SECTION 7.0

Alternatives Analysis

Section 7.1

Vermont & Maine Solid Waste Regulatory Considerations

Title 38: WATERS AND NAVIGATION
Chapter 13: WASTE MANAGEMENT
Subchapter 1-A: SOLID WASTE
Article 3: SOLID WASTE FACILITY SITING

§1310-X. Future commercial waste disposal facilities

1. New facilities. Notwithstanding Title 1, section 302, the department may not approve an application for a new commercial solid waste disposal or biomedical waste disposal or treatment facility after September 30, 1989, including any applications pending before the department on or after September 30, 1989.

[PL 1993, c. 355, §52 (AMD).]

2. Relicense or transfer of license. The department may relicense or approve a transfer of license for a commercial solid waste disposal or biomedical waste disposal or treatment facility after September 30, 1989, if the facility had been previously licensed by the department as a commercial solid waste disposal or biomedical waste disposal or treatment facility prior to October 6, 1989, and all other provisions of law have been satisfied.

[PL 1995, c. 465, Pt. A, §20 (AMD); PL 1995, c. 465, Pt. C, §2 (AFF).]

3. Expansion of facilities. The department may license an expansion of a commercial solid waste disposal or biomedical waste disposal or treatment facility after September 30, 1989 if:

A. The department has previously licensed the facility prior to October 6, 1989; [PL 1991, c. 297, §1 (RPR).]

B. The department determines that the proposed expansion is contiguous with the existing facility and:

(1) Is located on property owned on December 31, 1989 by the licensee or by a corporation or other business entity under common ownership or control with the licensee; or

(2) For a commercial solid waste disposal facility that is a commercial landfill facility that is not under order or agreement to close, is located on property owned by the licensee; and [PL 2011, c. 566, §1 (AMD).]

C. For a commercial solid waste disposal facility the commissioner or the department determines as provided in section 1310-N, subsection 3-A that the facility provides a substantial public benefit. [PL 1995, c. 465, Pt. A, §21 (AMD); PL 1995, c. 465, Pt. C, §2 (AFF).]

The department may not process or act upon any application or license an expansion of a commercial landfill facility pursuant to this subsection until the applicant demonstrates to the department that it is in full compliance with the host community agreement pursuant to section 1310-N, subsection 9, if any, on the existing facility and until a host community agreement amendment is executed to account for the proposed expansion.

An expanded facility may not receive a property tax exemption on real or personal property.

[PL 2011, c. 566, §1 (AMD).]

4. Exemption. The following are exempt from the provisions of this section:

A. A commercial biomedical waste disposal or treatment facility, if at least 51% of the facility is owned by a licensed hospital or hospitals as defined in Title 22, section 328, subsection 14 or a group of hospitals that are licensed under Title 22 acting through a statewide association of Maine hospitals or a wholly owned affiliate of the association; and [PL 2003, c. 551, §17 (AMD).]

B. Expansion of a commercial solid waste disposal facility, if the expansion will not result in an increase in the facility's disposal capacity and the expansion will not be used for solid waste disposal. [PL 1995, c. 588, §1 (NEW).]

[PL 2003, c. 551, §17 (AMD).]

SECTION HISTORY
PL 1989, c. 585, §E34 (NEW). PL 1989, c. 869, §A9 (RPR). PL 1989, c. 878, §H8 (RPR). PL 1991, c. 297, §1 (RPR). PL 1991, c. 382 (AMD). PL 1993, c. 355, §52 (AMD). PL 1995, c. 68, §1 (AMD). PL 1995, c. 465, §§A20,21 (AMD). PL 1995, c. 465, §C2 (AFF). PL 1995, c. 588, §1 (AMD). PL 2003, c. 551, §17 (AMD). PL 2011, c. 566, §1 (AMD).

Difficulties Siting a Landfill in Vermont ~ 2020 and beyond

The Vermont Agency of Natural Resources Waste Management & Prevention Division has adopted Solid Waste Management Rules (eff. March 15, 2012) which regulate all waste management and recycling activities in the State of Vermont.

The Rules were adopted under authority of 10 V.S.A. Chapter 159 ("Waste Management") in order to establish procedures and standards to protect human health and the environment through "safe, proper and sustainable management of solid waste in Vermont." The Rules are administered by the Secretary of the Vermont Agency of Natural Resources (Secretary).

Vermont law limits the amount of waste coming in from neighboring states like New Hampshire by requiring that all the municipal solid waste (primarily residential waste) deposited in a Vermont landfill must have originated from a municipality with a Solid Waste Implementation Plan (SWIP) approved by the Secretary. See Rules, Subchapter 4 - Planning. Under 10 V.S.A. § 6604, a municipality's SWIP must be in conformance with the terms and provisions of the Vermont (state-wide) Materials Management Plan (MMP). Once a SWIP is approved, the municipality must file an annual certification report which demonstrates continued compliance with the MMP. The goals and objectives of the MMP include the reduction of waste generated and deposited in Vermont, the reduction of greenhouse gasses and promotion of energy conservation. A municipality's SWIP must demonstrate that it meets such goals and objectives and must include specific performance measures which relate to the removal of household hazardous waste, collection of recyclable materials, collection/diversion of food residuals, as well as development of education and outreach programs. Given the requirements of the MMP, it is unclear whether an out-of-state municipality would be able to successfully apply for and obtain a SWIP.

While the Secretary does have the authority to allow certain out-of-state "special wastes" such as contaminated soils, sludge and uniform building materials, to be transported into Vermont for disposal, this material typically constitutes 25% or less of the overall waste stream managed at Vermont's only operating landfill in Coventry, Vermont. To date, no municipality located outside of the State of Vermont has submitted a SWIP for approval from the Secretary and, therefore, no out-of-state municipal solid waste is disposed of within Vermont.

There is a single operating landfill in Vermont that manages approximately 75% of the waste that is generated within the State. While there is a regional need for solid waste disposal capacity, siting and developing a second landfill in Vermont would simply not be feasible at this time due to the complex and complicated SWIP requirements and the related uncertainty as to whether out-of-state municipalities could meet the applicable standards in order to be approved to deposit municipal solid waste in Vermont.

For these reasons, siting a landfill in Vermont for the municipalities that Casella Waste System, Inc. services in New Hampshire was not considered.

Section 7.2

Avoidance & Minimization Written Narrative

AVOIDANCE AND MINIMIZATION WRITTEN NARRATIVE

Water Division/Land Resources Management
Wetlands Bureau

Check the Status of your Application

RSA/ Rule: RSA 482-A/ Env-Wt 311.04(j); Env-Wt 311.07; Env-Wt 313.01(a)(1)b; Env-Wt 313.01(c)

APPLICANT'S NAME: Granite State Landfill, LLC **TOWN NAME:** Dalton/Bethlehem

An applicant for a standard permit shall submit with the permit application a written narrative that explains how all impacts to functions and values of all jurisdictional areas have been avoided and minimized to the maximum extent practicable. This attachment can be used to guide the narrative (attach additional pages if needed). Alternatively, the applicant may attach a completed Avoidance and Minimization Checklist (NHDES-W-06-050) to the permit application.

SECTION 1 - WATER ACCESS STRUCTURES (Env-Wt 311.07(b)(1))

Is the primary purpose of the proposed project to construct a water access structure?

NO

SECTION 2 - BUILDABLE LOT (Env-Wt 311.07(b)(1))

Does the proposed project require access through wetlands to reach a buildable lot or portion thereof?

YES

SECTION 3 - AVAILABLE PROPERTY (Env-Wt 311.07(b)(2))*

For any project that proposes permanent impacts of more than one acre, or that proposes permanent impacts to a PRA, or both, are any other properties reasonably available to the applicant, whether already owned or controlled by the applicant or not, that could be used to achieve the project's purpose without altering the functions and values of any jurisdictional area, in particular wetlands, streams, and PRAs?

**Except as provided in any project-specific criteria and except for NH Department of Transportation projects that qualify for a categorical exclusion under the National Environmental Policy Act.*

The applicant, Granite State Landfill (GSL), conducted a state-wide search for suitable properties to site the facility. With the exception of public lands, host communites and solid waste districts with current solid waste landfills, and two communities (Bethlehem and Rochester) where two privately-owned landfills exist, potential properties where screened. This first tier of the screening process centered on idenifying sites that were sufficient in size, under one ownership, that had the potential to meet NHDES solid waste siting rules.

Other practical considerations included: landfill footprint setbacks from wetlands and other natural and man-made land use features; location of pubic water supplies in the project vicinity; site topography; property location within a single municipality; and significant natural and cultural resources such as rare, threatened, or endangered species, critical wildlife habitat; and archeological/historically sensitive sites.

Based on the state-wide search, 4 candidate sites were identified. They are the Dalton site, Carroll West and Carroll East sites, and the Shelburne site. These alternatives were further assessed through a Screening Level Design process. A Wetland Permit Level Design Review and a comparative evaluation of the sites determined the Dalton site as the preferred alternative location. See Siting, Evaluation and Minimization Report.

SECTION 4 - ALTERNATIVES (Env-Wt 311.07(b)(3))

Could alternative designs or techniques, such as different layouts, different construction sequencing, or alternative technologies be used to avoid impacts to jurisdictional areas or their functions and values as described in the Wetlands Best Management Practice Techniques For Avoidance and Minimization?

See attached text.

SECTION 5 - CONFORMANCE WITH Env-Wt 311.10(c) (Env-Wt 311.07(b)(4))**

How does the project conform to Env-Wt 311.10(c)?

***Except for projects solely limited to construction or modification of non-tidal shoreline structures only need to complete relevant sections of Attachment A.*

Pursuant to Env-Wt 311.10(c), a functional assessment was performed by Certified Wetland Scientist, Barry H. Keith, in accordance with the US Army Corps of Engineers "Highway Methodology Workbook." As required (EnvWt311.10 (c) (1), the results of the assessment were used to select the location of the proposed project having the least impact to wetlands functions. The site's wetland resources are headwater wetlands associated with tributaries to Alder Brook, which drains into the Amonnosuc River, a major regional river. In general, the man-made/altered wetlands associated with Douglas Drive, small isolated wetlands, and wetlands within the upper reaches of the watershed, not connected to other wetlands by intermittent or perennial streams exhibited more limited wetland functions than the larger, more diverse, wetland complex positioned along several perennial tributaries west of Douglas Drive.

Given the positioning of the wetlands with the least functions, the design (Env-Wt311.10(c)(2)) concepts (see Section 7.2 narrative) were refined (see Concept 5.3) to avoid those wetlands which ranked highest in wetland function while positioning the design (Env-Wt311.10(c)(3)) to minimize the wetland impact to those areas having the least impact to wetlands functions.

In accordance with Env-Wt311.10(c)(4), site minimization measures and construction management practices to protect aquatic resource functions include site grading and erosion control measures, stormwater management measures, surface and groundwater protection measures, and the use of a box culvert stream crossing and retaining walls to minimize roadway construction wetland impacts have been incorporated into the design in order to project aquatic resource functions.

SECTION 7.2 – ALTERNATIVES

Seven (7) alternative Landfill Concept Designs were assessed to avoid and minimize wetland impacts while achieving the project's purpose to develop a viable solid waste facility to meet the future needs of New Hampshire.

Concept 1, which has a landfill footprint of 238.16 acres, is a more rectangular shaped footprint which would maximize lanfill capacity. This design would directly impact approximately 39.60 acres of wetland including perennial streams. High value wetland functions would directly and indirectly be impacted.

Concept 2 reduces the landfill footprint to approximately 218.78 acres. The footprint configuration is more "horse shoe" like to avoid some of the higher functioning wetlands. The total direct wetland impact of this concept is 31.38 acres.Given the extent of wetland impacts, Concepts 3 and 4 were assessed to further avoid and minimize wetland impact.

Concept 3 (181.22 acres) is significantly narrower with a more pronounced "horse shoe" configuration in order to avoid impacts to the highest functioning wetlands associated with the headwater tributaries of Alder Brook. Approximately 18.44 acres of wetland would be impacted.

Concept 4 exhibits a somewhat smaller landfill footprint (173.67 acres) which was achieved by modifying the limits of the landfill, site grades, and stormwater management features in order to further minimize wetland impacts (16.09 acres) while avoiding the site's most sensitive wetlands. The permit design plans required supplemental impacts for Douglas Drive and Route 116 improvements and for stormwater management.

The objective of Concept 5 was to develop a single-phase project within the 3-phase Concept 4 footprint that minimizes environmental impacts. Our goal was to avoid wetland filling to the extent practicable in conjunction of wetland functions and values, avoid disturbing the highest value wetlands associated with Alder Brook and its tributaries located west and south of the borrow pit access road to provide more separation between the landfill and Alder Brook, along with consideration of other factors such as limiting filling of intermittent streams and vernal pools.

Three sub-concept alternatives (Concepts 5.1, 5.2, and 5.3) were developed for project consideration. Concept 5.3 was selected as the preferred alternative as it had the lowest, most favorable score as the least impacting alternative to the high value wetlands adjacent to Alder Brook. Concept 5.3 is an 18-year duration project that better aligns the required permit applications and durations and incorporates the following design changes to reduce potential impacts to Alder Brook.

- The lined landfill footprint is reduced to 70 acres from 135 acres.
- The distance from the lined landfill footprint to Alder Brook increases to 2,730 feet from 910 feet.
- The total project area of disturbance, including landfill, infrastructure, stormwater, and roadway improvements is reduced to 148 acres from 270 acres.
- The landfill operating duration is reduced to 18 years from 38 years.

Refer to Section 7.3 of the Application package for additional information regarding evaluation of alternatives.

AVOIDANCE AND MINIMIZATION CHECKLIST

Water Division/Land Resources Management
Wetlands Bureau

Check the Status of your Application

RSA/Rule: RSA 482-A/ Env-Wt 311.07(c)

This checklist can be used in lieu of the written narrative required by Env-Wt 311.07(a) to demonstrate compliance with requirements for Avoidance and Minimization (A/M), pursuant to RSA 482-A:1 and Env-Wt 311.07(c).

For the construction or modification of non-tidal shoreline structures over areas of surface waters without wetland vegetation, complete only Sections 1, 2, and 4 (or the applicable sections in Attachment A: Minor and Major Projects (NHDES-W-06-013).

The following definitions and abbreviations apply to this worksheet:

- "A/M BMPs" stands for Wetlands Best Management Practice Techniques for Avoidance and Minimization dated 2019, published by the New England Interstate Water Pollution Control Commission (Env-Wt 102.18).
- "Practicable" means available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes (Env-Wt 103.62).

SECTION 1 - CONTACT/LOCATION INFORMATION	
APPLICANT LAST NAME, FIRST NAME, M.I.: Granite State Landfill, LLC	
PROJECT STREET ADDRESS: Douglas Drive	PROJECT TOWN: Dalton/Bethlehem
TAX MAP/LOT NUMBER: 406/2.1 & 406/3 (Dalton) and 406/1 and 406/2 (Bethlehem)	

SECTION 2 - PRIMARY PURPOSE OF THE PROJECT		
Env-Wt 311.07(b)(1)	Indicate whether the primary purpose of the project is to construct a water-access structure or requires access through wetlands to reach a buildable lot or the buildable portion thereof.	☐ Yes ☒ No

If you answered "no" to this question, describe the purpose of the "non-access" project type you have proposed:

The applicant (Granite State Landfill, LLC) proposes to construct an approximately 70-acre lined municipal solid waste landfill on land in Dalton. The site is accessed via Douglas Drive at its intersection with Route 116 in Bethlehem. Refer to Sections 1 through 3 of the Wetlands Application package for a project description and additional information.

SECTION 3 - A/M PROJECT DESIGN TECHNIQUES Check the appropriate boxes below in order to demonstrate that these items have been considered in the planning of the project. Use N/A (not applicable) for each technique that is not applicable to your project.		
Env-Wt 311.07(b)(2)	For any project that proposes new permanent impacts of more than one acre or that proposes new permanent impacts to a Priority Resource Area (PRA), or both, whether any other properties reasonably available to the applicant, whether already owned or controlled by the applicant or not, could be used to achieve the project's purpose without altering the functions and values of any jurisdictional area, in particular wetlands, streams, and PRAs.	☒ Check ☐ N/A
Env-Wt 311.07(b)(3)	Whether alternative designs or techniques, such as different layouts, construction sequencing, or alternative technologies could be used to avoid impacts to jurisdictional areas or their functions and values.	☒ Check ☐ N/A
Env-Wt 311.07(b)(4) Env-Wt 311.10(c)(1) Env-Wt 311.10(c)(2)	The results of the functional assessment required by Env-Wt 311.03(b)(10) were used to select the location and design for the proposed project that has the least impact to wetland functions.	☒ Check ☐ N/A
Env-Wt 311.07(b)(4) Env-Wt 311.10(c)(3)	Where impacts to wetland functions are unavoidable, the proposed impacts are limited to the wetlands with the least valuable functions on the site while avoiding and minimizing impacts to the wetlands with the highest and most valuable functions.	☒ Check ☐ N/A
Env-Wt 313.01(c)(1) Env-Wt 313.01(c)(2) Env-Wt 313.03(b)(1)	No practicable alternative would reduce adverse impact on the area and environments under the department's jurisdiction and the project will not cause random or unnecessary destruction of wetlands.	☒ Check ☐ N/A
Env-Wt 313.01(c)(3)	The project would not cause or contribute to the significant degradation of waters of the state or the loss of any PRAs.	☒ Check ☐ N/A
Env-Wt 313.03(b)(3) Env-Wt 904.07(c)(8)	The project maintains hydrologic connectivity between adjacent wetlands or stream systems.	☒ Check ☐ N/A
Env-Wt 311.10 A/M BMPs	Buildings and/or access are positioned away from high function wetlands or surface waters to avoid impact.	☒ Check ☐ N/A
Env-Wt 311.10 A/M BMPs	The project clusters structures to avoid wetland impacts.	☒ Check ☐ N/A
Env-Wt 311.10 A/M BMPs	The placement of roads and utility corridors avoids wetlands and their associated streams.	☒ Check ☐ N/A
A/M BMPs	The width of access roads or driveways is reduced to avoid and minimize impacts. Pullouts are incorporated in the design as needed.	☒ Check ☐ N/A
A/M BMPs	The project proposes bridges or spans instead of roads/driveways/trails with culverts.	☒ Check ☐ N/A

A/M BMPs	The project is designed to minimize the number and size of crossings, and crossings cross wetlands and/or streams at the narrowest point.	☒ Check ☐ N/A
Env-Wt 500 Env-Wt 600 Env-Wt 900	Wetland and stream crossings include features that accommodate aquatic organism and wildlife passage.	☒ Check ☐ N/A
Env-Wt 900	Stream crossings are sized to address hydraulic capacity and geomorphic compatibility.	☒ Check ☐ N/A
A/M BMPs	Disturbed areas are used for crossings wherever practicable, including existing roadways, paths, or trails upgraded with new culverts or bridges.	☒ Check ☐ N/A
SECTION 4 - NON-TIDAL SHORELINE STRUCTURES		
Env-Wt 313.03(c)(1)	The non-tidal shoreline structure has been designed to use the minimum construction surface area over surfaces waters necessary to meet the stated purpose of the structure.	☐ Check ☒ N/A
Env-Wt 313.03(c)(2)	The type of construction proposed for the non-tidal shoreline structure is the least intrusive upon the public trust that will ensure safe navigation and docking on the frontage.	☐ Check ☒ N/A
Env-Wt 313.03(c)(3)	The non-tidal shoreline structure has been designed to avoid and minimize impacts on the ability of abutting owners to use and enjoy their properties.	☐ Check ☒ N/A
Env-Wt 313.03(c)(4)	The non-tidal shoreline structure has been designed to avoid and minimize impacts to the public's right to navigation, passage, and use of the resource for commerce and recreation.	☐ Check ☒ N/A
Env-Wt 313.03(c)(5)	The non-tidal shoreline structure has been designed, located, and configured to avoid impacts to water quality, aquatic vegetation, and wildlife and finfish habitat.	☐ Check ☒ N/A
Env-Wt 313.03(c)(6)	The non-tidal shoreline structure has been designed to avoid and minimize the removal of vegetation, the number of access points through wetlands or over the bank, and activities that may have an adverse effect on shoreline stability.	☐ Check ☒ N/A

Section 7.3

Siting, Evaluation and Minimization Report

Granite State Landfill

Dalton, New Hampshire

Siting, Evaluation and Minimization Report

November 2023

Submitted to:

NHDES Water Division – Wetlands Bureau

29 Hazen Drive, P.O. Box 95

Concord, New Hampshire 03303-0095

Submitted by:

Granite State Landfill, LLC

1855 VT Route 100

Hyde Park, Vermont 05655

Prepared by:

CMA ENGINEERS

Civil and Environmental Engineers

35 Bow Street

Portsmouth, New Hampshire 03801

Siting, Evaluation and Minimization Report

Granite State Landfill

Dalton, New Hampshire

November 2023

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* Prepared by B.H. Keith Associates

**Prepared in conjunction with B.H. Keith Associates and Sanborn Head & Associates

CMA ENGINEERS

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FULL SIZE DRAWINGS (22X34) BOUND SEPARATELY

1.0 INTRODUCTION

This report supports the Standard Dredge and Fill Wetlands Permit Application to the New Hampshire Department of Environmental Services (NHDES) for the proposed Granite State Landfill, LLC (GSL) in Dalton, New Hampshire. The report details the New Hampshire and Massachusetts site search process and results, candidate site evaluation, and minimization of wetland filling and disturbance for the selected alternative. Permit-level design drawings for the project are included in the application submittal.

GSL is proposing the landfill be developed in a single phase, having two stages with each incorporating 3 smaller cells. The six individual cells are planned to be constructed in sequence approximately every 3 years. Full development of the landfill would provide +/- 18 years of capacity at a filling rate of approximately 600,000 cubic yards per year. GSL expects the Granite State Landfill will begin construction of the first phase within the next 3 or 4 years.

CMA Engineers, Inc. (CMA Engineers) and Sanborn, Head & Associates (SHA) conducted a regional site search initially including New Hampshire and the bordering states of Maine, Massachusetts, and Vermont. Regulatory considerations in the State of Maine and State of Vermont dictate that the site search area be restricted to the States of New Hampshire and Massachusetts. Title 38, Chapter 13, Subchapter 1-A, Article 3 of the State of Maine regulations governing Solid Waste Facility Siting for future commercial waste disposal facilities states that the Department of Environmental Protection "may not approve an application for a new commercial solid waste disposal or biomedical waste disposal or treatment facility after September 30, 1989, including any application pending before the Department on or after September 30, 1989."

The Vermont Agency of Natural Resources Waste Management and Prevention Division has adopted Solid Waste Management Rules (eff. March 15, 2012) which regulate all waste management and recycling activities in the State of Vermont. The Rules were adopted under authority of 10 V.S.A. Chapter 159 ("Waste Management") to establish procedures and standards to protect human health and the environment through "safe, proper and sustainable management of solid waste in Vermont." Vermont law limits the amount of waste coming in from neighboring states like New Hampshire. For these reasons, siting a landfill in Maine or Vermont for municipalities that NCES services in New Hampshire was not considered.

CMA Engineers conducted the siting study for New Hampshire and SHA conducted the siting study for Massachusetts. The SHA study shared the key site characteristics described in Section 3.2 and siting criteria established by the State of Massachusetts for solid waste landfills. The SHA study found no viable landfill candidate sites and is provided in Appendix A to this report.

1.1 Understood Project Permitting Schedule

- DES Wetlands Standard Permit application is filed in November 2023. Decision December 2024.
- USACOE 404 Wetland Permit application is filed in November 2023. Decision December 2024.
- DES Alteration of Terrain (AoT) Permit application is filed in November 2023. Decision December 2024.

- DES-ARD Title V Permit application is filed in June 2023.
- DES 401 Water Quality Certification application filed in February 2024. Decision February 2025.
- DES Solid Waste Standard Permit application filed on October 31, 2023. Decision December 2024.
- DES Shoreland Permit application filed in December 2023.
- Groundwater Release Detection Permit Application filed in June 2024.
- DOT Driveway Access Permit submitted in June 2022. Decision end of 2023.

2.0 REGULATORY AND PERMITTING BACKGROUND

Solid Waste rules were changed in the 1980s to require high density polyethylene (HDPE) double-liner containment systems for all new or expanded landfills. Subsequent federal regulations (1991 RCRA Subtitle D design guidance) required closure of essentially all unlined landfills not in compliance with these new liner design requirements. Prior to these new rules most landfills in the state were smaller and unlined and served a local community. As the unlined municipal landfills were closed, new lined landfills were permitted and then sequentially expanded to accept waste from a larger service area including the municipal waste previously disposed in local municipal landfills.

Currently there are six operating lined landfills in New Hampshire:

- The North Country Environmental Services (NCES) Landfill in Bethlehem
- Waste Management Inc. (WMI) Turnkey Landfill in Rochester
- The Mt. Carberry Landfill (Androscoggin Valley Regional Refuse Disposal District - AVRRDD) landfill in Success
- The Lower Mt. Washington Valley Solid Waste District (LMWVSWD) in Conway
- The City of Nashua Landfill
- The City of Lebanon Landfill

These six landfills have been operating continuously since the 1980s. Five of the six sites (LMWVSWD being the exception) had been operating unlined or soil lined landfills on their sites or adjacent parcels prior to permitting lined landfills. Two additional lined ash landfills in Newport and Franklin were permitted and built in the 1980s to manage waste-to-energy plant residue and have since closed.

The GSL Landfill, also referred herein as the "Dalton Site," would be the first landfill permitted in New Hampshire on a new site since 1989. GSL is pursuing a new landfill site to continue solid waste disposal services to its existing customers in New Hampshire and the region after the NCES Landfill is filled and ceases disposal operations in 2027. Granite State Landfill, LLC and NCES are subsidiaries of New England Waste Services, Inc., a unit of Casella Waste Systems, Inc. Expansion of the Bethlehem NCES Landfill had been the preferred project alternative as this site is an existing solid waste facility meeting regulatory and project criteria and expanding the site would have only small direct and indirect wetland impacts. Expansion of the site is not allowed by town zoning and the NCES facility is not now a viable expansion candidate.

3.0 STATE-WIDE SITE SEARCH

3.1 Limits of Search

CMA Engineers conducted a state-wide search in New Hampshire on behalf of GSL to locate a solid waste landfill site in New Hampshire. The entire state was evaluated except for the areas listed below. Figure 1 portrays the portions of the state evaluated and excluded from the site search. Excluded areas include:

- *Current publicly owned and operated solid waste landfill host communities and solid waste district municipal members*: These municipalities include 19 communities and unincorporated areas in Coos County belonging to the Androscoggin Valley Resource Recovery Disposal District (AVRRDD), three towns belonging to the Lower Mount Washington Valley Solid Waste District (LMWVSWD) in Conway, and the cities of Lebanon and Nashua who operate municipal landfills to serve their communities. These communities have invested significant tax dollars and effort to build and operate publicly owned landfills. In general, they view these landfills as a public resource and operate them to provide long-term disposal capacity to their member communities, and to have control of cost and the source and volume of the incoming waste. A commercial landfill sited in one of these communities would necessarily only accept waste from outside the host community and would largely negate the perceived value of the public landfill to the community residents. A proposal to site a commercial landfill in these communities would likely have limited local support and a low probability of a successful application.

- *Two additional communities hosting privately owned and operated landfills were excluded from the site search:*
  - The Town of Bethlehem has voted to prohibit expanding the town zone where landfills are permitted. The existing NCES landfill is now expanding to the limits of the landfill zone and future expansions at that site or elsewhere in Bethlehem are not allowed by town zoning.
  - The City of Rochester has a decades-long host community agreement with Waste Management, Inc. to operate the commercial Turnkey Landfill. It is highly unlikely the city would consider hosting a second commercial landfill given its on-going relationship with Waste Management.

- *National Forest Land*: The White Mountain National Forest is owned by the United States federal government and is operated by the National Forest Service through the Department of Agriculture. Operating a commercial solid waste landfill is not permitted on National Forest land. The White Mountain National Forest occupies over 750,000 acres in the north-central portion of the state.

- *Other Municipal, State or Federally Owned Public Land:* These lands include town forests, state parks and forests, and other federal land such as the United States Fish and Wildlife Service's Pondicherry National Wildlife Refuge in Whitefield.

- *Other Privately-owned Conservation Land:* Privately-owned land protected by in-fee acquisition or conservation easement held by Conservation Land Trusts, Non-Profit Conservation Organizations, colleges or universities, or other similar conservation interest groups.

3.2 Key Site Characteristics

Siting a landfill in New Hampshire is subject to NHDES solid waste, air resources, groundwater and surface water management, and New Hampshire and Federal wetland rules, municipal ordinances, and many other regulatory and practical considerations. Although it is not quantified in any rule, a major GSL project objective in developing the landfill is to limit direct and indirect impacts to wetlands and surface water, both on a temporary and permanent basis. It is, however, essentially impossible to construct a regional lined contiguous landfill in New Hampshire without filling wetlands. One primary goal therefore was to find a viable site that limits filling of wetlands and indirect impacts to the extent practicable when compared to other potentially viable sites, while meeting the disposal capacity needs of the project and other identified criteria. An overview of other key site characteristics considered in the site search follows.

Site Size:

A prospective site would need sufficient land area to accommodate a 70-acre lined landfill footprint, about 175 acres of disturbed area, including features such as perimeter berms and cell access roads, site access roads, stormwater ponds and infrastructure. Infrastructure includes an office, equipment garage/maintenance building, scales and scale house, leachate storage and transfer facilities, gas management handling and treatment systems and provisions for on-site leachate treatment. Area is also required for vegetated property line setbacks to the landfill (500 feet in most instances) and setbacks to wetlands, surface water and public roads. Ideally a site would include sand, gravel, and rock mining potential for use in landfill earthwork construction and for daily waste cover soil to avoid traveling over public roads to transport these materials.

An earlier search was conducted for a larger lined footprint and disturbed area, initially about 200 and 300 acres, respectively. Considering the reduced project size as described above, regulators requested reducing the minimum site size in the search to 300 acres from the previous 600-acre limit. We note that larger parcels have been found to be essential in identifying viable sites that limit wetland and surface water impacts and in isolating the landfill from abutters and the public as described herein.

A lined landfill footprint large enough to accommodate 10.8 million cubic yards (MCY) of solid waste is to be located within the disturbed footprint. The 10.8 MCY value was arrived at assuming a 20-year permit duration, the maximum allowed by NHDES rule, a two-year construction period after the Standard Solid Waste Permit is issued, and disposal at a rate of 600,000 CY per year for 18 years.

Siting Criteria:

In selecting a site GSL is fully comply with the following NHDES solid waste siting rules:

- The landfill footprint shall avoid 100-year flood plains.
- The landfill waste shall be set back 200 feet from perennial streams, rivers, ponds, and lakes.
- The landfill waste shall be at least 200 feet upgradient and 100 feet downgradient of wetlands.

- The landfill waste shall be at least 1,000 feet upgradient of a surface water reservoir or intake used for a community drinking water supply.
- The landfill shall not be located within a wellhead protection area.
- The landfill waste shall be set back from public roads, residences and land zoned to allow residential development as provided in NHDES rules.
- The landfill shall be set back 5,000 feet from an airport runway serving propeller-powered aircraft, 10,000 feet from an airport runway serving jet-powered aircraft, and six miles from an airport having the characteristics set forth in FAA Advisory Circular 150/5200-34A.
- The landfill footprint and key supporting infrastructure shall avoid unstable or eroding riverbanks and potentially unstable slopes.
- The landfill waste shall be located outside of a 1,320-foot corridor associated with a river designated for protection by the NHDES Rivers Management and Protection Program.
- Site hydrogeologic conditions must support the ability to monitor groundwater quality at the site.

The GSL search also considered the following practical considerations:

- The landfill footprint and required setbacks should not be crossed by stationary permanent public infrastructure features such as power lines, railroad lines, pipelines or a public road that would reduce the useful landfill footprint to an area less than the search criterion. Each of these features would be difficult at best to move to accommodate a contiguous landfill footprint.
- GSL chose to avoid filling any major wetlands systems or perennial surface water identified in the National Wetland Inventory (NWI) as a baseline criterion for establishing a lined landfill footprint in recognition of the need to minimize significant impacts.
- The site should have direct or near direct access to a state road designed for heavy truck traffic. As a result of the state having regionalized landfill facilities, much of the waste will be consolidated locally at transfer stations and transported to the site using tractor trailers. GSL intends to limit major truck traffic on secondary roads where the truck traffic would pass by residences or through congested municipal centers.
- The landfill should be naturally screened to the extent practicable from abutting and nearby residences by topography, vegetation, and distance. The NHDES rules require a 500-foot setback from the landfill waste to residential properties. Larger distances are desirable in some instances to limit potential landfill-related noise.
- The double-lined landfill technology proposed for this project has been used successfully in northern New England for over 30 years. A typical landfill cross section and liner and cap schematics are shown on Figure 2. For this project GSL proposes to enhance the performance of the conventional high density polyethylene liners with the addition of a geosynthetic clay liner to form a composite primary liner with superior barrier properties. As required by NHDES rule GSL will monitor the landfill primary liner performance on a near continuous basis by measuring flow in the lower secondary collection system. The landfill would be subject to

regular groundwater and surface water quality monitoring throughout its operating life and after closure. With that background, in siting it is still best to avoid locations directly upgradient of sensitive receptors such as public potable water supplies or significant aquifers.

- Overly steep terrain should be avoided as the potential for instability of the waste mass increases on steeper slopes. Canyon or ravine-type topography further reduces overall stability. The landfill base slope should average less than 12 percent unless buttressed by a substantial area of base area sloped at less than 8 percent. No landfill lined area should be steeper than 3H:1V. Steeper slopes often lower landfill capacity due to geometric constraints so that a larger landfill footprint and more wetland filling is needed for a given capacity. Selected landfill configurations should be stable as demonstrated by thorough geotechnical stability analyses.
- Sites with near surface or exposed bedrock should be avoided due to difficulty in siting monitoring wells to provide thorough monitoring.

Other considerations include the following:

- The site should preferably be purchased from or partnered with a single owner. Finding a willing landowner is difficult and needing to negotiate with two or more owners to piece together a viable site would complicate and perhaps prevent access to the land. A parcel from a second owner to achieve the minimum 300-acre criterion is considered in the siting evaluation if a promising combined parcel or improved access results.
- The landfill footprint and setbacks should be located within only one municipality. GSL endeavors to develop a cooperative, open, and mutually beneficial relationship with the host municipality. This would include developing a host community agreement with the municipality that addresses local concerns and provides financial benefits. Conducting such negotiations with two separate municipalities rather than one would likely have a much lower probability of success and dilute host community benefits.
- Each candidate site should be thoroughly evaluated for important natural resources such as wetlands type and function, surface water quality and habitat, land use, land area habitat value, and sensitive plant or animal species, as well as historical resources and archeologic features.

3.3 Resources and Methods

CMA Engineers initially established the site search as a desk study using on-line databases and mapping. We evaluated prospective sites for adequate size, proper access, conformance with NHDES siting rules, avoidance of perennial surface water and NWI wetland filling, avoidance of permanent built features (public roads, power lines, rail lines, etc.) that would be difficult to move and could restrict footprint size, and other considerations listed in Section 3.2 as key site features.

The evaluation proceeded in sequential steps using the following screening tools.

Initial Screen

1. The New Hampshire Gazetteer map and software identifies roads, railroads, power lines, low resolution topography, town borders and surface water bodies. We were able to use this resource to delineate land areas of at least 300 acres that potentially meet project requirements.
2. From there, each potential site was considered further using digital U.S. Geologic Survey (USGS) national topographic mapping. These maps provide higher resolution topography and additional detail on surface features such as perennial and intermittent streams and wetlands.
3. Online municipal tax maps and on-Xmapping and AcreValue software identifies tax map parcels and their size, and property ownership for prospective sites.

Site Evaluation Screen

The site evaluation screening included use of the following tools, software, and data:

1. The U.S. Fish & Wildlife National Wetland Inventory (NWI) online wetland Mapper Tool identifies surface water bodies and major wetland systems. Wetlands and surface water bodies are fully characterized in accordance with federal criteria. Streams are identified as perennial or intermittent and intermittent streams are further identified as temporarily or seasonally flooded or saturated.
2. The U.S. Department of Agriculture, Natural Resource Conservation Service (NRCS) Web Soil Survey identifies surface and near surface soil characteristics that would likely be mapped as jurisdictional wetlands (e.g., hydric soils) during a field survey of the site. The NRCS data also includes useful information on soil types and drainage, and depth to groundwater and bedrock.
3. The State of New Hampshire Granit GIS System includes LIDAR topography with 2-foot contour intervals for most of the state that provides additional valuable detail on topography.
4. We checked Federal Emergency Management Agency (FEMA) flood maps to avoid sites on floodplains.
5. Google Earth was accessed to evaluate existing or near-current site development conditions.

3.4 State-wide Site Search Results

We identified 169 sites in New Hampshire in the three steps of the initial screening portion of the siting process outlined above. These sites met the first-level criteria of being at least 300 acres of level or moderately sloped land not crossed or bisected by roads, railroads, power lines, town borders or perennial surface water. A complete listing of the identified sites is provided in Appendix B. The site host municipality, the site location reported in latitude and longitude, parcel size and number, viability and comments/notes and acceptability are provided for each site.

Considering the mapping and other resources in the 5 steps of the site evaluation screen, and all siting criteria, we identified four candidate sites out of the 169 possible sites. No other sites in the state, other than the NCES expansion site in Bethlehem, met the GSL project needs. The viability of sites was judged based on avoiding impacts to NWI designated wetlands and perennial surface water; site size and capacity; adherence to regulatory siting rules; site access and connections to appropriate public roads; and cooperation from site owners among other factors. Twenty potential sites were identified as publicly owned or conservation areas and removed from consideration. The candidate sites are in the

towns of Dalton, Carroll (two sites) and Shelburne as shown on Figure 3. The four candidate sites share the following characteristics:

- Site Size. Sites substantially larger than the minimum 300-acre criterion are necessary for viable landfill development. The 500-foot property setback alone essentially eliminates the viability of a 300-acre site. Assuming a perfectly square 300-acre site, the setback would occupy about 165 acres, leaving an insufficient area of 135 acres to accommodate the design disturbed area of 175 acres. Rectangular or irregularly shaped properties would need to allocate an even larger percentage of site area for the property line setback. A larger site facilitates flexibility in positioning and shaping the contiguous landfill footprint to avoid wetland impacts to the extent practicable and to naturally screen and isolate the landfill, while accounting for setbacks required by NHDES rules and in locating site roads and infrastructure. Each of the four candidate sites encompass available parcels of 1,600 or more acres, and each has the potential to provide direct access to state roads designed for heavy truck traffic.
- Terrain, wetlands, and surface water. The site search necessarily focused on rural locations to avoid the population density associated with cities, larger towns, and highly developed suburban areas. The more rural portions of the state tend to be dominated by hilly and mountainous terrain. The terrain is often characterized by steeper hillside slopes and narrow valleys that invariably contain perennial streams and rivers and associated wetlands. A landfill cannot be sited on a hillside without broad flatter terrain at the bottom to buttress the waste mass. The presence of perennial surface water and wetlands in the narrow valley bottoms preclude any landfill developments at these locations. Larger river valleys often have a flatter shelf of land proximate to the river. Given the scarcity of flat and developable land in these areas, the flat river bottom land is often already developed or is designated a flood plain and not viable for a landfill.
- Land in the upper reaches of a watershed. Each of the four candidate sites is located on a broad terrace-like feature located well above perennial surface water bodies. The terraces are either located in the upper reaches of the watershed or elevated above more prominent streams and rivers. Land with these features tend to have deeper water tables and less prevalence of streams and associated wetlands resulting in more favorable conditions for siting a large contiguous landfill footprint.
- Low population density. The four candidate sites are surrounded by lightly populated areas. Combined with the large parcel sizes, these sites limit visibility of the landfill, reduce levels of any transient landfill-related nuisances at the property line due to their remote locations. Any such impacts would be limited to a relatively small group of area residents due to surrounding low population density. This level of isolation is rare in more developed and populated areas of the state. Many remote sites, however, are accessed only by miles of narrow unpaved roads. Often seasonal and permanent residences are located along these roads. These roads are not designed to handle sustained tractor trailer traffic without damaging the road, and GSL has sought to avoid having landfill traffic pass by residences on narrow country roads for safety and nuisance reasons.

  As a measure of isolation, we used the number of residents living within a 2-mile radius of a landfill site property line. The number of residents was estimated using the United States Environmental Protection Agency (USEPA) Environmental Justice Screening Tool. The results are summarized

below. The local population analysis and full environmental justice review is discussed in Section 6.0, with additional data provided in Appendix C.

Candidate Sites	Residents Within 2 Miles of Landfill Site
Dalton	510
Carroll West	568
Carroll East	482
Shelburne	102

Existing Landfills	Residents Within 2 Miles of Landfill Site
AVRRD Berlin	7,741
LMWVSWD Conway	1,119
City of Lebanon	3,830
Four Hills Nashua	29,142
TLR Rochester	9,933
NCES Bethlehem	340

All candidate sites compare favorably relative to isolation measured by the population of residents living within 2 miles of the six existing solid waste landfill sites in New Hampshire, except for the NCES Landfill in Bethlehem.

4.0 EVALUATION OF CANDIDATE SITES

We conducted a comparative evaluation of the four candidate sites. The candidate sites are identified as the Dalton site, Carroll West site, Carroll East site, and the Shelburne site. A site plan for each site is presented on Figures 4 through 7. Each site was subject to the screening tools and evaluated and scored with respect to the key site characteristics set forth in section 3.2. These four sites conform to all NHDES landfill siting rules.

4.1 Screening Level Design

We followed a three-step process for each candidate site to develop a screening level design.

1. The first step was a desk study to confirm a potentially viable footprint could be available.
2. The second step incorporated information gained from a site reconnaissance to expand on the desk study.

3. The third step involved site reconnaissance during multiple visits by the project wetland scientist, engineer, hydrogeologist, and operating and permitting representatives of GSL to qualitatively evaluate site conditions resulting in a screening level site design.

The landfill footprints shown on Figures 4 through 7 represent the maximum limit of filling and disturbance associated with the landfill to confirm site potential viability. The lined portion of the landfill, disposal capacity, and limits of disturbance would ultimately be smaller following minimization to the single-phase design criteria. Capacity for each site footprint was calculated conservatively assuming the waste extended to the limits of the footprint without perimeter earthen berms and the bottom of the landfill was set at the ground surface. Each site appears to have enough non-wetland area on buildable land, a total of 175 acres +/- including the landfill, to support the needed disposal capacity and infrastructure without filling NWI mapped significant wetlands. Accordingly, the proposed locations of these facilities including stormwater ponds, operations, and maintenance buildings; employee parking; scales and queuing lanes; leachate storage, treatment and unloading facilities; gas treatment plant and roadway access are not shown on the figures.

The criteria used to establish the screening level design footprint area and preliminary maximum capacity at each site follows. For the selected Dalton site, the wetland filling and disturbed area was calculated by overlying the screening level landfill footprint on the field-delineated wetland limits. The wetland filling and disturbance area for the other sites was developed by comparing the screening level footprint with a qualitative evaluation of wetland limits based on a natural resources review conducted by the project wetland scientist as presented in Section 4.2.

Dalton: The Dalton site is shown on Figure 4. The limits of the landfill footprint were set back from a perennial stream and wetland complex to the south, a substantial wetland complex and surface water to the west, an intermittent stream and a soil mining operation to the west-northwest, steep mountainside slopes and the property line to the north, and a ridgeline representing a watershed divide to the east. The screening level footprint resulted in a 181-acre landfill, filling or disturbing 18 acres of wetlands, and 32 million cubic yards (MCY) of capacity.

Carroll West: The Carroll West site is shown on Figure 5. The landfill area is set back from property lines to the north and west, a watershed divide to the east, and streams and steep slopes to the south. The site is crossed by several perennial streams. Accounting for required setbacks to the streams results in four separate landfill footprints on the site. The preliminary footprints result in an aggregate landfill area of 242 acres, filling of 22 acres of wetlands, and a 24.5 MCY capacity.

Carroll East: The Carroll East site is shown on Figure 6. The landfill area is set back 10,000 feet from the runway of the White Mountain Regional Airport in Whitefield to the north, railroad tracks (property line) crossing through the site to the west, a perennial stream to the south, and a perennial stream and wetlands to the east. A perennial stream crosses the landfill area. Setback requirements for that stream result in two separate landfill footprints on the site. The preliminary footprints result in an aggregate area of 190 acres, filling 41 acres of wetlands, and a 30 MCY capacity.

Shelburne: The Shelburne site is shown on Figure 7. The landfill footprint is set back from a brook and steep slopes to the east, perennial streams to the north and south, and a steep mountainside

to the west. The preliminary footprint resulted in a 95-acre landfill, filling 15 acres of wetland, and a 16 MCY capacity.

4.2 Natural Resources Evaluation

Upon review of aerial photography, National Wetland Inventory (NWI) maps, soils, and floodplain maps, New Hampshire Natural Heritage Inventory (NHB) data check, and New Hampshire Wildlife Action Plan maps an initial site reconnaissance of the candidate sites was conducted by Certified Wetland Scientist and Wildlife Biologist, Barry Keith. Mr. Keith is the author of this section. This initial screening process centered on field verification of general existing natural resource site conditions within the respective candidate sites. A watershed map for each candidate site is provided on Figures 9 through 12. Figures depicting habitat type and ranking for each candidate site are provided on Figures 13 through 18.

Based on the initial review, subsequent work focused on aerial photo wetlands mapping and more comprehensive site evaluations to determine the location and class of state and federal jurisdictional wetlands and streams and other significant natural resources. No comprehensive wetland delineations or mapping were conducted. This effort centered on identifying and qualitatively and quantitatively evaluating wetlands and other natural resource conditions to develop a screening level site design.

Screening level site designs for the four (4) candidate sites are depicted as Figures 4 through 7. Based on this review, a comprehensive wetland delineation was conducted on the preferred alternative, the Dalton site (Figure 4), to develop a permit level design that avoided and minimized direct and indirect wetland impact as much as possible.

The following serves to summarize the wetland, surface water, and other natural resource and land use considerations for the Dalton, Carroll West, Carroll East, and Shelburne candidate sites.

Dalton:

- The overall property consists of several parcels comprising over 2,000 acres. The subject area contains 4 lots totaling 1,279.36 acres. Steep slopes associated with the Dalton Mountain Range are positioned along the northwest, northern, and northeastern limits of the site. These steep slopes serve as a drainage divide between the candidate site and Forest Lake, to the immediate east. The more gently sloped areas within the site, west of the drainage divide, exhibit upland and wetland areas that serve as headwaters for Alder Brook, a tributary of the Ammonoosuc River.
- Existing land use is mixed. Extensive active gravel mining operations are positioned within the northeastern and northern portions of the site. An active stone quarry and aggregate stockpile area is located near an asphalt plant, since removed, in the central portion of the site. Other abandoned or inactive gravel mining sites are positioned along the main access road. A partially constructed drag strip and the property owner's residence are located outside of the subject area off Douglas Drive, the main access road off New Hampshire Route 116. The balance of the site is composed of recently clear-cut forestland, early successional growth forest, and wetland.
- Adjacent land use includes an active shooting range, sawmill and log concentration yard, a wood-fired energy powerplant, an auto safety snow and off-road driving school, other

commercial businesses, residential development, Forest Lake State Park, and undeveloped forestland.

- An access/egress upgrade at the Route 116 intersection and improvements to Douglas Drive will require minor wetland impacts. Route 116 provides access to main state roadways such as Route 3 and Interstates I-93 and I-91.
- NWI maps depict the main wetland areas associated with Alder Brook and its tributaries. The site screening process determined that the NWI wetlands were more extensive, particularly in the headwater areas associated with a network of intermittent and perennial streams. The perennial no-name streams contain active and former beaver colonies. The wetlands within the upper reaches of the watershed consist largely of poorly drained palustrine forested wetland. Other wetland areas along Douglas Drive and within other disturbed areas have been either man-made or altered in the past.
- Five (5) vernal pools were identified within the screening level design footprint.
- The principal wetland functions of the naturally occurring wetlands are fish and wildlife habitat, flood flow alteration, nutrient removal, production export and groundwater discharge. The main functions of the wetlands associated with Douglas Drive and other disturbed areas center on sediment/toxicant retention, nutrient removal, and groundwater discharge.
- No "Highest Ranked Wildlife Habitat in New Hampshire" or "Highest Ranked Habitat in the Biological Region" areas were mapped by the New Hampshire Wildlife Action Plan within the subject site. Portions of the site were identified as "Supportive Landscapes" while, beyond the limits of the screening area, the higher elevations and areas immediately associated with Alder Brook were mapped as "Highest Ranked Habitat in the Biological Region."
- The New Hampshire Natural Heritage Bureau (NHB) data search found no records of rare, threatened, or endangered plant or animal species or other significant natural communities.
- Protected state-owned conservation land, Forest Lake State Park, borders the eastern property boundary of the subject parcels.
- No NWI, WAP, or NHB known habitats will be directly impacted by the screening level landfill design footprint.
- Other than raising and minor widening to an existing access road stream crossing, no perennial streams shall be impacted. An existing culvert will be replaced by an open bottom box culvert. A second natural stream in the vicinity that had been diverted to the culvert will be restored and provided with an open bottomed box culvert.
- The design footprint would impact the site's vernal pools.
- The design footprint avoids fish habitat but does affect wildlife habitat wetland function. Other listed functions, while affected, can in part be compensated for through stormwater management measures.
- This screening level landfill design footprint would directly impact approximately 18 acres of natural and man-made/altered wetlands and 1,100 linear feet of intermittent stream.

Carroll West:

- The site is a large (1,684 acre) undeveloped property with no direct access to Route 3.
- Access will require establishing an entrance road crossing a permanent stream on a separate parcel. The landfill perimeter road, particularly associated with Landfill Areas 1 and 2, will require significant wetland crossings.
- The limits of jurisdictional wetlands are more extensive than shown on NWI maps. The NWI wetlands are interconnected by a network of forested wetlands and streams that serve as the headwaters to Bog Brook. Significant areas of active and former beaver colonies exist throughout the site. A portion of the wetlands was classified as a bog. While most of the wetlands are palustrine broad-leaved and needle-leaved scrub-shrub and forested wetland. The former beaver influenced wetlands exhibit area of emergent wetland vegetation.
- The principal wetland functions center on fish and wildlife habitat, flood flow alteration, groundwater discharge, and production export.
- The New Hampshire Wildlife Action Plan (WAP) mapped the site as having "Highest Ranked Habitat in New Hampshire" and "Highest Ranked Habitat in the Biological Region."
- The New Hampshire Natural Heritage Bureau (NHB) data search found no records of rare, threatened, or endangered plants or animals.
- Public water supply wells are positioned (Figure 10) to the northwest and northeast of the site.
- Direct and indirect impacts from the siting a landfill will affect both the "Highest Ranked Habitat in New Hampshire" and "Highest Ranked Habitat in the Biological Region."
- The principal wetland functions, particularly fish and wildlife habitat and production export would likely be adversely impacted.
- Permanent wetland impact was estimated to be approximately 22 acres. In addition, due to the proximity of the landfill footprints to the wetland complex, significant indirect wetland impacts are likely to occur.

Carroll East:

- This approximately 1,211-acre undeveloped site is positioned east of Carroll Brook and north of Lennon Road. It is bisected by a former railroad corridor now owned by the State of New Hampshire. This corridor is currently part of a major snowmobile trail network throughout the region.
- The principal existing access is via a gated logging road located off Lennon Road, east of the railroad corridor. Lennon Road is a Class 5 town road which runs from Route 3 easterly to Route 115. Most of the existing land use along the road is residential development.
- Given access constraints, an approximate 1-mile-long access road from Route 3 would be required to access the northern landfill footprint area. Portions of an existing abandoned logging road exist from Route 3 to Carroll Brook. Three to four culverts and associated wetland

fill would be required to reach Carroll Brook. Carroll Brook is designated as a "Wild Brook Trout Stream" by the New Hampshire Fish and Game Department. As stated in section 4.4.1, a minimum 30' span crossing would be required over this major stream. The access road will require crossing the railroad track. Access from Route 115 was not considered viable due to the need to access through private property and require impacts to Bear Brook, a perennial stream. Additionally, a large no-name wetland complex, associated with a perennial stream, parallels much of the eastern property boundary. This wetland complex essentially eliminates access from the east.

- The NWI mapped wetlands are largely associated with open palustrine scrub-shrub areas and wetlands influenced by beaver activity. These wetlands are principally associated with Carroll Brook, Bear Brook, and the no-name wetland complex found in the eastern portions of the site. In addition to these wetlands, aerial photo interpretation and site reconnaissance revealed that other, unmapped, forested wetlands exist associated with perennial and intermittent streams that connect the Bear Brook wetland complex to the extensive Carroll Brook wetland system. The no name eastern wetland complex is also more extensive than appears on NWI maps. Additional forested wetlands extend to the south and west from the NWI mapped wetland. A significant portion of this wetland would be impacted by the 140-acre landfill footprint. Portions of the 140-acre and 50-acre landfill footprints would also require filling wetlands, re-routing wetland drainage, and impacting sensitive wetland buffers.
- This property contains high function naturally occurring wetlands. The principal functions include fish (native Eastern Brook Trout) habitat, wildlife habitat, flood flow alteration, groundwater recharge/discharge, production export, and nutrient removal. The wetlands exhibit a high scenic or aesthetic value. While privately-owned land, it is open to the public for hunting, hiking, and wildlife observation.
- The 2020 Wildlife Action Plan map ranked the corridor along Carroll Brook and the no-name wetland complex on the eastern portion of the site as "Highest Ranked Habitat in New Hampshire." Additionally, the site contains associated habitats that were mapped as "Highest Ranked Habitat in the Biological Region." Supportive landscapes were also depicted in the northwest and eastern portion of the subject property.
- The NHB data search found no records of rare, threatened, or endangered plant and animal species or natural communities.
- The wellhead protection area for the Town of Whitefield Municipal Water Supply wells and another wellhead protection area located off Route 115 are adjacent to the landfill subject area. The proposed landfill footprint concepts are within the same watershed and upgradient of the Whitefield municipal wells.
- The northeast corner of the property abuts mapped (WAP) designated conservation (USFWS Pondicherry National Wildlife Refuge) lands.
- The access road crossing of Carroll Brook and its associated wetlands and riparian corridor will serve to impact "Highest Ranked Habitat in New Hampshire." Supportive landscape will also be affected primarily in the northern and eastern portions of the subject property.
- Principal wetland functions will be directly and indirectly lost due to access road and landfill wetland fills and stream crossings. Wetland buffer encroachment and overall fragmentation of habitat will likely serve to degrade the environmental integrity of the site and nearby environs.

- The total permanent wetland and stream impacts were estimated to fill approximately 41 acres of wetland and impact approximately 500 linear feet of perennial and intermittent stream.

Shelburne:

- The Shelburne conceptual landfill footprint is positioned in the northeast portion of a 3,586-acre forestland tract. This property is positioned within a large unfragmented block of forestland from Route 2 north to Route 26.
- Access to the site is via North Road to Lary Brook Road, a narrow gravel forest road that currently provides access for forest management activities. Lary Brook Road traverses through 3 private properties prior to entering the subject parcel. The section of North Road is governed by municipal seasonal weight load restrictions.
- Lary Brook, a native Brook Trout fishery, closely parallels Lary Brook Road for much of the distance to the site.
- As stated in Section 4.4.1, issues with North Road and the existing Lary Brook Road warrant significant access improvements. Given the landscape features and remoteness of the site, an approximate 4,000 linear foot access road from Route 2 to Lary Brook Road would be required. Proceeding northerly from Route 2, given the steep outwash terrace soils, an overpass crossing of the railroad, or a significant road fill/cut would be required. These fine sands are highly erodible. Excavation would be required in a narrow band of upland positioned between an oxbow of the Androscoggin River and a palustrine broad-leaved deciduous floodplain wetland associated with the river. Given these site conditions, it is likely that erosion and sedimentation are primary concerns in this area. Continuing approximately 2,500 linear feet towards the river crossing, most of the road would be positioned between the oxbow, floodplain wetlands, and Androscoggin River. Nearly 1,800 feet of road would be within the Designated 250-foot Shoreland Protection Zone.

  The crossing of the Androscoggin River would require an approximate 500-foot-long bridge span, comparable to the North Road span across the river. Two large concrete headwalls and a mid-river support pier would likely be required. In addition to direct impact to the river and riverbanks, due to steep grades on the north side of the river, the bridge would either be significantly elevated or significant excavation within the Shoreland Protection Zone would be required to achieve acceptable road grades.

  Proceeding northerly, the access road would cross an existing gas/oil pipeline. The pipeline crossing is in an elevated location between the river and North Road. Closer to North Road, the access road would require crossing an approximately 10-foot-wide forested wetland which is connected to a high-quality palustrine scrub-shrub aquatic swamp. The limits of road grading adjacent to this wetland would likely be less than 100 feet.

  Due to site distance issues and the existing steep topography on the south side of North Road, it is likely that an overpass would be required at this location. Wheeler Pond, a small open water pond surrounded by bog vegetation, is located on the northwest side of the existing North Road and Lary Brook Road intersection. This property is protected by a conservation easement. Changing the road profile at the North Road crossing will likely prove problematic so as not to directly or indirectly Wheeler Pond.

Crossing private property and bordering conservation easement land serve as restrictive features in widening and paving the access road. The existing 20-foot-wide bridge over a no-name tributary to Lary Brook would need to be replaced and approximately 6 existing road culverts would need to be replaced as part of the road upgrade. Existing jurisdictional wetland and non-wetland ditches positioned in the mid-section of road would likely be impacted during road widening.

In some cases, Lary Brook is quite close to the edge of the existing road. Currently, no stormwater features or means to treat road runoff exist. In accordance with current Alteration of Terrain (AoT) road design and stormwater management standards, stormwater structures will be required. This requirement may prove problematic in some locations due to the proximity of Lary Brook and constraints associated with property ownership. Approximately 1.5 miles of Lary Brook Road would be required to be improved for truck traffic to the site.

An existing forest road off Lary Brook Road provides access to the concept landfill footprint. The initial 300 linear feet of road is steep and will require significant grading to achieve acceptable road grades. No wetlands were documented in this area.

- No NWI mapped wetland areas were depicted within the concept landfill footprint.
- Much of the site has been heavily logged in the past. While not depicted on NWI maps, a series of palustrine scrub-scrub wetlands were found in topographic depressions and within drainageway within this clear-cut terrace. The elongated wetlands associated with natural drainageways typically direct surface water flow easterly to Lary Brook. Portions of these wetlands have been altered by skidder ruts in the past. The sloping terrain on the eastern face of the landfill footprint exhibits wetlands in the form of groundwater seeps. These seeps discharge groundwater flow easterly to a small no-name tributary to Lary Brook. These seep wetlands have also been altered by ruts in the recent past.

  The northeast quadrant of the landfill footprint is positioned within a palustrine broad-leaved deciduous forested wetland. This wetland is positioned at the toe of a steep slope on a gently sloping terrace. Due to wetness, this area was not heavily logged or was avoided in the past. Old skidder roads indicate that the last logging was likely during the winter months many years ago. A combination of groundwater seeps and surface water drainage likely contribute to the hydrology of this wetland. While no defined channel was observed, wetland flow is in an easterly to northeasterly direction, serving as headwaters to the no name stream.

- Groundwater discharge and wildlife habitat are the principal functions of the site's wetlands. Lary Brook and the permanent tributaries to the brook provide important cold-water fish habitat.
- As previously mentioned, this site is positioned in a remote location within a large un-fragmented block of forestland. It is abutted to the south and southwest by protected conservation lands. The 2020 WAP identified the corridor along Lary Brook and high elevation areas in the western portion of the subject property as "Highest Ranked Habitat in New Hampshire." The forests surrounding much of the higher elevation area were identified as

"Highest Ranked Habitat in the Biological Region." The remainder of the property, including the candidate landfill footprint were identified as "Supporting Landscapes."

- The NHB data search found no records of rare, threatened, or endangered plant and animal species or natural communities.
- Access road wetland and stream impacts will directly impact the Androscoggin River, forested wetlands, roadside wetlands, and a cold-water permanent tributary to Lary Brook. Indirect impacts, while difficult to quantify, will likely center on surface water quality degradation adjacent to the floodplain wetlands associated with the Androscoggin River, riverbank stabilization/bank degradation, degradation of the scrub-shrub aquatic wetland, Wheeler Pond water quality impacts, Lary Brook water quality and adverse impact to the existing forested buffers associated with these natural resource features.

  These impacts will likely adversely impact the cold-water fish habitat of Lary Brook and the perennial no name tributary to the brook. Moreover, the proximity of road improvements adjacent to Wheeler Pond will likely change water chemistry over time, adversely affecting the existing sensitive bog vegetation and wildlife habitat.

- The direct loss of wetland and wetland functions within the concept landfill footprint would serve to significantly reduce the viable function of the remaining wetlands in the general vicinity. As previously mentioned, these wetlands serve as headwaters to Lary Brook.
- The total permanent wetland and stream impacts were estimated to fill approximately 15 acres of wetland and impact 800 linear feet of stream and river.

4.3 Wetland Permit Level Design

The selected alternative, the Dalton site, was subject to two additional design steps (Concepts 4, 5, and 5.1 through 5.3 on Figures 22 through 24, respectively) to minimize wetland filling and indirect impacts as described in the Minimization of Selected Alternative section below. Through this effort the Dalton site engineering progressed to a wetland permit level of design. The design efforts depicted in Concept 4 included grading for all proposed earthwork and disturbance including perimeter berms, landfill perimeter roads, swales, stormwater ponds, layout and grading of the infrastructure area, and improvements to the site access road and entrance on Route 116. Furthermore, the limits of waste are required to be at least 200 feet upgradient and 100 feet downgradient from any permitted wetland filling or natural wetland boundary in accordance with NHDES siting criteria, thus reducing the size of the lined landfill area.

In Concept 5.3 the landfill footprint was significantly reduced and set back to provide buffer to Alder Brook, a sensitive surface water receptor. The landfill capacity was reduced to 10.8 MCY, a value that would allow for the entire project to be permitted within the Solid Waste Rules in a single 20-year phase, the maximum length of permit allowed by the rules. This 20-year period would include a 2-year construction period followed by 18 years of operations at a filling rate of 600,000 CY per year. It is intended that state and federal wetland permits as well as the water quality certification would cover the construction of the entire project proposed in the Solid Waste permit application. In calculating design capacity, the landfill base liner was set at an elevation at least 7 feet above the seasonal high groundwater level, and the landfill height was lowered 20 feet to reduce visibility.

For the Dalton site, the wetland permit level design and minimization efforts for the Concept 5.3 landfill reduced the screening level design lined landfill footprint (Concept 3, Figure 21) by 61.6% to 70 acres from 181 acres. The permit level design is shown in concept on Figure 22 and in detail on Sheets 4 through 19 of the Drawings. Wetland filling associated with the landfill footprint and ponds was reduced 47.8% to 9.8 acres from 18.4 acres. Vernal pool filling was reduced to 5 from 7. Landfill capacity was reduced 66.2% to 10.8 million cubic yards from 32 million cubic yards. Separation distances from the lined landfill to Alder Brook increased to 2,650 feet from 910 feet. Separation distances from the Infrastructure Area to Alder Brook increased to 1,600 feet from 650 feet. Filling of an intermittent stream was reduced to 600 feet from 1,100 feet.

For comparative purposes, we assumed permit-level design of the other three candidate sites subject to similar minimization efforts would reduce the footprint and wetland filling qualitatively by the proportion of the footprint reduction to limit capacity to 10.8 MCY. Increased separation distance to sensitive surface waters was estimated on a case-by-case basis. All four sites can accommodate a 10.8 MCY capacity landfill, therefore capacity and landfill footprint are not criteria used in the comparative site evaluation. Table 1 presents a summary of quantitative project and landfill characteristics for each site including projected wetland filling acreage and setbacks to sensitive waters for each landfill footprint.

The Stage VII Expansion of the NCES landfill in Bethlehem was the preferred alternative at the beginning of the planning process to develop new landfill capacity. The Stage VII expansion concept had progressed to a wetland permit level of design when the siting study was initiated. Stage VII encompasses 60 acres to form a contiguous 112-acre landfill, provides 8 MCY of capacity, and would result in about 1 acre of wetland filling. The NCES Landfill is shown on Figure 8. In addition to lowest wetland impacts by a large margin, NCES Stage VII benefits from having all the necessary support infrastructure in place and other favorable features such as close access to Interstate 93 without passing by a residence, thoroughly studied hydrogeologic conditions resulting in reliable groundwater monitoring, and ownership of the land. NCES Stage VII is hindered only by its lower relative capacity in comparison to the other candidate sites. The Ammonoosuc River is located about 1,000 feet downgradient of the landfill. NCES Stage VII is included in Table 1 for comparative purposes. NCES Stage VII was not included in the site evaluation in Table 2 as this expansion is not allowed by Town of Bethlehem zoning.

4.4 Comparative Site Evaluation

A Site Selection Matrix was developed to provide a comparative site evaluation as discussed below. The Site Selection Matrix is presented in two parts on Table 2. Part 1 compares and ranks the four sites. Part 1 includes three items that are fundamental to the conditions being considered in the wetland permit application including: 1) landfill area impacts to wetlands, 2) landfill area impacts to sensitive surface water, and 3) the potential to significantly impact wetlands and surface in developing or improving site access. Part 2 compares and ranks the four sites on a qualitative basis for 10 landfill siting or design related site characteristics or considerations that are important to site selection, although most of which are not directly relevant to the wetland application.

Subtotal scores are provided for the two parts, followed by a combined total score for each site. Note that we weighted the scores for Part 1 by a factor of five over the scores for Part 2. Our intent was to have Part 1 provide most of the combined Part 1 and 2 total score, with its focus on the important wetland permit criteria. Comparing the Table 2 totals and subtotals, Part 1 provided 58 percent of the total scoring. Without weighting Part 1, the 10 items scored in Part 2 would have provided 79 percent of the total score leaving Part 1 with only 21 percent. We also note that the GSL site scored first in both Part 1 and Part 2, and ultimately would score first regardless of how the two parts are weighted or not weighted.

Lower ranking scores are more favorable than higher numbers in Table 2. Landfill capacity is the same for each candidate site and is not considered in the comparison. Impacts from site infrastructure are not included in the comparative evaluation as it appears each of the four sites has enough upland area to build infrastructure support and locate stormwater ponds to control stormwater runoff and recharge groundwater in a manner that limits substantial direct and indirect impacts to wetlands.

4.4.1 Table 2 Part 1 Discussion

Part 1 scoring focuses on fundamental wetland-related criteria. The first two items in Part 1 are derived from the summary of quantitative landfill characteristics presented in Table 1. The third item in Part 1 is a qualitative evaluation of wetland impacts from construction of an access road from an appropriate public road to the facility infrastructure area and lined landfill. This third item was added to the more highly weighted Part 1 as access road direct and indirect impacts could be substantial as described below. A discussion of this third item follows. The sites are addressed in order of the ranking in Part 1 of Table 2.

Site Access Road Direct and Indirect Impacts to Wetlands and Surface Water:

Dalton: The Dalton site has favorable access road conditions. An existing access road capable of handling truck traffic connects the proposed infrastructure area to Route 116. For this project we propose minor cutting and filling to reduce grade changes, road widening to facilitate safe two-way traffic for tractor trailer trucks, increasing the road base thickness, paving the road surface, and altering the entrance geometry and flaring for safe egress and ingress. These changes will increase impervious surfaces and require storm water ponds to attenuate surface water flow to levels comparable to existing conditions and to provide water quality treatment in the form of infiltration, treatment swales, and/or vegetative buffers. There is ample room and appropriate locations for such features at the Dalton site as described below in the Minimization of Selected Alternative in Section 5. In places where the access road abuts wetlands, the road widening will incorporate low retaining walls and culvert headwalls rather than sloped berms to limit wetland filling. Access to the landfill area will use an existing road crossing of a perennial stream, upgraded to handle large truck access.

Carroll East: Current access into the Carroll East site is from Lennon Road to the south via a gravel road. The access road is currently used for commercial logging of the property. Lennon Road is a narrow road and provides access to 15 homes. The road is not viable for waste hauling traffic due to the presence of multiple residences, the potential for unsafe traffic movement, and design limitations associated with heavy wheel loads. The site does have a frontage on Route 3 to the west. An access road from Route 3 would be at least one mile long and cross over Carroll Stream

and railroad tracks. The stream crossing would require about a 30-foot span subject to stream crossing rules. It is unclear at this time if a grade crossing would be acceptable to the railroad track owner (the State of New Hampshire). Construction of this access road and bridge would likely result in wetland filling as described in Section 4.2. Six properties to the east of the site could provide direct access to the landfill from Route 115. Four of these sites contain residences and two are undeveloped. Two of the residential sites would require crossing one or more NWI designated perennial streams and use of any of these parcels for access would likely include wetland filling. Use of any of these properties would require negotiating a purchase or easement agreement. Each of these properties are located on steep hillside slopes that would likely present design challenges for road safety, attenuating runoff flows and in treating runoff for water quality improvement. Access to the site from the north is not feasible due to lack of access to an appropriate public road.

Carroll West: Current access to the Carroll West site is from Route 3 through an abutting property to the north in the form of a gravel road currently used for commercial logging of the property. The owner of the abutting property allows site access for logging operations but has indicated he would not allow access through his property for this project. Five properties to the east of the site could provide direct access to Route 3. Two of these sites contain residences and three are undeveloped. Each of the undeveloped sites would require crossing one or more NWI designated perennial stream and use of these sites for access would likely include wetland filling. Use of any of these properties would require negotiating a purchase or easement agreement with the owner. Route 3 access to the site from the south would be through a property containing commercial sand and gravel mining and rock quarrying operations. Preliminarily it appears the site owner would be receptive to negotiating an access easement agreement. This access road would be three to four miles long and traverse up and down steep slopes associated with a 300- to 400-foot hill. This access route would cross intermittent streams and result in wetland filling. The steepness of the hillside slopes would present design challenges for safety, attenuating runoff flows and in treating runoff water quality. Access to the site from the west is not feasible due to the lack of access to an appropriate public road.

Shelburne: Current access to the Shelburne site is directly from North Road to the south. Mountainous terrain and lack of public roads prevent access to the site from the west, north and east. Access to interior portions of the site is from a gravel road currently used for commercial logging of the property. North Road is a narrow road servicing 15 homes and an inn with 18 rooms and five cottages. North Road does not provide viable waste hauling traffic access due to the presence of multiple residences and the inn, the potential for unsafe traffic movement, and likely design limitations associated with heavy truck wheel loads. North Road is posted to prevent truck traffic access during the late winter/early spring thaw season. The owner of the site also owns land across North Road extending to the Androscoggin River and beyond to Route 2. A detailed account of natural resource impacts associated with direct access from Route 2 is provided in Section 4.2. Direct access from Route 2 would require a 4000-foot-long access road that would cross railroad tracks and an interstate oil and gas pipeline and require a 500-foot-long bridge over the Androscoggin River and flood plain including a center support pier in the river. The access road would cross low areas adjacent to the flood plain that likely include significant wetland areas.

North Road in the vicinity of the site entrance has poor sight lines due to terrain, turns and thick vegetation. Crossing the road with large trucks in a safe manner would require controls such as stop signs or lights, or perhaps a bridge. Most of the first 3,000 feet of the existing on-site access road abuts private property under conservation easement to the Mahoosuc Land Trust. It appears a small portion of the road crosses onto the trust easement land. The access road then crosses through three other properties not owned by the owner of the candidate landfill site. It is not clear at this time whether the easement agreements among these entities would allow for the travel of waste hauling trucks, or if each of these owners would be willing to sell their parcels. The access road has one approximately 20-foot-long bridge over a brook that would need to be re-built and widened on one of these separately owned properties. Alternatively, the access road could be relocated to land owned by the candidate site owner. This route would require three new bridge crossings over brooks and likely additional wetland filling. Long segments of the existing access road to the landfill footprint are located near the banks of Lary Brook. The road would require widening and paving to safely accommodate tractor trailer waste trucks. Mitigating runoff quantity and quality would be a challenge with the road being located adjacent to the steep banks of the brook.

Table 1 indicates development of the Dalton site would result in the lowest total acreage of wetland filling and other direct and indirect impacts associated with the lined landfill and site access road. The Dalton site has an existing access road that requires only modest improvements involving minor wetland filling. The Carroll East site was a clear second choice, ahead of the Carroll West and Shelburne site.

4.4.2 Table 2 Part 2 Discussion

A discussion of the qualitative evaluation of Table 2 Part 2 criteria follows. The sites are discussed in order of ranking for each key site characteristic.

Access to State Highway:

The Dalton site has an existing New Hampshire Department of Transportation (NHDOT) driveway permit for direct access to Route 116 (A new driveway permit application accounting the for the landfill project is pending a decision) and an existing site access road that only requires limited upgrades for the proposed use. The Carroll East site has frontage on Route 3 and requires a new mile-long site access road with a bridge over a sensitive stream and a railroad crossing to access the landfill. The Carroll West site requires acquiring or obtaining an easement through another property to gain access to Route 3 and construction of a new site access road to the landfill area. The Shelburne site requires a 500-foot-long bridge over the Androscoggin River, traffic improvement to cross a small rural road, and a railroad track and interstate pipeline crossings to access Route 2.

Traffic Routing to Site:

The Carroll East and West sites have similar truck routes to travel to the site. Most of the truck traffic would travel northbound on Interstate 93 and exit on Route 3 north. The trucks would travel north

through the White Mountain National Forest, the light commercial development in the Twin Mountain village in Carroll, and directly to the site entrances on Route 3. The Carroll West site has the potential to use an existing truck access driveway for the commercial sand and gravel mining operation south of the site. The Dalton site traffic would follow a similar route and continue to Whitefield and through a small commercial area, turning onto southbound Route 116 to the site entrance prior to the Littleton town line. The Shelburne site has the longest haul for waste trucks. The trucks would take Route 3 north to Route 115 in Carroll, then Route 2 east to the site entrance. Truck traffic would be through the commercially developed center of Gorham on Route 2.

Natural Screening of Landfill and Isolation from Public and Abutters:

Shelburne: The Shelburne site is located two miles from the nearest public road in a remote mountain valley. Other than a seasonal cabin located on the site access road, the landfill would not be visible or likely heard from any public road, residence or building of any kind. Only 102 residents would live within a 2-mile radius of the landfill property. A watershed map of the Shelburne site is provided on Figure 9.

Dalton: The Dalton site is in a bowl-shaped valley essentially devoid of residential development other than the home of the property owner. A total of 510 residents would live within a 2-mile radius of the landfill site. A watershed map of the Dalton site is provided on Figure 10. Topography and remoteness will aid in screening residences outside of the valley and the public from noise and visual impacts. About one half mile east of the Dalton site over a ridge line, is the western shore of Forest Lake. The public facilities of Forest Lake State Park are located about 0.9 miles from the landfill on the northern shore of the lake. Residences line the western, northern (except for the park) and eastern shore of the lake. The southern end of the lake is undeveloped due to the presence of a large wetland complex along the shoreline. The ridgeline topography and forest growth will block the view of the landfill from the western and northern lakefront. The top portion of the landfill would likely be visible from about one mile away on portions of the eastern lakefront over the ridgeline. A visibility study depicting views of the landfill from the eastern shore is provided with the wetland application. This visibility may be mitigated with screening by natural tree growth or buffer plantings, as shown in the study. Most of the landfill will not be visible on the horizon but rather in the foreground of nearby mountains to the west and north. Several residences on West Side Road located about a mile southeast of the landfill may be able to see the top portions of the landfill, again in the foreground of mountains, although trees on those properties may partially block the view. The top of the landfill will be visible from a section of Route 116 to the southeast about 2 miles away. The landfill will also be in view from residences located at higher elevations looking down on the landfill from as close as 1.4 miles to the west and 2.5 miles to the south. There is no view of the landfill from the north from residential properties. Although the managed forest portion of Forest Lake State Park abuts the northern limits of the landfill property, there are no public facilities in this portion of the park. The mountainside slopes in the abutting area are steep (about 30 to 35 percent) and would not support reasonable future public use. The landfill would not be visible from boaters or fisherman in or on the banks of the Ammonoosuc River.

Carroll West: The Carroll West site is in a largely undeveloped valley that would aid in screening nearby residences and the public from noise and visual impacts. A total of 568 residents would live within a 2-

mile radius of the landfill site. A watershed map of the Carroll West site is provided on Figure 11. A residential area is currently being developed on a ridgeline about 1 mile southwest of the landfill. Several of these residences would look down on the landfill. Abutting residential lots located 2,000 feet or more to the east on Route 3 would be screened from noise and views of the landfill by topography and forest. Several other residences located at least about 1.5 miles from the landfill may be able to view the top portion of the landfill, along with southbound traffic on a short length of Route 3. There is no view from residences or the public from the south.

Carroll East: The Carroll East site is located on a plateau between Route 115 to the east and Route 3 to the west. A total of 482 residents would live within a 2-mile radius of the landfill site. A watershed map of the Carroll East site is provided on Figure 12. Residences abutting the property about 3,000 feet to the east and those farther east across Route 115 would look down on the landfill, although their view may be blocked to some degree by nearby forest. The view 0.5 miles from the south from residences on Lennon Road would likely be blocked by forest on those properties. The view from the west from several residences on Route 3 at a distance of at least 0.7 miles would likely have a partial view of the landfill. The landfill would be mostly exposed to traffic on a relatively long segment of Route 3, although the landfill would be in the foreground of large mountains and would not extend above the horizon. Portions of the landfill could be seen from the north at the White Mountain Regional Airport and nearby industrial facilities located about two miles from the landfill.

Groundwater Monitorability:

Shelburne: As shown on the watershed map on Figure 9 the Shelburne site is located on a valley terrace close to Lary Brook, the surface water body that ultimately receives groundwater flow from the watershed. The principal groundwater flow direction is predictably to the east directly toward the brook, with minor flow components to the north and south to smaller streams. The site can be readily monitored using shallow overburden monitoring wells.

Dalton: The Dalton site is in the upper reaches of the Alder Brook watershed as shown on the watershed map on Figure 10. Groundwater flow is downslope through granular glacial till deposits to the west with discharge into tributaries to Alder Brook and adjacent wetlands. The site can be readily monitored using shallow overburden monitoring wells. Groundwater monitoring can confirm groundwater flow in overburden and bedrock is to the west as demonstrated by comprehensive hydrogeologic studies, and not to the east toward Forest Lake.

Carroll West: The Carrol West site is in the upper reaches of the Bog Brook watershed as shown on the watershed map on Figure 11. The landfill is immediately west of the groundwater divide between Bog Brook and Carroll Stream to the east. Flow from the landfill area is in multiple directions to small tributaries to Bog Brook. Bedrock is at a shallow depth in upgradient portions of landfill areas near the groundwater divide, and groundwater flow in overburden soil and bedrock is possible in these areas. Monitoring of the landfill for overburden and bedrock flow will necessarily increase and complicate the overall monitoring program.

Carroll East: The Carroll East site is situated on a terrace below mountains to the east and above Carroll Stream to the west as shown on the watershed map on Figure 12. The landfill is located over a sub-watershed groundwater divide between tributaries to the Carroll Stream. Groundwater in the western portion of the landfill flows about 2,500 feet to the west into Carroll Stream, and the eastern portion of the landfill flows a similar distance to the east and north into Bear Brook. Groundwater flow would be in many directions from each landfill unit, and it may be difficult to site an appropriate upgradient or background water quality well. Monitoring of multiple principal flow directions will increase the overall complexity and degree of monitoring.

Potential Ecological Affects:

Potential ecological effects for each candidate site are detailed in Section 4.2. Key findings relative to site rankings are provided below.

Dalton: The Dalton landfill site has no area designated as being the Highest Ranking in Wildlife Habitat in New Hampshire or in the Biological Region. Landfill traffic will cross an upgraded existing stream crossing box culvert with built-in wildlife corridor passage capability. Sections of Alder Brook are identified as native cold water trout habitat. Indirect impacts to the brook such as increases in temperature, changes in water chemistry, and alteration of flow in Alder Brook are addressed in the Water Quality Certification application.

Carroll West: The Carroll West landfill site has areas designated as being the Highest Ranking in Wildlife Habitat in New Hampshire and in the Biological Region. Siting the landfill at this location would result in direct and indirect impacts to this wildlife habitat. The development will require crossing a permanent stream and several significant wetland crossings to access the site and the landfill. Indirect impacts such as increases in temperature, changes in water chemistry, and alteration of flow in Bog Brook would require study if this site had been selected.

Carroll East: Eastern portions of the Carroll East landfill site have areas designated as being the Highest Ranking in Wildlife Habitat in New Hampshire and in the Biological Region. A required site access road includes constructing a 30-foot-long bridge span over Carroll Brook, designated as a Wild Brook Trout Stream. Site wetlands to be impacted include native Eastern Brook Trout habitat. Carroll Brook and associated wetlands exhibit high scenic and aesthetic value. Indirect impacts such as increases in temperature, changes in water chemistry, and alteration of flow in Carroll Stream and Bear Brook would require study if this site had been selected.

Shelburne: The Lary Brook corridor and higher elevations on the site are identified as the Highest Ranked Wildlife Habitat in New Hampshire. A required access road from Route 2 would impact the Androscoggin River floodplain and wetlands and cross the 250-foot Shoreland Protection Zone. A 500-foot-long bridge is needed across the Androscoggin River including concrete abutments in the flood zone and a mid-river support pier would likely be required. Lary Brook is a native Brook Trout fishery and along with its tributaries provides important cold water fish habitat. Runoff from the access road would likely adversely impact the cold-water fish habitat of Lary Brook and its tributaries. The proximity

of road improvements adjacent to Wheeler Pond will likely change water chemistry over time, adversely affecting the existing sensitive bog vegetation and wildlife habitat.

Potential Sensitive Human Receptors:

Dalton: Groundwater and surface water from the Dalton site discharge into tributaries to Alder Brook downslope of the landfill. Alder Brook combines with Hatch Brook and flows into the Ammonoosuc River about 1.3 miles south of the landfill. The Alder/Hatch Brook watershed covers about six square miles as shown on Figure 10. There are several residences along the western ridgeline in an upslope setting beyond the brooks near the boundary of the watershed at least 1.4 miles from the landfill. There are no other residences (other than the site owner) or water supply wells in the watershed, and no drinking water supplies or other sensitive receptors throughout the flow path from the landfill to the Ammonoosuc River. The Ammonoosuc River is the receptor of groundwater and surface water from the watershed.

Shelburne: Groundwater and surface water from the Shelburne site discharge into Lary Brook about 400 feet to the east. Lary Brook is part of a pristine 18 square mile watershed essentially lacking any development as shown on Figure 9. Lary Brook provides an important cold water trout habitat. A seasonal cabin is located about 0.5 miles south of where the landfill is proposed. We do not know if the seasonal cabin is serviced by a water supply well. The cabin is situated in a side-gradient position. The cabin is 170 feet from the river and any supply well at that location could possibly draw water indirectly from the river.

Carroll West: Groundwater and surface water from the Carroll West site discharges into headwater wetlands and tributaries of Bog Brook. Bog Brook flows into the Johns River near the center of Whitefield about five miles to the north-northwest as shown on Figure 11. The Bog Brook watershed covers about 13 square miles, with the upper reaches being largely undeveloped. Most of the residences in the lower reaches of the watershed are serviced by Town of Whitefield public water supplies. Abutting residential properties to the east are in the Carroll Stream watershed and are serviced by Town of Carroll public water supplies. A portion of one of the landfill areas overlaps part of an 82-acre lower yield aquifer as shown on Figure 11. A larger contiguous 6,700-acre aquifer is mapped along Carroll Stream 0.5 miles to the east and the Ammonoosuc River 2.5 miles to the south. This larger aquifer is in a different watershed than the landfill. Bog Brook and the Johns River drain into the Connecticut River. The public water supply wells servicing the Towns of Carrol and Whitefield are not located in the Bog Brook watershed.

Carroll East: Groundwater and surface water from the Carroll East site discharges into tributaries to Carroll Stream to the west and Bear Brook to the north as shown on Figure 12. Bear Brook and Carroll Stream join about 1.5 miles north before flowing into the Johns River. The Town of Whitefield operates three public water supply wells beyond the confluence of Bear Brook and Carrol Stream. Three additional municipal supply wells are located adjacent to Route 115 in Whitefield, side-gradient of the proposed landfill. The landfill would be in the upper reaches of the watershed of these wells and outside of the aquifer protection zone for each well. The large Carroll Stream aquifer is located about

2,500 feet east and downgradient of the landfill. The site is abutted to the northeast by a national fish and wildlife refuge.

Compatibility with Surrounding Land Use:

The Dalton site is logged commercially, and contains active sand and gravel mines, a rock quarry, and a small commercial pre-cast concrete operation. An asphalt plant was previously operated on the site but has since been removed. Surrounding properties include a gun club firing range (Alderbrook Sportsman's Association) to the south, undeveloped woodlands and wetlands to the east, an off-road and winter driving school to the north-northwest, a state park (Forrest Lake State Park) to the northeast, residential lots and Forrest Lake to the east, and a wood-fired power plant (Pinetree Power, Inc.) and log processing facility (Commonwealth Wood Preservers of NH) to the southeast. The Town of Dalton currently has no zoning. A Master Plan prepared by the Town in 2011 identifies the Dalton Landfill property ("the area accessed off Route 116 in Bethlehem") as one that could be defined as an industrial land use area. Abutting properties in Bethlehem are zoned industrial, while those in Whitefield and Littleton are zoned residential. The landfill operations would be in character with these surrounding land uses. Forest Lake State Park abuts the site to the north with public areas separated from the landfill site by a forest and a ridgeline that spans nearly a mile in combination. The forested portion of Forest Lake State Park has been logged periodically in the past and contains no known trails or access for public use.

The Carroll West site is logged commercially and is located along the margins of a large undeveloped area. Residential properties border the site to the east. The Carroll East site is logged commercially. Residences border the site to the east and south, and a national fish and wildlife refuge borders the site to the northeast.

The Shelburne site is logged commercially. The site is abutted by conservation land to the southwest and northeast. The Appalachian Trail is located about 3 miles to the northwest. Other than one seasonal cabin, the entire 18 square mile valley is undeveloped. The landfill would be located two miles away from the nearest public road. While isolated from the public, operation of a solid waste disposal facility or any large industrial facility on this site does not appear compatible with the natural remote nature of the valley.

Terrain and Slopes:

The Carroll East site is situated on a terrace or plateau feature with gently sloping ground suitable for landfill development. The Carrol West site has some areas of steep slopes that limit landfill footprint locations, but otherwise is gently sloped. The Dalton site is in the upper reaches of a bowl-shaped valley with gentle to moderate slopes. Steeper mountainside slopes to the north limit landfill footprint locations. The Shelburne site is located on a moderately sloped terrace. Steeper mountainside slopes limit landfill footprint locations to the west and steep riverbanks limit landfill footprint locations to the east.

Willing Owner:

The Dalton site has one owner willing to allow development of the property. The Carroll West site had one owner willing to allow development of the site as of several years ago. An additional parcel or easement is needed to establish access to Route 3. The Carroll East site has two owners, one of whom had been known to be willing to consider development of the property, and the second owner has not been approached. The two separately owned parcels are needed to create a viable landfill footprint. The existing access road to the Shelburne site crosses through three parcels not owned by the landfill site owner who has recently listed the property for sale. The three parcels are owned by three separate entities. It is not known as to whether all three owners would be willing to sell or provide access easements, although a more environmentally intrusive road alignment avoiding these three parcels is possible.

Table 2 Part 2 results indicate the Dalton site ranks first overall with the best access to a state highway, no downgradient sensitive receptors, most compatibility with surrounding land use, and a supporting landowner.

4.4.3 Overall Scoring

The Dalton site was first among the four candidate sites in the Part 1 and Part 2 scoring system by a wide margin and is the clear choice among the four candidate sites.

5.0 ON-SITE MINIMIZATION OF SELECTED ALTERNATIVE

The Granite State Landfill (GSL) footprint revisions evolved over a five-year span with the goal to minimize wetland disturbance while maintaining project justification. The project was a collaboration of permit team guidance and regulatory input and is detailed by a five-step process as described below. The seven concepts and sub-concepts are shown on Figures 19 through 30. Detailed design drawings of the landfill and required infrastructure area along with stormwater features are depicted on the 50-sheet design drawing plan set to be submitted with the full application.

Overall minimization of the selected final footprint also included detailed design consideration of the infrastructure area and upgrading the access road and entrance on Route 116. The upgrades to the access road include substantial improvement to environmental considerations including wildlife habitat protection and functionality along with long term drainage considerations from a highway design perspective. These improvements to the site access road (Douglas Drive) and the entrance on Route 116 are shown on Sheets 22 through 36. Minimization of indirect impacts involved balancing pre- and post-development watershed conditions downslope of the landfill, infrastructure area, and access road as presented in the separate Alteration of Terrain permit application submitted near concurrently with this Wetland application.

5.1 Landfill Expansion Footprint

Concept 1 – Desk Study

The siting criteria were first applied to the GSL site during the desk study phase of work. The initial potentially viable landfill footprint is shown on Figure 19 as Concept 1. The footprint boundary shows the limits of excavation and filling associated with the lined landfill area and the perimeter berm and

access road. Stormwater ponds needed to manage stormwater runoff, replenish groundwater, and treat runoff water quality are shown separately outside of the footprint limits. It was assumed during this preliminary period that the infrastructure area could be constructed, and the access road upgraded without substantial additional wetland filling or disturbance. The Concept 1 footprint would not result in filling or permanent disturbance of NWI wetlands or perennial streams and surface water. The footprint complies with all NHDES siting criteria other than separation to field-delineated wetlands.

The southern limits of Concept 1 were established to provide a 200-foot setback to an NWI designated perennial stream. A similar setback to NWI surface water established the western limits of Concept 1. The northwestern corner of Concept 1 was set back 200 feet from an intermittent stream and a nearby commercial sand and gravel mining operation located beyond the stream. Steep slopes limited the landfill footprint to the north, as well as a 100-foot setback to the property line shared with the managed forest area of Forest Lake State Park. The eastern limits of the Concept 1 footprint were set back 100 feet from a ridgeline to situate the landfill within the Alder Brook watershed and outside of the Forest Lake watershed.

Using the subsequently completed field-delineated wetland survey as a base plan layer, the landfill footprint of Concept 1 filled and permanently disturbed 40 acres of wetland, with required stormwater ponds resulting in an additional 3 acres of wetland filling or disturbance (not allowed by rules). Concept 1 has a landfill footprint of 238 acres and a capacity of 67 million cubic yards (MCY).

Concept 2 – Initial Site Visit

During initial site reconnaissance it became apparent that the extent of perennial surface water and significant wetlands extended into the east-central portion of the Concept 1 footprint. As shown on Figure 20, the footprint limits were adjusted to avoid those areas resulting in a decline in footprint area to 219 acres. Landfill capacity declined to 44 MCY and footprint wetland filling and disturbance declined to 32 acres applying the subsequently completed field delineated wetland limits. The stormwater pond wetland filling and disturbance declined to about 0.2 acres or less.

Concept 3 – Screening Level Design

Subsequent site reconnaissance confirmed the likelihood that the perennial stream and associated wetland complex in the east-central portion of the footprint extended east to the existing site road used to access the sand and gravel mining operation in the northern portion of the site. The landfill footprint was reduced to avoid filling or disturbance in this area. Observations also indicated the existence of bogs/beaver ponds along the eastern portion of the southern landfill footprint limits. The landfill footprint limits were moved to the north in this area to provide the required NHDES setbacks to surface water. As shown on Figure 21, the landfill footprint area declined to 181 acres, wetland filling and disturbance declined to 19 acres applying the subsequently completed field delineated wetland limits, the stormwater pond wetland filling and disturbance was unchanged at about 0.2 acres or less. Landfill capacity declined to 32 MCY.

Concept 4 – Preliminary Wetland Permit Level Design

The landfill footprint was developed to a Wetland Permit Level Design including grading of earthwork, and design of perimeter berms, swales, roadways and stormwater ponds and pond access roads as described above. The field delineated wetland survey was incorporated into existing conditions during these design efforts. The landfill footprint was reduced from Concept 3 to limit wetland filling and disturbance and to incorporate other features favorable to direct and indirect impacts:

- The landfill footprint was moved about 100 feet downslope and west from the ridgeline parallel to the eastern landfill limits relative to Concept 3. This change had the following results:
  - Filling wetlands near the northeast corner of the landfill is avoided.
  - The limit of waste is now 350 to 375 feet from the ridgeline, an additional 100 feet of separation from Concept 3, and about 190 feet from the Forest Lake Park boundary to the north.
  - The landfill is situated farther from the Forest Lake watershed.
  - The landfill is less visible, particularly from the eastern shore of Forest Lake.
- The southeast boundary of the landfill footprint was moved to the north to avoid a large wetland complex. This modification also reduces the landfill visibility from the southeast shore of Forest Lake.
- Stormwater ponds were added to the lowest southwest corner of the landfill to reduce indirect impacts to downslope wetlands and surface water. This change reduced the lined landfill area and extended the distance from the limit of waste to surface water and wetlands beyond what is required by NHDES regulation in this key location where leachate drains and be collected within the double-lined landfill.
- The limit of waste, or lined area of the landfill was set back at least 200 feet upgradient and 100 feet downgradient from field-delineated wetlands to conform with NHDES siting criteria. This change reduced the landfill footprint from 181 acres to 173 acres and provided a larger buffer between the waste and the wetlands. The lined footprint within the overall landfill footprint was 137 acres.
- The wetland setback criteria were modified to be based on topography rather than the groundwater phreatic surface. This change reduced the lined landfill area from 137 acres to 135 acres and provided a larger buffer between the waste and the wetlands.
- A round of minimization took place during the regulatory feedback process. Low retaining walls were added at the toe of slope of perimeter berms in places, a few stormwater ponds were moved out of wetlands, and low retaining walls were added to pond access roads to reduce wetland filling.

As shown on Figure 22, the overall landfill footprint was reduced to 173 acres, wetland taking declined to 18 acres, wetland filling associated with stormwater ponds and pond access roads remained at about 0.2 acres or less and landfill capacity declined to 23 MCY.

Concept 5 – Wetland Permit Level Design

NHDES, and U.S. Army Corps of Engineers (USACE) regulatory feedback on Concept 4 required re-evaluation of the project scope and design from a three-phase project to a single development. The NHDES-WMD solid waste permit is by law limited to a 20-year period. In this instance that period would include 2 years

of construction and 18 years of operation at an annual disposal rate of 600,000 CY per year for a total capacity of 10.8 MCY. The previous Concept 4 plan included a three-phase landfill development to be constructed and built over a 38-year period. The USACE and the USEPA communicated in permit meetings that the master plan buildout of three phases would need to be understood at the time of application. However, the NHDES Wetlands Bureau needed to limit the permitting scope to a single development. Therefore, the project team could not reconcile the project schedules and scopes of the various permitting processes.

With the new development, indirect impact to Alder Brook would be decreased, as detailed below. Alder Brook contains cold water brook trout habitat which would require that the project limit temperature increases among other runoff and groundwater discharge related impacts. Increased setback distances to the brook and abutting high value wetlands would mitigate warmer runoff temperature impacts and provide for additional treatment of overland flow from the landfill area.

Concepts 5.1 through 5.3 are alternatives for an 18-year duration project that better aligns the required permit applications and durations and incorporates the following design changes to reduce potential impacts to Alder Brook.

- The lined landfill footprint is reduced to 70 acres from 135 acres.
- The distance from the lined landfill footprint to Alder Brook increases substantially for 2 of the 3 alternatives.
- The total project area of disturbance, including landfill, infrastructure, stormwater, and roadway improvements is reduced to about 150 acres from 270 acres.
- The landfill operating duration is reduced to 18 years from 38 years.
- Wetland filling is reduced to 10 acres from 18 acres for two of the alternatives.
- Vernal pool filling is reduced to varying degrees for the alternatives evaluated.
- Stormwater pond surface area is reduced from 11 acres to 5 acres.
- Filling of intermittent streams is reduced for 2 of the 3 alternatives.
- A lined stormwater pond is added to the leachate handling portion of the infrastructure area to collect and contain any spills or breaches.

In addition:

- The maximum landfill height is lowered by 20 feet to reduce visibility.
- White liner and tarp geomembranes will be employed during construction and operations rather than conventional black materials to cool surface water runoff.
- Trees will be planted around and in ponds and adjacent to swales to shade and cool surface water.
- To the extent allowed by the rules, the ponds are designed to infiltrate runoff into the ground to aid in cooling the water.

5.2 Minimization of Selected On-Site Landfill Location

The objective of Concept 5 was to develop a single-phase project within the 3-phase Concept 4 footprint that minimizes environmental impacts. Our goal was to avoid wetland filling to the extent practicable, and limit filling of streams and vernal pools. Our evaluation considered wetland cover types and principal and

suitable wetland functions and values. We chose to avoid disturbing the high value wetlands associated with Alder Brook and its tributaries located west and south of the borrow pit access road, and to provide more separation between the landfill and Alder Brook. Three sub-concept alternatives developed for project consideration are shown as attached Concepts 5.1, 5.2, and 5.3 on Figures 23 through 25, respectively. Each concept would provide at least 10 MCY of capacity.

On-site alternative selection matrices are provided in Tables 3 and 4. The matrices cover the seven concepts and sub-concepts developed. Table 3 contains selection criteria for filling of four wetland cover types, two stream types, and vernal pools. Table 4 contains selection criteria in acreage filled for 12 principal and suitable functions and values.

Regarding Table 3, Concepts 5.2 and 5.3 have less total wetland filling than Concept 5.1. Concepts 5.2 and 5.3 fill about the same acreage of wetlands but differ in that Concept 5.2 fills more length of intermittent stream and fewer vernal pools than Concept 5.3. Regarding Table 4, again Concepts 5.2 and 5.3 fill significantly fewer total wetlands than Concept 5.1. Concept 5.2 fills a little less than Concept 5.3 of principal function/value wetland acreage, whereas Concept 5.3 fills a little less than Concept 5.2 in suitable function/value wetland acreage.

Overall, Concepts 5.2 and 5.3 have similar scoring considering the summaries provided in Tables 3 and 4. Concept 5.3 was selected as the preferred alternative when considering regulatory requirements other than wetlands. Concept 5.3 is set back 700 feet farther than Concept 5.2 from the main branch of Alder Brook. The brook has been identified as a cold water habitat trout among other species. This additional buffer provides benefits to water quality in the stream by naturally filtering landfill area runoff through overland flow and allowing runoff from the landfill to cool over an increased distance through forested areas and via a longer path of groundwater flow. Additionally, the increased buffer provided by Concept 5.3 provides longer groundwater travel times to Alder Brook and thus more time to study and remediate any releases detected in the monitoring wells located near the perimeter of the landfill.

5.3 Infrastructure Area

The infrastructure area and access road area of disturbance are shown on Figure 27. The infrastructure area includes truck scales, queueing, and staging areas; office and maintenance buildings; leachate storage, treatment and unloading facilities; a landfill gas to pipeline quality “natural gas” processing facility, and stormwater ponds. These infrastructure facilities are sited in upland areas and minimal wetlands are directly filled or disturbed by this portion of the project. Stormwater ponds are incorporated into the infrastructure site layout to control and treat runoff and to infiltrate groundwater to limit indirect impacts. In the recent design revisions, the infrastructure area has been consolidated into a smaller footprint and the distance from Alder Brook to the disturbed infrastructure area footprint increases to 1,600 feet from 650 feet.

5.4 Site Access Road (Douglas Drive)

The existing 7,000-foot-long site access road is appropriate for truck traffic associated with the current soil and rock mining operations at the site. Modifications to the grade and alignment of the road are required

to accommodate safe and efficient travel for the larger tractor trailer trucks delivering waste to the landfill. Modifications include widening the road to allow safe passing of trucks moving in opposite directions, widening turns to accommodate tractor trailer turning wheel motions, flattening certain sections for ease of travel and site lines, paving the road in current gravel sections, and thickening the pavement base section of paved areas near Route 116. The entrance to the site has been realigned into a 90 degree "T" configuration to improve turning motions.

The existing road crosses seven undersized and deteriorating culverts draining small watersheds flowing east to west. The road will be raised, and these culverts replaced with appropriately sized culverts. Wetlands border the road at these and other locations. Raising and widening the road will necessarily result in permanent and temporary wetland filling. Using conventional berm slopes the road upgrades would result in wetland filling. The design instead incorporates culvert headwalls and low retaining walls to reduce wetland filling.

Raising, widening, and paving the road would result in additional stormwater runoff. Accordingly, we are proposing to construct five stormwater ponds at selected locations along the road alignment to control runoff flow and treat runoff water quality. Stormwater management is discussed in more detail in the separate report in the Alteration of Terrain application.

The access road from the infrastructure area to the landfill is relocated 950 feet upstream from the previous design to an upgraded existing crossing. The existing pipe culvert will be replaced by an open bottomed box culvert. Details of the stream crossing are shown on Sheets 30 through 33 of the design drawings. The proposed box culvert will incorporate sufficient height and width to accommodate wildlife passage beneath the road. A second natural stream crossing near that location would be restored after it had earlier been diverted to the other channel through a man-made roadside swale. The reported perennial stream filling on Figure 27 includes filling of the man-made roadside ditch.

As shown on Figure 27, the overall access road and infrastructure area of disturbance is 36 acres, with wetland filling of 0.9 acres.

5.5 Evaluation of Other Possible On-Site Landfill Location Alternatives

We found no viable alternatives to the final permit-level design (Concept 5.3) that met project criteria for limiting overall environmental impacts and providing the required disposal capacity. Figure 30 shows four additional areas on site evaluated for the lined landfill. The rest of the site is unsuitable for a landfill as these areas contain perennial streams/ponds, significant wetland systems, ongoing commercial activities intended to be continued by the property owner and topographic constraints. We did not evaluate a contiguous part of the property located in the Town of Littleton as we preferred to site the landfill in only one municipality, and that parcel is crossed by a perennial tributary stream to the main stem of Hatch Brook.

Area A

Area A is located immediately north/northwest of the selected footprint. Although portions of Area A satisfy design criteria for the landfill (See Concept 5.2 on Figure 24), those Concept 5.2 areas would be set aside to provide a buffer between the landfill and Alder Brook. Active sand and gravel mines, and Alder Brook and additional perennial streams are located farther to the north/northwest. These

north/northwest portions of Area A include mountainside slopes that are too steep to provide a stable base grade for the landfill and financially viable disposal capacity.

Area B

Area B is located immediately west of the selected footprint. Area B also satisfies design criteria for the landfill, but it too has been set aside to provide a buffer between the landfill and Alder Brook.

Area C

Area C is located south of the Infrastructure Area and the selected footprint in a watershed that drains directly into the Ammonoosuc River rather than Alder Brook. It occupies an area on the south facing slope of a ridgeline. The potentially viable footprint is bounded by the crest of the hill to the north and west, steep slopes and the Forest Lake drainage basin divide to the northeast; wetlands, surface water and the 500-foot property line set back to the south; and setbacks to the site owner's house along with the Alder/Hatch Brook water shed boundary to the southeast. Accounting for setbacks, the landfill footprint is too small to provide the needed disposal capacity. Furthermore, the Area C landfill would be significantly more visible to many more residences on the lake than the selected alternative and would also face and be visible to the nearby abutting residential properties lining West Side Road immediately to the south. Importantly, the property owner is considering an industrial park at this location and is not in favor of pursuing a landfill footprint in Area C.

Area D

Area D contains extensive NWI designated wetlands and perennial streams including the main stem of Alder Brook.

6.0 ENVIRONMENTAL JUSTICE CONSIDERATIONS

Environmental justice is based on the principle that all people have a right to a clean and healthful environment regardless of race, nationality, income, age, education level, or language proficiency. Environmental justice is the equal protection of all people with respect to enforcement of environmental laws, regulations and policies and the equitable distribution of environmental benefits and burdens. The objectives of our environmental justice review are to evaluate whether an environmental justice qualifying population exists in the vicinity of the prospective landfill site, and to consider the presence of such a population in siting the landfill.

CMA Engineers evaluated environmental and socioeconomic data for the Dalton (GSL) site using the USEPA Environmental Justice Screening tool. The screening tool results are provided in Appendix C. The Environmental Justice Screening Tool collects data on socioeconomic indicators such as people of color, income, age, employment, education, and English- speaking proficiency; and environmental parameters associated with air quality, water quality, and waste site proximity.

Regarding the pollution levels and sources provided in Appendix C, New Hampshire has on average lower levels of air and water pollution, and fewer sources of such pollution, than the United States as a whole. The area within two miles of the GSL site in the Towns of Dalton, Whitefield, Bethlehem, and Littleton has overall lower levels of pollution and pollution sources than the state-wide values. These data indicate that

the residents in the vicinity of the GSL site do not qualify as an Environmental Justice Population as already degraded environmental conditions do not exist.

Similarly, the local GSL population does not qualify as an Environmental Justice Population considering the unemployment rate, English-speaking proficiency, or education level, as the local values are mostly more favorable than the state-wide and country-wide values. New Hampshire has a small population of People of Color, particularly outside of the major cities and towns. As a result, the relatively few People of Color in the vicinity of the GSL site do not qualify as an Environmental Justice Population as the project will not have a disproportionate impact on that population.

The socioeconomic indicators for income and age do indicate the need for further evaluation. Low income is defined by USEPA as income being lower than twice the national poverty level. The low-income population within 2 miles of the site comprises 25 percent of those residents. That value is higher than the state-wide value of 19 percent, but lower than the national value of 30 percent. The concentration of residents over the age of 64 in the vicinity of the GSL site is 27 percent, a value that is higher than the state-wide concentration of 18 percent, which in turn is higher than the national concentration of 16 percent. This older population is more likely to be retired and living on a fixed income, perhaps impacting the income levels.

Given this mixture of age and income, we evaluated real estate values as a measure of wealth other than income. Realtor.com reports the median sale price of homes in Coos and Grafton Counties to be $210,000 and $357,000, respectively, in February 2023. Using the Zillow website, median home values within 2 miles of the GSL site are shown to be worth $321,000 in January 2023. Note that Zillow estimated home values for only 76 percent of the homes known to exist in the 2-mile zone. We judge this relatively large sampling of home values to be reasonably representative of the total. The value of real estate in the vicinity of the GSL is within the upper range of the surrounding communities. A recent check indicates real estate values in the area have increased by about 9 percent since February.

We also reviewed the abutter list provided in the wetland application. Of the total 36 residential properties that abut the GSL site and the current owner's contiguous property, only 15 have mailing addresses in the Towns of Dalton, Whitefield, Bethlehem, or Littleton. The out-of-town ownership of the other 21 abutting properties suggest these properties are second homes. The out-of-town owners are not considered residents by the USEPA environmental justice screen and are excluded from the socioeconomic indicators including income. Including the out-of-town owners within the 2-mile survey zone would likely lower the reported percentage of the low-income population substantially as the second homeowners are more likely to have a higher income than the local population in this instance.

Lastly, GSL will offer a host community agreement that would include significant annual payments to the Town of Dalton, free trash pickup and disposal, and recycling service to every resident, and other financial benefits. Negotiating the proposed host community benefit agreement is the best opportunity for Dalton residents to provide input that will help shape operations at the facility. The host community agreement terms will provide direct financial benefits to residents of Dalton in terms of lower property taxes.

Considering the income, age and real estate data discussed above, as well as the financial benefits of the host community agreement, the residents in the vicinity of the GSL site do not qualify as an Environmental Justice Population because of low income.

In addition to the USEPA Environmental Justice Screening tool, the site and area was evaluated using Climate and Economic Justice Screening Tool provided by the White House Council on Environmental Quality. Census tracts are considered disadvantaged if they meet the threshold for at least one of the tool's categories of burden and corresponding economic indicator. These categories include Income, Climate Change, Energy, Health, Housing, Legacy Pollution, Transportation, Water and Wastewater, and Workforce Development.

According to the Tool, the census tract containing the project location does not meet any burden threshold. Notably, the proportion of people in households where income is less than or equal to twice the federal poverty level in the Dalton/Whitefield census tract is below this economic threshold and therefore the site and surrounding area are not considered to be disadvantaged.

TABLES

Table 1
Summary of Quantitative Landfill Characteristics

ITEM	DALTON	CARROLL WEST	CARROLL EAST	SHELBURNE	NCES BETHLEHEM[1]
Wetland Area Filled:					
Screening Level Footprint[2]	18.6 acres	22 acres	41 acres	15 acres	+/- 1 acre
Permit Level Design Footprint[3]	9.6 acres	12 acres	22 acres	12 acres	
Lined Landfill Area:					
Screening Level Footprint	181 acres	242 acres	190 acres	95 acres	60 acres
Permit Level Design Footprint	70 acres	82 acres	70 acres	70 acres	
Landfill Capacity:					
Screening Level Capacity	32 mcy[4]	24 mcy	30 mcy	16 mcy	8 mcy
Permit Level Design Footprint	10.8 mcy	10.8 mcy	10.8 mcy	10.8 mcy	
Distance to Sensitive Surface Water[5]:					
Screening Level Design	910 feet	2,100 feet	2,000 feet	220 feet	1,000 feet
Permit Level Design	2,650 feet	2,300 feet	2,500 feet	350 feet	
Local Population[6]:	510	568	482	102	340

[1] The NCES Landfill expansion is not a viable site due to Town of Bethlehem zoning restrictions. Data presented for this facility is for information and comparative purposes only.

[2] The screening level design was developed for each site based on a desk top study and multiple site visits by the project team. The screening level footprint includes the lined landfill area, perimeter roads and embankments, and stormwater ponds and pond access roads.

[3] The permit level design was completed for the selected alternative, the Dalton site, and included consideration of field delineated wetland and surface water bodies and design of site features and earthwork as described in the text. Percentage relative reductions in screening level wetland filling, landfill area, and capacity at the Dalton site resulting from permit level design work were qualitatively applied to the other candidate sites for purposes of comparison.

[4] mcy is million cubic yards.

[5] Sensitive surface water: Dalton - Alder Brook, Carroll West – Bog Brook, Carroll East – Carroll Stream, Shelburne – Lary Brook.

[6] Local population numbers derived from the USEPA Social Justice Screening Tool and assuming a 2-mile radius from the landfill. Full output from the screening tool is provided in Appendix C.

Table 2
Site Selection Matrix

PART 1: Wetland and Capacity Considerations[7,8,9]

Weighted Score Values Range From 5 to 20 (Correspond to rankings 1 to 4)				
ITEM	**DALTON**	**CARROLL WEST**	**CARROLL EAST**	**SHELBURNE**
Wetland Acreage Filled in Landfill Footprint	5	10	20	10
Distance to Sensitive Surface Water	5	10	5	20
Site Access - Direct Indirect Impacts to Wetlands and Surface Water	5	10	15	20
Subtotal Score PART 1:	15	30	40	50

PART 2: Qualitative Assessment of Key Site Features

Score Values Range From 1 to 4 (Correspond to ranking 1 to 4)				
ITEM	**DALTON**	**CARROLL WEST**	**CARROLL EAST**	**SHELBURNE**
Access to State Highway	1	2	3	4
Traffic Routing to Site	3	1	1	4
Natural Screening of Landfill	2	3	4	1
Isolation from abutters and Public	2	3	4	1
Groundwater Monitorability	2	3	4	1
Potential Sensitive Receptors	2	3	3	3
Potential Ecological Affects	1	2	3	4
Compatibility with Surrounding Land Use	1	2	3	4
Terrain and Slopes	3	2	1	4
Willing Owner(s)	1	2	4	3
Subtotal Score PART 2:	18	23	30	28
TOTAL:	**33**	**53**	**70**	**78**

Note: Lower scores are favorable, higher scores are unfavorable

[7] Refer to Table 1 and the text discussion for the rationale for the ranking.

[8] The Part 1 rankings are multiplied by a factor of 5 to weight the importance of these criteria, and the Part 2 rankings are weighted 1 for each rank.

[9] The Selection Matrix uses the wetland permit level design values where present.

Table 3 - Wetland Impacts by Cover Type for Different Landfill Alternatives
Granite State Landfill
Dalton, NH

Concept	Wetland Cover Type (Acres)					Stream Type (Feet)		Number of Vernal Pools
	PFO	PSS	PE/SS	PEM	Total	Intermittent	Perennial	
Concept 1	33.7	4.8	4.6	0.2	43.3	2279	5484	7
Concept 2	23.8	4.1	4.2	0.1	32.2	1833	5070	7
Concept 3	14.6	3.3	0.7	0	18.6	1614	426	7
Concept 4	13.9	3.4	0.7	0	18.0	1614	108	7
Concept 1 to 4 Roadway	0.1	0	0	0	0.1	0	0	0
Concept 5.1	8.7	3.1	0.2	0	12.0	0	0	7
Concept 5.2	7.7	1.9	0.2	0	9.8	1618	0	1
Concept 5.3	6.6	3.0	0.2	0	9.8	932	0	5
Concept 5.1 to 5.3 Roadway	0.5	0.2	0.2	0	0.9	24	910	0

Notes:
1. Refer to Figures 19 to 27 for additional information and notes regarding data sources and area/length calculations.
2. Areas were rounded to the nearest tenth of an acre. After-the-Fact Impacts are not included.
3. Perennial stream lengths were multiplied by a factor of three, except for a segment of perennial stream adjacent to Douglas Drive (refer to Wetland Impact Plans prepared by Horizons Engineering for additional information).
4. Abbreviations: PFO = Palustrine Forested; PSS = Palustrine Scrub-Shrub; PEM/SS = Palustrine Emergent/Scrub-Shrub; PEM = Palustrine Emergent

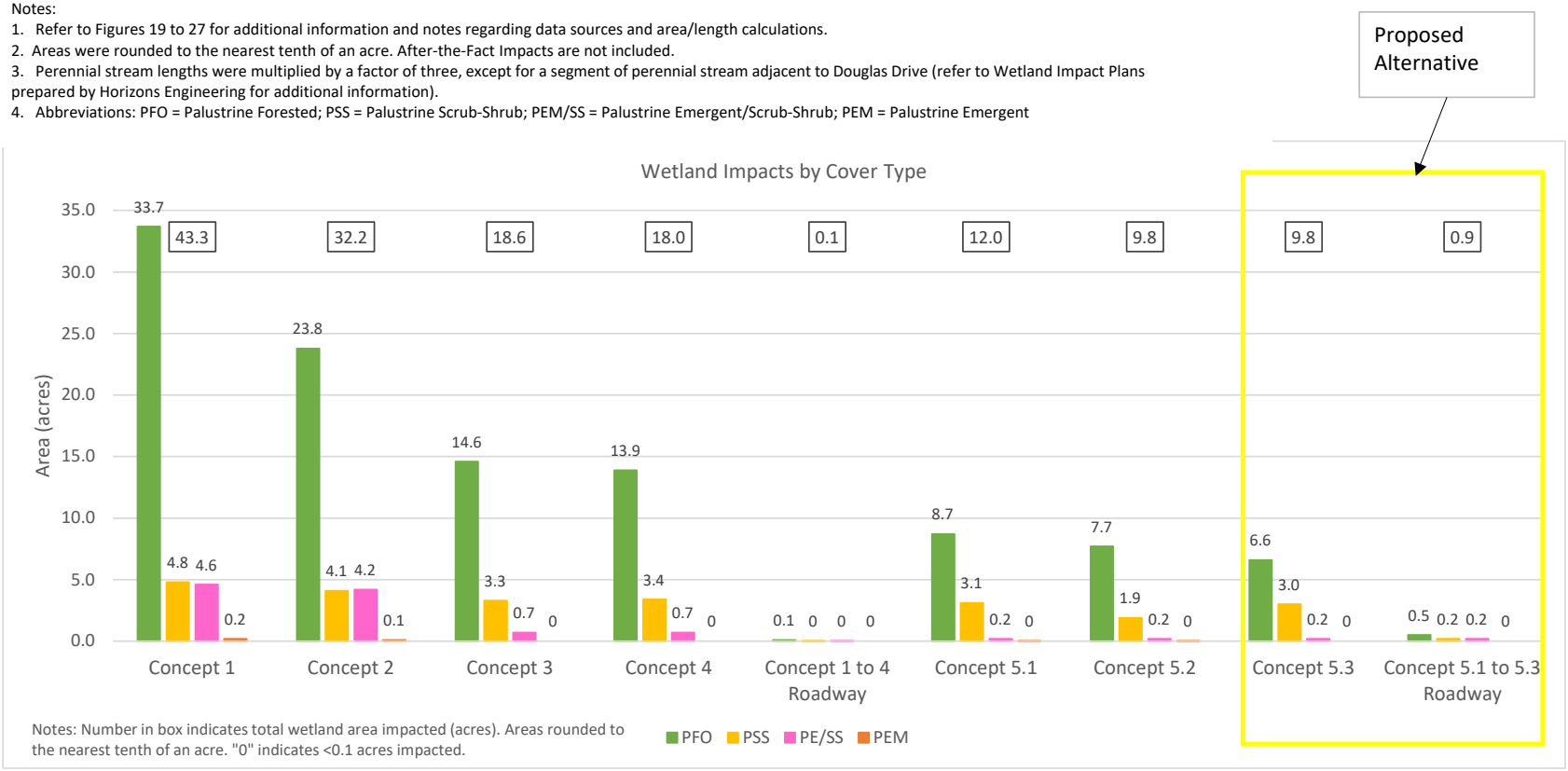


Table 4 - Wetland Impacts by Principal and Suitable Functions and Values for Different Landfill Alternatives
Granite State Landfill
Dalton, NH

Concept	Ground-water	Floodflow Alteration	Fish & Shellfish Habitat	Sediment/ Shoreline Stabilization	Nutrient Removal	Product Export	Sediment Shoreline	Wildlife Habitat	Recreation	Education, Scientific Value	Unique Heritage	Visual Quality, Aesthetics
Principal Function/Value (Acres)												
Concept 1	39.1	33.2	6.5	21.1	26.3	22.0	1.2	42.1	0.0	0.0	0.2	0.0
Concept 2	28.0	23.4	4.9	11.9	16.8	13.3	0.0	31.1	0.0	0.0	0.2	0.0
Concept 3	14.8	10.4	0.0	5.6	5.6	1.2	0.0	17.6	0.0	0.0	0.2	0.0
Concept 4	14.5	10.1	0.0	5.2	5.2	1.0	0.0	16.9	0.0	0.0	0.2	0.0
Road/Infrastructure - Concept 4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Concept 5.1	10.1	8.5	0.0	3.5	3.6	0.1	0.0	11.4	0.0	0.0	0.2	0.0
Concept 5.2	8.5	4.9	0.0	1.2	1.3	1.2	0.0	8.9	0.0	0.0	0.0	0.0
Concept 5.3	7.6	5.2	0.0	0.0	0.1	0.3	0.0	9.0	0.0	0.0	0.0	0.0
Road/Infrastructure - Concept 5.3	0.1	0.1	0.1	0.0	0.1	0.1	0.0	0.3	0.0	0.0	0.0	0.0
Suitable Function/Value (Acres)												
Concept 1	1.6	0.9	11.9	11.0	6.2	14.6	17.7	1.1	0.0	0.0	0.0	16.7
Concept 2	1.9	1.0	0.0	6.0	6.3	5.7	0.1	1.4	0.0	0.0	0.0	0.0
Concept 3	1.5	0.9	1.0	5.7	6.0	11.1	0.2	1.0	0.0	0.0	0.0	2.0
Concept 4	1.2	0.9	1.0	5.8	5.8	10.9	0.0	1.0	0.0	0.0	0.0	1.6
Roadway - Concept 4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Concept 5.1	1.1	0.9	0.0	5.8	5.8	8.4	0.1	0.7	0.0	0.0	0.0	1.0
Concept 5.2	0.3	0.0	1.2	3.7	3.7	5.6	0.1	1.0	0.0	0.0	0.0	0.1
Concept 5.3	1.6	0.9	0.0	5.8	6.2	5.6	0.0	0.8	0.0	0.0	0.0	0.0
Roadway - Concept 5.3	0.4	0.1	0.0	0.2	0.1	0.1	0.1	0.6	0.0	0.0	0.0	0.0

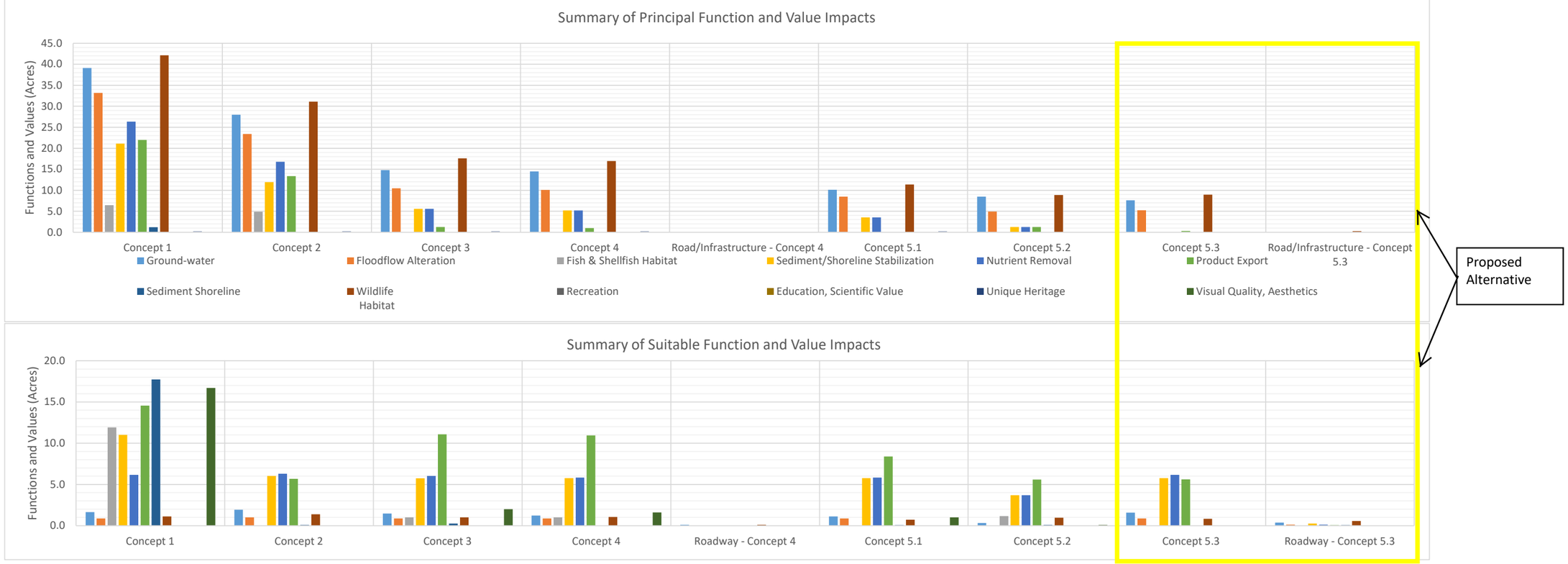


Table 5 - Wetland Functions and Values and Impacted Areas
Granite State Landfill
Dalton, New Hampshire

Primary Sheet	Representative Flagging ID	GIS/CAD ID	Wetland Cover Type	Latitude	Longitude	Total Area (Acres)	Impacted Area (Acres)										Number of Principal Functions	Number of Suitable Functions
							Concept 1	Concept 2	Concept 3	Concept 4	Roadway Concept 1 to 4	Concept 5.1	Concept 5.2	Concept 5.3	Roadway Concept 5.1 to 5.3	Total - Concept 5.3 + Roadway		
Within Concept 5.3																		
2	A70	2_A70	PSS/FO1	44.3511	-71.7030	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3	3
8	38	8_38	PSS/FO	44.3407	-71.6938	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	1
8	39	8_39	PSS1EX	44.3403	-71.6939	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	1
8	40	8_40	PSS1Ex, PFO	44.3397	-71.6938	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0	1
8	44	8_44	PFO1	44.3400	-71.6942	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	1
8	45	8_45	PFO1	44.3394	-71.6943	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1	1
9	T-601	9_T-601	PSS/FO1	44.3433	-71.6936	0.6	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0	2
12	C-280	12_C-280	PSS/FO	44.3496	-71.6947	1.6	1.6	1.6	0.2	0.0	0.0	0.0	0.1	0.0	0.0	0.0	6	2
13	16-100	13_16-100	R4UBJ, PFO1	44.3520	-71.6995	3.4	3.3	2.0	1.8	1.8	0.0	0.0	1.8	0.7	0.0	0.7	2	1
13	17.18	13_17.18	PFO1	44.3526	-71.6967	0.3	0.3	0.3	0.3	0.3	0.0	0.2	0.3	0.2	0.0	0.2	0	1
19	20.21.27.34.35.82.83.84	19_20.21.27.34.35.82.83.84	PFO1	44.3556	-71.6926	0.2	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.2	0.0	0.2	0	2
20	14.22	20_14.22	PFO1	44.3526	-71.6935	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.1	0.1	0.0	0.1	0	2
20	19.26	20_19.26	PFO1	44.3541	-71.6914	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	1
20	6	20_6	PSS/FO	44.3523	-71.6920	1.7	1.7	1.7	1.6	1.7	0.0	1.7	1.7	1.7	0.0	1.7	2	0
20	90	20_90	PFO1E	44.3539	-71.6956	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.1	0	1
21	1.3.7.10.11.12.ZZ	21_1.3.7.10.11.12.ZZ	PSS/FO	44.3507	-71.6930	3.9	3.9	3.9	3.9	3.9	0.0	3.9	3.7	3.9	0.0	3.9	3	4
21	3.13	21_3.13	PEM/SS1EXd	44.3493	-71.6926	0.2	0.2	0.2	0.1	0.2	0.0	0.2	0.2	0.1	0.0	0.1	0	1
22	FF.MM	22_FF.MM	PSS/FO	44.3483	-71.6883	0.4	0.4	0.4	0.3	0.1	0.0	0.1	0.0	0.4	0.0	0.4	1	2
22	LL	22_LL	PSS	44.3475	-71.6908	0.9	0.9	0.9	0.9	0.9	0.0	0.9	0.0	0.9	0.0	0.9	1	4
22	NN.PP.QQ	22_NN.PP.QQ	PFO/SS	44.3482	-71.6915	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0	1
22	OO	22_OO	PSS	44.3479	-71.6915	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.1	0.0	0.1	1	1
22	RR.RRR.UU.YY	22_RR.RRR.UU.YY	PFO1	44.3494	-71.6898	1.0	1.0	1.0	1.0	1.0	0.0	1.0	0.0	1.0	0.0	1.0	3	4
22	SS.VV.WW	22_SS.VV.WW	PFO1	44.3492	-71.6909	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	1
22	T	22_T	PSS/FO1	44.3469	-71.6929	3.3	3.3	3.3	2.6	2.6	0.0	2.6	0.0	0.0	0.0	0.0	5	1
23	BB.CC.JJ.KK	23_BB.CC.JJ.KK	PEM/SS1Edx	44.3460	-71.6912	0.2	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.2	1	1
23	T.BB.CC	23_T.BB.CC	R3UBH, PSS/FO	44.3452	-71.6923	9.7	5.2	4.9	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	6	2
26	BB	26_BB	PSS/FO1E R4UBJ	44.3486	-71.6872	6.8	1.9	1.7	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.3	4	0
31	43	31_43	PEM/SS1Edx	44.3386	-71.6937	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1	1
31	43.46	31_43.46	PSS/FO	44.3387	-71.6941	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1	1
31	47	31_47	PEM/SS1Edx	44.3377	-71.6930	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1	1
31	68	31_68	PSS1Edx	44.3381	-71.6918	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	3
32	48.49.50	32_48.49.50	PSS/FO4/1	44.3343	-71.6941	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0	5
33	52.53.54.55.56	33_52.53.54.55.56	PSS/FO	44.3334	-71.6940	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0	1
34	57	34_57	PSS1E	44.3311	-71.6947	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0
34	58.59.60.61	34_58.59.60.61	PSS/FO	44.3292	-71.6942	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.2	0	1
35	61	35_61	PFO, R4UBJ, PEM1Edx	44.3284	-71.6933	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2	3
35	68	35_68	PSS/FO. R3UBH	44.3274	-71.6919	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0	2
35	70.71.72	35_70.71.72	PSS/FO, R3UBH	44.3273	-71.6944	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	0
Within Alternative Concept																		
1	33.79	1_33.79	PFO, R3UBH	44.3537	-71.7009	0.9	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	2	1
2	29.73.74.75	2_29.73.74.75	PSS/FO, R3UBH, R4UBJ	44.3513	-71.7017	2.9	1.1	1.2	1.0	1.0	0.0	0.0	1.2	0.0	0.0	0.0	6	1
3	C.X	3_C.X	R3UBH, PEM/SS	44.3507	-71.6966	16.3	10.9	3.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	6	4
3	K43	3_K43	PSS/FO1/4Eb	44.3480	-71.7017	4.5	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8	1
5	C.L	5_C.L	PSS, PFO	44.3461	-71.6970	0.9	0.7	0.7	0.7	0.6	0.0	0.0	0.0	0.0	0.0	0.0	2	0
10	80	10_80	PSS	44.3447	-71.6954	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	2
10	C708.760	10_C708.760	PFO1E	44.3461	-71.6952	0.4	0.4	0.4	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.0	1	0
10	R	10_R	PSSFO1/4E	44.3453	-71.6965	0.5	0.5	0.5	0.5	0.5	0.0	0.0	0.0	0.0	0.0	0.0	1	0
10	U-1.13	10_U-1.13	PSS1	44.3468	-71.6937	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	2	0
11	C-500	11_C-500	PFO, PEM/SS	44.3488	-71.6961	3.0	3.0	1.8	1.8	1.6	0.0	0.9	0.0	0.0	0.0	0.0	5	3
11	C-585	11_C-585	PFO, PEM/SS	44.3474	-71.6989	3.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5	3
11	C-690	11_C-690	PEM/SS	44.3465	-71.6961	0.2	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	2	0
11	S-1.12	11_S-1.12	PFO	44.3477	-71.6958	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1	0
11	T-262	11_T-262	PSS/FO VP-2	44.3470	-71.6934	0.1	0.1	0.1	0.1	0.1	0.0	0.1	0.0	0.0	0.0	0.0	2	0
13	16-1	13_16-1	PEM1Ex	44.3518	-71.7003	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	2
14	32.87.90.91	14_32.87.90.91	PFO1	44.3538	-71.7002	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	1	0
14	89	14_89	PFO1	44.3539	-71.6998	0.3	0.3	0.3	0.3	0.1	0.0	0.0	0.3	0.0	0.0	0.0	1	0
26	GG	26_GG	PFO1/4E	44.3484	-71.6860	0.3	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	1	0
Outside Alternatives (included for reference only)																		
4	J.C	4_J.C	PEM, PSS, PFO	44.3455	-71.7002	5.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5	3
6	T393	6_T393	PSS/FO, R3UBH	44.3427	-71.6975	9.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8	2
7	X.Z	7_X.Z	PSS/FO	44.3406	-71.6970	13.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2	4
35	62	35_62	PSS	44.3279	-71.6945	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0	1
36	Ammonoosuc River	36_AR	R2UBH	44.3267	-71.6947	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	8	4

Table 5 - Wetland Functions and Values and Impacted Areas
Granite State Landfill
Dalton, New Hampshire

Primary Sheet	Representative Flagging ID	GIS/CAD ID	Function and Values												
			Ground-water	Floodflow Alteration	Fish & Shellfish Habitat	Sediment/Shoreline Stabilization	Nutrient Removal	Product Export	Sediment Shoreline	Wildlife Habitat	Recreation	Education, Scientific Value	Unique Heritage	Visual Quality, Aesthetics	Endangered Species Habitat
Within Concept 5.3															
2	A70	2_A70	P	P	-	X	X	X	-	P	-	-	-	-	-
8	38	8_38	-	-	-	-	-	-	-	X	-	-	-	-	-
8	39	8_39	-	-	-	-	-	-	-	X	-	-	-	-	-
8	40	8_40	-	-	-	-	-	-	-	X	-	-	-	-	-
8	44	8_44	-	-	-	-	-	-	-	X	-	-	-	-	-
8	45	8_45	X	-	-	-	-	-	-	P	-	-	-	-	-
9	T-601	9_T-601	X	-	-	-	-	-	-	X	-	-	-	-	-
12	C-280	12_C-280	P	P	-	P	P	P	X	P	-	-	-	X	-
13	16-100	13_16-100	P	-	-	-	-	X	-	P	-	-	-	-	-
13	17.18	13_17.18	-	-	-	-	-	-	-	X	-	-	-	-	-
19	20.21.27.34.35.82.83.84	19_20.21.27.34.35.82.83.84	X	-	-	-	-	-	-	X	-	-	-	-	-
20	14.22	20_14.22	X	-	-	-	-	-	-	X	-	-	-	-	-
20	19.26	20_19.26	-	-	-	-	-	-	-	X	-	-	-	-	-
20	6	20_6	P	-	-	-	-	-	-	P	-	-	-	-	-
20	90	20_90	-	-	-	-	-	-	-	X	-	-	-	-	-
21	1.3.7.10.11.12.ZZ	21_1.3.7.10.11.12.ZZ	P	P	-	X	X	X	-	P (VP-7)	-	-	X	-	-
21	3.13	21_3.13	-	-	-	-	-	-	-	X	-	-	-	-	-
22	FF.MM	22_FF.MM	X	-	-	-	X	-	-	P	-	-	-	-	-
22	LL	22_LL	X	X	-	X	X	-	-	P	-	-	-	-	-
22	NN.PP.QQ	22_NN.PP.QQ	-	-	-	-	-	-	-	X	-	-	-	-	-
22	OO	22_OO	-	-	-	-	-	-	-	P (VP-3)	-	-	X	-	-
22	RR.RRR.UU.YY	22_RR.RRR.UU.YY	P	P	-	X	X	X	-	P (VP-4,5,6)	-	-	X	-	-
22	SS.VV.WW	22_SS.VV.WW	-	-	-	-	-	-	-	X	-	-	-	-	-
22	T	22_T	P	P	-	P	P	X	-	P	-	-	-	-	-
23	BB.CC.JJ.KK	23_BB.CC.JJ.KK	X	-	-	-	-	-	-	P	-	-	-	-	-
23	T.BB.CC	23_T.BB.CC	P	P	P	X	P	P	X	P	-	-	-	-	-
26	BB	26_BB	P	P	-	-	-	P	-	P	-	-	-	-	-
31	43	31_43	X	-	-	-	-	-	-	P	-	-	-	-	-
31	43.46	31_43.46	X	-	-	-	-	-	-	P	-	-	-	-	-
31	47	31_47	X	-	-	-	-	-	-	P	-	-	-	-	-
31	68	31_68	X	-	-	X	-	-	-	X	-	-	-	-	-
32	48.49.50	32_48.49.50	X	X	-	X	X	-	-	X	-	-	-	-	-
33	52.53.54.55.56	33_52.53.54.55.56	-	-	-	-	-	-	-	X	-	-	-	-	-
34	57	34_57	-	-	-	-	-	-	-	-	-	-	-	-	-
34	58.59.60.61	34_58.59.60.61	-	-	-	-	-	-	-	X	-	-	-	-	-
35	61	35_61	P	X	-	X	X	-	-	P	-	-	-	-	-
35	68	35_68	-	-	-	X	-	X	-	-	-	-	-	-	-
35	70.71.72	35_70.71.72	-	-	-	-	-	-	-	-	-	-	-	-	-
Within Alternative Concept															
1	33.79	1_33.79	P	-	-	-	-	X	-	P	-	-	-	-	-
2	29.73.74.75	2_29.73.74.75	P	P	X	P	P	P	-	P	-	-	-	-	-
3	C.X	3_C.X	P	P	X	P	P	P	X	P	-	-	X	X	-
3	K43	3_K43	P	P	P	P	P	P	P	P	-	-	-	X	-
5	C.L	5_C.L	P	-	-	-	-	-	-	P	-	-	-	-	-
10	80	10_80	X	-	-	-	-	-	-	X	-	-	-	-	-
10	C708.760	10_C708.760	-	-	-	-	-	-	-	P	-	-	-	-	-
10	R	10_R	-	-	-	-	-	-	-	P	-	-	-	-	-
10	U-1.13	10_U-1.13	-	-	-	-	-	-	-	P (VP-1)	-	-	P	-	-
11	C-500	11_C-500	P	P	-	P	P	X	-	P	-	-	X	X	-
11	C-585	11_C-585	P	P	-	P	P	X	-	P	-	-	X	X	-
11	C-690	11_C-690	P	-	-	-	-	-	-	P	-	-	-	-	-
11	S-1.12	11_S-1.12	-	-	-	-	-	-	-	P	-	-	-	-	-
11	T-262	11_T-262	-	-	-	-	-	-	-	P (VP-2)	-	-	P	-	-
13	16-1	13_16-1	X	-	-	-	-	-	-	X	-	-	-	-	-
14	32.87.90.91	14_32.87.90.91	-	-	-	-	-	-	-	P	-	-	-	-	-
14	89	14_89	-	-	-	-	-	-	-	P	-	-	-	-	-
26	GG	26_GG	-	-	-	-	-	-	-	P	-	-	-	-	-
Outside Alternatives (included for reference only)															
4	J.C	4_J.C	P	P	-	P	P	X	-	P	-	-	X	X	-
6	T393	6_T393	P	P	P	P	P	P	P	P	-	-	X	X	-
7	X.Z	7_X.Z	P	X	-	X	X	X	-	P	-	-	-	-	-
35	62	35_62	X	-	-	-	-	-	-	-	-	-	-	-	-
36	Ammonoosuc River	36_AR	P	P	P	P	P	P	P	P	X	X	X	X	-

Table 5 - Wetland Functions and Values and Impacted Areas
Granite State Landfill
Dalton, New Hampshire

Notes:

1. Primary sheet, flagging IDs, cover types, and function and values were provided by B.H. Keith Associates of Freedom, New Hampshire in November 2023. Sheet numbers reference the Existing Conditions Wetland Plans prepared by Horizons Engineers of Littleton, New Hampshire. Limits of disturbance for Concepts 1 through 4, 5.1, 5.2, and 5.3 were provided by CMA Engineers of Portsmouth, NH on October 23 and 25, 2023. Impacted wetland areas refers to the acreage of permanent and temporary wetland impcats within the proposed limits of disturbance for each concept. Areas were rounded to the nearest tenth of an acre. Latitudes and longitudes refer to the centroid of the corresponding wetland features.

2. Refer to Figures 19 through 29 for additional information. Refer to information included elsewhere in this application package for additional information regarding delineation, survey, and description of wetlands.

3. Abbreviations:

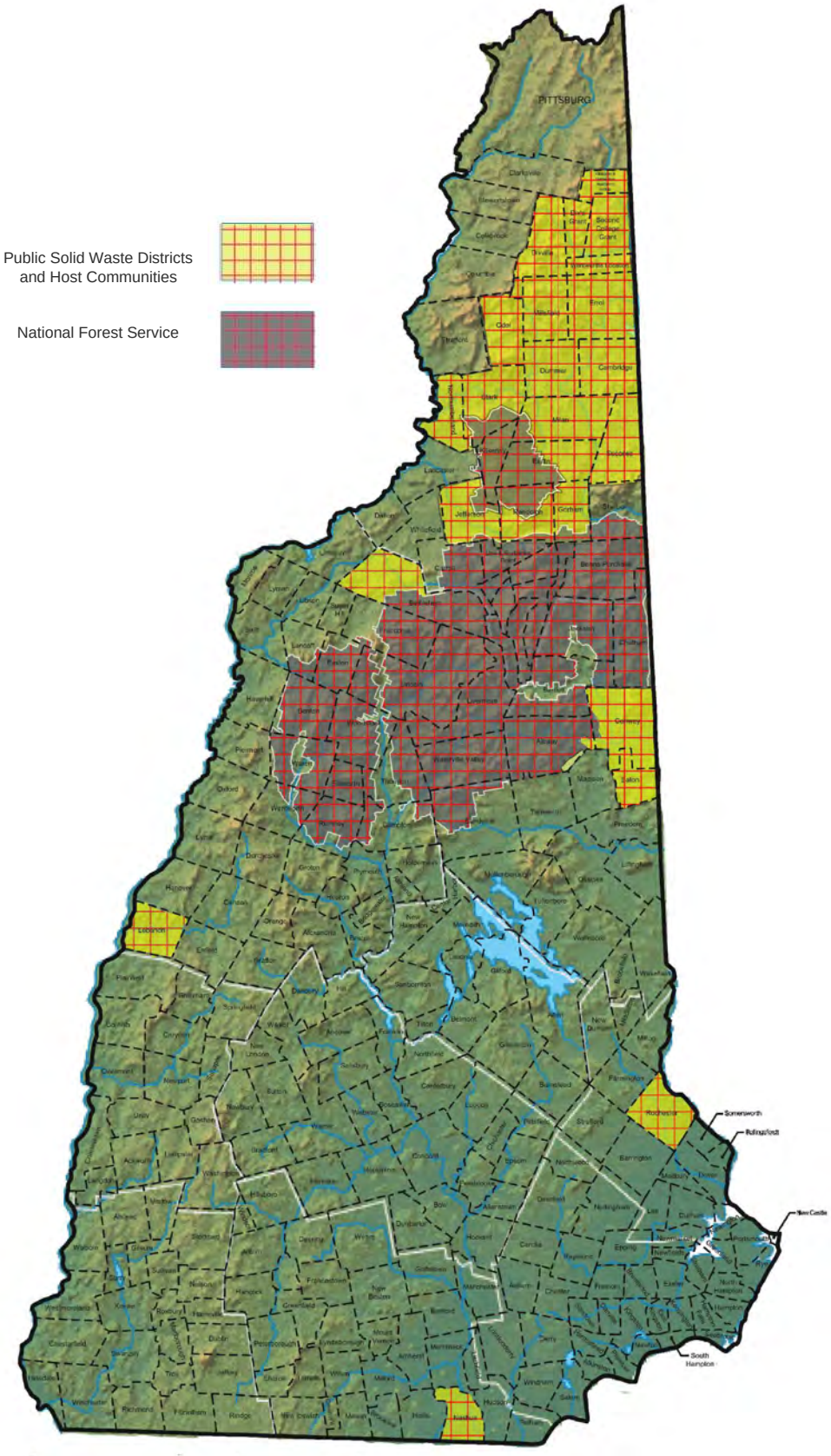
Wetland Cover Type Class:

PSS1E = Palustrine Scrub-Shrub, Broad-leaved Deciduous, Seasonally Flooded/Saturated
PFO1E = Palustrine Forested, Broad-leaved Deciduous, Seasonally Flooded/Saturated
PFO4E = Palustrine Forested, Needle-leaved Evergreen, Seasonally Flooded/Saturated
PME1E = Palustrine Emergent, Persistent, Seasonally Flooded/Saturated
R4UBJ = Riverine, Intermittent, Unconsolidated Bottom, Intermittently Flooded
R3UBH = Riverine, Upper Perennial, Unconsolidated Bottom, Permanently Flooded
R2UBB = Riverine, Lower Perennial, Unconsolidated Bottom, Permanently Flooded
VP = Vernal Pool

Function/Value:

X = Sustainable Function/Value
P= Principal Function/Value

FIGURES



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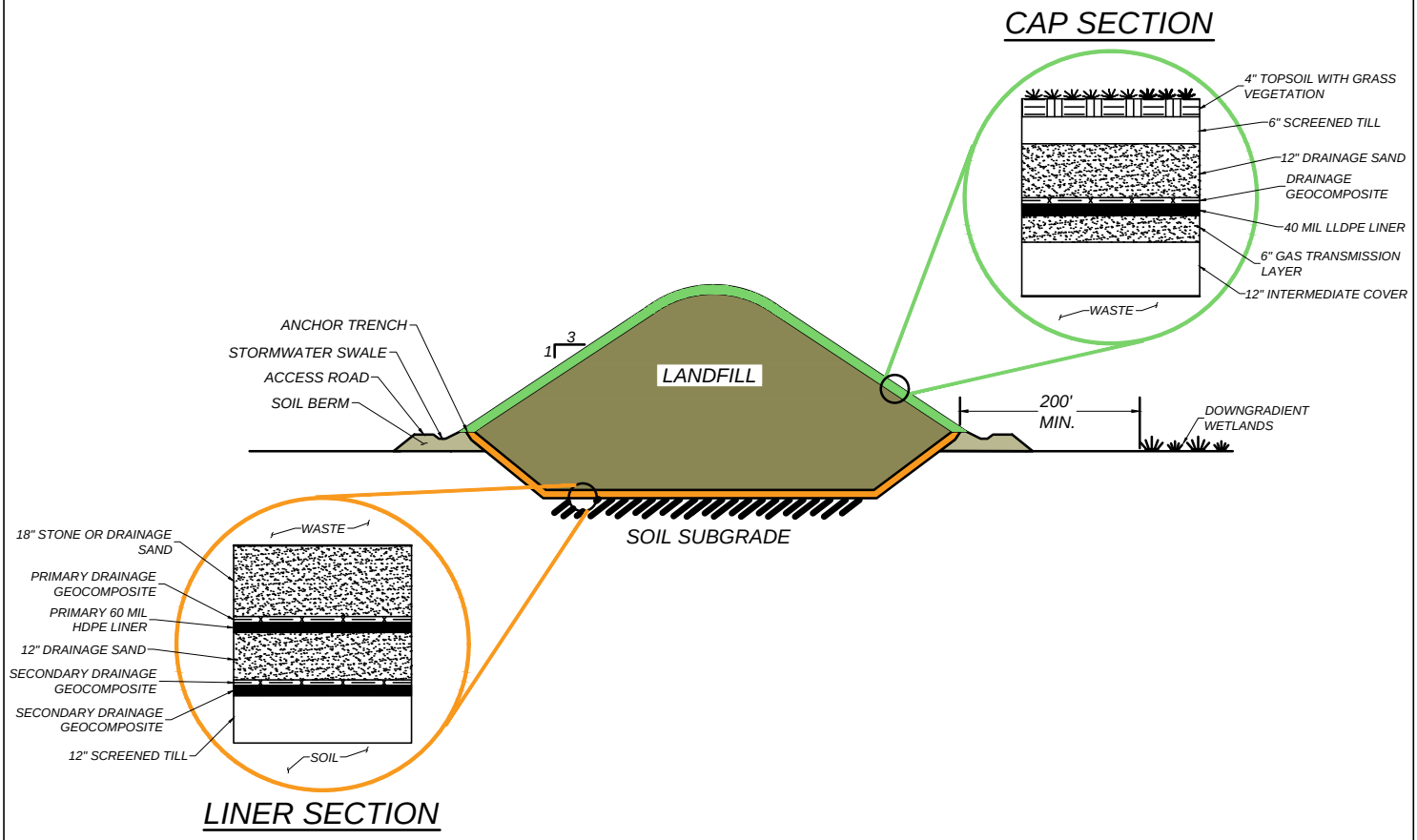
Granite State Landfill
Dalton, New Hampshire
Wetlands Application

State-Wide Site Search

Figure 1

TYPICAL LANDFILL CROSS SECTION



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Wetlands Application

Landfill Cross-Section and Liner Cap Schematics

Figure 2

Shelburne

Dalton

Carroll East

Carroll West

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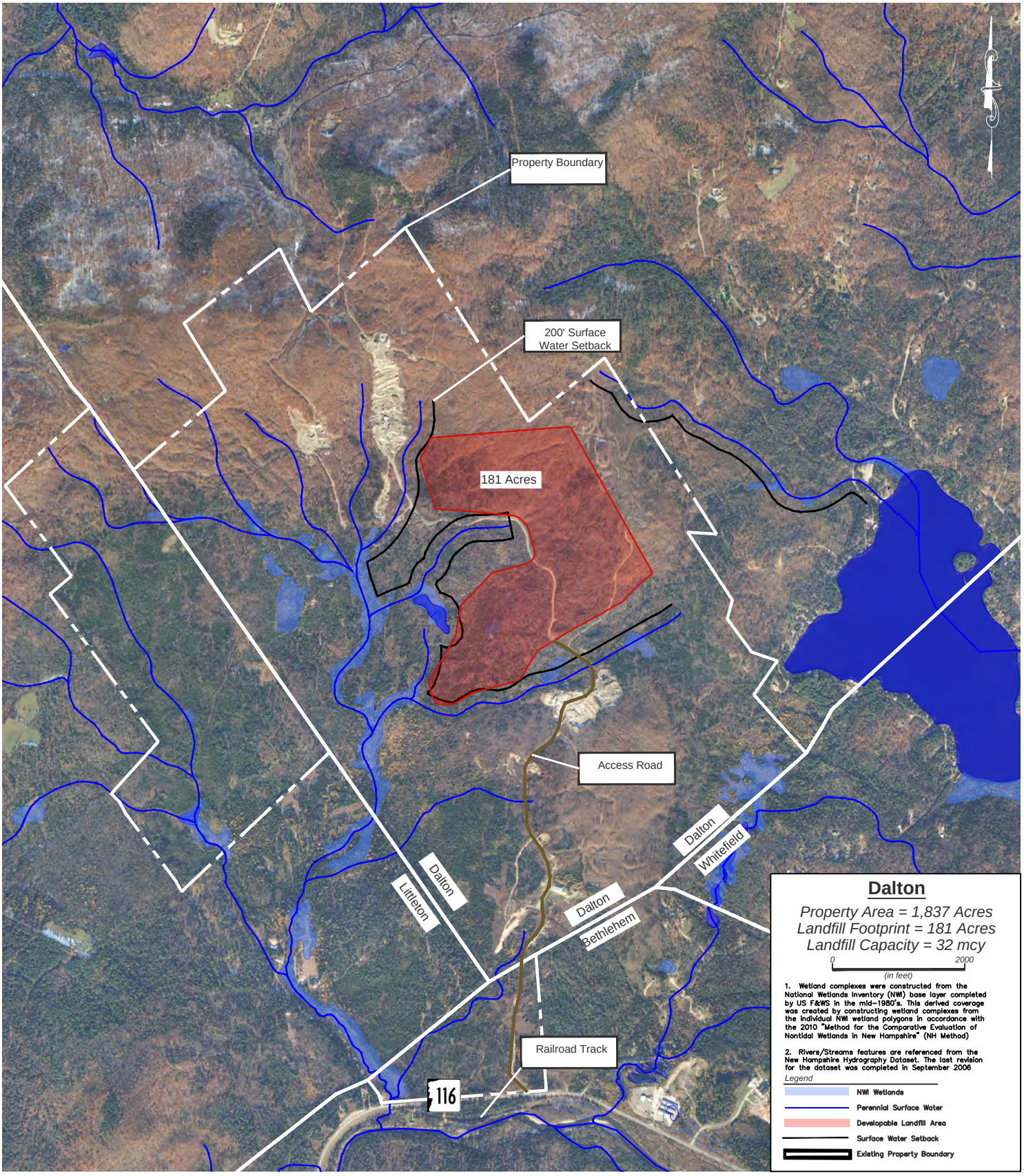
Dalton, New Hampshire
Wetlands Application

Candidate Site Locations

Figure 3

M:\CADD\PROJECTS\1101 NCES Dalton Site\DWG\05-FIGURES & LOCUS\Wetland Application Figures\1101 USGS.dwg Date Plotted: Jul 14, 2020 - 1:22pm



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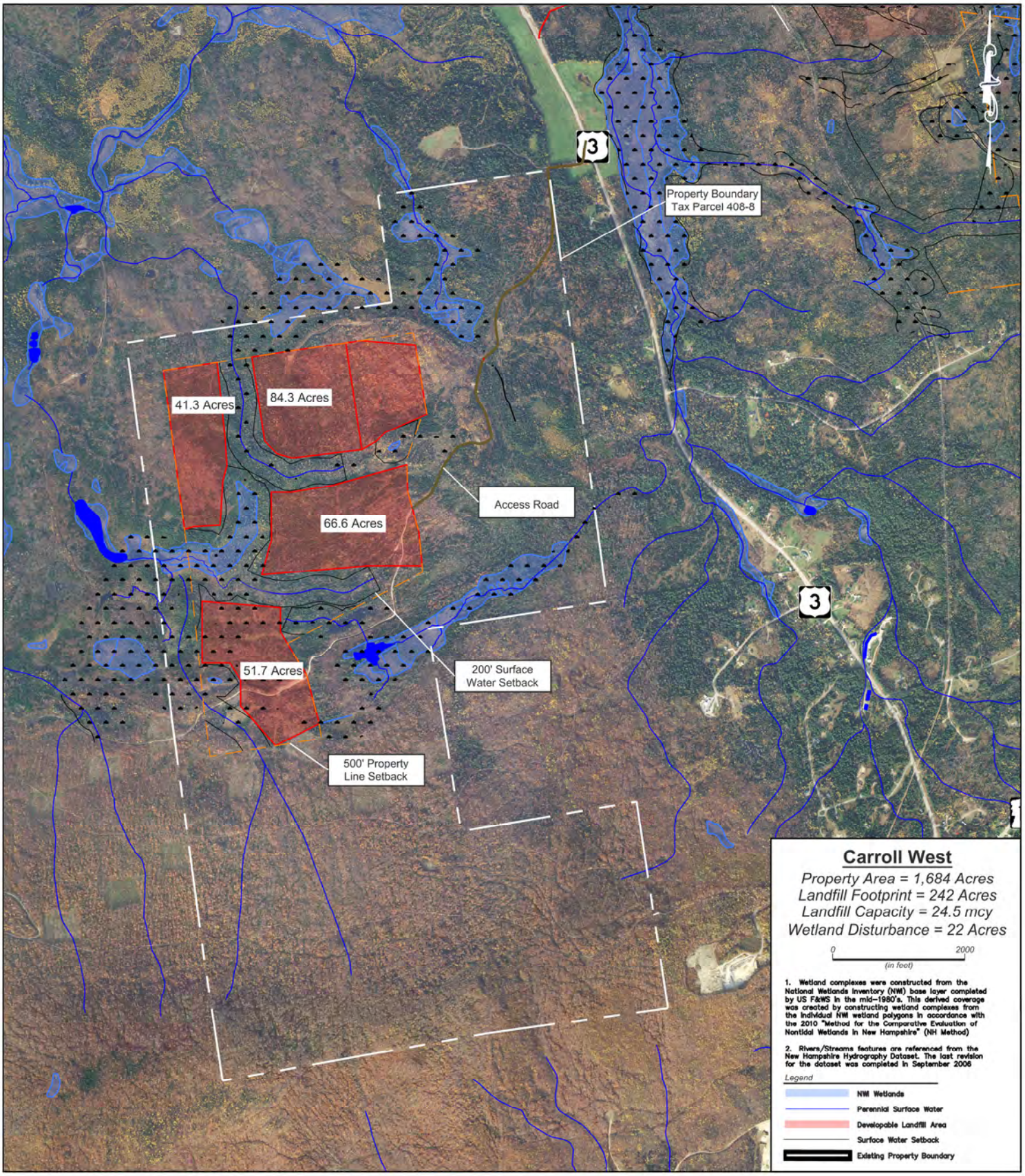
Granite State Landfill, LLC
Granite State Landfill
Dalton, New Hampshire
Wetlands Application

Dalton Screening Level Design Footprint

Figure 4



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Granite State Landfill
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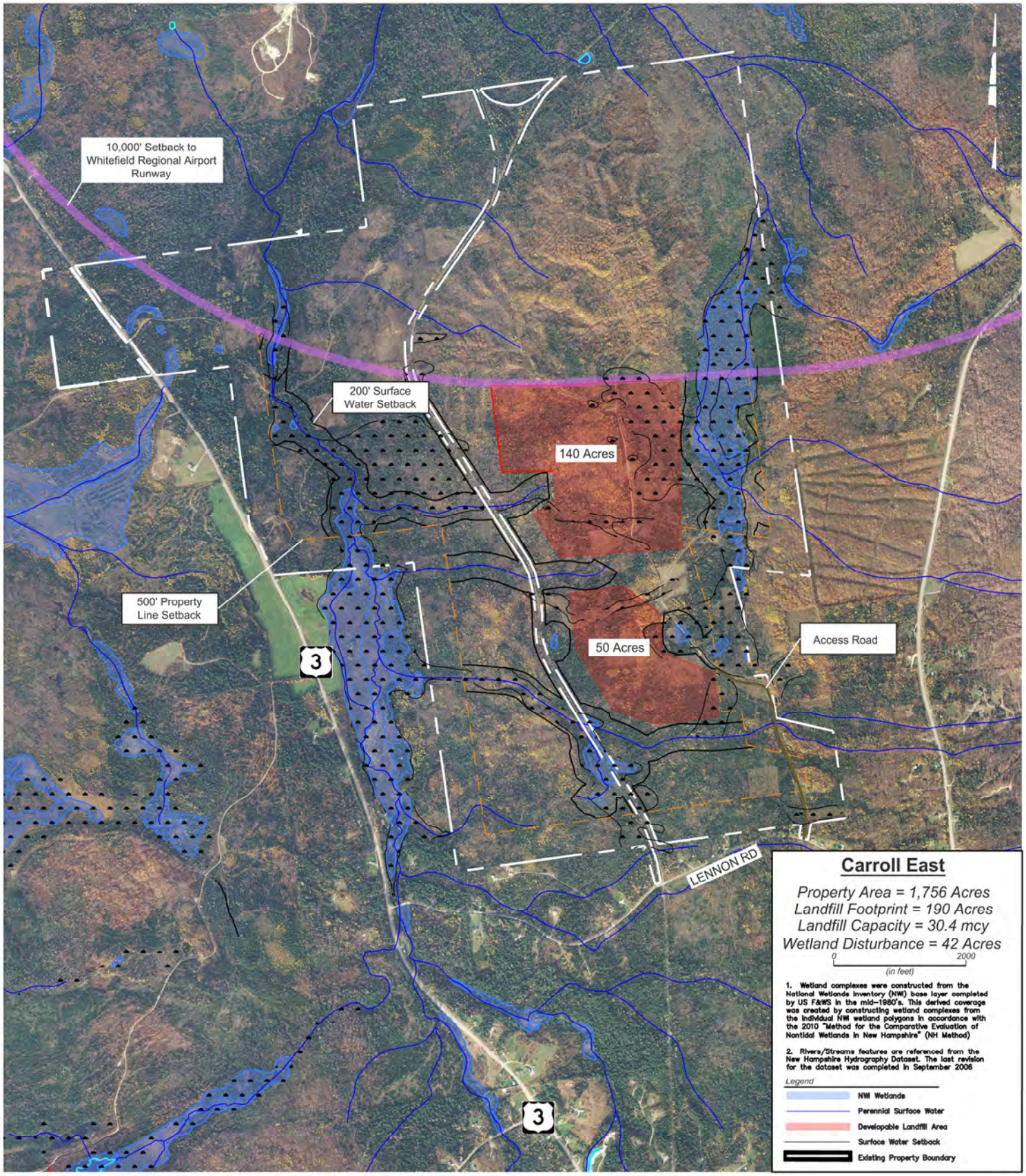
Wetlands Application

Carroll West Screening Level Design Footprint

Figure 5



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Dalton, New Hampshire
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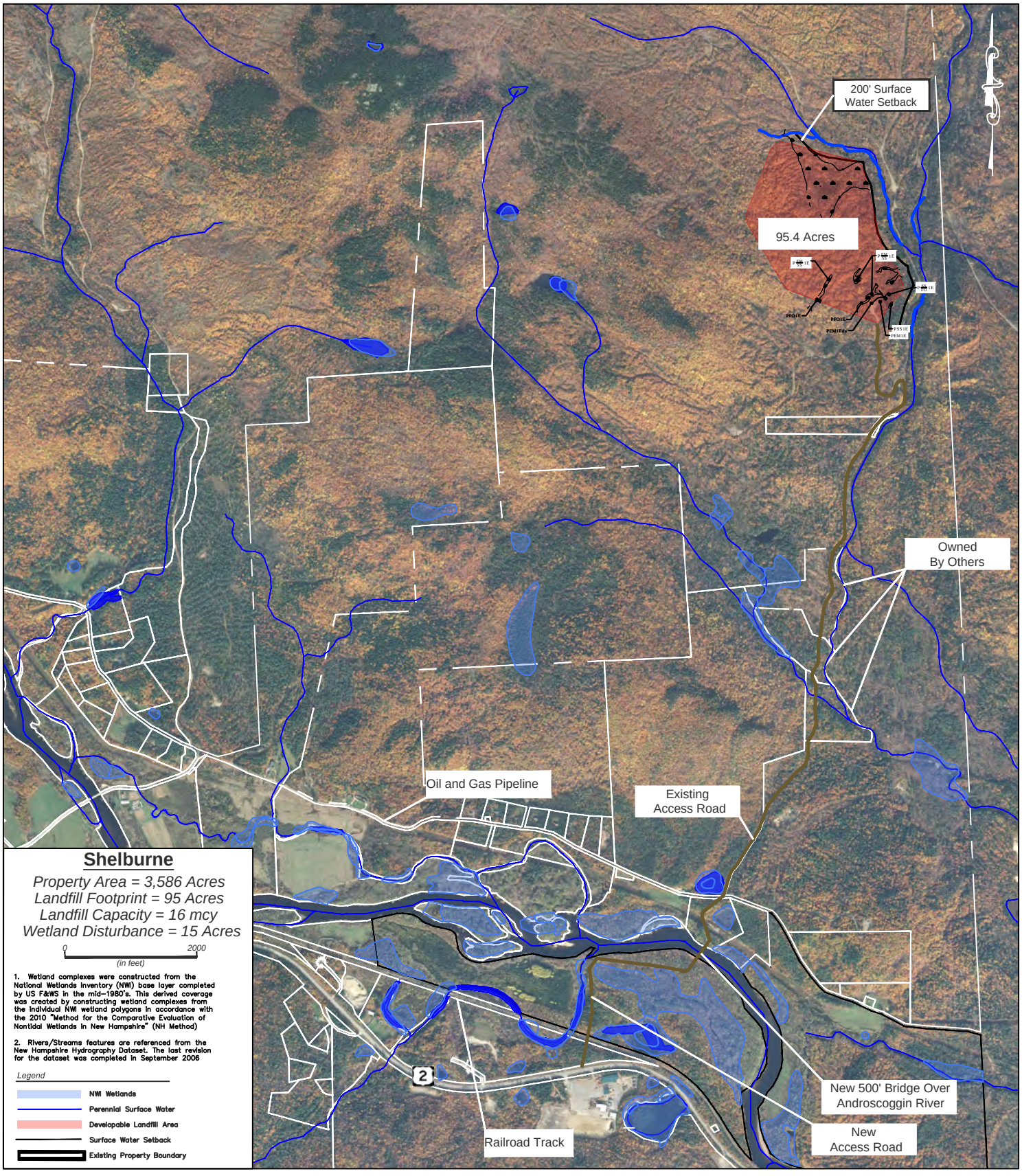
Carroll East Screening Level Design Footprint

Figure 6



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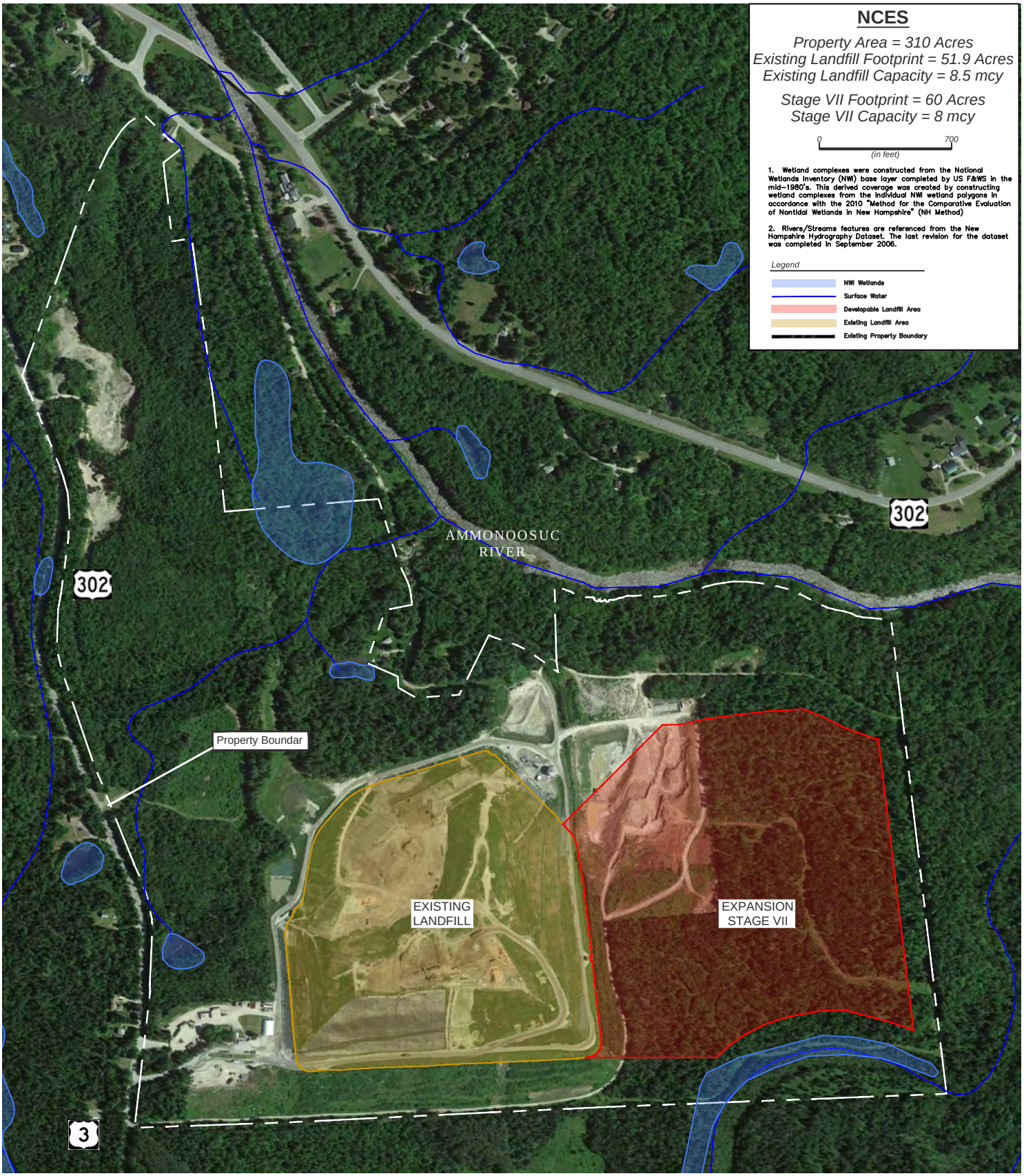
Granite State Landfill, LLC
Granite State Landfill
Dalton, New Hampshire
Wetlands Application

Shelburne Screening Level Design Footprint

Figure 7



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Granite State Landfill, LLC
Granite State Landfill
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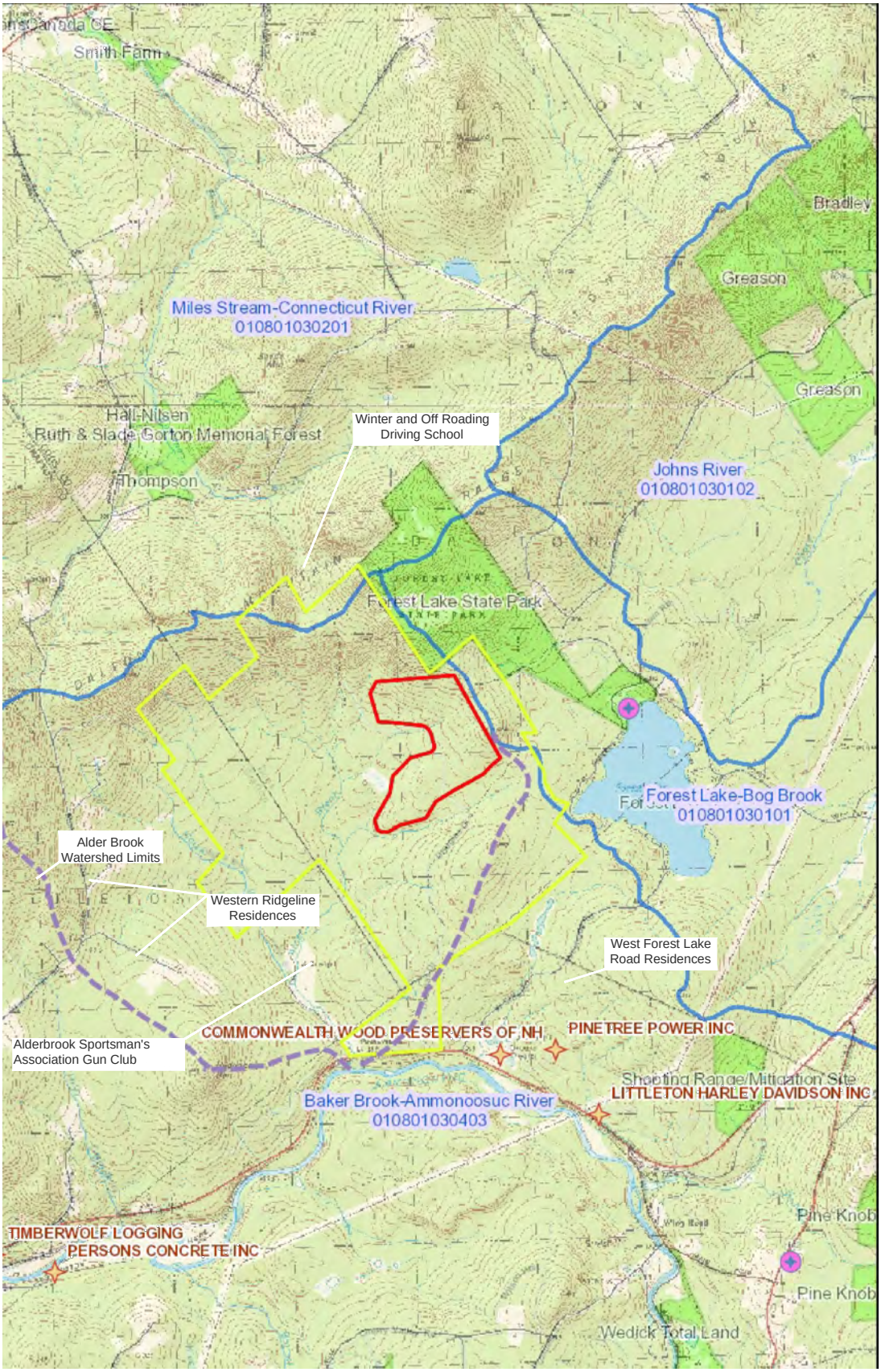
Wetlands Application

Bethlehem - NCES Landfill

Figure 8



Legend

- Wellhead Protection Areas
- Public Water Supply Wells
- Water Supply Intake Protect Areas
- Hazardous Waste Generato
- Outstanding Resource Wate Watersheds
- Sub Watersheds - HUC 12
- Conservation and Public Lar
- Landfill Limits
- Property Line

0 5000

(in feet)

Map Scale

1: 50,000

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Notes

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Granite State Landfill, LLC
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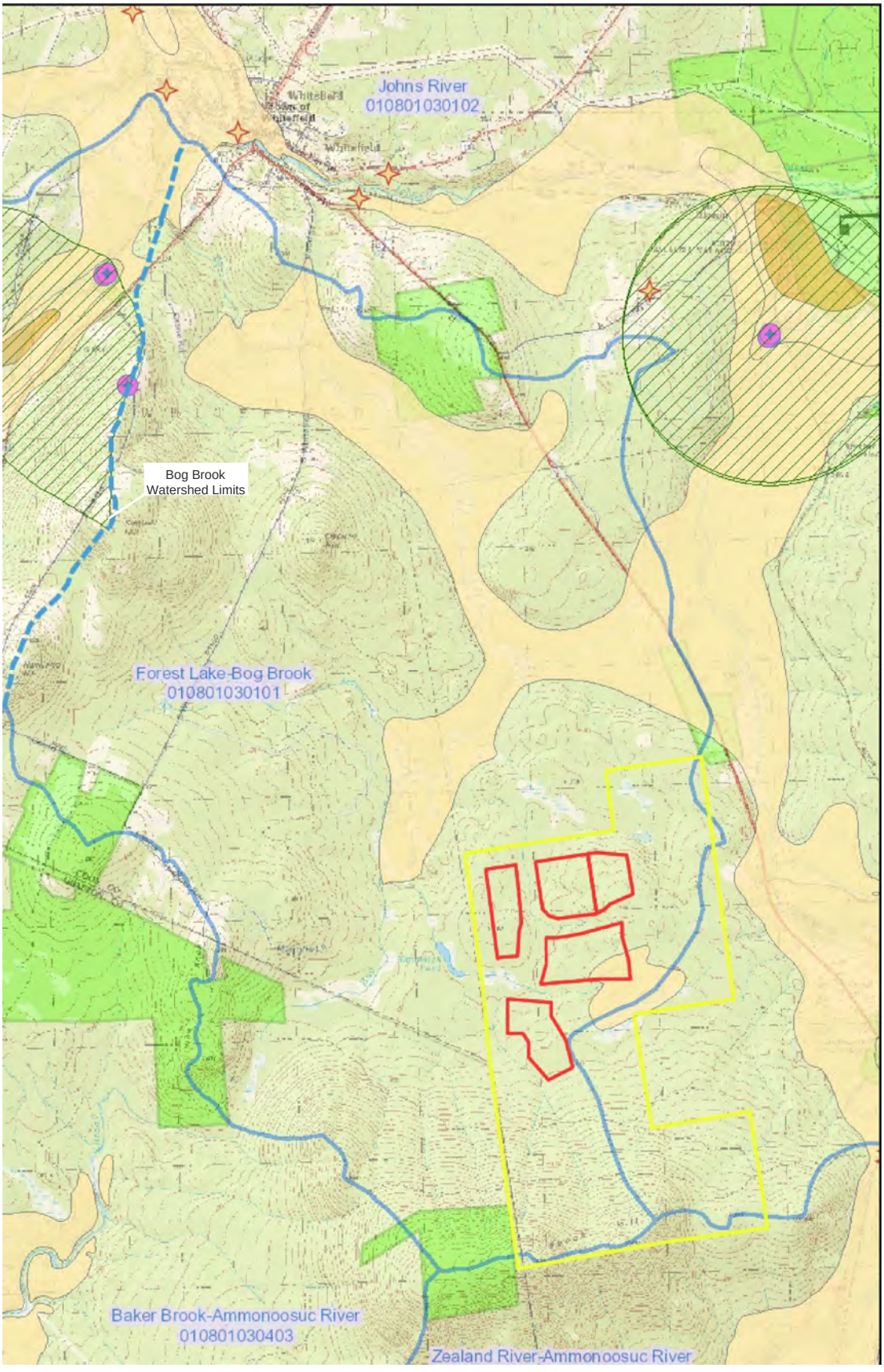
Dalton, New Hampshire
Wetlands Application

Dalton Watershed Map

Figure 9



Legend

- Wellhead Protection Areas
- Public Water Supply Wells
- Water Supply Intake Protect Areas
- Hazardous Waste Generato
- Outstanding Resource Wate Watersheds
- Sub Watersheds - HUC 12
- Aquifer Transmissivity
  - Less than 2000 feet sq./day
  - 2000 - 4000 feet sq./day
  - Greater than 4000 feet sq./day
- Conservation and Public Lar
- Landfill Limits
- Property Line

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(in feet)

Map Scale
1: 50,000

Map Generated: 5/29/2020

Notes

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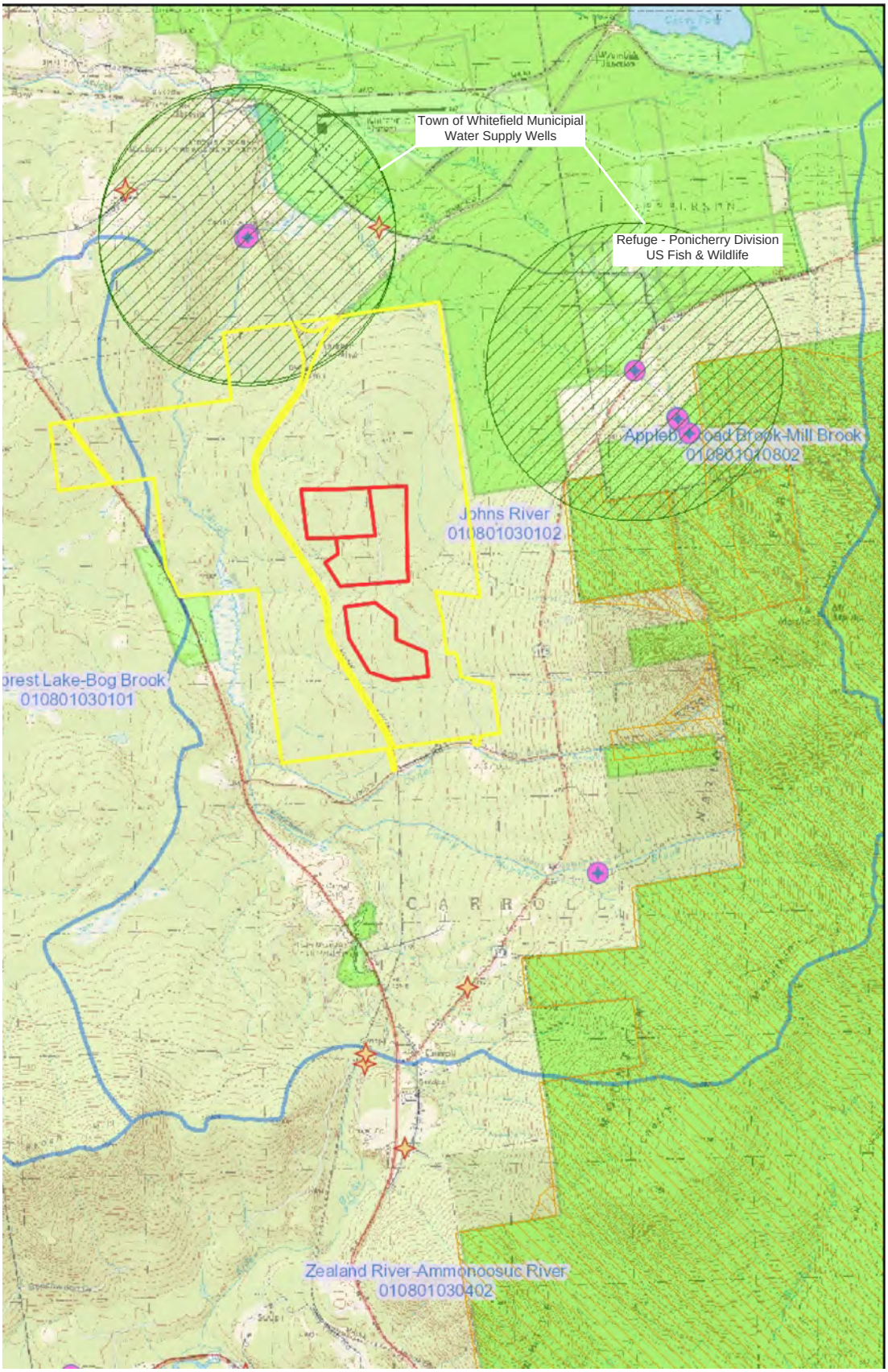
Wetlands Application

Carroll West Watershed Map

Figure 10



Legend

- Wellhead Protection Areas
- Public Water Supply Wells
- Water Supply Intake Protect Areas
- Hazardous Waste Generato
- Outstanding Resource Wate Watersheds
- Sub Watersheds - HUC 12
- Conservation and Public Lar
- Landfill Limits
- Property Line

0 5000
(in feet)

Map Scale
1: 50,000

Map Generated: 5/29/2020

Notes

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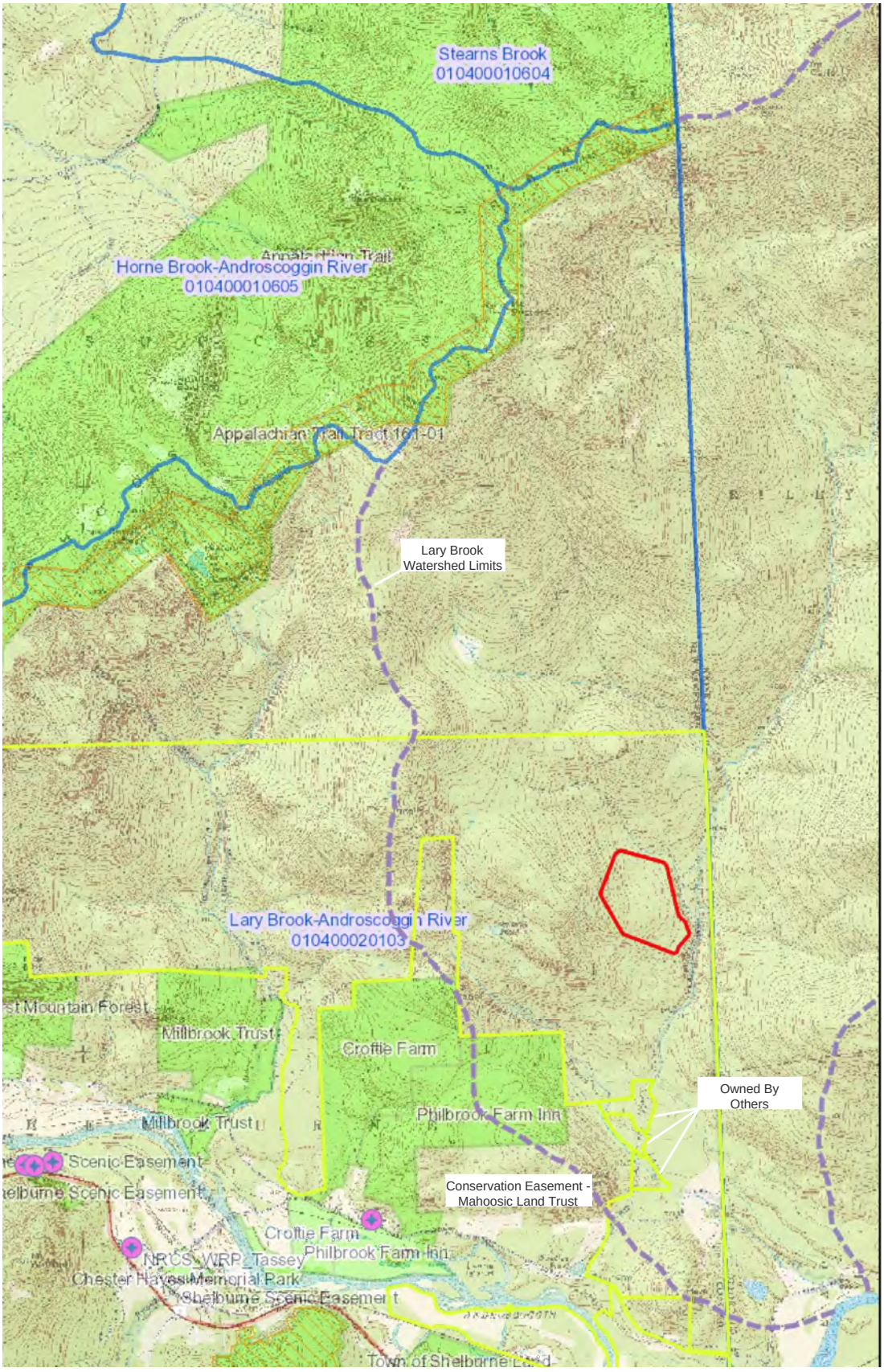
Granite State Landfill
Dalton, New Hampshire
Wetlands Application

Carroll East Watershed Map

Figure 11



Legend

- Wellhead Protection Areas
- Public Water Supply Wells
- Water Supply Intake Protect Areas
- Hazardous Waste Generato
- Outstanding Resource Wate Watersheds
- Sub Watersheds - HUC 12
- Conservation and Public Lar
- Landfill Limits
- Property Line

0 5000
(in feet)

Map Scale
1: 50,000

Map Generated: 6/3/2020

Notes

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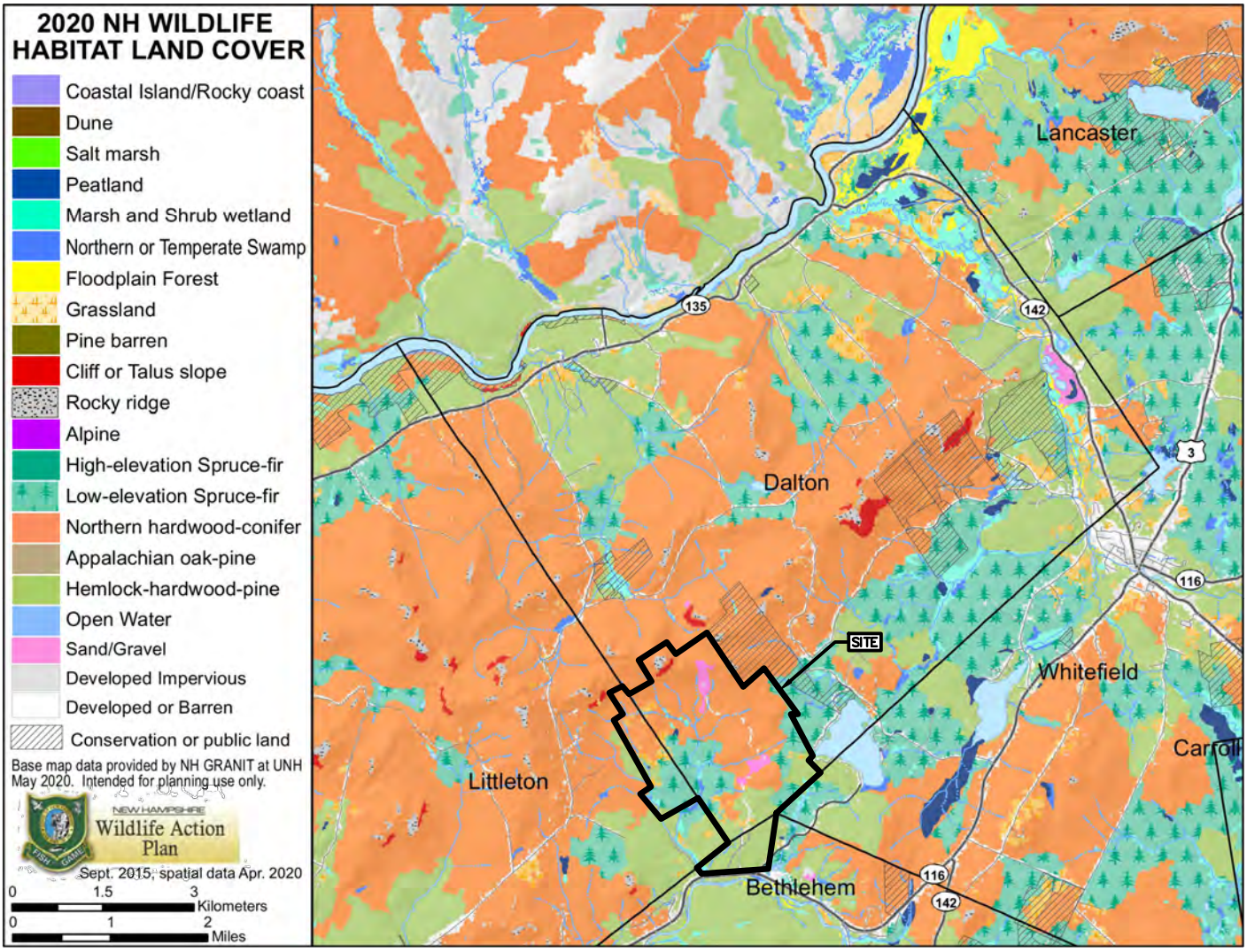
Shelburne Watershed Map

Figure 12



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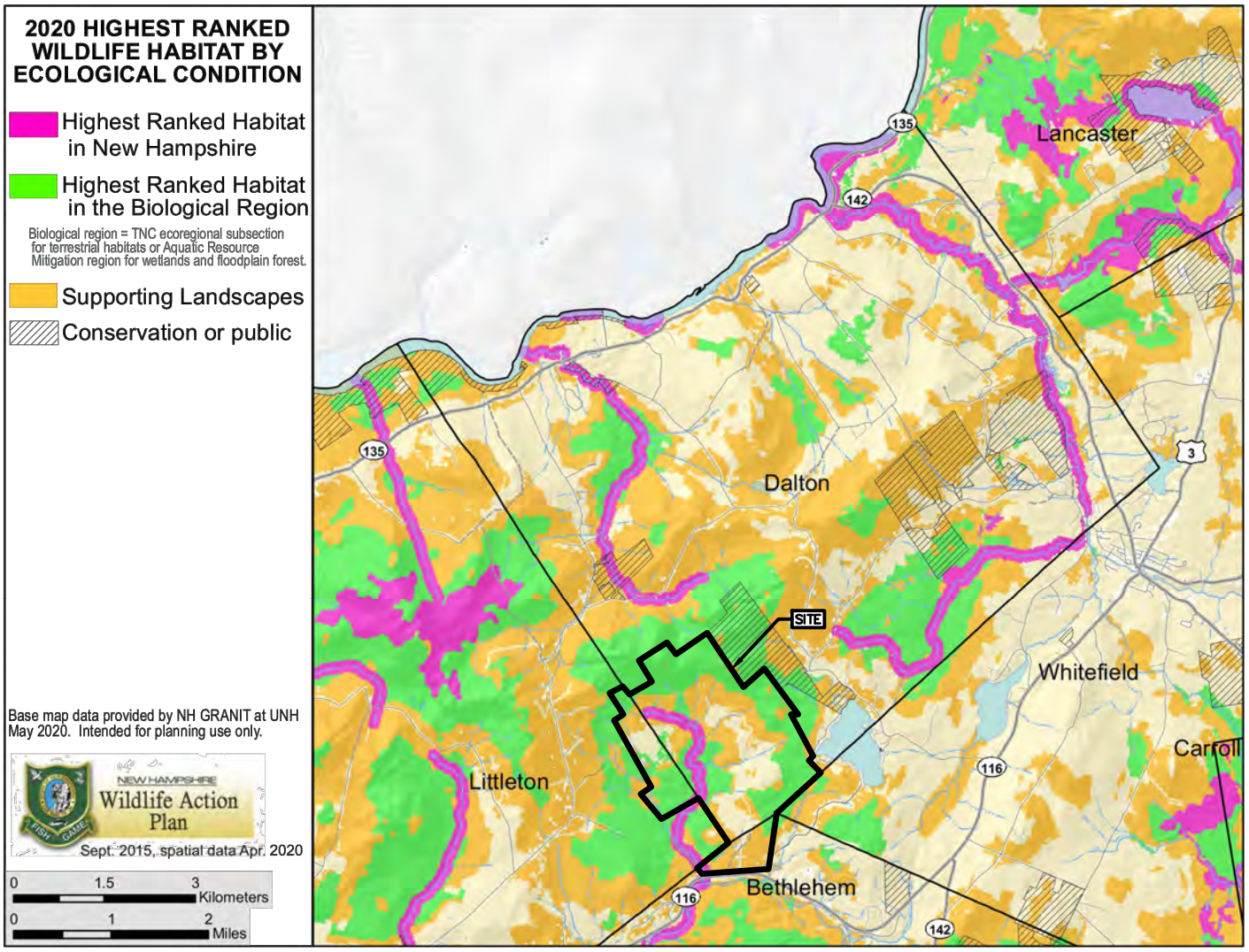
Granite State Landfill
Dalton, New Hampshire
Wetlands Application

Dalton Habitat

Figure 13



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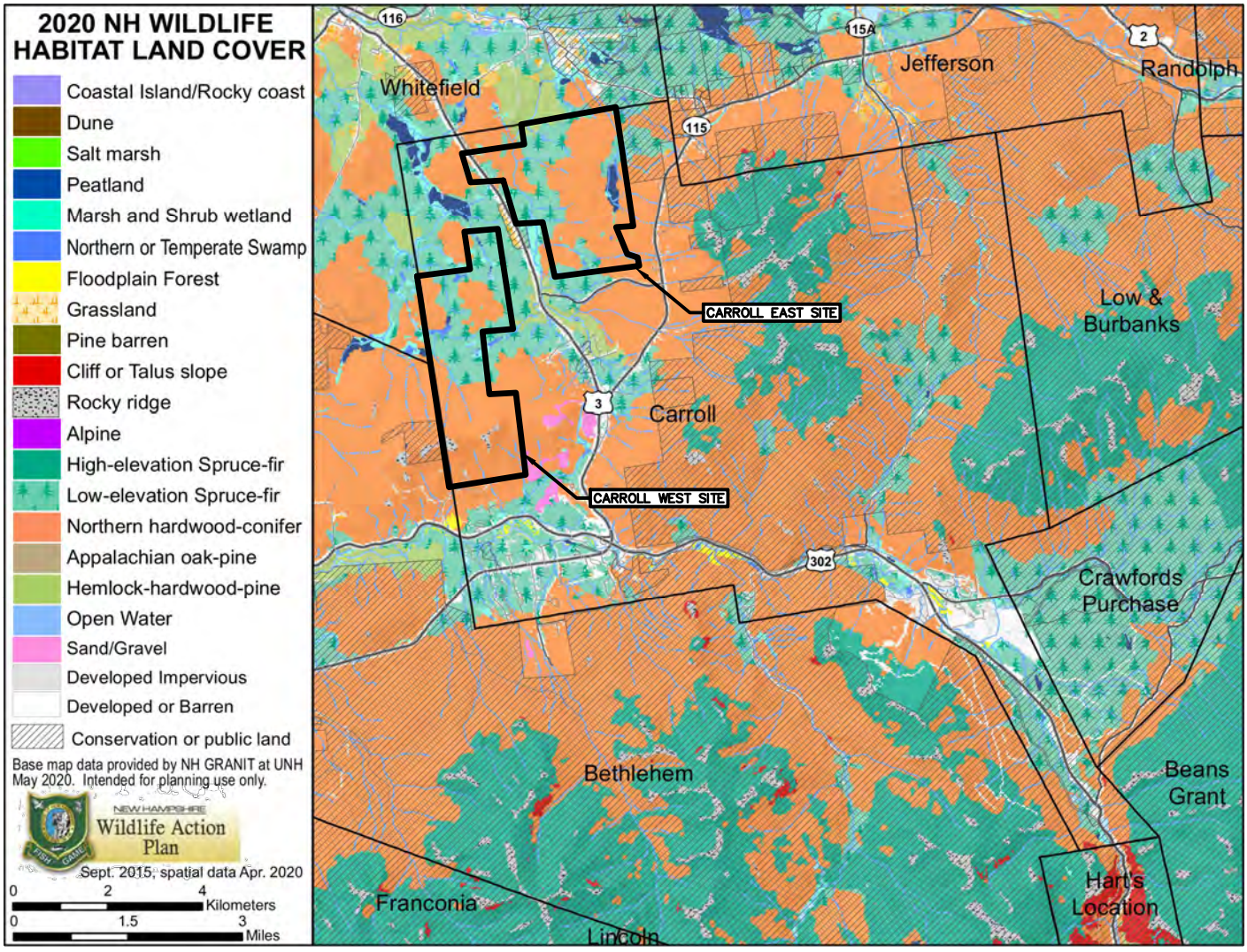
Granite State Landfill
Dalton, New Hampshire
Wetlands Application

Dalton Scoring

Figure 14



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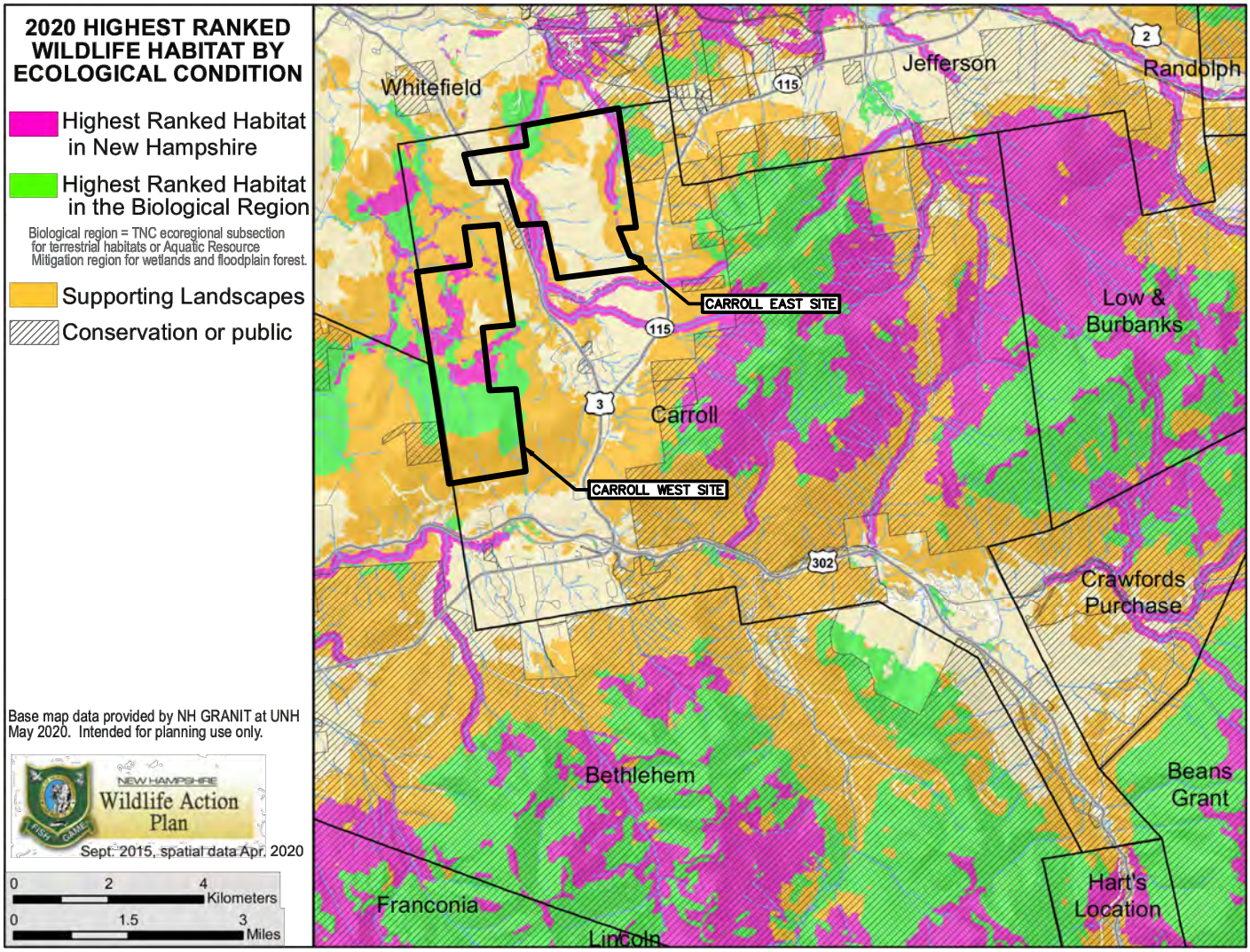
Wetlands Application

Carroll Habitat

Figure 15

M:\CADD\PROJECTS\1101 NCES Dalton Site\DWG\05-FIGURES & LOCUS\Wetland Application Figures\1101-Habitat and Scoring.dwg Date Plotted: Jul 14, 2020 - 12:58pm



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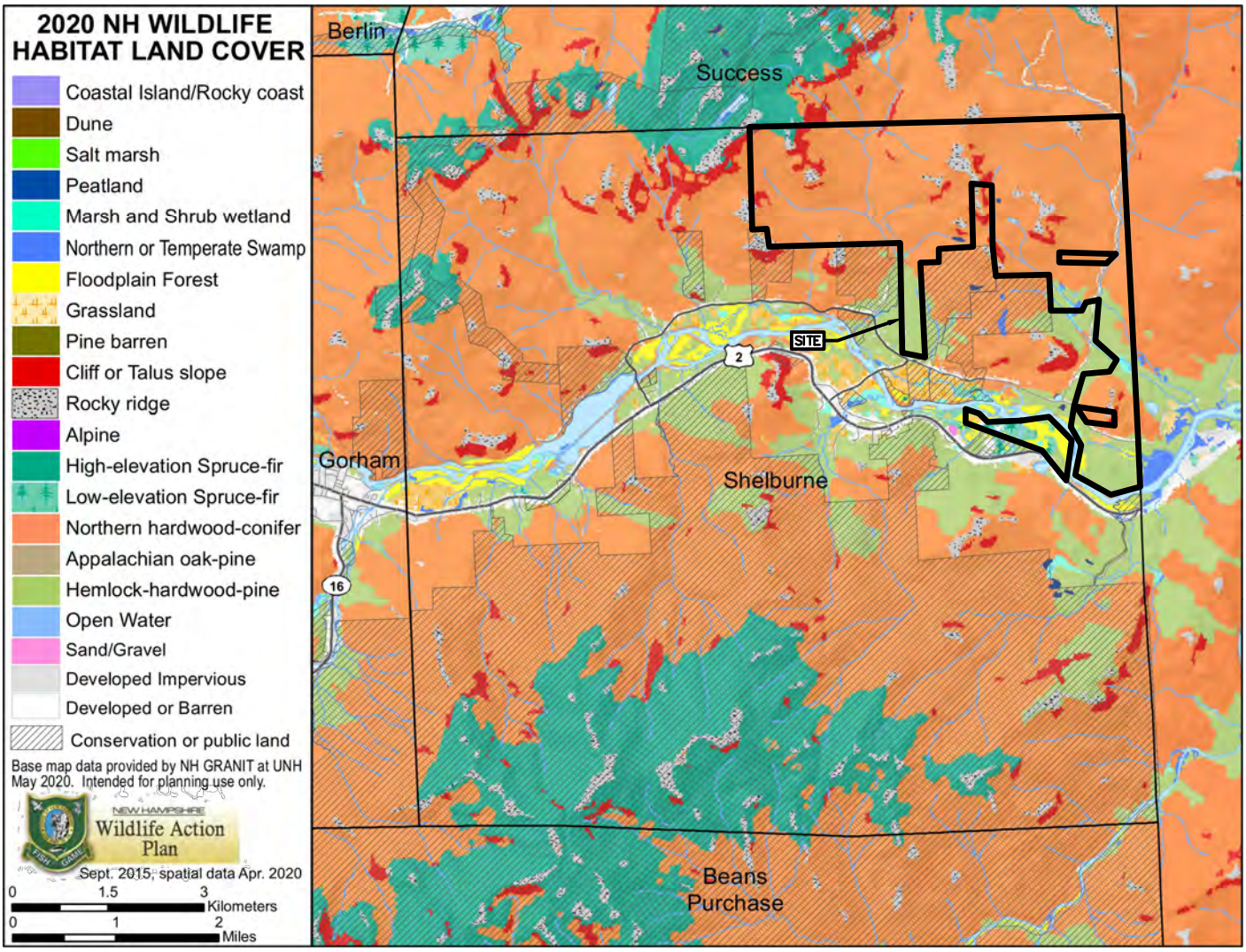
Granite State Landfill, LLC
Granite State Landfill
Dalton, New Hampshire
Wetlands Application

Carroll Scoring

Figure 16



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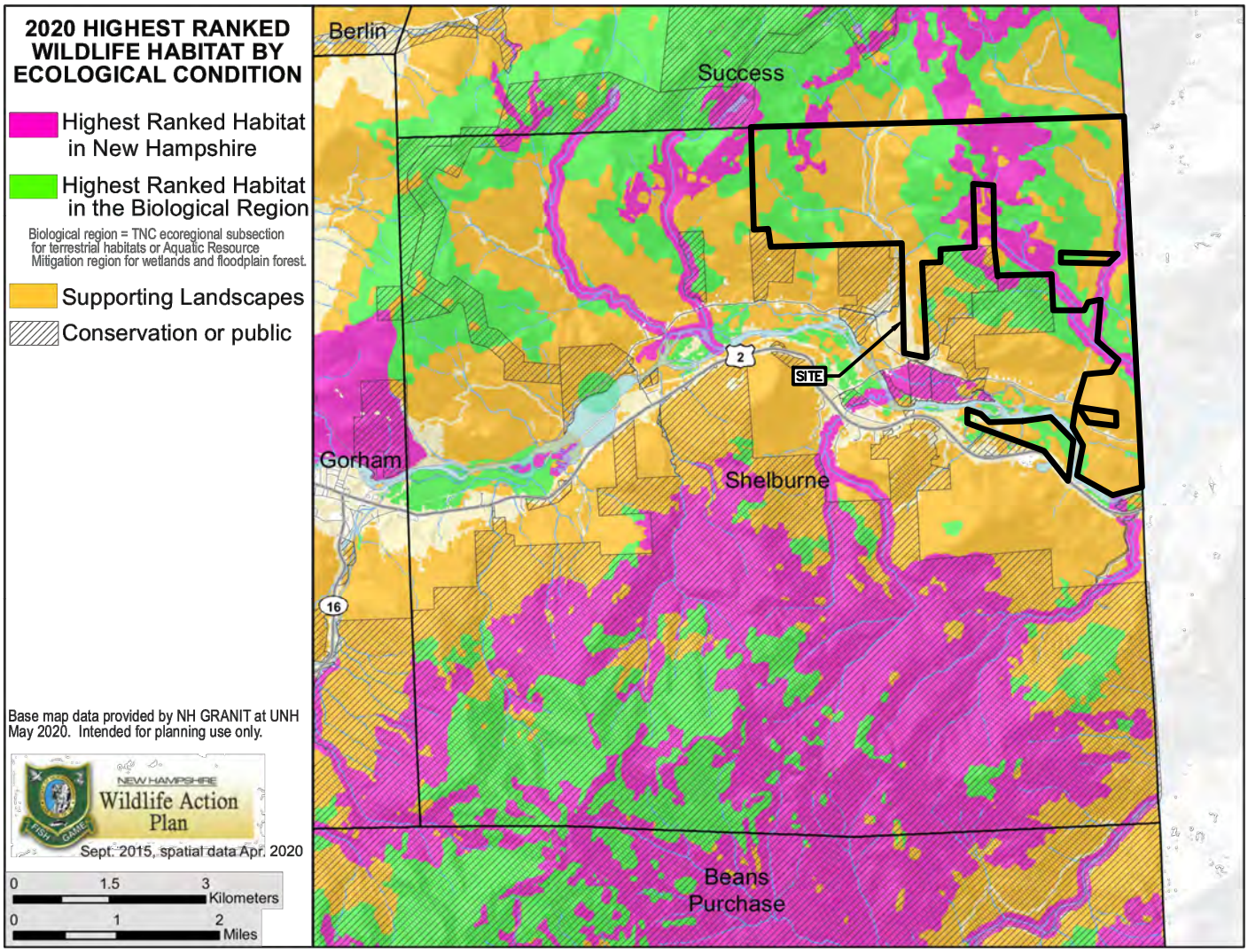
Granite State Landfill, LLC
Granite State Landfill
Dalton, New Hampshire
Wetlands Application

Shelburne Habitat

Figure 17



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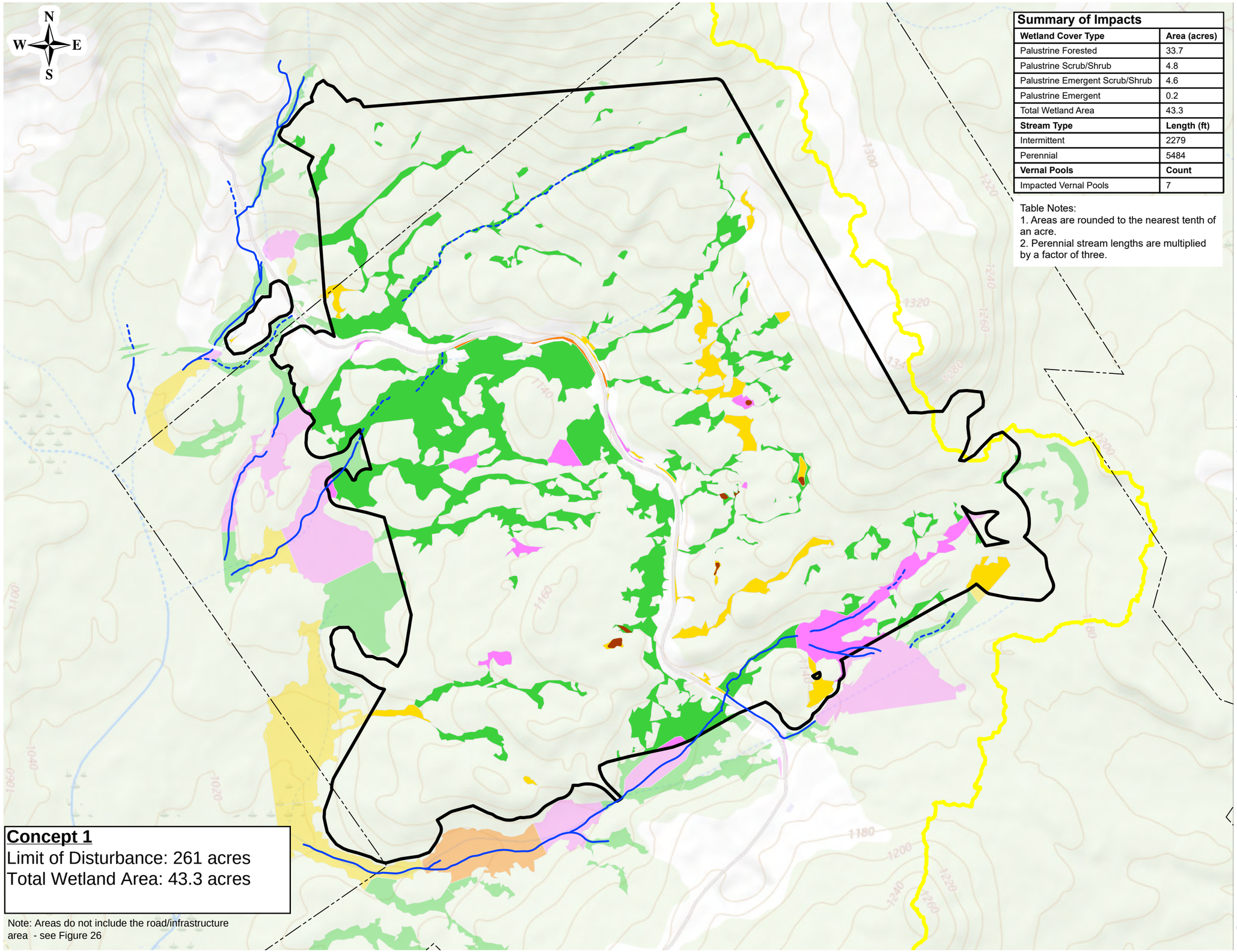
Granite State Landfill, LLC
Granite State Landfill
Dalton, New Hampshire
Wetlands Application

Shelburne Scoring

Figure 18



Summary of Impacts	
Wetland Cover Type	**Area (acres)**
Palustrine Forested	33.7
Palustrine Scrub/Shrub	4.8
Palustrine Emergent Scrub/Shrub	4.6
Palustrine Emergent	0.2
Total Wetland Area	43.3
Stream Type	**Length (ft)**
Intermittent	2279
Perennial	5484
Vernal Pools	**Count**
Impacted Vernal Pools	7

Table Notes:
1. Areas are rounded to the nearest tenth of an acre.
2. Perennial stream lengths are multiplied by a factor of three.

Figure 19

Wetland Impact Plan: Concept 1 (Cover Types)

Wetland Permit Application

Granite State Landfill, LLC

Dalton, New Hampshire

Drawn By:	D. Heacock / E. Wright
Designed By:	L. Corenthal / A. Matthews
Reviewed By:	T. White
Project No:	1003.24
Date:	November 2023

Figure Narrative

This figure depicts wetland cover types in the vicinity of the proposed Granite State Landfill project site and summarizes impacts within the limits of disturbance for the above referenced concept. Refer to Figures 26 and 27 for roadway and infrastructure area impacts applicable to Concepts 1 to 4, and Concepts 5.1 to 5.3, respectively.

Notes

1. USGS Topo Map provided by ESRI through ArcGIS Online.

2. Existing delineated wetlands, streams, and vernal pools features were provided by Horizons Engineering of Littleton, NH on October 30, 2023. Cover types were digitized by Sanborn Head from information provided by B.H. Keith Associates of Freedom, NH in October 2023. Transitions between cover types may be gradual and vary over time based on a variety of factors and are depicted as lines for the purposes of tabulating areas. Refer to information included elsewhere in this package for additional information regarding delineation, survey, and description of wetlands.

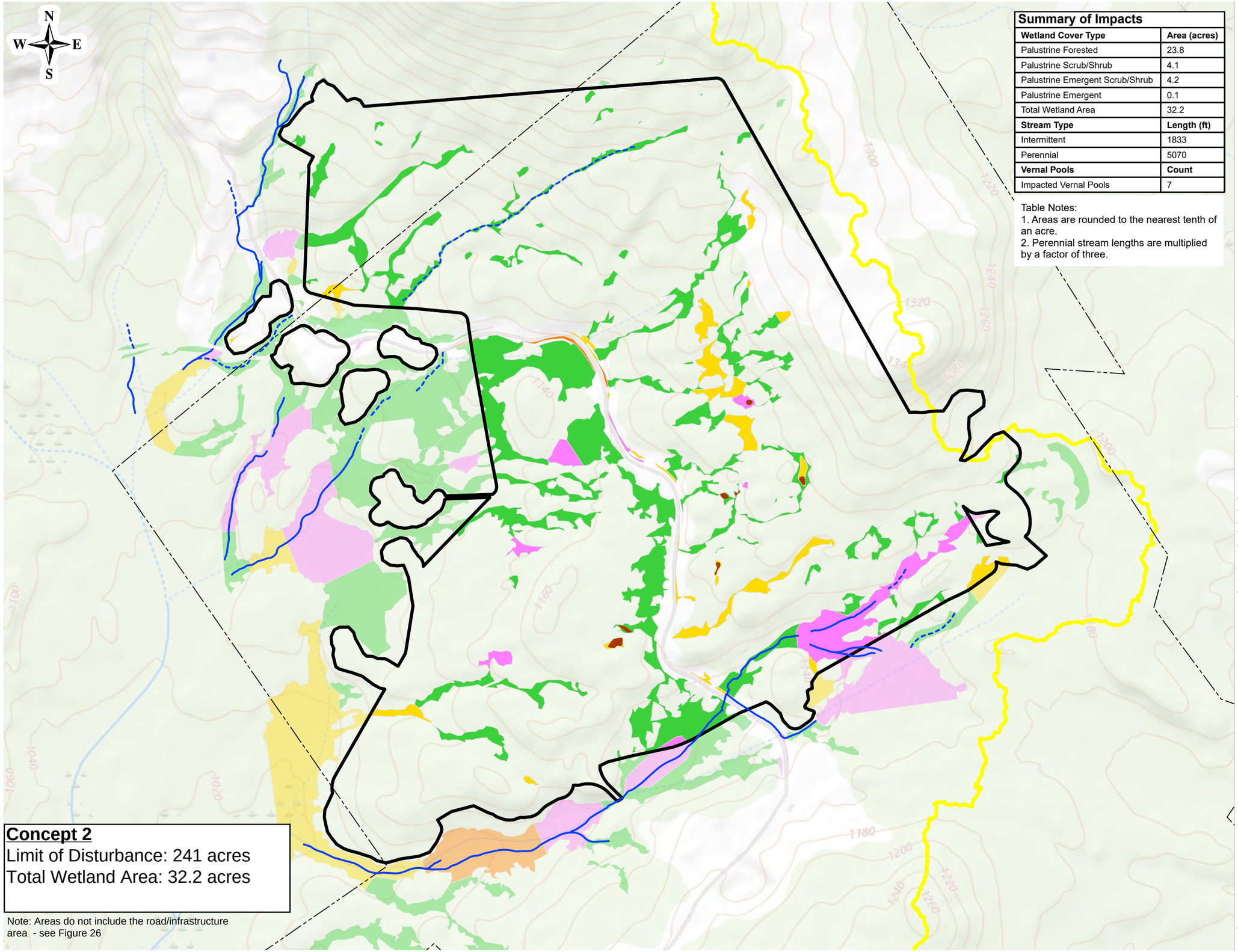
3. Limits of disturbance for Concepts 1 through 4, 5.1, 5.2, and 5.3 were provided by CMA Engineers of Portsmouth, NH on October 23 and 25, 2023.

Legend

Wetland Cover Type
- Palustrine Forested
- Palustrine Scrub/Shrub
- Palustrine Emergent Scrub/Shrub
- Palustrine Emergent
- Vernal Pool
- Intermittent Stream
- Perennial Stream
- Subject Property Line
- Alder Brook / Hatch Brook Catchment
- Limit of Disturbance

250 125 0 250 500 Feet

SANBORN HEAD



Concept 2
Limit of Disturbance: 241 acres
Total Wetland Area: 32.2 acres

Note: Areas do not include the road/infrastructure area - see Figure 26

Summary of Impacts	
Wetland Cover Type	**Area (acres)**
Palustrine Forested	23.8
Palustrine Scrub/Shrub	4.1
Palustrine Emergent Scrub/Shrub	4.2
Palustrine Emergent	0.1
Total Wetland Area	32.2
Stream Type	**Length (ft)**
Intermittent	1833
Perennial	5070
Vernal Pools	**Count**
Impacted Vernal Pools	7

Table Notes:
1. Areas are rounded to the nearest tenth of an acre.
2. Perennial stream lengths are multiplied by a factor of three.

Figure 20

Wetland Impact Plan: Concept 2 (Cover Types)

Wetland Permit Application

Granite State Landfill, LLC

Dalton, New Hampshire

Drawn By:	D. Heacock / E. Wright
Designed By:	L. Corenthal / A. Matthews
Reviewed By:	T. White
Project No:	1003.24
Date:	November 2023

Figure Narrative

This figure depicts wetland cover types in the vicinity of the proposed Granite State Landfill project site and summarizes impacts within the limits of disturbance for the above referenced concept. Refer to Figures 26 and 27 for roadway and infrastructure area impacts applicable to Concepts 1 to 4, and Concepts 5.1 to 5.3, respectively.

Notes

1. USGS Topo Map provided by ESRI through ArcGIS Online.

2. Existing delineated wetlands, streams, and vernal pools features were provided by Horizons Engineering of Littleton, NH on October 30, 2023. Cover types were digitized by Sanborn Head from information provided by B.H. Keith Associates of Freedom, NH in October 2023. Transitions between cover types may be gradual and vary over time based on a variety of factors and are depicted as lines for the purposes of tabulating areas. Refer to information included elsewhere in this package for additional information regarding delineation, survey, and description of wetlands.

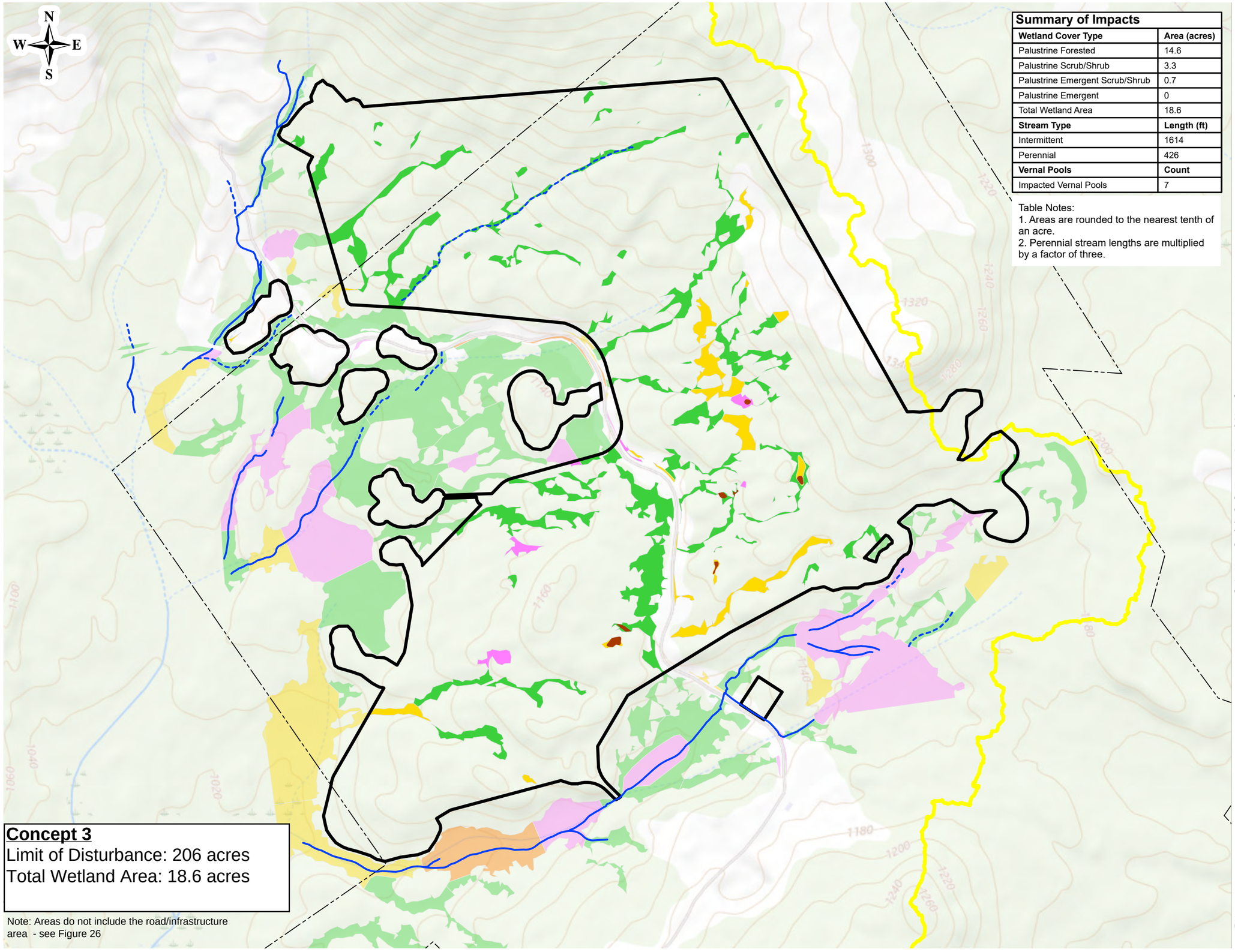
3. Limits of disturbance for Concepts 1 through 4, 5.1, 5.2, and 5.3 were provided by CMA Engineers of Portsmouth, NH on October 23 and 25, 2023.

Legend

Wetland Cover Type
- Palustrine Forested
- Palustrine Scrub/Shrub
- Palustrine Emergent Scrub/Shrub
- Palustrine Emergent
- Vernal Pool
- Intermittent Stream
- Perennial Stream
- Subject Property Line
- Alder Brook / Hatch Brook Catchment
- Limit of Disturbance

250 125 0 250 500 Feet

SANBORN HEAD



Concept 3
Limit of Disturbance: 206 acres
Total Wetland Area: 18.6 acres

Note: Areas do not include the road/infrastructure area - see Figure 26

Summary of Impacts	
Wetland Cover Type	**Area (acres)**
Palustrine Forested	14.6
Palustrine Scrub/Shrub	3.3
Palustrine Emergent Scrub/Shrub	0.7
Palustrine Emergent	0
Total Wetland Area	18.6
Stream Type	**Length (ft)**
Intermittent	1614
Perennial	426
Vernal Pools	**Count**
Impacted Vernal Pools	7

Table Notes:
1. Areas are rounded to the nearest tenth of an acre.
2. Perennial stream lengths are multiplied by a factor of three.

Figure 21

Wetland Impact Plan: Concept 3 (Cover Types)

Wetland Permit Application

Granite State Landfill, LLC

Dalton, New Hampshire

Drawn By:	D. Heacock / E. Wright
Designed By:	L. Corenthal / A. Matthews
Reviewed By:	T. White
Project No:	1003.24
Date:	November 2023

Figure Narrative

This figure depicts wetland cover types in the vicinity of the proposed Granite State Landfill project site and summarizes impacts within the limits of disturbance for the above referenced concept. Refer to Figures 26 and 27 for roadway and infrastructure area impacts applicable to Concepts 1 to 4, and Concepts 5.1 to 5.3, respectively.

Notes

1. USGS Topo Map provided by ESRI through ArcGIS Online.

2. Existing delineated wetlands, streams, and vernal pools features were provided by Horizons Engineering of Littleton, NH on October 30, 2023. Cover types were digitized by Sanborn Head from information provided by B.H. Keith Associates of Freedom, NH in October 2023. Transitions between cover types may be gradual and vary over time based on a variety of factors and are depicted as lines for the purposes of tabulating areas. Refer to information included elsewhere in this package for additional information regarding delineation, survey, and description of wetlands.

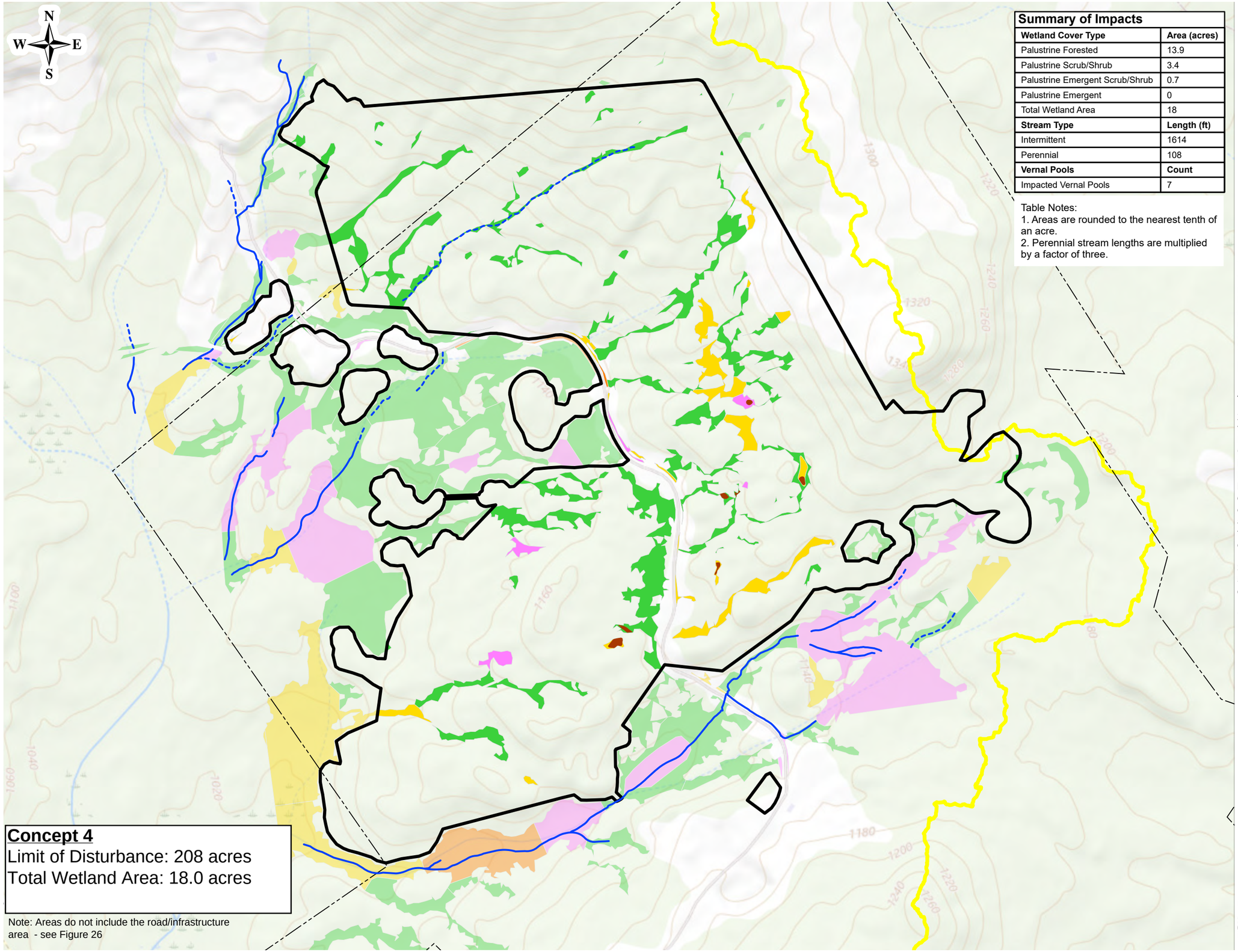
3. Limits of disturbance for Concepts 1 through 4, 5.1, 5.2, and 5.3 were provided by CMA Engineers of Portsmouth, NH on October 23 and 25, 2023.

Legend

Wetland Cover Type
- Palustrine Forested
- Palustrine Scrub/Shrub
- Palustrine Emergent Scrub/Shrub
- Palustrine Emergent
- Vernal Pool
- Intermittent Stream
- Perennial Stream
- Subject Property Line
- Alder Brook / Hatch Brook Catchment
- Limit of Disturbance

250 125 0 250 500 Feet

SANBORN HEAD



Summary of Impacts	
Wetland Cover Type	**Area (acres)**
Palustrine Forested	13.9
Palustrine Scrub/Shrub	3.4
Palustrine Emergent Scrub/Shrub	0.7
Palustrine Emergent	0
Total Wetland Area	18
Stream Type	**Length (ft)**
Intermittent	1614
Perennial	108
Vernal Pools	**Count**
Impacted Vernal Pools	7

Table Notes:
1. Areas are rounded to the nearest tenth of an acre.
2. Perennial stream lengths are multiplied by a factor of three.

Figure 22

Wetland Impact Plan: Concept 4 (Cover Types)

Wetland Permit Application

Granite State Landfill, LLC

Dalton, New Hampshire

Drawn By:	D. Heacock / E. Wright
Designed By:	L. Corenthal / A. Matthews
Reviewed By:	T. White
Project No:	1003.24
Date:	November 2023

Figure Narrative

This figure depicts wetland cover types in the vicinity of the proposed Granite State Landfill project site and summarizes impacts within the limits of disturbance for the above referenced concept. Refer to Figures 26 and 27 for roadway and infrastructure area impacts applicable to Concepts 1 to 4, and Concepts 5.1 to 5.3, respectively.

Notes

1. USGS Topo Map provided by ESRI through ArcGIS Online.

2. Existing delineated wetlands, streams, and vernal pools features were provided by Horizons Engineering of Littleton, NH on October 30, 2023. Cover types were digitized by Sanborn Head from information provided by B.H. Keith Associates of Freedom, NH in October 2023. Transitions between cover types may be gradual and vary over time based on a variety of factors and are depicted as lines for the purposes of tabulating areas. Refer to information included elsewhere in this package for additional information regarding delineation, survey, and description of wetlands.

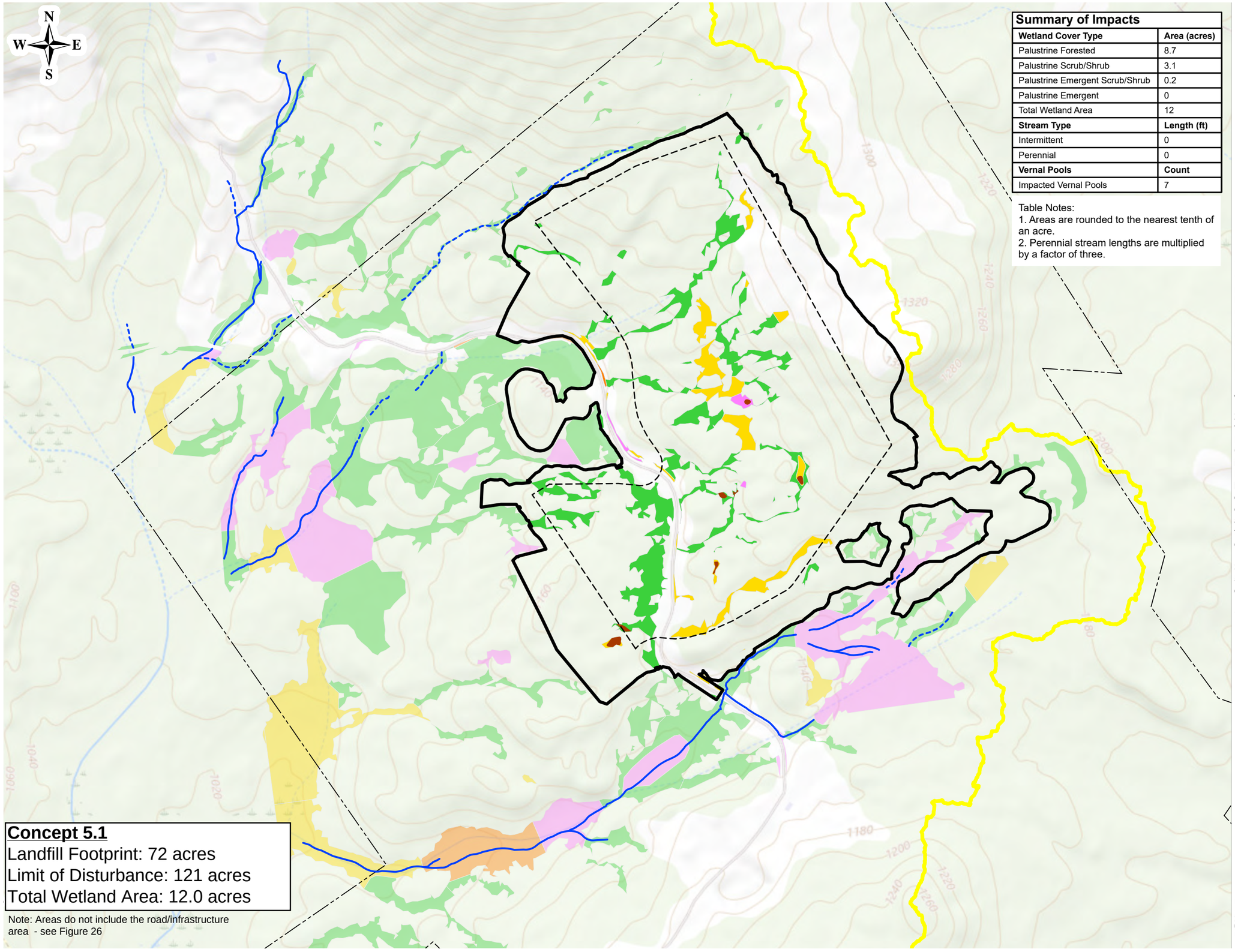
3. Limits of disturbance for Concepts 1 through 4, 5.1, 5.2, and 5.3 were provided by CMA Engineers of Portsmouth, NH on October 23 and 25, 2023.

Legend

Wetland Cover Type
- Palustrine Forested
- Palustrine Scrub/Shrub
- Palustrine Emergent Scrub/Shrub
- Palustrine Emergent
- Vernal Pool
- Intermittent Stream
- Perennial Stream
- Subject Property Line
- Alder Brook / Hatch Brook Catchment
- Limit of Disturbance

250 125 0 250 500 Feet

SANBORN HEAD



Summary of Impacts	
Wetland Cover Type	**Area (acres)**
Palustrine Forested	8.7
Palustrine Scrub/Shrub	3.1
Palustrine Emergent Scrub/Shrub	0.2
Palustrine Emergent	0
Total Wetland Area	12
Stream Type	**Length (ft)**
Intermittent	0
Perennial	0
Vernal Pools	**Count**
Impacted Vernal Pools	7

Table Notes:
1. Areas are rounded to the nearest tenth of an acre.
2. Perennial stream lengths are multiplied by a factor of three.

Concept 5.1
Landfill Footprint: 72 acres
Limit of Disturbance: 121 acres
Total Wetland Area: 12.0 acres

Note: Areas do not include the road/infrastructure area - see Figure 26

Figure 23

Wetland Impact Plan: Concept 5.1 (Cover Types)

Wetland Permit Application

Granite State Landfill, LLC

Dalton, New Hampshire

Drawn By:	D. Heacock / E. Wright
Designed By:	L. Corenthal / A. Matthews
Reviewed By:	T. White
Project No:	1003.24
Date:	November 2023

Figure Narrative

This figure depicts wetland cover types in the vicinity of the proposed Granite State Landfill project site and summarizes impacts within the limits of disturbance for the above referenced concept. Refer to Figures 26 and 27 for roadway and infrastructure area impacts applicable to Concepts 1 to 4, and Concepts 5.1 to 5.3, respectively.

Notes

1. USGS Topo Map provided by ESRI through ArcGIS Online.

2. Existing delineated wetlands, streams, and vernal pools features were provided by Horizons Engineering of Littleton, NH on October 30, 2023. Cover types were digitized by Sanborn Head from information provided by B.H. Keith Associates of Freedom, NH in October 2023. Transitions between cover types may be gradual and vary over time based on a variety of factors and are depicted as lines for the purposes of tabulating areas. Refer to information included elsewhere in this package for additional information regarding delineation, survey, and description of wetlands.

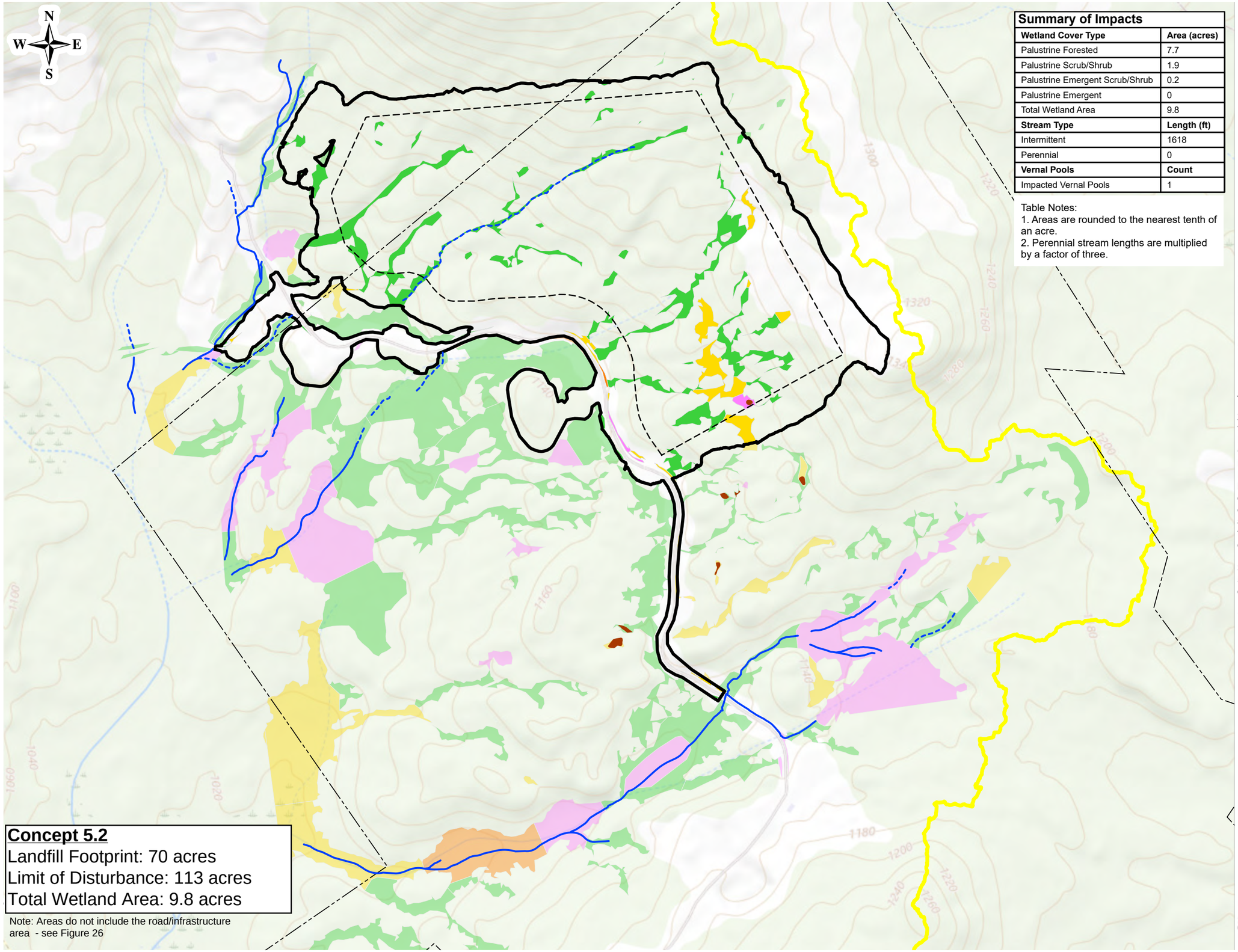
3. Limits of disturbance for Concepts 1 through 4, 5.1, 5.2, and 5.3 were provided by CMA Engineers of Portsmouth, NH on October 23 and 25, 2023.

Legend

Wetland Cover Type
- Palustrine Forested
- Palustrine Scrub/Shrub
- Palustrine Emergent Scrub/Shrub
- Palustrine Emergent
- Vernal Pool
- Intermittent Stream
- Perennial Stream
- Subject Property Line
- Alder Brook / Hatch Brook Catchment
- Limit of Disturbance
- Anchor Trench

250 125 0 250 500 Feet

SANBORN HEAD



Concept 5.2
Landfill Footprint: 70 acres
Limit of Disturbance: 113 acres
Total Wetland Area: 9.8 acres

Note: Areas do not include the road/infrastructure area - see Figure 26

Summary of Impacts	
Wetland Cover Type	**Area (acres)**
Palustrine Forested	7.7
Palustrine Scrub/Shrub	1.9
Palustrine Emergent Scrub/Shrub	0.2
Palustrine Emergent	0
Total Wetland Area	9.8
Stream Type	**Length (ft)**
Intermittent	1618
Perennial	0
Vernal Pools	**Count**
Impacted Vernal Pools	1

Table Notes:
1. Areas are rounded to the nearest tenth of an acre.
2. Perennial stream lengths are multiplied by a factor of three.

Figure 24

Wetland Impact Plan: Concept 5.2 (Cover Types)

Wetland Permit Application

Granite State Landfill, LLC
Dalton, New Hampshire

Drawn By:	D. Heacock / E. Wright
Designed By:	L. Corenthal / A. Matthews
Reviewed By:	T. White
Project No:	1003.24
Date:	November 2023

Figure Narrative

This figure depicts wetland cover types in the vicinity of the proposed Granite State Landfill project site and summarizes impacts within the limits of disturbance for the above referenced concept. Refer to Figures 26 and 27 for roadway and infrastructure area impacts applicable to Concepts 1 to 4, and Concepts 5.1 to 5.3, respectively.

Notes

1. USGS Topo Map provided by ESRI through ArcGIS Online.

2. Existing delineated wetlands, streams, and vernal pools features were provided by Horizons Engineering of Littleton, NH on October 30, 2023. Cover types were digitized by Sanborn Head from information provided by B.H. Keith Associates of Freedom, NH in October 2023. Transitions between cover types may be gradual and vary over time based on a variety of factors and are depicted as lines for the purposes of tabulating areas. Refer to information included elsewhere in this package for additional information regarding delineation, survey, and description of wetlands.

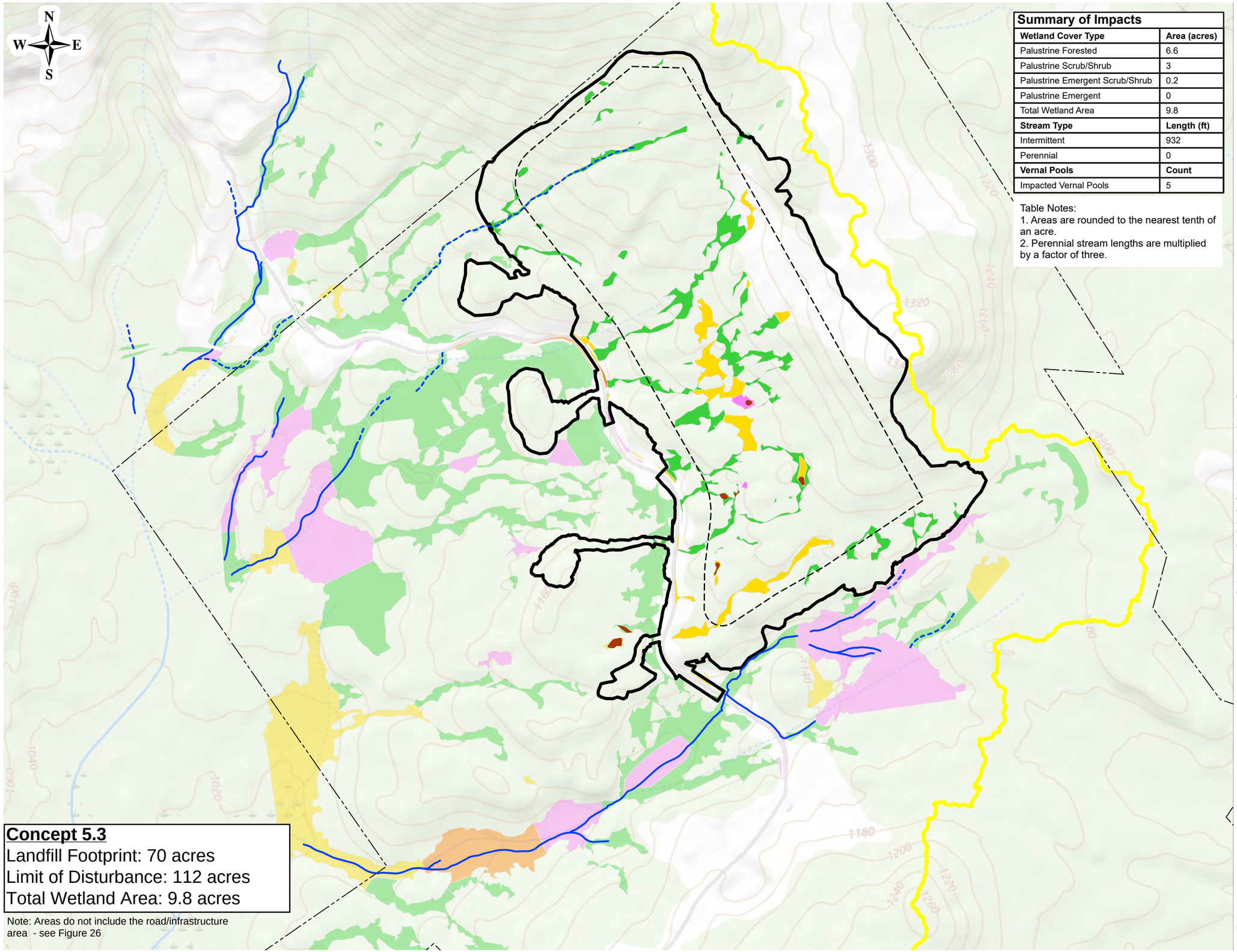
3. Limits of disturbance for Concepts 1 through 4, 5.1, 5.2, and 5.3 were provided by CMA Engineers of Portsmouth, NH on October 23 and 25, 2023.

Legend

Wetland Cover Type
- Palustrine Forested
- Palustrine Scrub/Shrub
- Palustrine Emergent Scrub/Shrub
- Palustrine Emergent
- Vernal Pool
- Intermittent Stream
- Perennial Stream
- Subject Property Line
- Alder Brook / Hatch Brook Catchment
- Limit of Disturbance
- Anchor Trench

250 125 0 250 500 Feet

SANBORN HEAD



Summary of Impacts	
Wetland Cover Type	**Area (acres)**
Palustrine Forested	6.6
Palustrine Scrub/Shrub	3
Palustrine Emergent Scrub/Shrub	0.2
Palustrine Emergent	0
Total Wetland Area	9.8
Stream Type	**Length (ft)**
Intermittent	932
Perennial	0
Vernal Pools	**Count**
Impacted Vernal Pools	5

Table Notes:
1. Areas are rounded to the nearest tenth of an acre.
2. Perennial stream lengths are multiplied by a factor of three.

Figure 25

Wetland Impact Plan: Concept 5.3 (Cover Types)

Wetland Permit Application

Granite State Landfill, LLC

Dalton, New Hampshire

Drawn By:	D. Heacock / E. Wright
Designed By:	L. Corenthal / A. Matthews
Reviewed By:	T. White
Project No:	1003.24
Date:	November 2023

Figure Narrative

This figure depicts wetland cover types in the vicinity of the proposed Granite State Landfill project site and summarizes impacts within the limits of disturbance for the above referenced concept. Refer to Figures 26 and 27 for roadway and infrastructure area impacts applicable to Concepts 1 to 4, and Concepts 5.1 to 5.3, respectively.

Notes

1. USGS Topo Map provided by ESRI through ArcGIS Online.

2. Existing delineated wetlands, streams, and vernal pools features were provided by Horizons Engineering of Littleton, NH on October 30, 2023. Cover types were digitized by Sanborn Head from information provided by B.H. Keith Associates of Freedom, NH in October 2023. Transitions between cover types may be gradual and vary over time based on a variety of factors and are depicted as lines for the purposes of tabulating areas. Refer to information included elsewhere in this package for additional information regarding delineation, survey, and description of wetlands.

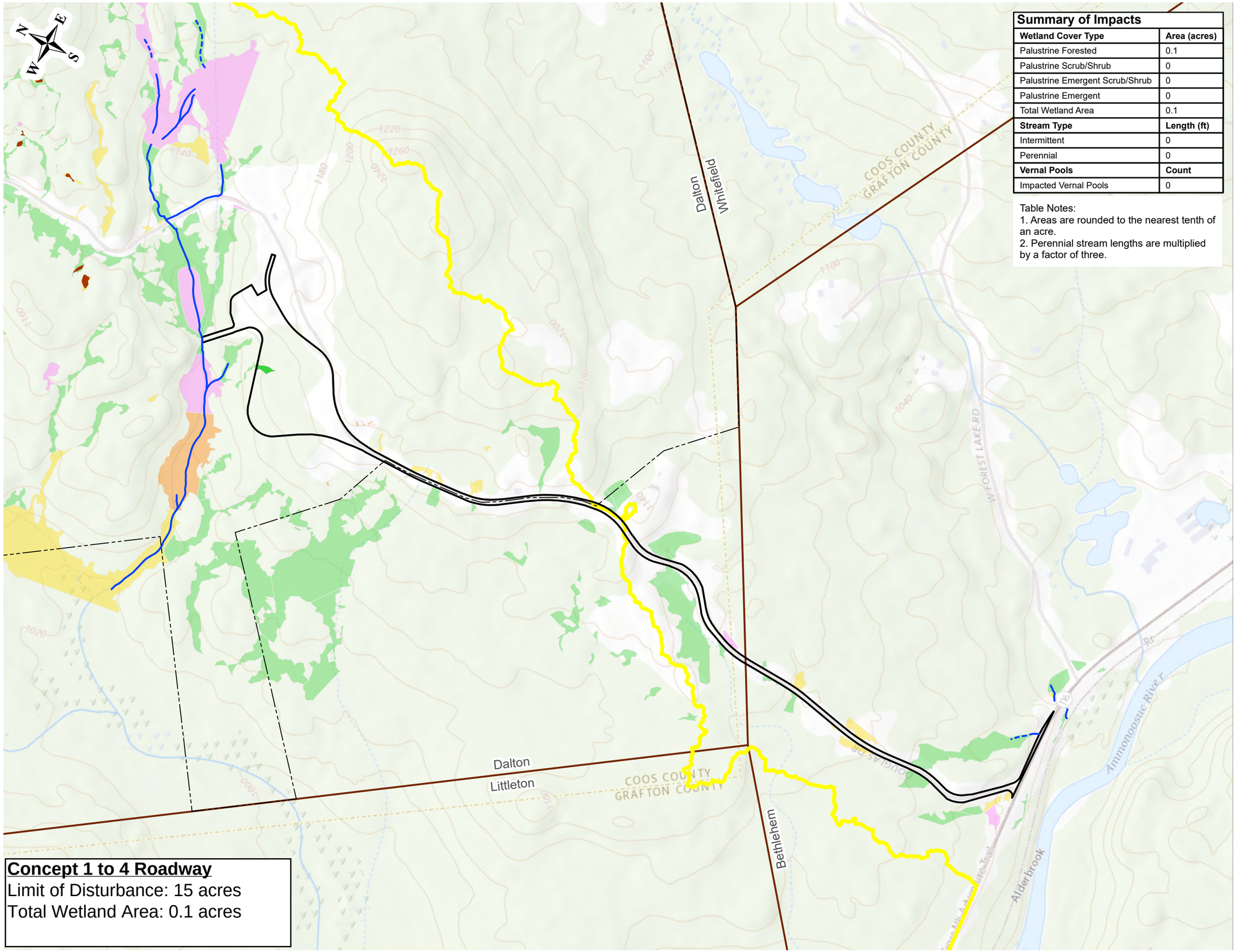
3. Limits of disturbance for Concepts 1 through 4, 5.1, 5.2, and 5.3 were provided by CMA Engineers of Portsmouth, NH on October 23 and 25, 2023.

Legend

Wetland Cover Type
- Palustrine Forested
- Palustrine Scrub/Shrub
- Palustrine Emergent Scrub/Shrub
- Palustrine Emergent
- Vernal Pool
- Intermittent Stream
- Perennial Stream
- Subject Property Line
- Alder Brook / Hatch Brook Catchment
- Limit of Disturbance
- Anchor Trench

250 125 0 250 500 Feet

SANBORN HEAD



Summary of Impacts	
Wetland Cover Type	**Area (acres)**
Palustrine Forested	0.1
Palustrine Scrub/Shrub	0
Palustrine Emergent Scrub/Shrub	0
Palustrine Emergent	0
Total Wetland Area	0.1
Stream Type	**Length (ft)**
Intermittent	0
Perennial	0
Vernal Pools	**Count**
Impacted Vernal Pools	0

Table Notes:
1. Areas are rounded to the nearest tenth of an acre.
2. Perennial stream lengths are multiplied by a factor of three.

Figure 26

Wetland Impact Plan: Concept 4 Roadway (Cover Types)

Wetland Permit Application

Granite State Landfill, LLC

Dalton, New Hampshire

Drawn By:	D. Heacock / E. Wright
Designed By:	L. Corenthal / A. Matthews
Reviewed By:	T. White
Project No:	1003.24
Date:	November 2023

Figure Narrative

This figure depicts wetland cover types in the vicinity of the proposed Granite State Landfill project site and summarizes impacts within the limits of disturbance for the above referenced concept. Refer to Figures 19 through 22 and Figures 23 through 25 for landfill footprint impact areas applicable to Concepts 1 to 4 and Concepts 5.1 to 5.3, respectively.

Notes

1. USGS Topo Map provided by ESRI through ArcGIS Online.

2. Existing delineated wetlands, streams, and vernal pools features were provided by Horizons Engineering of Littleton, NH on October 30, 2023. Cover types were digitized by Sanborn Head from information provided by B.H. Keith Associates of Freedom, NH in October 2023. Transitions between cover types may be gradual and vary over time based on a variety of factors and are depicted as lines for the purposes of tabulating areas. Refer to information included elsewhere in this package for additional information regarding delineation, survey, and description of wetlands.

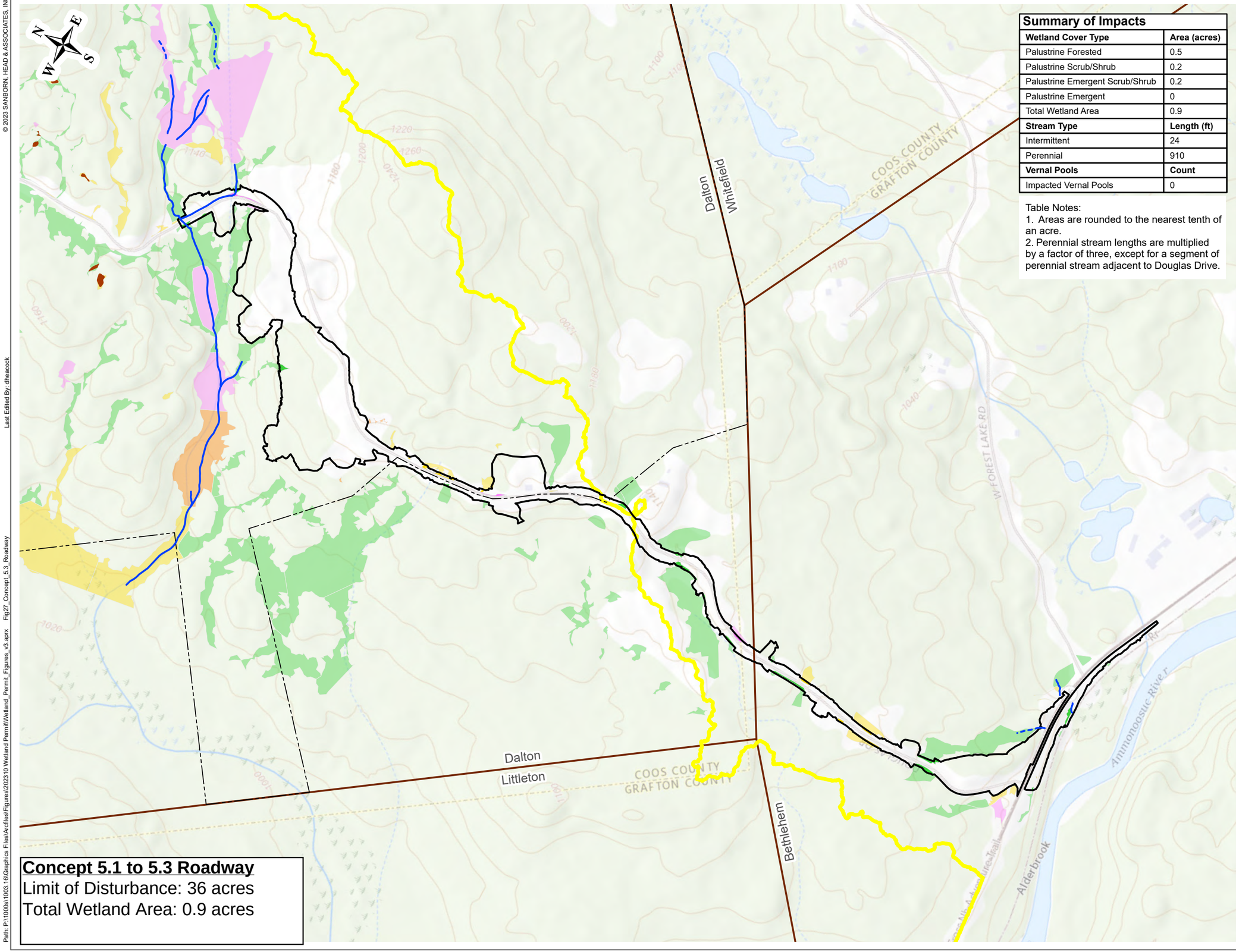
3. Limits of disturbance for Concepts 1 through 4, 5.1, 5.2, and 5.3 were provided by CMA Engineers of Portsmouth, NH on October 23 and 25, 2023.

Legend

Wetland Cover Type
- Palustrine Forested
- Palustrine Scrub/Shrub
- Palustrine Emergent Scrub/Shrub
- Palustrine Emergent
- Vernal Pool
- Intermittent Stream
- Perennial Stream
- Subject Property Line
- Alder Brook / Hatch Brook Catchment
- Limit of Disturbance

300 150 0 300 600 Feet

SANBORN HEAD



Concept 5.1 to 5.3 Roadway
Limit of Disturbance: 36 acres
Total Wetland Area: 0.9 acres

Summary of Impacts	
Wetland Cover Type	**Area (acres)**
Palustrine Forested	0.5
Palustrine Scrub/Shrub	0.2
Palustrine Emergent Scrub/Shrub	0.2
Palustrine Emergent	0
Total Wetland Area	0.9
Stream Type	**Length (ft)**
Intermittent	24
Perennial	910
Vernal Pools	**Count**
Impacted Vernal Pools	0

Table Notes:
1. Areas are rounded to the nearest tenth of an acre.
2. Perennial stream lengths are multiplied by a factor of three, except for a segment of perennial stream adjacent to Douglas Drive.

Figure 27

Wetland Impact Plan: Concept 5.3 Roadway (Cover Types)

Wetland Permit Application

Granite State Landfill, LLC

Dalton, New Hampshire

Drawn By:	D. Heacock / E. Wright
Designed By:	L. Corenthal / A. Matthews
Reviewed By:	T. White
Project No:	1003.24
Date:	November 2023

Figure Narrative

This figure depicts wetland cover types in the vicinity of the proposed Granite State Landfill project site and summarizes impacts within the limits of disturbance for the above referenced concept. Refer to Figures 19 through 22 and Figures 23 through 25 for landfill footprint impact areas applicable to Concepts 1 to 4 and Concepts 5.1 to 5.3, respectively.

Notes

1. USGS Topo Map provided by ESRI through ArcGIS Online.

2. Existing delineated wetlands, streams, and vernal pools features were provided by Horizons Engineering of Littleton, NH on October 30, 2023. Cover types were digitized by Sanborn Head from information provided by B.H. Keith Associates of Freedom, NH in October 2023. Transitions between cover types may be gradual and vary over time based on a variety of factors and are depicted as lines for the purposes of tabulating areas. Refer to information included elsewhere in this package for additional information regarding delineation, survey, and description of wetlands.

3. Limits of disturbance for Concepts 1 through 4, 5.1, 5.2, and 5.3 were provided by CMA Engineers of Portsmouth, NH on October 23 and 25, 2023.

Legend

Wetland Cover Type
- Palustrine Forested
- Palustrine Scrub/Shrub
- Palustrine Emergent Scrub/Shrub
- Palustrine Emergent
- Vernal Pool
- Intermittent Stream
- Perennial Stream
- Subject Property Line
- Alder Brook / Hatch Brook Catchment
- Limit of Disturbance

300 150 0 300 600 Feet

SANBORN HEAD

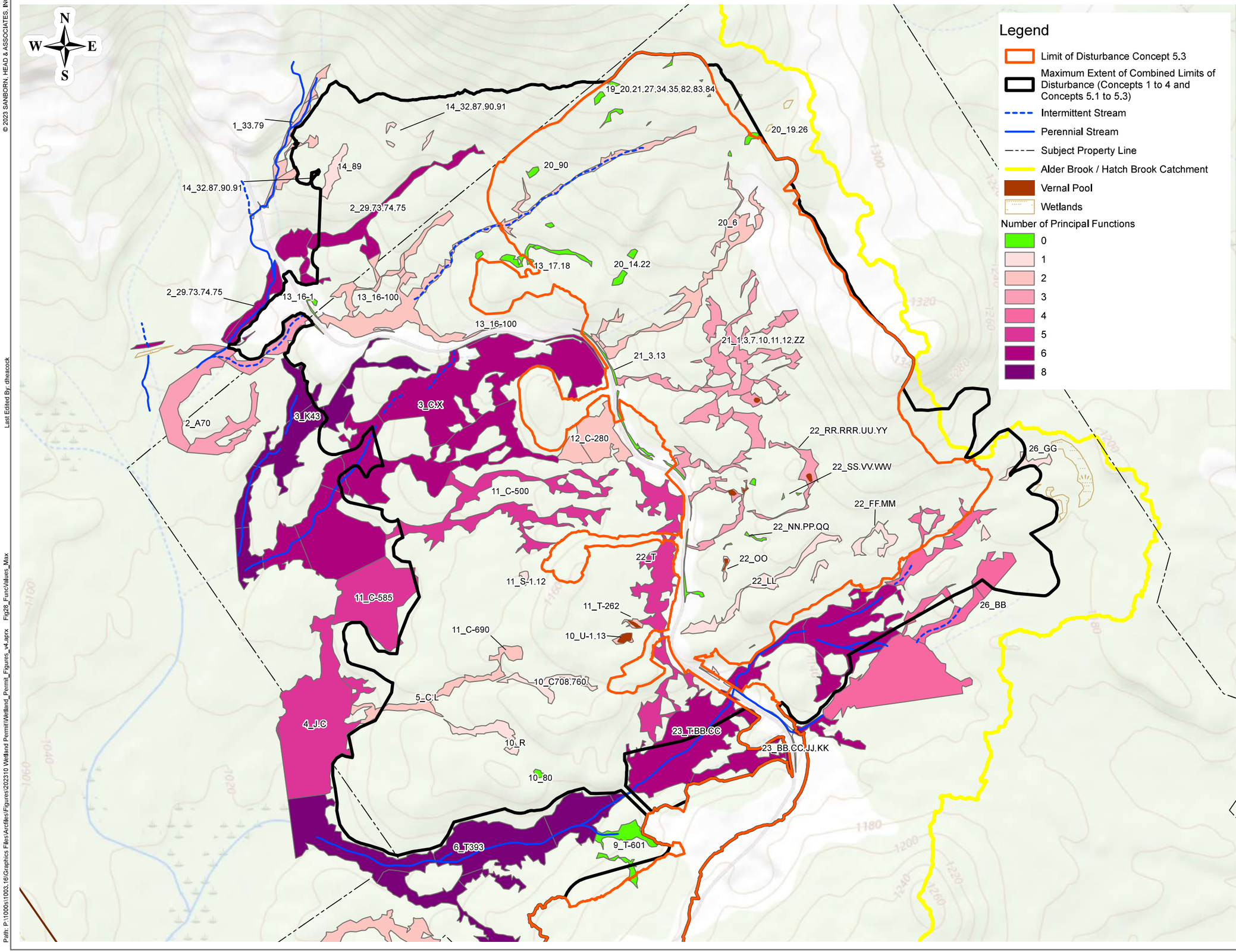


Figure 28

Wetland Impact Plan: Concept 1 to 4 and 5.1 to 5.3 (Principal Functions & Values)

Wetland Permit Application

Granite State Landfill, LLC

Dalton, New Hampshire

Drawn By:	D. Heacock / E. Wright
Designed By:	L. Corenthal / A. Matthews
Reviewed By:	T. White
Project No:	1003.24
Date:	November 2023

Figure Narrative

This figure summarizes the number of principal functions and values for wetlands within the maximum extent of the limits of disturbance for Concepts 1 to 4 and 5.1 to 5.3. Refer to the accompanying table for additional information regarding the functions and comparison of impacted areas between concepts. Refer to Figure 29 for a depiction of the roadway and infrastructure area.

Notes

1. Existing delineated wetlands, streams, and vernal pools features were provided by Horizons Engineering of Littleton, NH on October 30, 2023. The number of principal functions and IDs for each wetland feature were summarized from information provided by B.H. Keith Associates (BHK) of Freedom, NH in October and November 2023. Refer to information included elsewhere in this package for additional information regarding delineation, survey, and description of wetlands.

2. Wetland IDs were designated by BHK based on the primary sheet number followed by representative flagging ID(s). Refer to existing condition plans prepared by Horizons for additional detail.

3. Limits of disturbance for Concepts 1 through 4, 5.1, 5.2, and 5.3 were provided by CMA Engineers of Portsmouth, NH on October 23 and 25, 2023.

4. Refer to previous figures for additional notes and legend.

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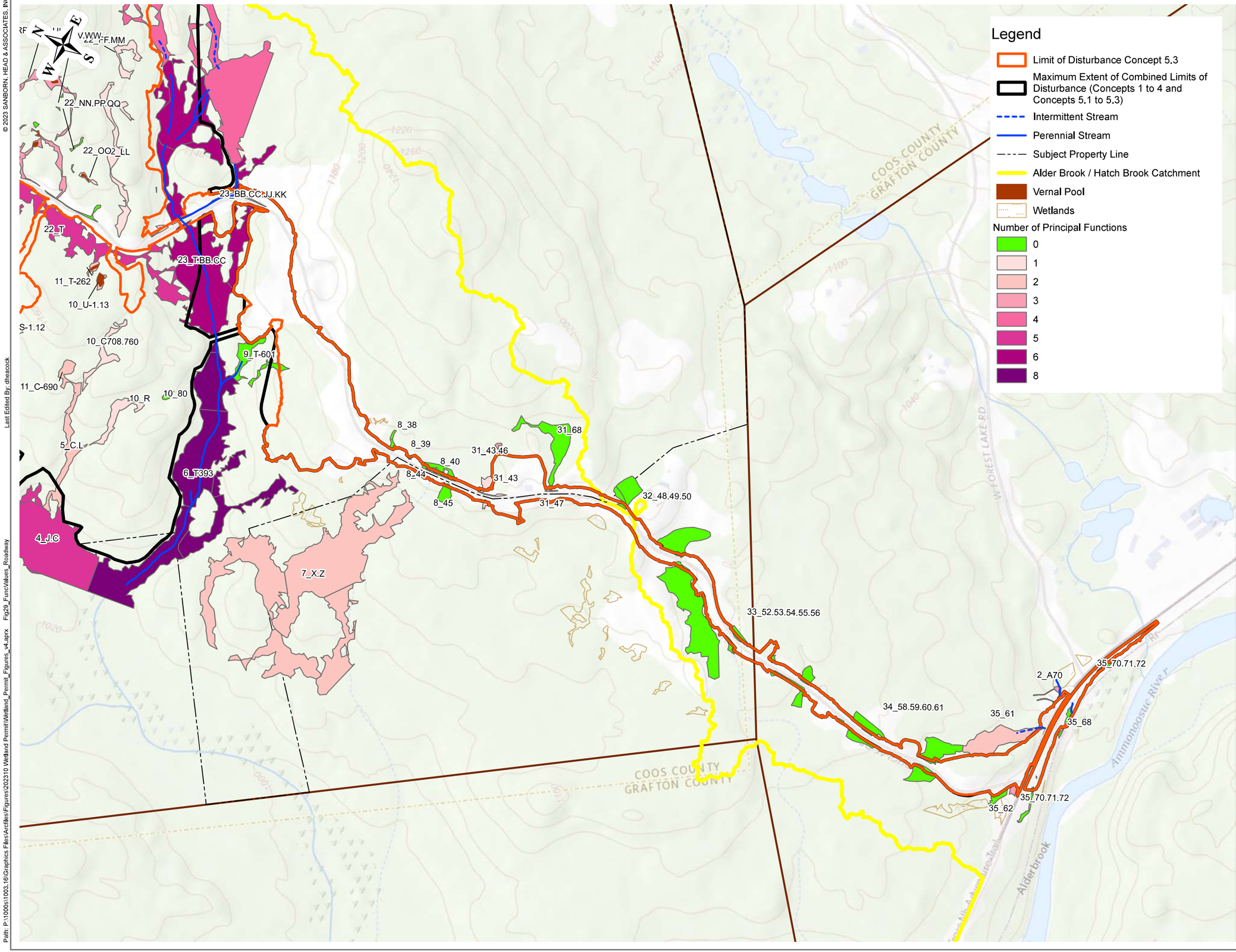

Figure 29

Wetland Impact Plan: Concept 1 to 4 and 5.1 to 5.3 (Principal Functions & Values)

Wetland Permit Application

Granite State Landfill, LLC

Dalton, New Hampshire

Drawn By:	D. Heacock / E. Wright
Designed By:	L. Corenthal / A. Matthews
Reviewed By:	T. White
Project No:	1003.24
Date:	November 2023

Figure Narrative

This figure summarizes the number of principal functions and values for wetlands within the maximum extent of the limits of disturbance for Concepts 1 to 4 and 5.1 to 5.3. Refer to the accompanying table for additional information regarding the functions and comparison of impacted areas between concepts. Refer to Figure 28 for a depiction of the landfill area.

Notes

1. Existing delineated wetlands, streams, and vernal pools features were provided by Horizons Engineering of Littleton, NH on October 30, 2023. The number of principal functions and IDs for each wetland feature were summarized from information provided by B.H. Keith Associates (BHK) of Freedom, NH in October and November 2023. Refer to information included elsewhere in this package for additional information regarding delineation, survey, and description of wetlands.

2. Wetland IDs were designated by BHK based on the primary sheet number followed by representative flagging ID(s). Refer to existing condition plans prepared by Horizons for additional detail.

3. Limits of disturbance for Concepts 1 through 4, 5.1, 5.2, and 5.3 were provided by CMA Engineers of Portsmouth, NH on October 23 and 25, 2023.

4. Refer to previous figures for additional notes and legend.

SANBORN HEAD

Notes:

1. Existing topography was created by Eastern Topographics of Wolfeboro, New Hampshire. The survey was created from Aerial Survey performed on November 15, 2022. Horizontal datum is based on NAD83 NH State Plane coordinates system and the Vertical datum is based on NAVD88.
2. Existing conditions Base Map provided by Horizons Engineering of Littleton, New Hampshire. Existing features composed from site surveys and Aerial Survey.
3. Wetlands delineated by Barry Keith, CWS #87.

Legend

- Existing Property Line
- Existing Edge of Gravel
- Existing Edge of Pavement
- Existing Perennial Stream
- Existing Intermittent Stream
- Existing Wetlands
- Existing Contours 10'
- Wetland Field Delineation Limit
- Property Line Setback
- Subject Parcel

FOREST LAKE
WHITEFIELD
DALTON
100' SETBACK TO PROPERTY NOT ZONED RESIDENTIAL
STATE PARK MANAGED FOREST
EXISTING OFF-ROAD SNOW RALLY DRIVING SCHOOL
AREA A
5.2
5.3
5.1
500' SETBACK TO RESIDENTIAL ZONED PROPERTY
WETLANDS FIELD DELINEATION LIMIT
AREA C
EXISTING ROCK QUARRY
FORMER LOG PROCESSING FACILITY
AREA B
500' SETBACK TO RESIDENTIAL ZONED PROPERTY
500' SETBACK TO RESIDENTIAL ZONED PROPERTY
W. FOREST LAKE ROAD
BETHLEHEM
DALTON
EXISTING GRAVEL PIT LIMITS
INGERSON RESIDENCE
WETLANDS WEST OF DELINEATION LIMIT ESTIMATED FROM AERIAL IMAGERY
FUTURE DRAG STRIP LOCATION
DOUGLAS DRIVE
DALTON
LITTLETON
BETHLEHEM
LITTLETON
ROUTE 116
AREA D
DALTON
LITTLETON
EXISTING GUN CLUB FIRING RANGE

no.	revision	date	by

CMA ENGINEERS
Civil/Environmental/Structural
Portsmouth, NH • Manchester, NH • Portland, ME
603/431-6196 603/627-0708 207/541-4223
cmaengineers.com

designed by: ATR/NJM/STF/AJS
drawn by: ATR/NJM/STF
approved by: AJS
date: October 2023
project no: 1101
checked by: AJS
scale: 1" = 450'

Granite State Landfill, LLC
Dalton, New Hampshire
Permitting Plan Set

Figure 30 - Alternative On-Site Landfill Locations

drawing no. 1

sheet: 1 of 1