEMARCATION FENCING (PDF) SHALL BE USED TO PHYSICALLY MARK SITE BOUNDARIES.

2.2. LIMIT DISTURBANCE AREA

PREVENTING INITIAL SOIL EROSION BY MINIMIZING THE EXPOSED AREA IS MUCH MORE EFFECTIVE THAN TREATING ERODED SEDIMENT. EARTH DISTURBANCE CAN BE MINIMIZED THROUGH CONSTRUCTION PHASING BY ONLY OPENING UP EARTH AS NECESSARY. THIS CAN LIMIT THE AREA THAT WILL BE DISTURBED AND EXPOSED TO EROSION. EMPLOY TEMPORARY CONSTRUCTION STABILIZATION PRACTICES IN INCREMENTAL STAGES AS PHASES CHANGE. FOR PROJECTS WHICH FALL UNDER THE CONSTRUCTION GENERAL PERMIT, ONLY THE ACREAGE LISTED ON THE PERMIT AUTHORIZATION MAY BE EXPOSED AT ANY GIVEN TIME.

2.3. SITE ENTRANCE/EXIT STABILIZATION

TRACKING OF SEDIMENT ONTO PUBLIC HIGHWAYS SHALL BE MINIMIZED TO REDUCE THE POTENTIAL FOR RUNOFF ENTERING RECEIVING WATERS. INSTALLATION SHALL COINCIDE WITH THE CONTRACTORS PROGRESS SCHEDULE. STABILIZED CONSTRUCTION ENTRANCES SHALL BE INSTALLED ANYWHERE EQUIPMENT WILL BE GOING FROM AREAS OF EXPOSED SOIL TO PAVED SURFACES.

2.4. INSTALL SEDIMENT BARRIERS

SEDIMENT BARRIERS SHALL BE UTILIZED TO INTERCEPT RUNOFF AND ALLOW SUSPENDED SEDIMENT TO SETTLE OUT. THEY SHALL BE INSTALLED PRIOR TO ANY UP SLOPE WORK. INSTALL SILT FENCES PARALLEL TO GROUND CONTOURS DOWN SLOPE OF ALL DISTURBED AREAS. INSTALL INLET PROTECTION AROUND ALL CATCH BASINS (EXISTING OR NEW) THAT COLLECT CONSTRUCTION SITE STORMWATER RUNOFF.

2.5. DRAINAGE DIVERSION

ANY DRAINAGE SWALES WITH A SLOPE GREATER THAN 5% SHALL USE STONE LINING FOR STABILIZATION.

2.6. STABILIZE EXPOSED SOILS DURING CONSTRUCTION

ALL AREAS OF DISTURBANCE MUST HAVE TEMPORARY STABILIZATION IN PLACE WITHIN 48 HOURS OF DISTURBANCE. SURFACE ROUGHENING OF ALL EXPOSED SLOPES, COMBINED WITH TEMPORARY MULCHING, SHALL BE UTILIZED ON A REGULAR BASIS. BIODEGRADABLE EROSION CONTROL MATTING OR AN EQUIVALENT SHALL BE USED TO STABILIZE ALL SLOPES STEEPER THAN 1:3. THE FORECAST OF RAINFALL EVENTS SHALL TRIGGER IMMEDIATE PROTECTION OF EXPOSED SOILS.

2.7. STABILIZE SOIL AT FINAL GRADE

EXPOSED SOIL MUST BE STABILIZED WITHIN 48 HOURS OF REACHING FINAL GRADE. SEED, MULCH, FERTILIZER AND LIME SHALL BE USED TO ESTABLISH PERMANENT VEGETATION. FOR SLOPES STEEPER THAN 1:3, BIODEGRADABLE EROSION CONTROL MATTING OR AN EQUIVALENT SHALL BE USED INSTEAD OF MULCH.

3. EROSION PREVENTION SEDIMENT CONTROL TIMING AND CONSTRUCTION SEQUENCING

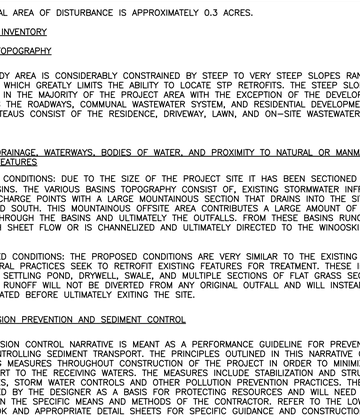
- A PRE-CONSTRUCTION MEETING WILL BE HELD AT LEAST ONE-WEEK PRIOR TO COMMENCING CONSTRUCTION WITH THE CONTRACTOR TO REVIEW EROSION PREVENTION AND SEDIMENT CONTROL MEASURES.
- THE FIRST ORDER OF CONSTRUCTION SHALL BE TO INSTALL ALL EROSION CONTROL MEASURES INCLUDING A STABILIZED CONSTRUCTION ENTRANCE, SILT FENCING, AND CATCH BASIN INLET PROTECTION.
- THE EROSION AND SEDIMENT CONTROL STRUCTURES SHALL BE VISUALLY INSPECTED FOR STABILITY AND OPERATION EVERY MORNING BEFORE CONSTRUCTION BEGINS. THIS INSPECTION IS ESPECIALLY CRUCIAL AFTER RAINFALL. IF THE CONTROL DEVICES DETERIORATE, FLOOD, OR FILL WITH SOIL, THEN THEY SHALL BE IMMEDIATELY REPAIRED OR REPLACED AND ANY ACCUMULATED SEDIMENT SHALL BE REMOVED. AFTER CONSTRUCTION, THESE STRUCTURES SHALL BE MAINTAINED UNTIL THE SITE IS AGAIN STABLE AND VEGETATION IS ESTABLISHED.
- SOIL AND CONSTRUCTION MATERIALS WILL BE STOCKPILED AND APPROPRIATELY PROTECTED WITH A PERIMETER BARRIER OF SILT FENCING OR OTHER APPROVED SEDIMENT BARRIERS. PORTIONS OF THE SITE WILL THEN BE ROUGH GRADED TO ACHIEVE THE APPROXIMATE DESIRED SITE GRADES.
- ANY ROUGH GRADED AREAS WILL BE TEMPORARILY STABILIZED WITHIN 7 DAYS OF INITIAL DISTURBANCE.
- FOLLOWING SITE GRADING, INSTALLATION OF PROPOSED PAVEMENT, BUILDING, AND UTILITIES, DISTURBED AREAS WILL BE STABILIZED WITH TOPSOIL, SEED, AND MULCH AND/OR EROSION MATTING (WHERE APPLICABLE). THE PROJECT WILL NOT HAVE DISTURBED EARTH IN ANY ONE LOCATION FOR MORE THAN 7 CONSECUTIVE CALENDAR DAYS WITHOUT TEMPORARY OR FINAL STABILIZATION.
- FOLLOWING FINAL SITE STABILIZATION REMOVE SILT FENCING AND LIMIT OF DISTURBANCE BARRIERS.
- SWEEP ALL IMPERVIOUS SURFACES WHEN SEDIMENT ACCUMULATES.

5.1. EROSION CONTROL REQUIREMENTS – WINTER PERIOD (15 OCTOBER TO 1 MAY)

FOR WORK OCCURRING DURING THE WINTER PERIOD EROSION CONTROL MEASURES INCLUDING CONSTRUCTION ENTRANCES, CONSTRUCTION LIMITS, STABILIZED LAYDOWN AREAS, AND SILT FENCE ARE TO BE INSTALLED PRIOR TO THE GROUND FREEZING AND MAINTAINED UNTIL FINAL STABILIZATION IS ACHIEVED.

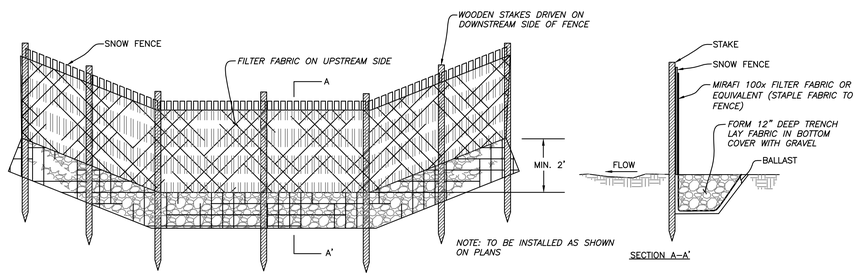
STABILIZED ENTRANCES AND ACCESS POINTS SHOULD BE ENLARGED TO PROVIDE FOR SNOW STOCKPILING. A MINIMUM 25' BUFFER SHALL BE MAINTAINED FROM PERIMETER CONTROLS SUCH AS SILT FENCE AND LIMITS OF DISTURBANCE.

WHERE MULCH IS THE SELECTED STABILIZATION MEASURE, DOUBLE THE STANDARD RATE OF MULCH SHALL BE USED DURING THE WINTER PERIOD (2 INCHES OF MULCH WITH 80-90% COVER). WHERE MULCH IS SUBJECT TO WIND ACTION, IT SHALL BE SECURED WITH NETTING OR OTHER APPROVED METHOD. SNOW AND ICE SHALL BE REMOVED TO LESS THAT 1 INCH THICKNESS PRIOR TO STABILIZATION.



STOCKPILE EROSION PROTECTION DETAIL

SCALE: N.T.S.



TEMPORARY SILT FENCE EROSION BARRIER DETAIL

SCALE: N.T.S.

SIMPLE DISCONNECTION NOTES

IMPERVIOUS AREAS SHOWN HATCHED IN BLUE ARE THOSE SURFACES FOR WHICH STORMWATER RUNOFF MUST BE DISCONNECTED, MEANING UNCOLLECTED OR OTHERWISE REDISTRIBUTED AS SHEET FLOW INTO VEGETATED AREAS OF A SPECIFIED FLOW LENGTH AND SLOPE. THE AREAS RECEIVING RUNOFF FROM THESE SURFACES MUST BE VEGETATED FOR A MINIMUM LENGTH AS SPECIFIED BELOW AND AT A SLOPE OF LESS THAN 8%, AND SHALL REMAIN WELL VEGETATED AND FREE FROM EROSION. IF CONCENTRATED FLOW OR EROSION IS OBSERVED IN THE DISCONNECTION LOCATION SURROUNDING THE HATCHED SURFACES, CORRECTIVE ACTION IS NECESSARY.

ROOF TOP DOWNSPOUT SIMPLE DISCONNECTION NOTES:

1. ROOFTOP AREAS CONVEYED BY A SINGLE DOWNSPOUT DISCHARGE LOCATION SHALL NOT EXCEED 1,000 SQUARE FEET. DOWNSPOUTS SHALL BE SPACED ADEQUATELY SO THAT THEY DO NOT SHARE THE SAME DISCONNECTION AREA.
2. ROOFTOP AREAS CONVEYED BY DOWNSPOUTS SHALL HAVE A MINIMUM DISCONNECTION AREA THAT IS 12' WIDE, OR EQUAL TO THE CONTRIBUTING WIDTH FOR ALL OTHER SURFACES. DOWNSPOUTS SHALL BE SPACED ADEQUATELY TO NOT SHARE THE SAME DISCONNECTION AREA.
3. DOWNSPOUT SHALL HAVE A STONE DIAPHRAGM, LEVEL SPREADER, SPLASH PAD, OR APPROVED OTHER SPREADING DEVICE TO DISTRIBUTE RUNOFF EVENLY OVER A MINIMUM 12' WIDTH.
4. DOWNSPOUTS SHALL BE DIRECTED AWAY FROM BUILDINGS TO PROTECT FOUNDATIONS AND BASEMENTS.
5. THE VEGETATED DISCONNECTION LENGTH DOWNSTREAM OF THE DOWNSPOUT SHALL HAVE A MINIMUM LENGTH OF 65'.

PARKING AREAS AND DRIVEWAYS WITH CONTRIBUTING LENGTH GREATER THAN 10':

1. IT IS ANTICIPATED THAT ONLY THE PARKING AREAS NEAR THE SINGLE FAMILY RESIDENCE WILL HAVE A CONTRIBUTING FLOW LENGTH THAT EXCEEDS 10' IN LENGTH.THE MAXIMUM CONTRIBUTING FLOW LENGTH TO ANY ONE VEGETATED DISCONNECTION AREA SHALL BE NO GREATER THAN 75'.
2. ALL PARKING AREAS AND DRIVEWAYS SHALL BE DIRECTED AWAY FROM BUILDINGS TO PROTECT FOUNDATIONS AND BASEMENTS. LOCALIZED GRADING MAY BE REQUIRED TO PROPERLY DIRECT DISTRIBUTED SHEET FLOW RUNOFF TO DISCONNECTED AREAS AND AWAY FROM BUILDINGS.
3. THE VEGETATED DISCONNECTION LENGTH DOWNSTREAM OF PARKING AREAS AND DRIVEWAYS WITH CONTRIBUTING LENGTH GREATER THAN 10' SHALL HAVE A MINIMUM LENGTH OF 65'.

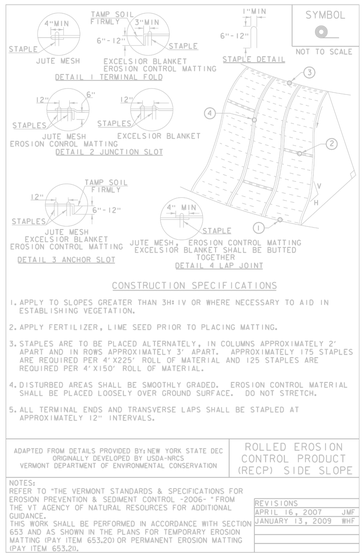
SEEDING NOTES

TOPSOIL:

1. WHENEVER POSSIBLE, STOCKPILE AND REAPPLY NATIVE TOPSOIL TO THE AREAS THAT ARE TO BE VEGETATED.
2. TOPSOIL SHALL HAVE AT LEAST 2% BY WEIGHT OF FINE TEXTURED STABLE ORGANIC MATERIAL, AND NO GREATER THAN 6%.
3. TOPSOIL SHALL HAVE NOT LESS THAN 20% FINE TEXTURED MATERIAL (PASSING THE NO. 200 SIEVE) AND NOT MORE THAN 15% CLAY.
4. TOPSOIL TREATED WITH SOIL STERILANTS OR HERBICIDES SHALL BE SO IDENTIFIED TO THE PURCHASER.
5. TOPSOIL SHALL BE RELATIVELY FREE OF STONES OVER 1-1/2" DIAMETER, TRASH, NOXIOUS WEEDS SUCH AS NUTSEDGE AND QUACKGRASS, AND WILL HAVE LESS THAN 10% GRAVEL BY VOLUME.
6. TOPSOIL CONTAINING SOLUBLE SALTS GREATER THAN 500 PPM SHALL NOT BE USED.
7. TOPSOIL SHALL BE DISTRIBUTED TO A UNIFORM DEPTH OVER THE AREA. IT SHALL NOT BE PLACED WHEN IT IS PARTLY FROZEN, MUDDY OR ON FROZEN SLOPES, OR OVER ICE, SNOW OR STANDING WATER PUDDLES.

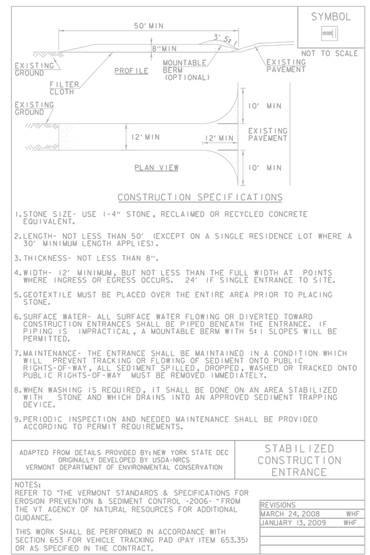
SEEDING

8. SOIL AMENDMENTS –
   8.1. LIME TO pH OF 6.0
   8.2. FERTILIZE WITH 600 LBS OF 5-10-10 OR EQUIVALENT PER ACRE (14 LBS/1,000 SQFT)
9. USE SEED MIXTURES AS SHOWN IN THE TECHNICAL SPECIFICATIONS.
10. WATER MAY BE ESSENTIAL TO ESTABLISH A NEW SEEDING. IRRIGATION IS A SPECIALIZED PRACTICE AND CARE NEEDS TO BE TAKEN TO NOT EXCEED THE APPLICATION/INFILTRATION RATE OF ANY GIVEN SOIL. EACH APPLICATION MUST BE UNIFORMLY APPLIED AND TWO INCHES OF WATER SHOULD BE APPLIED PER APPLICATION SETUP.



SLOPE STABILIZATION DETAIL

NTS



STABILIZED CONSTRUCTION ENTRANCE

NTS

FOR PERMITTING PURPOSES ONLY

REVISIONS	BY

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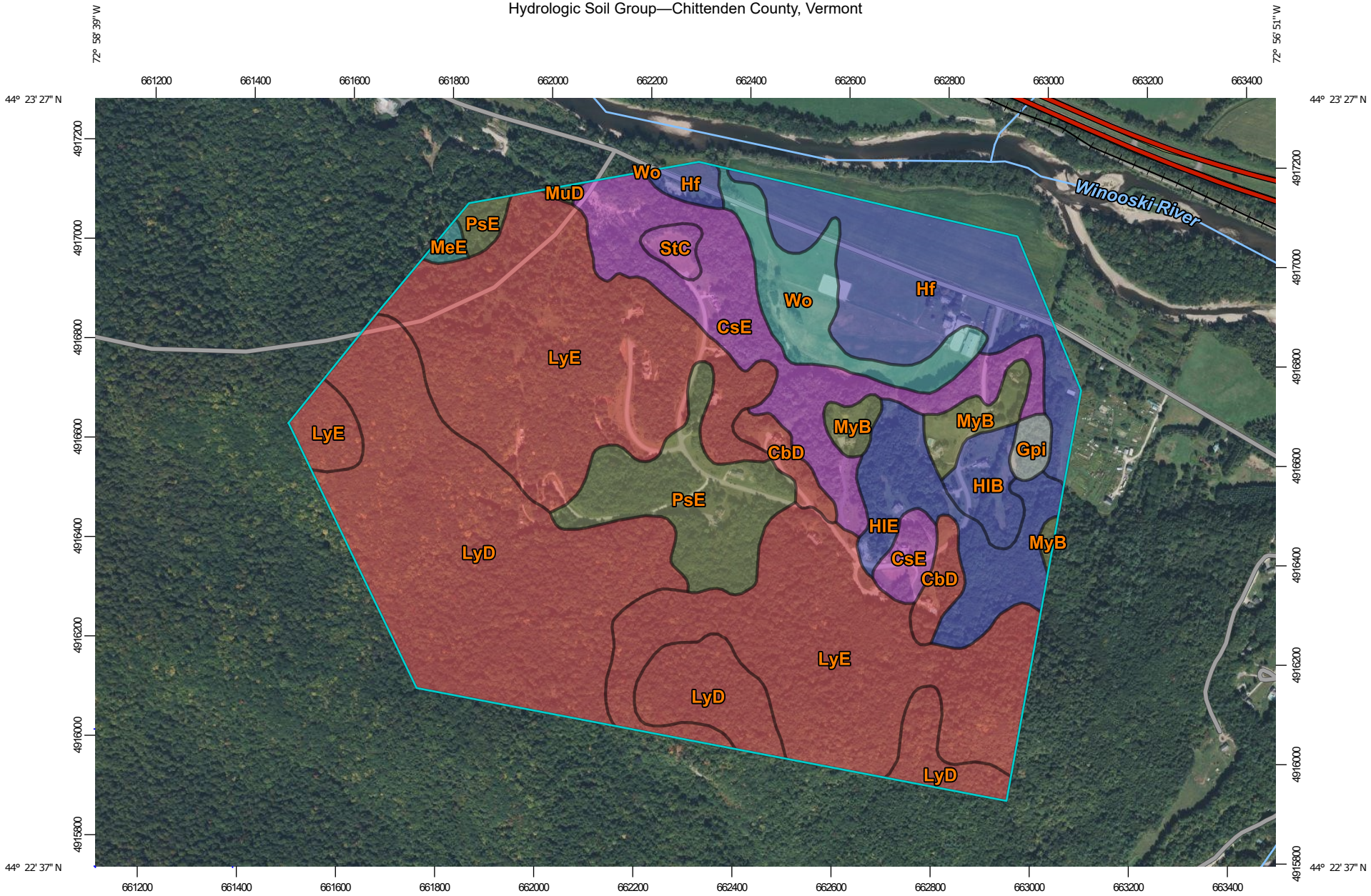
DRAFT

GREYSTONE ESTATES
STORMWATER GENERAL PERMIT 3-9050
DETAIL SHEET
GREYSTONE DRIVE
RICHMOND, VERMONT

DRAWN	RH
CHECKED	SJD
DATE	1/10/2024
SCALE	AS NOTED
JOB NO.	806190233
SHEET	DT.2

Appendix B

NRCS Soil Survey Data


72° 58' 39" W
72° 56' 51" W
44° 23' 27" N
44° 22' 37" N
661200
661400
661600
661800
662000
662200
662400
662600
662800
663000
663200
663400
4917200
4917000
4916800
4916600
4916400
4916200
4916000
4915800
Winooski River
Wo
Hf
MuD
PsE
MeE
StC
CsE
LyE
MyB
Gpi
CbD
HIB
HIE
LyD
Map Scale: 1:10,900 if printed on A landscape (11" x 8.5") sheet.
N
Meters
0 150 300 600 900
Feet
0 500 1000 2000 3000
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

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

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: Chittenden County, Vermont
Survey Area Data: Version 27, Sep 10, 2023

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

Date(s) aerial images were photographed: Jun 1, 2020—Sep 21, 2020

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.

Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
CbD	Cabot silt loam, 3 to 25 percent slopes, very stony	D	7.3	1.9%
CsE	Colton and Stetson soils, 30 to 60 percent slopes	A	36.7	9.8%
Gpi	Pits, sand and Pits, gravel		2.2	0.6%
Hf	Hadley very fine sandy loam	B	37.3	9.9%
HlB	Hartland very fine sandy loam, 2 to 6 percent slopes	B	6.2	1.7%
HlE	Hartland very fine sandy loam, 25 to 60 percent slopes	B	19.6	5.2%
LyD	Lyman-Marlow complex, 5 to 30 percent slopes, very rocky	D	89.1	23.7%
LyE	Lyman-Marlow complex, 30 to 60 percent slopes, very rocky	D	126.7	33.7%
MeE	Marlow fine sandy loam, 20 to 60 percent slopes, very stony	C	1.1	0.3%
MuD	Munson and Belgrade silt loams, 12 to 25 percent slopes	C/D	0.4	0.1%
MyB	Munson and Raynham silt loams, 2 to 6 percent slopes	C/D	7.9	2.1%
PsE	Peru fine sandy loam, 20 to 60 percent slopes, very stony	C/D	23.9	6.4%
StC	Stetson gravelly fine sandy loam, 12 to 20 percent slopes	A	2.3	0.6%
Wo	Winooski very fine sandy loam	C	15.3	4.1%
Totals for Area of Interest			**375.9**	**100.0%**

Description

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Appendix C

Test Pit Logs

Soil Test Pit Logs

Project Name: Greystone Estates
Location: Greystone Dr, Richmond, VT
Date: August 22, 2023
KAS Project # 806190233

Method: Mini-excavator
Logged By: Stephen Diglio & Joe Bartlett
Official Present: None

Test Pit: TP23-1

Depth (Inches)	Texture	Consistence or Density	Stucture	Color	Mottles	Comments
0-12"	Rock Fill					Rock Fill Organics
12"- 30"	Sandy Loam	Friable	Subangular	10 yr 5/4, Yellowish Brown	No	
30"- 50"	Very Fine Sandy Loam	Friable	Subangular	10 yr 6/2, Light Brownish Gray	Yes	
50"-80"	Loam	Friable	Blocky	10 yr 6/3, Pale Brown	Some	
80"-100"	Fine Sandy Loam	Friable	Subangular	10 yr 4/4, Dark Yellowish Brown	No	
100"-±120"	Sand	Friable	Subangular	10 yr 3/4, Dark Yellowish Brown	No	
120"-130"	Sand	Friable	Subangular	10 yr 5/4, Yellowish Brown	No	
130+"	Silt Loam	Firm	Platy	10 yr 4/2, Dark Grayish Brown		Saturated Silt Loam

Test Pit: TP23-2

Depth (Inches)	Texture	Consistence or Density	Stucture	Color	Mottles	Comments
0- 8"						Organic
8"-18"	Silt Loam	Firm	Platy	10 yr 5/2, Grayish Brown		roots, potential fill
18+"	Clayey silt	Firm	Platy	10 yr 5/1, Gray		Roots