GRANITE STATE LANDFILL, LLC
1855 VT Route 100 • Hyde Park, VT 05655 **p.** 802.651.5454 **f.** 802.888.7931

April 19, 2024

Judith E. Sears Houston, P.E.
Water Quality Planning Section Supervisor
Watershed Management Bureau, Water Division
New Hampshire Department of Environmental Services
Concord, NH 03302-0095

RE: **Granite State Landfill, LLC**
Proposed Lined Landfill - Dalton, New Hampshire
US Army Corps of Engineers
Section 404 of the Clean Water Act - Individual Wetland Permit Application
Request for Water Quality Certification

Dear Ms. Sears Houston:

Granite State Landfill, LLC (GSL) writes to provide this request for water quality certification for a proposed solid waste disposal facility in Dalton, NH. An Individual Wetland Permit Application per Section 404 of the Clean Water Act has been submitted to the US Army Corps of Engineers (USACE) and therefore the Proposed Activity will require water quality certification under §401 of the federal Clean Water Act. Per §121.5 of the Clean Water Act, applicants for water quality certification are required to submit a certification request concurrently to the certifying authority (NHDES) and the agency of the Federal Government to which the application is made USACE. This letter and the accompanying application serve as the GSL certification request to the certifying authority NHDES and a separate certification request has been submitted to the agency of the Federal Government to which the application for a federal permit is made (USACE).

This certification request and the supporting information have been prepared in accordance with NHDES requirements and are based on extensive communications with NHDES and other participating agencies. Central to this certification request have been multiple baseline environmental studies developed and implemented consistent with a Sampling and Analysis Plan (SAP) to satisfy the participating agency requests and comments. Multiple coordination meetings, Project site visits, written comments, and other communications between the Project Team and the participating agencies were instrumental in guiding the development of the SAP and subsequent studies as well as the proposed Project design and accompanying impacts analysis that are presented in this certification request. We look forward to your review of this request for certification and should you have any questions, please contact me at (802) 236-5973 or by email at john.gay@casella.com.

Sincerely,

GRANITE STATE LANDFILL, LLC

John Gay, EI
Permitting, Compliance, & Engineering

c. Bethlehem Municipal Clerk/Conservation Commission (via email)
Dalton Municipal Clerk/Conservation Commission (via email)
Ammonoosuc River Local Advisory Committee (via email)

NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES

WATER QUALITY CERTIFICATION APPLICATION

GRANITE STATE LANDFILL
DALTON, NEW HAMPSHIRE

PREPARED FOR:

GRANITE STATE LANDFILL, LLC
1855 VERMONT ROUTE 100
HYDE PARK, VERMONT 05655

APRIL 2024

ACKNOWLEDGEMENT

This request for Water Quality Certification was prepared by the following:

Granite State Landfill, LLC
1855 Vermont Route 100
Hyde Park, Vermont 05655

B.H. Keith Associates
11 Elm Street
P.O. Box 326
Freedom, New Hampshire 03836

CMA Engineers, Inc.
35 Bow Street
Portsmouth, New Hampshire 03801

Horizons Engineering, Inc.
34 School Street
Littleton, New Hampshire 03561

Normandeau Associates, Inc.
25 Nashua Road
Bedford, New Hampshire 03110

Sanborn, Head & Associates, Inc.
6 Bedford Farms Drive
Bedford, New Hampshire 03110

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Attachments (Bound Separately)

APPLICATION FOR WATER QUALITY CERTIFICATION

Water Division
Water Quality Certification Program

RSA: 485-A: 12, III and IV

Date of Request April 19, 2024
Date Request Received by NHDES _____

I. Applicant Information

Principal Place of Business of the Applicant Hyde Park, VT
Mailing Address [Street, PO Box, RR, etc.] 1855 VT Route 100
City/Town and ZIP Code Hyde Park, VT 05655
Telephone No. 802-236-5973
Email Address John.gay@casella.com
Name and Title of Signatory Official Responsible for the Activity for which Certification is Sought (e.g., President, Administrator) John Gay, Engineer

II. Project Information

Name of Project Granite State Landfill
Name of Town and County that contains the Project Dalton, Coos County and Bethlehem, Grafton County
Name of Receiving Waterbody and Drainage Basin Landfill, facilities area, northern portion of access road: Alder Brook, Alder Brook/Hatch Brook watershed; Southern portion of access road/NH Route 116: Unnamed drainage to Ammonoosuc River; Ammonoosuc River, Ammonoosuc River watershed
Summary of Activity (e.g., construction, operation, or other practice or action) Construction and operation of secure solid waste disposal facility

III. Additional Submittal Information

PLEASE SUBMIT AS MUCH INFORMATION AS POSSIBLE IN ELECTRONIC FORMAT

Please provide an individual response to each bullet, below. If applicable information is contained in the application materials, please provide a reference to the specific section in the application materials that will represent the response to the individual bullets below.

- Type of activity (e.g., construction, operation, other action such as water withdrawal) and the start and end dates of the activity.
- The characteristics of the activity: Whether the activity is associated with a discharge and/or water withdrawal and whether the discharge and/or withdrawal is proposed or occurring.
- The characteristics of the discharge and/or withdrawal:
    - Flow rate (cfs).
    - Potential chemical, physical, biological constituents.
    - Frequency (e.g., daily, hourly).
    - Duration.
    - Temperature (Celsius).
    - Latitude and longitude (dd:mm:ss).

- The existing and designated use(s) that are potentially affected by the proposed activities. (Designated Uses are listed in the NHDES Consolidated Assessment and Listing Methodology.)
- The provision(s) of surface water quality standards (Env-Wq 1700) that are applicable to the designated uses affected by the proposed activities.
- A pollutant loading analysis to show the difference between predevelopment and post-development pollutant loads for a typical year. The objective of the loading analysis is to show post-development pollutant loads do not exceed pre-development pollutant loads. Loading analysis guidance and a simple spreadsheet model will be provided by NHDES. The loading analysis will be used to determine appropriate stormwater management measures, which must be effectively designed, installed, and maintained to ensure compliance with surface water quality standards.
- A description of any other aspect of associated with construction and operation of the activity that would affect the chemical composition, temperature, flow, or physical aquatic habitat of the surface water.
- An original or color copy/reproduction of a United States Geological Survey Quadrangle Map that clearly shows the location of the activity and all potential discharge points.
- A copy of the final complete federal permit application or federal license application, including the federal permit, license, or project number.
- A copy of the NHDES wetlands permit (RSA 482-A:3), if necessary.
- A copy of the NHDES alteration of terrain permit (RSA 485-A:17), if necessary.
- A plan showing the proposed activities to scale including:
    - The location(s) and boundaries of the activities.
    - The location(s), dimension(s), and type(s) of any existing and/or proposed structures.
    - The location(s), name(s), identification number(s), and extent of all potentially affected surface water bodies, including wetlands.
- For projects that involve a new surface water withdrawal, provide the following:

phone (603) 271-2457
fax (603) 271-7894
PO Box 95, Concord, NH 03302-0095
www.des.nh.gov

- A copy of the water conservation plan (WCP) submitted to the NHDES Water Conservation Program and the status of NHDES approval.
- A copy of a waiver approved by the NHDES Water Conservation Program that waives the requirement to submit a WCP prior to or in conjunction with the application for water quality certification.

- Pursuant to Env-Wq 2101, and unless a waiver is applied for and granted by NHDES, all applicants for water quality certification are required to submit a water conservation plan (WCP) for projects that involve a new withdrawal from a surface water prior to or in conjunction with this application. Contact the NHDES Water Conservation Program for guidance related to drafting a WCP and the review and approval process. Information regarding the WCP, including contact information, may be found at the NHDES Water Conservation website.

- If the project is located within ¼ (one quarter) mile of a designated river, as defined under RSA 483 (the Rivers Management and Protection Act), provide documentation showing that the Local River Management Advisory Committee (LAC) has been provided with a copy of this complete application. A list and map of the designated rivers, as well as contact information, may be found at the NHDES Rivers Management and Protection website.

Signature – MUST BE SIGNED AND DATED BY APPLICANT

To the best of my knowledge, the data and information described above, which I have submitted to the New Hampshire Department of Environmental Services, is true and correct. I understand that an approval of the requested water quality certification based upon incorrect data may be subject to revocation of the certification. I have complied with all local regulations or ordinances relative to the proposed activity and have obtained or will obtain, prior to the commencement of any work, all other approvals that may be required.

Signed: _____

Date: 4/18/24

Additional Submittal Information

Project Overview – 401 Water Quality Certification Alder Brook Study Area

Granite State Landfill, LLC (GSL), a subsidiary of Casella Waste Systems, Inc. (Casella) proposes to develop a modern lined landfill facility (Proposed Project or Project) off Route 116 in the Town of Dalton, New Hampshire. The following information supports the application for Project water quality certification (WQC) from the New Hampshire Department of Environmental Services (NHDES), pursuant to Section 401 of the federal Clean Water Act. The Project will include activities located in wetlands and GSL has filed applications for:

- New Hampshire Department of Environmental Services (NHDES) Standard Permit for Solid Waste Landfill (application in review)
- NHDES Standard Dredge and Fill Wetlands Permit (application in review)
- NHDES Alteration of Terrain Permit (application in review)
- NHDES Temporary Air Permit (application in review)
- NHDES Shoreland Impact Permit (application not yet submitted)
- NHDES Subsurface Systems Bureau approval (application not yet submitted)
- NHDES Groundwater Release Detection Permit (application not yet submitted)
- New Hampshire Department of Transportation (NHDOT) authorization (application in review)
- United States Army Corps of Engineers (USACE) Section 404 Individual Permit (application in review)
- GSL requires no local approvals

The 2022–2023 Granite State Landfill Baseline Environmental Studies Sampling and Analysis Plan (SAP) was prepared by Normandeau Associates, Inc. (Normandeau), last revised in October 2023, in support of 401 WQC requirements (included as Attachment 1). The October 2023 SAP presents the plan for baseline environmental studies for characterizing the existing fish community, habitat, and water quality in Alder Brook and its tributaries in Dalton, NH that may potentially be impacted by the Project. The October 2023 SAP includes descriptions of the study area, the sampling design, and approach for site selection, environmental sample collection methods, analytical techniques, and documentation procedures.

The scope of the SAP was developed in close coordination with GSL's Wetland Scientist (B.H. Keith Associates) and representatives from NHDES and the New Hampshire Fish and Game Department (NHF&G). The SAP focuses on the principal water quality concerns related to the Project as identified by State agencies, namely: establishing baseline data to evaluate current site conditions, determine whether existing and designated uses are supported in the surface water environment, and assess any potential for adverse impacts to the existing and designated uses in the watershed. Specifically, coldwater fish habitat, primarily Eastern Brook Trout, in Alder Brook and its headwater tributaries near the landfill Project, was identified as the most sensitive and vulnerable existing and designated use in the watershed with potential for adverse effects due to the Project. Specific concerns regarding Eastern Brook Trout habitat in the Alder Brook watershed focused on potential impacts to perennial stream flow, water temperature, pH, and dissolved oxygen conditions, particularly during summer months as Eastern Brook Trout are a coldwater species with low tolerance for prolonged periods of high water temperature. A site plan showing the baseline monitoring stations and Eastern Brook Trout habitat is provided below.

The baseline monitoring stations were carefully selected based on representativeness and suitability for long term monitoring and station selection was communicated to and reviewed by NHDES. Because the monitoring station locations were carefully selected and vetted through the SAP review process, these stations may also serve as compliance monitoring points when determining the potential for Project impacts to the watershed.

The baseline environmental studies included assessments of the fish community, macroinvertebrate community, in-stream habitat, and surface water quality in Alder Brook and its tributaries. Baseline monitoring stations were selected based on communications with State agencies during Project meetings and site visits. The environmental studies included monitoring at multiple sampling stations located within/near the expected Project impact area. In 2022, seven monitoring stations were utilized for water quality, biological, and stream habitat studies. Based on the data collected in 2022 and based on communications with NHDES and NHF&G, several monitoring station changes were made in 2023, including abandoning two station locations and adding four new station locations (nine total stations in 2023). The revised monitoring locations in 2023 included two new monitoring stations located within the Hatch Brook watershed adjacent to the upper Alder Brook watershed and outside the area of direct impacts associated with the Project. Environmental monitoring in the Hatch Brook watershed will provide reference information to evaluate long term changes in the Alder Brook watershed and assess potential Project impacts.

Based on site measurements and observations, Project characteristics, and communication with representatives from NHDES and NHF&G, the existing and designated use with the greatest anticipated vulnerability and potential to be affected by site development associated with the proposed activity is the Eastern Brook Trout fishery and supporting habitat in Alder Brook. Potential impacts due to Project activities are primarily related to land clearing, development of impervious surfaces, alteration of subwatershed boundaries, stormwater management, and flow alterations in tributaries. Indirect effects of the Project may include heat associated with waste decomposition. Based on the identified potential concerns, the primary provisions of surface water quality standards that are applicable to assessment of these uses are water temperature, dissolved oxygen, pH, and flow

The following observations describe site features that suggest potential temperature and flow impacts due to the Project would be largely attenuated before reaching viable brook trout habitat within the main stem of Alder Brook:

- **Distance to Eastern Brook Trout habitat in Alder Brook and position within the watershed** – the landfill and associated stormwater ponds are 1,700 feet or greater linear distance from the nearest brook trout habitat (flow path distance will be greater than linear distance). The Project footprint proportionally comprises a relatively small area of the Alder Brook watershed in the reaches with brook trout habitat (e.g., the total Project disturbed area is about 8-12% of the total watershed area in the uppermost reaches with documented brook trout). In addition, the landfill is separated from Alder Brook by a generally contiguous area of wetlands with high functions and values, and these wetlands will be maintained (see NHDES Standard Dredge and Fill permit application).
- **Existing stream temperatures compared to groundwater temperatures** – Stream baseflow during summer months is largely supported by groundwater discharge (i.e., versus event-driven runoff during higher flows). Monitoring of surface water quality indicates that temperatures in

streams during the summer is primarily influenced by ambient air temperatures and the amount of insolation an area locally receives. Summer surface water temperatures are likely moderated by groundwater temperatures. Groundwater temperatures are buffered from ambient air temperatures, whereas surface water temperatures are strongly influenced by ambient air temperatures. Seasonal high temperatures in groundwater typically occur in September, whereas seasonal high temperatures in surface water in 2023 occurred in July. Following a summer precipitation event with storm runoff, temperatures in surface water generally decreased (sometimes by several degrees Celsius). Based on these observations, it is likely that the primary drivers of surface water temperature, during critical baseflow periods, within the viable coldwater fishery reaches of Alder Brook, will continue to be air temperature and insolation, rather than Project stormwater discharges or other Project effects to the environment.

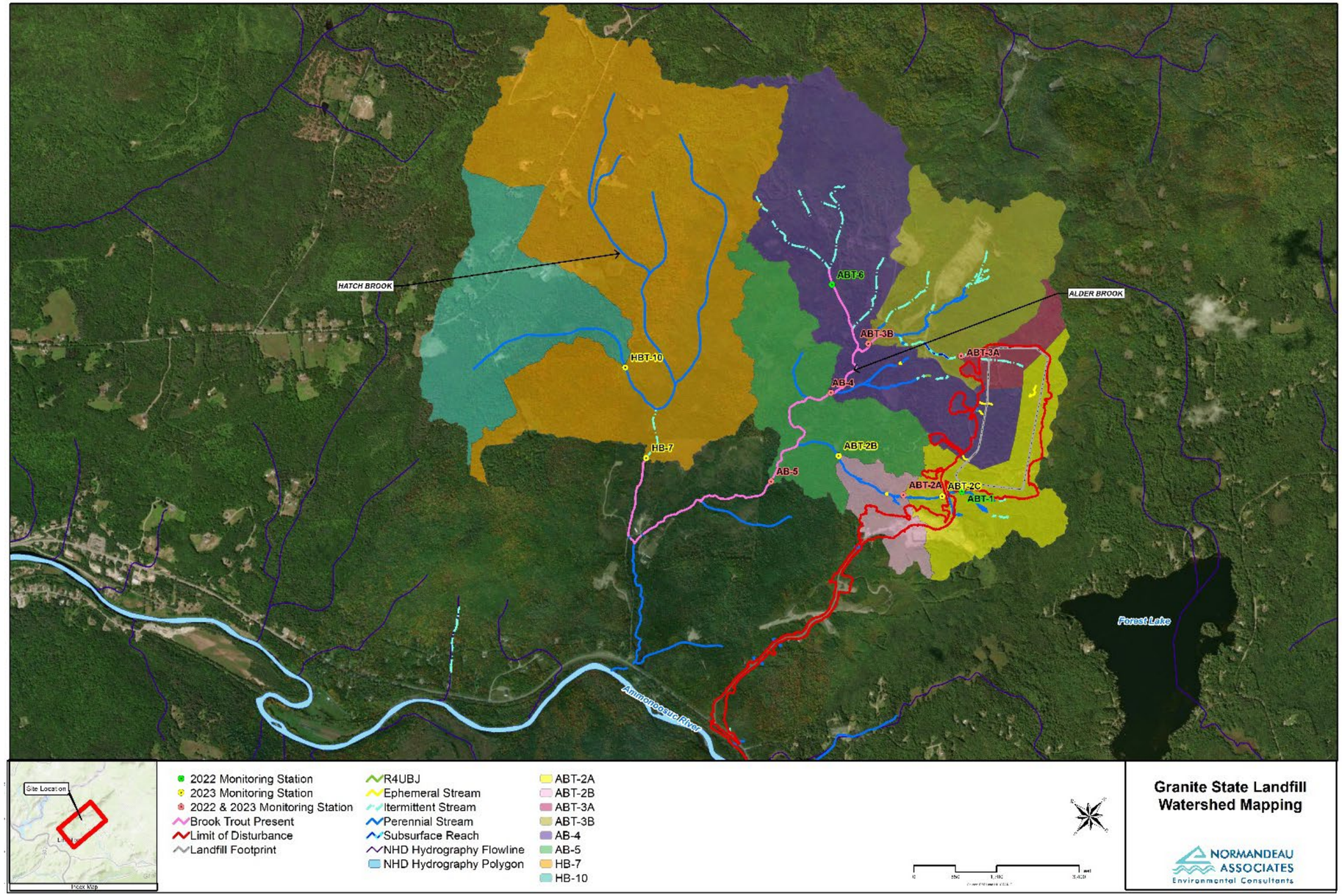
The Project design was developed to minimize environmental impacts overall and with special emphasis on impacts to neighboring surface waters. As discussed below, several strategies will be employed to minimize changes in flow volume, timing, or temperature in each tributary reach potentially affected by the Project, including:

- **Flow balancing in subwatersheds** - the stormwater management system has been designed to maintain, to the maximum extent practicable, the total runoff contributing area in each subwatershed potentially affected by the Project.
- **Infiltration Best Management Practices (BMPs)** – Rather than conventional stormwater management with direct discharge to surface waters, the Proposed Project will take advantage of the latest stormwater BMP guidance to infiltrate stormwater to groundwater to reduce peak flows, maintain baseflows, and minimize heating effects.
- **Other engineering/design factors to reduce stormwater temperatures** – Use of white geomembrane in place of black geomembrane to reflect sunlight and reduce temperatures. Conveyance of stormwater in underground pipes where practical rather than open swales to reduce sunlight exposure and reduce temperatures. Planting native tree species within stormwater ponds to provide shading in the ponds and reduce temperatures.
- **Stream crossings** – The Project access road includes a stream crossing that will be upgraded to meet the current stream crossing rules and improve the connectivity in the watershed separated by Douglas Drive.
- **Maintaining the current watershed water budget** – most of the flow alterations that could result from the Project will affect flow timing but changes to annual flow volumes are not expected to be significant as the only consumptive uses of water will be from water incidentally entering the leachate collection system (for off-site treatment) and water used for dust suppression spraying. The consumptive water uses are expected to be offset by a decrease in annual evapotranspiration due to the conversion of land cover types within the Project area.

Sections 1.0 through 13.0 of this Additional Submittal Information respond to each bulleted item listed on pages 2 and 3 of the Application for Water Quality Certification form (Form Number NHDES-W-07-003). The baseline monitoring report provides results of the monitoring completed per the SAP (Attachment 2).

Project Overview Plan – Alder Brook Sampling Locations and Eastern Brook Trout Habitat

The figure below shows the Eastern Brook Trout habitat within Alder Brook, Alder Brook sub-catchments, and water quality monitoring stations near the Granite State Landfill Project.



1.0 Type of Activity

Description of construction, operation, and other actions such as water withdrawal, and the start and end dates of the activity.

The Proposed Project includes the construction of a new 70-acre Subtitle D secure municipal solid waste disposal facility at an industrial site in Dalton, NH. Construction would occur over the operating life of the landfill as well as into the closure stages. The lined landfill would also be constructed in segments within the first fifteen or sixteen years of operation. Other landfill supporting features will be constructed in the initial years after permits are obtained and include features such as: driveway entrance and access road improvements, stormwater management and erosion control measures, scale and scale attendant building construction, construction of wastewater and landfill gas collection and control systems, and office and maintenance facilities.

Construction is anticipated to begin in 2025 with the landfill to have an operational duration of about 18 years. Following active operation, the facility would enter into a landfill closure period followed by a post-closure monitoring and maintenance period as required in the New Hampshire Department of Environmental Services (NHDES) regulations.

Leachate will be contained within the leachate collection system and transported off-site for treatment at a publicly owned treatment works (POTW). As discussed in Section 3, the only on-site discharges associated with the Project are related to stormwater management, a leach field for sanitary wastewater, and water applied to operations areas for dust suppression. There is no on-site disposal of leachate at this facility. A single water supply well will be developed and used for water at the facilities and for dust control at the landfill and access roads. There is no surface water withdrawal proposed with the Project, although stormwater collected in a lined pond near the scale house may be used as a source for dust suppression water.

2.0 Characteristics of the activity

Information on whether the activity is associated with a discharge and/or water withdrawal and whether the discharge and/or withdrawal is proposed or occurring.

The Proposed Project has no proposed surface water withdrawal and the proposed discharges are associated with stormwater management. Stormwater management will be designed so that stormwater will infiltrate over the area of development and in specific infiltration ponds to mimic the natural drainage into downgradient water resource areas. A single-lined engineered pond will contain precipitation/stormwater to provide water for dust control measures during construction and operation. Domestic water supply and wastewater management for proposed buildings will be conventional systems that will include a single water supply well developed on-site and wastewater will be discharged on-site through a leach field.

As mentioned, proposed stormwater management systems have been engineered using current stormwater Best Management Practices (BMP) guidance from NHDES with groundwater infiltration for nearly all stormwater management areas in the landfill area and bioretention systems along Douglas Drive. Stormwater infiltration structures will be located within each of the pre-development subwatershed areas. The infiltration of stormwater to groundwater is anticipated to maintain and stabilize flows and temperatures in Alder Brook surface waters downgradient of the Project. Because

stormwater management will be primarily through groundwater infiltration, direct surface discharges will be limited to extreme precipitation events that exceed the design capacity of the stormwater management systems (see Section 3.1), as well as from existing runoff in a small number of areas where conventional stormwater management will be required due to space constraints and other limiting factors (primarily along the access road, Douglas Drive).

The Proposed Project includes active leachate management with redundant features to prohibit release to the environment. The proposed designs include dual containment systems as required by NHDES regulation.

Project consideration also includes a maintenance shop for vehicle maintenance with a floor drain and tight tank system, following NHDES rule, with off-site treatment and disposal.

3.0 Characteristics of the discharge and/or withdrawal

The following sections describe the characteristics of stormwater discharges and withdrawals associated with the Proposed Project.

We note that dust suppression activities will occur daily as needed to maintain air quality at the Project site, typically during dry conditions. Dust suppression is considered to be an evaporative loss to the watershed because dust suppression water will not be applied at high enough volume/intensity to produce runoff from the site; rather, it is applied with a goal of only lightly saturating loose surfaces to inhibit airborne dust. If it were to occur, incidental runoff from dust suppression would enter the stormwater management areas. Flow rates for dust suppression water will be determined by the number of dust suppression vehicles in use and the application rates, typically 15,000 - 20,000 gallons per day during dry mid-summer conditions. Dust suppression activities were evaluated as part of this assessment but are not anticipated to have a material impact on water quality. No pollutant loading is expected to result from dust suppression activities because: 1) dust suppression spraying would not apply sufficient water volume to facilitate runoff; and 2) water would be sourced from on-site groundwater and/or captured precipitation. Because of these non-material effects, the narrative below summarizes only stormwater management within and near the landfill footprint and facilities areas.

3.1 Flow rate

Stormwater discharge flow rates will be primarily determined by the design features of the stormwater management systems. Nearly all stormwater runoff on-site will be managed through groundwater infiltration BMPs and the proposed design for the infiltration structures is consistent with NHDES Alteration of Terrain requirements at 5 inches per hour of infiltration maximum flow rate and 25,000,000 gallons per year on average. Stormwater discharges will be primarily to groundwater via infiltration BMPs with minimal direct surface discharge from the landfill areas. Direct surface discharges are limited to areas along the access road where designed infiltration systems are impractical as well as during extreme/infrequent precipitation events where the precipitation intensity + volume exceeds the design capacity of the infiltration structures (50-year, 24-hour storm event).

Groundwater withdrawals will be limited to a single water supply well for water use at the Project facilities (office, maintenance building) and for dust control at the landfill and access roads. Estimated water withdrawals from the water supply well are 1,000 gallons per day (gpd) on average and will not exceed the 57,600 gpd threshold for a NHDES large groundwater withdrawal permit. The Proposed

Project would also remove water from the Alder Brook watershed via capture of precipitation and runoff entering the leachate collection system that will then be contained and transported off-site for treatment at a POTW. The estimated precipitation entering the leachate collection system is approximately 10,000,000 gallons per year. Precipitation falling on capped (no waste contact) areas of the landfill will enter the stormwater management system and will be discharged on-site. Note also that the Project proposes conversion of 90 acres of forest to unforested land and there is an associated decrease in evapotranspiration that will result from that landcover conversion. The estimated reduction in evapotranspiration is 22,000,000 gallons per year after completion of the active phase of the landfill operation and after the landfill has been capped. The reduction in evapotranspiration is assumed to more than offset the consumptive use effects of the leachate collection system during the growing season.

3.2 Potential chemical, physical, and biological constituents

Discharges associated with the Project will be primarily stormwater, with on-site groundwater infiltration used as the primary means for stormwater management and discharge. The chemical, physical, and biological characteristics of the discharge will be typical of stormwater from industrial areas and roadways. Chemical constituents associated with industrial and roadway stormwater runoff include suspended solids, nutrients, metals, and toxics. A pollutant loading analysis for TSS, phosphorus, and nitrogen was completed for the Proposed Project, see Attachment 3. The pollutant loading analysis shows a net decrease in the watershed for TSS and total nitrogen and a minimal increase (1 pound annually) of total phosphorus for the proposed stormwater management system.

3.3 Frequency (e.g. daily, hourly)

Stormwater discharges are event driven and vary with precipitation volume, intensity, snowmelt, antecedent conditions, weather and temperature conditions, and other variable factors. The stormwater management system has been designed to manage at least a 1-inch rain event (water quality volume), falling over a 24 hour period, though in most cases the ponds are sized to manage significantly higher volumes. The maximum infiltration rate for the infiltration basins is 5 inches per hour. For design purposes, it was assumed that on an annual basis there will be 80 discrete runoff-producing events.

3.4 Duration

Stormwater discharges are event driven and the duration of the discharge will vary with precipitation volume, intensity, snowmelt, antecedent conditions, weather and temperature conditions, and other variable factors. The maximum infiltration rate for the infiltration basins is 5 inches per hour. The system is designed to manage the water quality volume that is equivalent to a 1-inch rain event falling over a 24 hour period.

3.5 Temperature

The discharge will consist of stormwater infiltration to groundwater through structural BMPs and will be characterized by a variable discharge temperature. The temperature of the discharge will be determined by the event timing and type (precipitation type/snowmelt), precipitation temperature, runoff flow rates and duration, antecedent surface/subsurface conditions (temperature, soil moisture levels), air temperatures and humidity, wind, and solar gain/radiative losses. Because the discharge will be to groundwater via infiltration, it is expected that during summer months the stormwater temperature will be reduced by subsurface processes prior to reaching the surface water network. Infiltration practices

are recognized for being highly effective at mitigating thermal pollution in stormwater (Gulliver et al, 2010, Long and Dymond, 2014). During summer low-flow periods, when surface water temperatures are expected to be at a seasonal peak, stormwater infiltration to the subsurface will help support baseflows in streams (e.g. compared to conventional stormwater discharges), and heat loading due to stormwater discharges should be mitigated by subsurface interactions (i.e., stormwater contact with cooler subsurface materials and mixing/displacement of cooler shallow groundwater). Temperature effects due to the Project construction and operation have been highlighted by the participating agencies as a primary environmental concern due to the presence of a coldwater fishery in the lower Alder Brook watershed. Because the agencies have identified temperature impacts as a primary concern, the Project has been sited and designed to minimize the temperature and flow impacts to the receiving waters, particularly at the main stem of Alder Brook where viable Eastern Brook Trout habitat is documented.

3.6 Latitude and Longitude

The locations of the discharge points are listed in the table below:

Table 3-1: Latitudes and Longitudes of Discharge Points

Pond ID	Center of Feature		Outlet Pipe	
	Latitude	Longitude	Latitude	Longitude
1	N44° 20' 28.87"	W71° 41' 41.03"	-	-
2	N44° 20' 32.91"	W71° 41' 42.52"	N44° 20' 32.57"	W71° 41' 43.72"
3	N44° 20' 38.60"	W71° 41' 33.67"	N44° 20' 38.83"	W71° 41' 34.69"
4	N44° 20' 39.39"	W71° 41' 29.04"	N44° 20' 40.10"	W71° 41' 29.14"
5	N44° 20' 43.17"	W71° 41' 26.52"	N44° 20' 42.96"	W71° 41' 25.83"
6	N44° 20' 45.38"	W71° 41' 26.70"	N44° 20' 45.62"	W71° 41' 27.78"
7	N44° 20' 46.30"	W71° 41' 35.90"	N44° 20' 46.94"	W71° 41' 34.47"
8	N44° 20' 48.12"	W71° 41' 31.61"	N44° 20' 47.54"	W71° 41' 30.70"
9	N44° 20' 52.46"	W71° 41' 17.61"	N44° 20' 51.11"	W71° 41' 18.52"
10	N44° 20' 57.26"	W71° 41' 11.06"	N44° 20' 57.68"	W41° 41' 09.53"
11	N44° 20' 52.78"	W71° 41' 41.40"	N44° 20' 53.11"	W71° 41' 43.53"
12	N44° 21' 01.17"	W71° 41' 43.26"	N44° 21' 03.19"	W71° 41' 43.37"
13	N44° 41' 07.86"	W71° 41' 46.67"	N44° 21' 09.21"	W71° 41' 47.25"
DD1	N44° 19' 40.35"	W71° 41' 38.93"	N44° 19' 40.04"	W71° 41' 36.92"
DD1A	N44° 19' 40.01"	W71° 41' 35.89"	N44° 19' 39.70"	W71° 41' 33.60"
DD2	N44° 19' 47.04"	W71° 41' 39.93"	N44° 19' 46.59"	W71° 41' 39.75"
DD3	N44° 19' 53.33"	W71° 41' 40.84"	N44° 19' 52.19"	W71° 41' 40.88"
DD3A	N44° 19' 58.28"	W71° 41' 38.26"	N44° 19' 58.00"	W71° 41' 37.65"
DD4	N44° 20' 04.18"	W71° 41' 36.04"	N44° 20' 04.09"	W71° 41' 36.77"
DD5	N44° 20' 17.65"	W71° 41' 38.12"	N44° 20' 16.67"	W71° 41' 38.43"
DD6	N44° 20' 27.99"	W71° 41' 39.73"	N44° 20' 27.62"	W71° 41' 40.43"
Leach field	N44° 20’ 34.47”	W71° 41’ 39.04”	-	-

4.0 Existing and designated use(s)

The existing and designated use(s) that are potentially affected by the proposed activities (Designated Uses are listed in the NHDES Consolidated Assessment and Listing Methodology).

The Proposed Project is in the Alder Brook watershed, a tributary to the Ammonoosuc River, which is classified as Class B – with the following designated uses for Class B waters per RSA 485-A:8(II):

- acceptable for fishing,
- acceptable for swimming
- acceptable for other recreational purposes,
- after adequate treatment, acceptable for use as water supplies.

The designated uses for NH surface waters are further described in Env-Wq 1702.17 and the 2020/2022 Section 305(b) and 303(d) Consolidated Assessment and Listing Methodology (CALM) document in Section 3.1.2 (see table 3-4 from the CALM document, below). Of the six designated uses in Env-Wq 1702.17, all but shellfish consumption are applicable for surface waters in the Project area. A description of the existing and designated uses that are potentially affected by the proposed activities follows.

Table 4-1: Designated Uses for New Hampshire Surface Waters
(from Table 3-4 of 2020/2022 Section 305(b) and 303(d) Consolidated Assessment and Listing Methodology, NHDES, 2022)

Designated Use	NH Code of Administrative Rules (Env-Wq 1702.17) Description			Applicable Surface Waters
Aquatic Life Integrity	The surface water can support aquatic life, including a balanced, integrated, and adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of similar natural habitats of the region.			All surface waters
Fish Consumption	The surface water can support a population of fish free from toxicants and pathogens that could pose a human health risk to consumers.			All surface waters
Shellfish Consumption	The tidal surface water can support a population of shellfish free from toxicants and pathogens that could pose a human health risk to consumers.			All tidal surface waters
Potential Drinking Water Supply	The surface water could be suitable for human intake and meet state and federal drinking water requirements after adequate treatment.			All surface waters
Swimming and Other Recreation In and On The Water	The surface water is suitable for swimming, wading, boating of all types, fishing, surfing, and similar activities.	**NHDES Clarification**		All surface waters
		Primary Contact Recreation (i.e. swimming)	Waters suitable for recreational uses that require or are likely to result in full body contact and/or incidental ingestion of water	
		Secondary Contact Recreation (i.e. boating)	Waters that support recreational uses that involve minor contact with the water.	
Wildlife	The surface water can provide habitat capable of supporting any life stage or activity of undomesticated fauna on a regular or periodic basis.			All surface waters

A portion of the roadway is located within an unnamed watershed (adjacent to the Alder Brook watershed) that drains to the Ammonoosuc River. Water quality impacts associated with improving and widening the existing roadways are inferred to be minor and were not identified as a concern for impacts to Eastern Brook Trout habitat as part of development of the SAP.

4.1 Designated Use: Env-Wq 1702.17(a)

Swimming and other recreation in and on the water, meaning the surface water is suitable for swimming, wading, boating of all types, fishing, surfing, and similar activities.

The 2020/2022 CALM document (NHDES, 2022) identifies several core indicators for assessing the Primary and Secondary Contact Recreation designated use, including:

- Bacteria (Pathogens)
- Discharge of Untreated Sewage
- Chlorophyll-a
- Nitrogen in Estuarine Waters
- Color, Foam, Debris, Scum, Slicks, Odors, and Surface Floating Solids
- Cyanobacteria
- Obstructions to Boating (Navigation)

The primary effect on surface waters from the Proposed Project will be the infiltration of stormwater from the landfill cap, roadways, and associated infrastructure, as well as minor changes to the watershed's water budget resulting from incidental capture and removal of precipitation entering the leachate collection system (for offsite treatment and discharge), and changes to watershed evapotranspiration rates. The proposed stormwater management system will utilize structural BMPs, primarily groundwater infiltration, to manage stormwater prior to discharge. Groundwater infiltration is highly effective at removing many common pollutants including solids, nutrients, and metals with average removal efficiencies for these pollutants of 65-89% (Fraley-McNeal et al, 2007). Removal efficiencies for bacteria are not published, however infiltration is generally recognized as effective for managing bacteria in stormwater (Minnesota Pollution Control Agency, 2023).

A pollutant loading analysis was completed using the NHDES SIMPLE method spreadsheet model (see Section 6.0, below). The results of the analysis show a net decrease to the watershed for TSS and total nitrogen and a minor increase in total phosphorus (1 pound per year increase). Baseline environmental monitoring was completed by the Project Team throughout the upper Alder Brook and Hatch Brook watersheds in accordance with a Sampling and Analysis Plan and the ad-hoc data collected indicate low levels of nutrients and chlorophyll-a and, therefore, any minor additional phosphorus loading, as determined in the pollutant loading analysis, is not expected to result in a measurable increase in any core indicator in potentially affected surface waters. There is no potential discharge of untreated sewage associated with the Project, as domestic wastewater will be managed with a conventional system and discharged through a leach field, and there are no proposed obstructions to navigation associated with the Project. The proposed activity is not expected to affect any of the core indicators for the primary and secondary contact recreation designated use.

Swimming and other recreation were not identified as existing or designated uses in the Project area either during development of the SAP or in subsequent discussions with NHDES and other agencies. The Project area is on private land with restricted access and there is no public recreation access at this site and therefore this designated use does not apply to the activity and is not expected to change as a result of the activity.

4.2 Designated Use: Env-Wq 1702.17(b)

Fish consumption, meaning the surface water can support a population of fish free from toxicants and pathogens that could pose a human health risk to consumers.

The 2020/2022 CALM document (NHDES, 2022) identifies two core indicators for assessing the fish consumption designated use:

- Fish consumption advisories due to toxics
- Water quality criteria for toxic substances in the ambient water

The first indicator is related to fish consumption advisories issued by the NHDES Environmental Health Program. All fresh surface waters in New Hampshire, including the Alder Brook watershed, have a fish consumption advisory due to mercury as noted in the most recent New Hampshire Fish Consumption Guidelines. No other special advisories are indicated for the Alder Brook watershed. The second indicator is related to the water quality standards for toxic substances published in Table Env-Wq 1703.1; however, as noted in the 2020/2022 CALM document, evaluation of water column toxics concentrations is not intended to replace detailed risk assessments for fish consumption. Table 3-37 in the 2020/2022 CALM document indicates that if no assessment methodology for a toxic substance has yet been established to determine full support for the designated use, then the designated use is considered fully supported. No assessment methodology is provided for any toxic substance in Table Env-Wq 1703.1 (except for mercury, which has an existing statewide total maximum daily load [TMDL]), and therefore the use can be considered fully supported in Alder Brook. Likewise, no method for evaluating change to the designated use is provided and therefore the use is considered fully supported until an assessment methodology is established for this water body.

In the absence of an assessment methodology, the water quality criteria in Table Env-Wq 1703-1 *Water Quality Criteria for Toxic Substances* were reviewed for *Water & Fish Ingestion* and *Fish Consumption Only* criteria. Baseline water quality data were collected from the Project site in 2022-2023 in accordance with the SAP, including 7 rounds of metals sampling and a single round of PFAS sampling to characterize toxic substances in Alder Brook and Hatch Brook. The data collected indicate generally low levels of metals and no detections of per- and polyfluoroalkyl (PFAS) substances in surface waters (although perfluorooctanesulfonic [PFOS] was detected once at 6.2 nanograms per liter [ng/L] in previous site sampling at SG-1, in 2019; subsequent sampling was below detection limits). Of the metals tested there were one or more exceedances (at any sampling station) of any human health criteria (water and fish ingestion or fish consumption only) for iron and manganese, while all other metals tested were either non-detect or detectable but did not exceed any ingestion/consumption standard. Detailed metals testing results are presented in the Baseline Monitoring Report. Other surface water quality monitoring at the site completed prior to and coincident with the baseline studies also included exceedances of the human health criteria for arsenic. The Proposed Project discharge consists primarily of stormwater discharged through groundwater infiltration BMPs and any discharge of metals is expected to be minimal and mitigated through the stormwater BMPs. Fish Consumption has not been identified as an existing use within the Project area and no change to the existing or designated use is expected to result from the proposed activity.

4.3 Designated Use: Env-Wq 1702.17(c)

Shellfish consumption, meaning the tidal surface water can support a population of shellfish free from toxicants and pathogens that could pose a human health risk to consumers.

The Alder Brook watershed does not have any tidal surface waters and, therefore, this designated use does not apply.

4.4 Designated Use: Env-Wq 1702.17(d)

Aquatic life integrity, meaning the surface water can support aquatic life, including a balanced, integrated, and adaptive community of organisms having a species composition, diversity, and functional organization comparable to that of similar natural habitats of the region.

The 2020/2022 CALM document (NHDES, 2022) identifies multiple core indicators for assessing the aquatic life integrity designated use, including:

- Biological based on benthic macroinvertebrates (Rivers/streams <= 4th order)
- Biological based on Fish Assemblage (Applicable rivers/streams)
- Biological based on at least 2 assemblages -fish and benthic macroinvertebrates (All surface waters)

or

- A minimum of dissolved oxygen, pH, and documentation by a water quality professional trained in biology that there is no obvious impairment to the biological community (All surface waters)
- Chlorophyll-a (lakes, ponds, and impoundments)
- Total Nitrogen (Waters of the Great Bay Estuary)

The Project Team has collected baseline environmental data in the upper Alder Brook watershed (as well as reference stations in Hatch Brook watershed) in accordance with the SAP. Fish and macroinvertebrate samples were collected consistent with the SAP to evaluate baseline conditions in the aquatic community present in surface waters and provide assessment information consistent with the CALM aquatic life designated use core indicators. Dissolved oxygen, pH, temperature, and other water quality parameters were also collected for evaluation of aquatic life integrity, in accordance with the SAP. Chlorophyll-a data were collected from streams, although there are no lakes or impoundments in the upper Alder Brook and Hatch Brook watersheds, and ponds are limited to small beaver ponds/wetlands. Total nitrogen is not a core indicator in the Alder Brook watershed as it is not a water of the Great Bay Estuary.

Seven sample locations in Alder Brook and its headwater tributaries were selected and sampled for fish community assessments in 2022. In 2023, eight sample locations were selected and sampled for fish community assessments including six within Alder Brook or Alder Brook headwater tributaries and two in the adjacent Hatch Brook watershed. The fish communities in each drainage were composed of eurythermal and coldwater species. Five species (Blacknose Dace, Eastern Brook Trout, Creek Chub, Northern Redbelly Dace, and Common Shiner) were identified in the Alder Brook drainage while seven species (Blacknose Dace, Eastern Brook Trout, Northern Redbelly Dace, Creek Chub, Slimy Sculpin, and Longnose Sucker) were identified in the Hatch Brook drainage. The Hatch and Alder Brook watersheds fall within geographic locations predicted to support coldwater fish species. Downstream stations with watersheds greater than one square mile were assessed using the NHDES Coldwater Index of Biotic Integrity (CIBI) and Transitional Water Index of Biotic Integrity (TWIBI). The determination to provide both assessments was based on results pointing towards stream communities showing attributes of both water classifications. The CIBI metric assessment resulted in scores ranging from 15 to 18 which are below the attainment score of 30 for this index. The TWIBI scores resulted in scores ranging from 20-24 which are below the attainment score of 28 for this index.

Macroinvertebrate community samples were collected using the U.S. Environmental Protection Agency (USEPA) Rapid Bioassessment Protocols (RBP) multihabitat methodology and assessed using a series of metrics to provide a baseline assessment of current conditions. Seven sample locations in Alder Brook and its headwater tributaries were selected and sampled in 2022 while in 2023, eight sample locations were selected and sampled including six within Alder Brook or Alder Brook headwater tributaries and two in adjacent Hatch Brook. At stations in Alder and Hatch Brooks with the largest drainage areas, 3 replicate rock bag samplers were deployed during 2023. These samples were collected, sorted, and consolidated by replicate into seven metrics used in the NH Benthic Index of Biotic Integrity (BIBI) for assessing water quality for aquatic life use attainment. The macroinvertebrate data are provided in the Baseline Monitoring Report for NHDES' evaluation of applicable environmental indexes.

The aquatic life integrity existing use/designated use has the potential to be affected by the proposed activities due to flow alteration, changes to landcover in the watershed, and discharge of stormwater. Eastern Brook Trout were identified by the participating agencies as the species most likely to be affected by the Proposed Project, due to it being a coldwater species sensitive to environmental changes in its supporting habitat. Therefore, a number of strategies will be utilized to protect the Alder Brook designated use as a coldwater fishery. Stormwater management structural BMPs will be used to the maximum extent practicable to mitigate Project effects on streamflow and temperature. Stormwater infiltration to groundwater is expected to help maintain flows in Alder Brook and its tributaries during non-stormflow periods and mitigate the risk of thermal pollution that could result from stormwater runoff. The expected benefits of stormwater infiltration BMPs will be particularly critical during summer low flows with seasonally high water temperatures when Eastern Brook Trout are most vulnerable to physiological stress. The stream reaches with viable Eastern Brook Trout habitat, in the lower Alder Brook watershed, will have less potential for project impacts to flow and temperature as there is greater separation from the Project area and a larger watershed area to attenuate potential Project impacts compared to the smaller upper watershed tributary reaches where no Eastern Brook Trout were documented.

While Eastern Brook trout were identified by the agencies and Project scientists as the aquatic species with the highest likelihood of being affected by Project construction and operation, the designated use for less sensitive fish species and habitats documented outside of Eastern Brook Trout habitat, but within the Alder Brook watershed, were also considered. In particular, Northern Redbelly Dace habitat was evaluated for potential effects as that species, along with Blacknose Dace and Creek Chub, were documented in stream reaches close to the Project limits of disturbance. After a literature review of threats to Northern Redbelly Dace and their supporting habitat in New Hampshire, and a review of potential Project effects to their documented viable habitat within the Alder Brook watershed, the GSL Project scientists concluded there was little potential for degrading NRD habitat.

4.5 Designated Use: Env-Wq 1702.17(e)

Wildlife, meaning the surface water can provide habitat capable of supporting any life stage or activity of undomesticated fauna on a regular or periodic basis;

The 2020/2022 CALM document (NHDES, 2022) states that core indicators for assessing the wildlife designated use are under development and all surface waters are currently assessed as "not assessed". In the absence of core indicators or assessment methodology, Project effects on the wildlife designated use cannot be determined; however, no effects to this designated use are expected to result from the

proposed activity. Any potential Project effects on wildlife are assessed with respect to the aquatic life integrity designated use.

4.6 Designated Use: Env-Wq 1702.17(f)

Potential drinking water supply, meaning the surface water could be suitable for human intake and meet state and federal drinking water requirements after adequate treatment.

The 2020/2022 CALM document (NHDES, 2022) states that:

"*Both Class A and Class B waters shall be considered potentially acceptable for water supply uses after adequate treatment (RSA 485-A:8 I & II). As no definition of "adequate" exists in RSA 485-A:8 or Env-Wq 1700, everything is considered treatable for assessment purposes.*"

Table 3-36 in the 2020/2022 CALM document indicates that if no assessment methodology has yet been established to determine full support for the designated use, then the designated use is considered fully supported. No assessment methodology is provided for potential drinking water supply and therefore the use can be considered fully supported in Alder Brook. Likewise, no method for evaluating change to the designated use is provided and therefore the use is considered fully supported until an assessment methodology is established for this water body. Drinking water supply from Alder Brook is not an existing use and, based on the flow characteristics of Alder Brook, development of a drinking water supply from Alder Brook is not considered a feasible potential use.

5.0 The provision(s) of surface water quality standards (Env-Wq 1700) that are applicable to the designated uses affected by the proposed activities.

Of the five designated uses applicable to Alder Brook, where the Proposed Project is located, including Env-Wq 1702.17(a), (b), (d), (e), and (f), only Env-Wq 1702-17(d) Aquatic Life Integrity has any reasonable potential to be affected by the proposed activities (see "Designated Uses" section above). No Project effects to designated uses are expected in any other drainage area outside the Alder Brook watershed (e.g. driveway areas along Rte. 116). The aquatic life integrity designated use is supported by many aspects of water quality identified in Env-Wq 1700 beyond just the core indicators listed in the CALM (NHDES, 2022) of macroinvertebrates, fish assemblage, dissolved oxygen, and pH. Because of the scope of the Project, the Project Team and NHDES determined that baseline environmental monitoring in the potentially affected waterbodies was prudent and necessary for evaluating the provisions of Env-Wq 1700 that may potentially be affected by the proposed activity. A Sampling and Analysis Plan (SAP, Attachment 1) was developed, and subsequent water quality monitoring was completed, consistent with the SAP, in 2022 and 2023 to determine baseline environmental conditions and identify the most vulnerable aquatic resources potentially affected by the proposed activity. The SAP and associated monitoring included a comprehensive suite of environmental parameters that consisted of:

- Stream habitat assessments
- Fish community assessments
- Macroinvertebrate assessments
- Continuous stream flow monitoring

- Continuous water quality data collection (dissolved oxygen, pH, temperature)
- Discrete measurements of water quality (dissolved oxygen, pH, temperature, turbidity, conductivity)
- Collection of water quality samples for laboratory analysis (nutrients, chlorophyll-a, dissolved organic carbon, chloride, metals, hardness, color, & PFAS)

The results of the baseline monitoring are presented in the Baseline Monitoring Report attached as Attachment 2 to this application. Based on the monitoring results and discussions with NHDES and the New Hampshire Fish and Game Department (NHFG), it was determined that the most vulnerable water resource that could potentially be affected by Project activities is the coldwater fish community, and in particular Eastern Brook Trout, native to Alder Brook. Discharges associated with the proposed activity are primarily stormwater discharges to groundwater through infiltration BMPs, which may result in flow alteration and water temperature changes in the receiving waters as well as discharge of some pollutants common to stormwater (primarily suspended solids and nutrients, see Section 6.0). Flow alteration and temperature changes were identified as having the greatest potential impact on the designated use aquatic life integrity, particularly during summer when the native coldwater species are most vulnerable to environmental changes. An evaluation of the provisions of Env-Wq 1700 that are applicable to the designated use aquatic life integrity and may potentially be affected by the proposed activity follows. Note: this evaluation of the provisions of Env-Wq 1700 is not exhaustive; rather, it was determined as part of the SAP development that other parameters (e.g. toxics, oil and grease, floatables, etc.) are not expected to be affected by the proposed activity or are not critical to supporting the designated uses.

5.1 Env-Wq 1703.01(d) Water Use Classifications; Designated Uses – Surface Water Quantity

Env-Wq1703.01(d) describes the flow requirements under Env-Wq 1700 and states:

"Unless high or low flows are caused by naturally-occurring conditions, surface water quantity shall be maintained at levels that protect existing uses and designated uses."

In the Alder Brook and Hatch Brook watersheds, aquatic life integrity is the designated use with the greatest potential to be affected by the proposed activity. The 2020/2022 CALM document (NHDES, 2022) includes flow as one of the core indicators for determining support of the aquatic life integrity designated use. To attain full support of the designated use, the CALM requires that:

"There is no documented evidence that non-naturally occurring flows were less than the Aquatic Base Flow (ABF), or less than minimum flow requirements established by NHDES through the Section 401 Water Quality Certification Program over the past two years."

The Aquatic Base Flow has not been established in Alder Brook and no minimum flow requirements have been established by NHDES through the Section 401 Water Quality Certification Program for this waterbody; therefore, it is not possible to evaluate this CALM core indicator criteria based on existing publicly available data. To address the requirements of Env-Wq 1703.01(d) more generally, it is necessary to establish current flow conditions and ensure the proposed activity does not affect those flow conditions in a way that would affect the existing and designated uses. Current flow conditions have been established throughout the Project watershed through wetland delineation, stream characterization, aquatic habitat assessment, and flow monitoring. The water resources most sensitive to

flow changes are the perennial reaches of Alder Brook, and its tributaries, particularly during summer low flow conditions. The perennial reaches in the lower watershed are also the areas supporting wild brook trout communities and have been identified as the aquatic resource most sensitive to flow alterations and temperature changes.

The Proposed Project will potentially affect flows in Alder Brook and its tributaries near the Project through several means:

- Creation of impervious surface and stormwater runoff associated with the landfill cap and bordering disturbed areas, access roads, and infrastructure areas;
- Changing the evapotranspiration flux and groundwater conditions where forested areas are converted to impervious surface and clearings;
- Altering topographic divides and tributary subwatersheds through terrain alterations such as cutting and filling the hillslope, creation of the landfill mound, and stormwater swales and other conveyances;
- Isolating and removing a fraction of the watershed contributing area where precipitation and runoff incidentally enter the leachate collection system (for offsite treatment and discharge);
- Construction of a groundwater withdrawal well for water use and dust suppression spraying;
- Filling 10.4 acres (451,569 square feet) of wetlands in the Alder Brook/Hatch Brook catchment, including 0.2 acres (10,363 square feet) of after-the-fact (ATF) impacts, and 1,873 linear feet of streams, including 932 linear of intermittent stream and 230 linear feet of ATF stream impacts in the upper watershed.

The net effects of these changes to the watershed are expected to lessen with distance from the Project area due to the proportional increase in watershed contributing area and at some point in the lower watershed flow alteration effects are expected to be de minimis. However, to address the potential flow effects to the upper watershed and the small tributary streams, several strategies will be employed to minimize any changes in volume or timing of flows in each tributary reach potentially affected by the Project, including:

- **Flow balancing in subwatersheds** - the stormwater management system has been designed to maintain to the maximum extent practicable the contributing area in each subwatershed. Stormwater discharge points (infiltration BMPs) have been located in each subwatershed to ensure flows are maintained in each tributary;
- **Infiltration BMPs** – Rather than conventional stormwater management with direct discharge to surface waters, the Proposed Project will take advantage of the latest stormwater BMP guidance to infiltrate stormwater to groundwater. Infiltration rates will not exceed the NHDES Alteration of Terrain (AoT) requirements for stormwater infiltration to minimize and extend peak flow conditions in receiving surface waters. Stormwater infiltration also helps to maintain groundwater levels in the Project area to reduce stream "flashiness" and maintain baseflow conditions. Stormwater infiltration will also ensure heat loading and pollutant loading is kept to a minimum (see pollutant loading section below).
- **Stream crossings** – The Project access road includes a stream crossing that will be upgraded to meet the current stream crossing rules and a second stream crossing that will allow a small perennial stream to be restored to its original state (the current stream course is diverted by a roadside ditch to a downgradient crossing. The stream crossing upgrades will improve the

connectivity in the watershed separated by Douglas Drive, benefiting the aquatic environment and wildlife passage while restoring the upper watershed stream morphology for two tributary streams.

- **Maintaining the current watershed water budget** – most of the flow alterations that could result from the Project will affect flow timing but changes to annual flow volumes are not expected to be significant. The only water that will be removed from the watershed will be any precipitation or runoff incidentally entering the leachate collection system (for offsite treatment and discharge). The contributing area for the leachate collection system will be equivalent to any active waste cells being constructed and will always be much less than the full landfill footprint. As mentioned previously, the conversion of hillslope forest to impervious surface will increase the runoff fraction in those areas (by reducing evapotranspiration losses) which, on an annual basis, is expected to offset all of the watershed losses due to the leachate collection system.

Because of the proposed stormwater management system design, it is reasonable to expect that pre-development and post-development flows will be similar throughout the Alder Brook watershed, with timing and flow volumes that are supportive of the potentially affected designated uses. The waterbodies with the highest potential to be affected will be those located within the Project footprint, while flow effects are expected to lessen downstream as the proportional effects scale down with increasing watershed area. It is important to note that no viable Eastern Brook Trout habitat was identified in the upper watershed tributaries (i.e. the areas with the highest potential for flow effects from the Project); rather Eastern Brook Trout habitat is located on the lower tributary areas and on the main stem of Alder Brook approximately 1,500-3,000 linear feet away from the Project development area. Other fish species documented in the upper watershed perennial tributaries are expected to be unaffected by the proposed activity due to the distribution of stormwater infiltration structures throughout the Project area, including upgradient of the headwater reaches, combined with the presence of wetland complexes and beaver ponds that will be preserved to provide supporting habitat and water storage.

5.2 Env-Wq 1703.07 Dissolved Oxygen

Alder Brook is a Class B water and the water quality standards for dissolved oxygen are identified in Env-Wq 1703.07(b):

"Except as naturally occurs and subject to (c) and (e), below, class B waters shall have a dissolved oxygen content of:

1) *At least 75% of saturation, as specified in RSA 485-A:8, II, based on a daily average; and*
2) *An instantaneous minimum dissolved oxygen concentration of at least 5 mg/l."*

The lower reaches of Alder Brook and Hatch Brook also support coldwater fish species that have additional dissolved oxygen requirements under Env-I1703.07(c) which states:

"In areas identified by the New Hampshire fish and game department (NHF&G) as cold water fish spawning areas of species whose early life stages are buried in the gravel on the bed of the surface water, the 7 day mean dissolved oxygen concentration shall be at least 9.5 mg/l and the instantaneous minimum dissolved oxygen concentration shall be at least 8 mg/l for the period from October 1 of one

year to May 14 of the next year, provided that the time period shall be extended to June 30 for a specific discharge to a specific waterbody if modeling done in consultation with the NHF&G determines the extended period is necessary to protect spring spawners or late hatches of fall spawners, or both."

Baseline environmental monitoring completed in 2022 and 2023 in accordance with the SAP included continuous and discrete measurements of dissolved oxygen throughout the Alder Brook and Hatch Brook watersheds. Dissolved oxygen levels were variable with time and between monitoring stations. Some of the monitoring stations did include low dissolved oxygen readings that exceeded the applicable standards, particularly in areas with periodic low-flow or no-flow conditions and in areas where water quality instruments were affected by beaver activity and deposition of sediments/flocculants. In the reaches with documented viable wild brook trout habitat, dissolved oxygen levels generally met the applicable criteria. It is unlikely the Proposed Project will have significant effects on dissolved oxygen in receiving waters as the discharge is primarily stormwater discharged to groundwater through infiltration BMPs. Impairments to dissolved oxygen are generally associated with flow alterations that cause damming/thermal-chemical stratification, as well as nutrient pollution, transport/decomposition of organic matter, and sediment chemical/biological processes (Friedl, 2002, Matlock et al., 2003). The proposed discharge will be primarily stormwater runoff from the landfill cap, associated infrastructure areas, and roadways, managed via infiltration BMPs, and there are no proposed activities that are expected to cause damming or water stratification, nutrient enrichment, excessive growth/transport of organic matter, or mobilization/transport of sediments.

A pollutant loading analysis was completed and is summarized in Section 6.0, below and is attached as Attachment 3. The pollutant loading analysis demonstrates a net decrease in total suspended solids and total nitrogen and a 1 lb./year net increase in total phosphorus, which is minor and not expected to have any deleterious effects in the watershed. Additionally, the Project stormwater design and infrastructure siting were developed with the objective of maintaining pre-development flows to the extent practicable and this will further support dissolved oxygen conditions and recovery from any dissolved oxygen impacts (i.e. through reaeration via turbulent flow in the stream channel). Any Project effects on dissolved oxygen in receiving surface waters are expected to be minimal and consistent with the requirements of Env-Wq 1703.07.

5.3 Env-Wq 1703.13(b) Temperature

Alder Brook is a Class B water and the water quality standards for temperature are identified in Env-Wq 1703.13(b):

"Temperature in class B waters shall be as specified in RSA 485-A:8, II and VIII."

RSA 485-A:8 II states:

"Class B waters shall be of the second highest quality and shall have no objectionable physical characteristics…

…Any stream temperature increase associated with the discharge of treated sewage, waste or cooling water, water diversions, or releases shall not be such as to appreciably interfere with the uses assigned to this class…"

RSA 485-A:8 VIII states:

"In prescribing minimum treatment provisions for thermal wastes discharged to interstate waters, the department shall adhere to the water quality requirements and recommendations of the New Hampshire fish and game department, the New England Interstate Water Pollution Control Commission, or the United States Environmental Protection Agency, whichever requirements and recommendations provide the most effective level of thermal pollution control."

Therefore, to evaluate Env-Wq 1703.13(b), temperature effects on the designated use aquatic life integrity must be determined, and any thermal waste discharge must be evaluated based on NHFG water quality criteria for coldwater species (as these species are most vulnerable to thermal waste and were identified by NHFG as the resource most likely to be affected by the Project). Wild Eastern Brook Trout (*Salvelinus fontinalis*) were documented in Alder Brook and are the coldwater species that has been highlighted by NHFG, NHDES, and the Project Team as most vulnerable to environmental changes in Alder Brook, particularly due to temperature and flow changes. Therefore, the supporting studies and impacts analysis for the proposed activity have focused on evaluating Eastern Brook Trout habitat and mitigating any potential effects to their habitat and supporting environment. Other temperature effects to aquatic life in the Alder Brook watershed are considered lesser than effects on Eastern Brook Trout (i.e. other species are less likely to experience thermal stress than Eastern Brook Trout) and therefore protection of Eastern Brook Trout is expected to be protective of other species as well. Eastern Brook Trout generally prefer waters less than 68°F (20°C; Raleigh 1982, Power 1980, Langdon et al. 2006) and, while capable of temporarily tolerating temperatures up to 77°F (24°C), show signs of physiological stress and avoidance at temperatures from 71.6°F (22°C; Ficke et al. 2009, Raleigh 1982). NHFG (2016) has used temperatures to evaluate management options for Eastern Brook Trout in New Hampshire watersheds using temperature criteria that include:

- The length and duration of water temperature exceeding 69.8°F (21.0 °C), and
- July and/or August mean water temperature exceeding 67 °F (19.5 °C) as conditions where Young-of-the-year Brook Trout are not found.

The NHFG water temperature criteria for Eastern Brook Trout were used to evaluate baseline temperature conditions in Alder Brook, Hatch Brook, and their tributaries as well as any potential effects on water temperatures resulting from the Proposed Project. The Baseline Monitoring Report (Attachment 2) includes detailed information from two seasons of temperature monitoring in the Alder Brook and Hatch Brook watersheds. In the areas where Eastern Brook Trout have been documented, measured water temperatures during two seasons of monitoring have generally met the NHFG criteria. Tributary reaches to the main stems of Alder Brook and Hatch Brook experienced water temperatures that at times exceeded the NHFG criteria for Eastern Brook Trout; however, the aquatic habitat was generally unsuitable for Eastern Brook Trout in those reaches (insufficient summer flows, extensive shallow beaver pond/wetland complexes, lack of defined channel, etc.). The upper tributary monitoring locations are too small in watershed area to realistically support viable populations of Eastern Brook Trout and, consequently, the NHFG temperature criteria for Eastern Brook Trout should not be applicable to those reaches.

Water temperature impacts from the Proposed Project can potentially result from stormwater runoff from heated surfaces including the landfill cap, roadways, infrastructure areas, and stormwater conveyances. These thermal effects are expected to be mitigated through the proposed stormwater BMPs that include groundwater infiltration (i.e. versus direct runoff to surface waters through

conventional stormwater systems). Stormwater infiltration practices are recognized as being highly effective for managing thermal pollution from stormwater runoff (Gulliver et al., 2010, Long and Dymond, 2014). Infiltration practices mitigate thermal pollution through retention in the ground, losses to evapotranspiration, contact with cooler subsurface materials, dilution in groundwater, and by delaying and prolonging the stormwater discharge to surface water allowing for greater dilution in the receiving surface water (Long and Dymond, 2014). The discharge locations from the proposed stormwater system are also located a substantial distance from documented Eastern Brook Trout habitat in the main stem of Alder Brook (1,500 – 3,000 linear feet from limits of disturbance) and it is expected that any nearfield surface water temperature increases from the stormwater discharges to the upper watershed tributaries would be attenuated before reaching the main stem reaches where documented Eastern Brook Trout habitat is located.

In recognition of the potential for Project effects on stream temperatures, GSL is committed to limiting or mitigating surface water temperature impacts to the extent practicable. Multiple BMPs and stormwater management strategies are proposed for the site to reduce stormwater temperatures prior to discharge to groundwater in the Alder Brook watershed including:

- Deployment of white geomembrane in place of black geomembrane which generates cooler temperatures in direct sunlight.
- Conveyance of stormwater in buried pipes where practical instead of swales that are exposed to direct sunlight.
- Planting tree species native to the site wetlands on the pond bottoms on a maximum 50-foot center-to-center spacing to shade standing water in the ponds.
- Infiltrating stormwater to groundwater at the maximum rates allowed under AoT rules to limit the amount of time stormwater ponds are water-filled and potentially being heated prior to discharge.
- Maintaining stream riparian buffers where possible near the Project footprint to promote shading and stream cooling.

5.4 Env-Wq 1703.18 pH

Alder Brook is a Class B water and the water quality standards for pH are identified in Env-Wq 1703.18(b):

"As specified in RSA 485-A:8, II, the pH of class B waters shall be 6.5 to 8.0 unless due to natural causes."

Baseline environmental monitoring completed in 2022 and 2023 in accordance with the SAP included continuous and discrete measurements of pH throughout the Alder Brook and Hatch Brook watersheds. PH was variable with time and between monitoring stations and was generally within the 6.5 – 8.0 s.u. range that is the standard for Class B waters (6.5-8.0 s.u. has also been recognized as the optimal range for Eastern Brook Trout, see Raleigh et al., 1982). A few brief exceedances of the lower pH standard were documented; however, these exceedances were temporary and likely event-driven and in some cases may be an instrument reading error due to changing site conditions (e.g. beaver damming/sediment deposition on instruments). In addition, other surface water quality monitoring at

the site completed prior to and coincident with the baseline studies indicated exceedances of the lower pH standard; however, the low-conductance waters at the site are a known impediment to accurate spot measurements with field pH meters, particularly at low temperatures, and these results may have been affected by site conditions. The baseline monitoring completed in accordance with the SAP utilized field techniques to account for the effects of low conductance waters on pH readings and during that study there was no indication of pH impairments. Impairments due to low pH have been identified in some northern New Hampshire streams in the CALM reports and may indicate a regional condition. It is unlikely the Proposed Project will have significant effects on pH in receiving waters as the discharge is primarily stormwater from the landfill cap, associated infrastructure areas, and roadways discharged to groundwater through infiltration BMPs. Any Project effects on pH in receiving surface waters are expected to be minimal and consistent with the requirements of Env-Wq 1703.18.

5.5 Env-Wq 1705 Flow Standards

Flow standards for surface water discharges are identified in Env-Wq 1705. The Proposed Project has the potential to alter flows in the Alder Brook watershed through alteration of the landscape and stormwater discharges; therefore, the criteria of Env-Wq 1705 must be met. Env-Wq 1705.01 Assimilative Capacity states:

"(a) Subject to (b), below, the department shall hold not less than 10 percent of the assimilative capacity of each surface water in reserve to provide for future needs;

(b) For purposes of combined sewer overflows, the department shall determine compliance based on 99 percent of the assimilative capacity of the receiving surface water."

The assimilative capacity is determined by the flow and transient storage in a water body, the antecedent water quality conditions, and the applicable surface water quality standards for a pollutant. A pollutant loading analysis is summarized in Section 6.0 below. No significant pollutant loading is anticipated to result from the proposed activity as discharges will be primarily stormwater that will be managed using infiltration BMPs. While the Proposed Project will likely result in flow alterations, particularly in the upper watershed within the Project footprint and immediately downgradient, on an annual basis and in areas of critical coldwater species habitat, flows in the Alder Brook watershed are not expected to be altered significantly (an analysis of the water budget shows that decreased evapotranspiration after Project construction is expected to offset any consumptive water uses associated with the Project). Because there is no anticipated significant pollutant loading and no anticipated significant changes to annual watershed flow volumes, the proposed activity is unlikely to alter the assimilative capacity of the receiving waters, and therefore the requirements of Env-Wq 1705.01 are expected to be met.

5.6 Env-Wq 1708 Antidegradation

Antidegradation requirements are specified in Env-Wq 1708 and include provisions for proposed activities to ensure water quality will be maintained to protect existing uses, to prevent a significant change in water quality, and to prevent any degradation of water quality without ensuring that all reasonable measures are taken to protect water quality. Because the Project does not propose a significant discharge of pollutants (the primary discharge will be stormwater discharged to groundwater

via infiltration BMPs) or other activity that would significantly degrade water quality, the most applicable aspect of the antidegradation rules is Env-Wq 1708.01(b)(2) which states:

"The department shall not approve any proposed discharge or activity that might cause degradation or lower water quality, without such conditions as are necessary to ensure that:

a. *Water quality will be adequate to fully protect existing uses;*
b. *The highest statutory and regulatory requirements will be achieved for all new and existing point sources; and*
c. *All cost effective and reasonable best management practices for nonpoint source control will be implemented."*

The Proposed Project has been evaluated for the potential to alter flows and hydrology, discharge stormwater and associated pollutants, and change temperatures in receiving waters as has been presented elsewhere in this application. The most vulnerable existing use/aquatic resource has been identified as the coldwater fish community in the Alder Brook and Hatch Brook watersheds. The siting of the landfill, associated infrastructure, and other disturbances as well as the proposed stormwater management system (that will utilize structural BMPs with groundwater infiltration) are designed to have acceptably low impacts to water quality in the potentially affected water bodies. Any changes to surface water flows, temperature, or water chemistry will be primarily within the Proposed Project footprint or immediately downgradient in the headwater reaches of several tributaries to Alder Brook. These stream reaches are either intermittent or perennial (although perennial reaches were observed to be dry/hydraulically disconnected in drought conditions in 2022) and the existing uses are adapted to highly variable flows and associated dissolved oxygen/temperature variations. Project effects in these headwater reaches should result in water quality variations that fall within the existing range of conditions (i.e., that includes no-flow conditions as have been documented) and should not degrade existing uses. In the main stem of Alder Brook, which is separated from the Project limits of disturbance by at least 1,700 linear feet, and where there is documented Eastern Brook Trout habitat, little to no change in annual water flow or water quality is expected. Therefore, the existing use in Alder Brook as a coldwater species habitat should be protected and by proxy other less sensitive habitats should also be protected. The stormwater discharges will be compliant with the highest statutory and regulatory requirements (i.e., compliant with AoT rules for stormwater management). Non-point sources areas (i.e., Project areas not located within stormwater management areas) will utilize BMPs to the maximum extent practicable. Therefore, the provisions of Env-Wq 1708.01(b)(2) are expected to be met for the proposed activity.

6.0 Pollutant loading analysis

A pollutant loading analysis to show the difference between predevelopment and post-development pollutant loads for a typical year.

A pollutant loading analysis was completed for the Project using the SIMPLE method spreadsheet model developed by NHDES (form: NHDES-W-07-055). The Project was evaluated for each of 5 primary subwatersheds in which Project developments are proposed. Land cover types were determined from existing site conditions and proposed development features. The Project includes 585 acres of total drainage area within the proposed stormwater management area, currently 2.31% of which is

impervious (13.5 acres) proposed to increase to 4.52% impervious area (26.45 acres). Stormwater from the site is currently managed using conventional drainage and the proposed Project includes the use of infiltration BMPs to manage stormwater prior to discharge. The SIMPLE model evaluates net increase/decrease of three pollutants of concern: total suspended solids (TSS), total phosphorus (TP), and total nitrogen (TN). Based on analysis with the SIMPLE model, the Proposed Project will have a net decrease from the five combined subwatershed areas of: -3,876 lbs. of TSS and -11 lbs. of TN. There will be an estimated net increase of 1 lb. of total phosphorus. While the Project development is expected to result in a 1 lb./year net increase in total phosphorus, this is expected to be essentially a de minimis condition that will not have a measurable effect on the environment. The net change in predevelopment and post-development pollutant loads is summarized in the table below and is presented in more detail in Attachment 3 - Pollutant Loading Analysis.

Table 6-1: Pollutant Loading Analysis Summary

Subcatchment	Post-development Area (acres)	TSS net change (Lb/year)	TP net change (Lb/year)	TN net change (Lb/year)
A	176.53	-383.7	0.3	-4.0
B	81.74	-1,084.5	-1.2	-23.7
C	270.74	-2,018.0	0.9	13.7
D	27.66	-107.3	0.8	6.9
E	28.53	-282.6	0.2	-3.4
Total	585.2	-3,876.1	1.0	-10.5

7.0 Other project effects on water quality

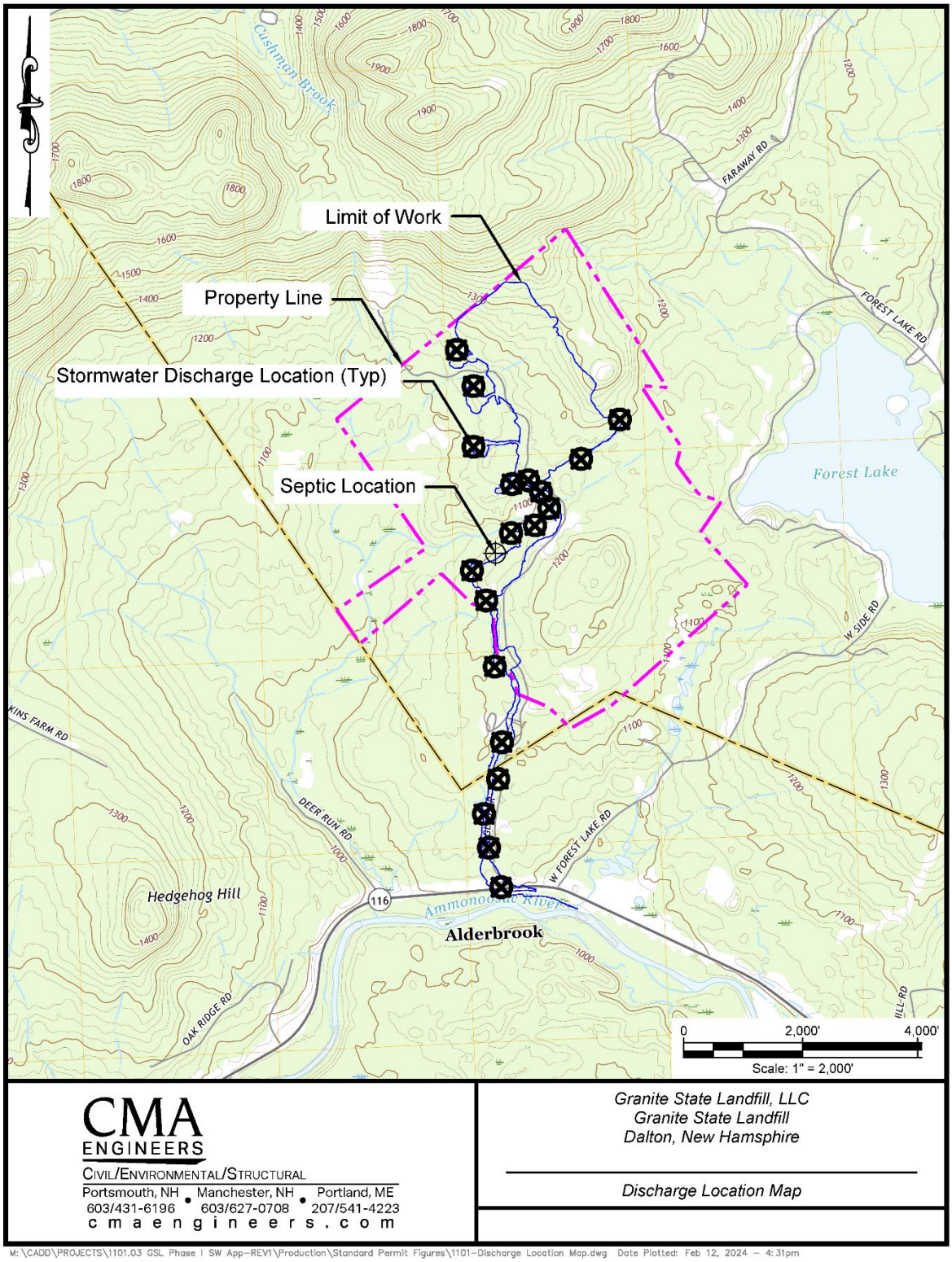
A description of any other aspect associated with construction and operation of the activity that would affect the chemical composition, temperature, flow, or physical aquatic habitat of the surface water.

Additional heat loading to the environment may be associated, at least seasonally, with the Proposed Project due to the land clearing, development of impervious surfaces, and construction/operation of the landfill waste mass - the latter of which experiences heat generation as a result of waste decomposition. Heated landfill leachate will be collected in the leachate collection system and transported offsite for treatment and discharge at a POTW. The landfill Project could also result in temperature effects to groundwater beneath the landfill; however, the groundwater flux beneath the landfill is expected to be a minor component of the total groundwater contributing to streamflow in the Alder Brook watershed and potential increases in groundwater temperature are not expected to result in measurable temperature impacts to surface waters in Alder Brook. The location of the landfill development area away from the main stem of Alder Brook and the stormwater management strategies discussed elsewhere in this application have been designed to minimize and mitigate potential thermal effects to the environment and allow for attenuation of thermal impacts prior to reaching any sensitive resource areas.

The 401 WQC is not intended to evaluate potential incidental releases from a Project; groundwater and surface water monitoring would be conducted under a NHDES Groundwater Release Detection Permit in accordance with the Env-Or 700 rules.

8.0 USGS Quadrangle Map

An original or color copy/reproduction of a United States Geological Survey Quadrangle Map that clearly shows the location of the activity and all potential discharge points.



9.0 Federal permit application

A copy of the final complete federal permit application or federal license application, including the federal permit, license, or project number.

The USACE Section 404 individual permit application is attached as Attachment 4.

10.0 NHDES Wetlands Permit

A copy of the NHDES wetlands permit (RSA 482-A:3), if necessary.

A NHDES wetlands permit application was filed in December 2023. At the time of submittal, a wetlands permit has not yet been issued for the Project.

11.0 NHDES Alteration of Terrain Permit

A copy of the NHDES alteration of terrain permit (RSA 485-A:17), if necessary.

A NHDES alteration of terrain permit application was filed in November 2023. At the time of submittal, an alteration of terrain permit has not yet been issued for the Project.

12.0 Project plans

A plan showing the proposed activities to scale including:

- ***The location(s) and boundaries of the activities.***
- ***The location(s), dimension(s), and type(s) of any existing and/or proposed structures.***
- ***The location(s), name(s), identification number(s), and extent of all potentially affected surface water bodies, including wetlands.***

Project plans are included in Attachment 5.

13.0 Rivers Management and Protection Act documentation

If the project is located within ¼ (one quarter) mile of a designated river, as defined under RSA 483 (the Rivers Management and Protection Act), provide documentation showing that the Local River Management Advisory Committee (LAC) has been provided with a copy of this complete application.

Portions of the Proposed Project are within ¼-mile of the Ammonoosuc River and therefore the Ammonoosuc River Local Advisory Committee will be provided a copy of this complete application.

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Attachments
(Bound Separately)