

**DES Waste Management Division
29 Hazen Drive; PO Box 95
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**Type I-A Permit Modification to Solid Waste
Management Facility Permit
Request for Additional Information
Application No. 2020-50565
Phase IV – Four Hills Landfill
Nashua, New Hampshire**

**NHDES Site #: 198403099
Project Number: 4905**

Prepared For:
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Date of Report: July 16, 2021

Jamie Colby
Waste Management Division
NH Department of Environmental Services (NHDES)
29 Hazen Drive
Concord, NH 03302-0095

July 16, 2021
File No. 3066.11

Re: Request for Additional Information
Applications for Type I-A Modification to Solid Waste Management Facility Permit
and Waiver (2020-50565)
Phase IV Landfill Expansion, Four Hills Landfill
Nashua, New Hampshire
Permit No. DES-SW-SP-95-002

Dear Jaime:

On the behalf of the City of Nashua (City), Sanborn, Head & Associates, Inc. (Sanborn Head) has prepared this letter to respond to the New Hampshire Department of Environmental Services (NHDES) November 20, 2020 comment letter regarding the completeness of the Phase IV Type I-A Modification to Solid Waste Management Facility Permit (Type I-A PMA) and Application for Waiver. We understand that the NHDES deemed the applications incomplete and is requesting additional information to continue reviewing the applications. For convenience, the remainder of this letter addresses each of the comments, reproduced in *italics*, followed by our response. Additional information is enclosed to support our responses.

1. *Provide a demonstration that the proposed expansion will not preclude the ability to satisfy Env-Sw 805.08(b), specifically the ability to independently monitor the landfill units (e.g., lined, unlined) pursuant to RSA 485-C and Env-Or 700, as previously discussed.*

The proposed location for the Phase IV expansion is uniquely well suited as the next municipal solid waste disposal area that will provide an environmentally responsible resource to the State of New Hampshire by securing long-term disposal capacity for the City of Nashua. The proposed Phase IV location was originally contemplated as part of the closure design of the Unlined Landfill and its location at the Four Hills Landfill meets the New Hampshire siting criteria for landfill facilities as noted in the Application. Phase IV is also located within the confines of the existing Groundwater Management and Release Detection Permit GWP-198403099-N-005 (Permit), which does not distinguish between lined and unlined units.

The Application acknowledges a need to modify the groundwater monitoring system to allow for the construction of Phase IV and the groundwater monitoring system complies with the letter and intent of Env-Sw 805.08(b), RSA 485-C, and Env-Or 700. Because none of the

referenced rules or statutes require “independent monitoring of landfill units,” lined or unlined, and because such a requirement is not consistent with the Permit at the Four Hills Landfill or at other landfill facilities in New Hampshire with Groundwater Release Detection Permits and/or Groundwater Management Permits, the rationale for this comment is unclear and appears to be inconsistent as this approach is not applied or applicable to the Four Hills facility nor other permitted landfills in New Hampshire.

The attached Figure 1 illustrates the current and proposed groundwater monitoring systems as presented in the Application. As depicted, the current groundwater monitoring system consists of 11 release detection well locations that surround the lined landfill area plus nine (9) management well locations. The proposed groundwater monitoring system would consist of 12 release detection wells that surround the lined landfill area plus nine (9) management wells. The difference in the groundwater monitoring system is that three (3) existing release detection well locations would be decommissioned and replaced by four (4) new release detection well locations. The three (3) existing release detection well locations to be decommissioned are located below the central section of the Phase IV area and the proposed four (4) new release detection well locations are located directly up and downgradient of the central section of the Phase IV area.

As shown on Figure 1, the proposed groundwater monitoring system complies with Env-Sw 805.08, RSA 485-C, and Env-Or 700 in that: (i) there is at least one (1) upgradient well and at least three (3) downgradient wells [Env-Sw 805.08(a)]; and (ii) the locations of these wells to comply with RSA 485-C [Env-Sw 805.08(b)]. The requirement for an upgradient monitoring point is satisfied by proposed new couplet designated A/B on Figure 1; the minimum of three downgradient monitoring points is satisfied by existing couplets MW-103S/R and MW-104S/R, newly proposed couplet designated C/D on Figure 1, and existing triplet MW-11S/M/R. According to the relevant portion of RSA 485-C [i.e., RSA 485-C:13 II(b)], lined landfills are to have a groundwater release detection permit – one exists for this facility (GWP-198403099-N-005). The applicable reference in Env-Or 700 is similar to RSA 485-C:13 II(b) in that a groundwater release detection permit is required. In addition, according to RSA 485-C:13 I., the purpose of a groundwater release detection permit shall be to monitor groundwater for early detection of any impact to groundwater quality. The proposed modifications to the groundwater monitoring network continue to meet the intent of this requirement by siting of monitoring wells at the nearest practicable locations downgradient of the landfill.

In order to address the NHDES’s concern relative to groundwater monitoring at the Four Hills Landfill, and acknowledging that MW-11S/M/R is positioned further downgradient from Phase IV than is typical for other monitoring points, the City has agreed to modify the proposed release detection monitoring system to include monitoring of potential liquids that could accumulate within the existing Unlined Landfill cover system drainage layer in the area where Phase IV is proposed to overlay the Unlined Landfill. Drainage/liquids from this layer, if any, would be conveyed and collected in a separate sump and would be sampled and analyzed as an additional release detection monitoring point beneath the proposed Phase IV landfill unit. Therefore, with the above described modifications, the monitoring network continues to meet the requirement to provide early detection of any impact to groundwater quality.

We are not aware of any precedent at other operational landfills in New Hampshire that are required to provide one upgradient monitoring well and three downgradient monitoring wells for each *individual* phase of a landfill. This indicates that the rules are applied to the landfill as a collective whole and not treating each sub-area of the landfill as independent. If it were, then no landfill in New Hampshire would be allowed to expand, which contradicts other provisions in the New Hampshire Solid Waste Rules.

Env-Sw 805.17 specifically addresses vertical expansions of landfills. By definition, a vertical expansion of a landfill can only occur on an existing landfill. Env-Sw 805.17(a) acknowledges that vertical expansions are allowed over lined and unlined landfills, and defines the required provisions for each scenario. Env-Sw 805.17(a)(2) clearly anticipates expansions such as that proposed in the Phase IV expansion by providing a liner requirement for expansion over landfills that do not have compliant liner systems. Therefore, by default, the Rules anticipate, define, and allow for vertical expansion over unlined landfills, which by the physical presence of the expansion, make the independent monitoring requirement stated in NHDES' comment invalid.

A review of other New Hampshire landfills, including the Four Hills Landfill, indicates that *individual* monitoring of discrete landfill units is not possible if landfill units are constructed adjacent to one another. For those landfill facilities that have expanded or plan to expand, expansions include horizontal and vertical components, which by their nature preclude the possibility of *individual* monitoring. Vertical expansions such as the Phase IV expansion are not new to New Hampshire and are common throughout the nation as they limit development of real estate for disposal capacity, limit unnecessary disturbance, optimize existing landfill infrastructure, and overall limit impacts to the surrounding community. At these facilities, the groundwater monitoring system is adjusted so that *the facility as a whole* is appropriately monitored.

Furthermore, based on the current understanding of groundwater flow in the area of the existing and proposed lined areas at the Four Hills Landfill, the proposed groundwater monitoring system will identify a release from the lined landfill (again, "independent" monitoring is not required by rule or statute nor is such consistent with current practice at this or other landfill facilities in the state). Our review of Env-Sw 805.08(b), RSA 485-C, and Env-Or 700 concludes that there is no requirement that groundwater monitoring be used to pinpoint the location of a hypothetical release from a landfill as implied by the NHDES comment. Additionally, as discussed in the response to Comment #19, the Phase IV design complies with the Env-Sw 805.07 in that isolation of leaks in the liner system is not required.

For example, at the Four Hills facility, the monitoring wells at the site surround the various phases of the already permitted landfill units have been placed to provide early detection monitoring. However, there are no wells located between landfill units that would allow for clear differentiation of a release/independent monitoring of landfill units. As such, we believe precedent at this Site, as well as other sites in New Hampshire where landfill units are constructed adjacent to one another, is such that independent monitoring of landfill units is not a concept that is either required by the regulation, nor is there meaningful precedent that this approach is applied uniformly in New Hampshire.

Based on the above, the proposed Phase IV design as presented in the Application does not preclude the ability to satisfy Env-Sw 805.08(b). As discussed with the NHDES as recently as June 11, 2021, it is acknowledged that the City has a long record of groundwater quality information and that future changes to the groundwater can be assessed based on site changes or events such as the construction and development of the Phase IV disposal area.

The final design of the Unlined Landfill cover system drainage layer will be presented in applicable Type II Modification to Solid Waste Management Facility Permit Applications. The additional groundwater monitoring wells will be installed and monitored as required by applicable New Hampshire Solid Waste Rules.

2. *Provide the proposed "approved design capacity" as defined in Env-Sw 102.09. In addition, please clarify the volume and percent by volume of the proposed Phase IV waste mass located over the existing landfill (Phases I-III).*

Env-Sw 102.09 defines "approved design capacity" for landfills as (a) average weekly tonnage and (b) design volume. For this Type I-A PMA, the City is not proposing to increase its yearly tonnage rate of 80,000 tons/year, or roughly 1,540 tons/week. As provided in Appendix I of the Type I-A PMA and the Operating Plan, the proposed Phase IV design volume is 3.9 million cubic yards (CY).

3. *The residential setback line (500-foot buffer) is not shown on Figure No. 3 on the south-southeastern portion of the property; therefore, NHDES is unable to assess setback requirements. Add the setback line.*

Drawing #3 of the Phase IV Design Drawings was revised to show the 500-foot setback around the facility perimeter and is enclosed.

4. *The application does not address potential threatened and endangered species, or wildlife in general; therefore, NHDES is unable to assess requirements relative to Env-Sw 315.05(k), inclusive of Env-Sw 303.09 regarding notification, and Env-Sw 1002.03, Protection of Wildlife. Provide the relevant information.*

Env-Sw 315.05(k) is relative to the content of a Type I PMA specific to proof of notification to municipalities, districts, and other affected entities. Documentation of the required notifications are provided in the Type I PMA as follows:

- Appendix A, Attachment D (Notifications to FAA and Airports);
- Appendix H (Notifications to City of Nashua Board of Aldermen, City Clerk, and Mayor's office).

Considering that the proposed Phase IV expansion located adjacent to and on existing permitted landfill areas, specific notices to the New Hampshire Fish and Game Department (NHFG) were not made. However, as part of the NHDES Alteration of Terrain permit application process, specifically Env-Wq 1503.07(p)(1), Sanborn Head contacted the Department of Natural and Cultural Resources, Division of Forest and Lands, and Natural Heritage Bureau (NHB) for a list of species identified as being threatened, endangered, or of

concern. A copy of the list downloaded for the project area using the NHB DataCheck Tool and is enclosed. Records of five species were included in the NHB report for the project area and NHB requested that the NHFG be contacted for additional consultation.

NHFG was contacted via email on April 29, 2020 regarding the project and the potential occurrence of species of concern in the project area. After review of the project details, NHFG requested a grassland bird survey of the grassland areas of the project to assess whether the state threatened Eastern Meadowlark bird is still at the site. An occurrence of the bird was last noted in 2007. As such, on May 26 and June 1, 2020, a staff biologist from the United States Department of Agriculture (USDA) completed a grassland bird survey of the project area, following the protocols provided by NHFG via email on May 19, 2020. A total of 47 individual birds were observed, comprised 13 different species; however, there were no observations of the Eastern Meadowlark during the grassland bird survey. These results were submitted to NHFG and are enclosed.

Based on further communications with NHFG, a wildlife assessment was performed by Gove Environmental Services, Inc. of Exeter, NH (Gove). Gove's Wildlife Habitat Assessment, which also is enclosed, states:

"Threatened and endangered wildlife and habitat present; HOWEVER, NO threatened or endangered wildlife, habitat, or wildlife corridors likely to be impacted by project activities. No conservation measures are proposed."

In summary, based on the above, the requirements of Env-Sw 303.09, 315.05(k), and 1002.03 are satisfied.

5. *The subgrade immediately beneath the proposed secondary liner system overlying the closed, capped, unlined landfill ("overlay area") consists of the existing drainage sand layer and/or proposed structural fill. Provide the hydraulic conductivity of these materials to demonstrate that the requirements of Env- Sw 805.03(b) are satisfied.*

Env-Sw 805.03(b) refers to "subgrade materials," not specifically the subgrade immediately beneath the secondary liner system. Beneath the existing drainage sand and/or proposed structural fill, there is an existing 40-mil thick textured HDPE geomembrane, which is part of the Unlined Landfill cap system, that exceeds the saturated hydraulic conductivity requirement of the rule in question.

6. *Demonstrate that the foundation of the overlay area, including the unlined landfill waste mass, satisfies the requirements of Env-Sw 805.03(c) through (e) as it relates to settlement (e.g., total, differential).*

A settlement calculation is enclosed that evaluates the performance of the overlay liner system as the unlined landfill waste mass compresses over time.

7. *Revise the leachate calculations to reflect the initial waste lift thickness of 8 feet as identified in the proposed Operating Plan.*

The Operation Plan was revised to indicate an initial lift thickness of 10 feet to be consistent with the calculations. Section 3.4.3 of the revised Operating Plan is enclosed.

8. *Provide the calculations necessary to address the requirements of Env-Sw 805.06(e).*

Calculations that address Env-Sw 805.06(e) were provided in the Type I-A PMA in Appendix A, Attachment A, Calculation B.1. This calculation demonstrates that a 330-mil thick drainage geocomposite limits the maximum head on the liner system to well below 12 inches for the 25-year storm event (5.55 inches based on Extreme Precipitation Data). The performance of the leachate collection and removal system was evaluated for three (3) scenarios of the Phase IV lifespan: (i) initial operations (1st lift of waste), (ii) active operations (50% waste placement), and (iii) full buildout (100% waste placement).

9. *The contingency event (100-year / 24-hour storm) leachate calculations combine the 100-year storm event leachate pumping rate from Phase IV with normal operating flows from Phases I-III. Revise to ensure the calculations reflect the 100-year storm event acting on all phases of the landfill at once, or otherwise justify combining the 100-year storm event flows from Phase IV with normal operating condition flows from Phases I-III.*

The critical condition associated with the contingency storm event occurs during initial operations in a newly opened cell with little waste in place and portions of the leachate collection system exposed. The volume of leachate generation depends upon the open area and areas that drain to the active cell, which will vary for each stage.

The 100-year contingency storm event is not relevant to the existing filled landfill phases because there is significant difference in hydraulic timing between rainfall that falls within a newly opened cell and rainfall that falls on filled landfill areas. In accordance with the facility's approved operating plan, stormwater is directed away from active filling areas and to the existing stormwater management features. Also, filled landfill areas have the ability to "soak" up rainfall that is not captured by the existing stormwater management features, thereby greatly increasing the amount of time it takes for leachate generated to flow to the existing sumps.

Furthermore, the calculation conservatively incorporated the highest average historic leachate flows measured for Phases I-III over the last 10 years as the "base flow" rather than using normal operating flows as the base flows. The total volume of leachate required to be managed at the facility for the contingency storm event is the sum of the conservative base flow and the contingency storm event volume.

We further note that this terminology and calculation method has been used and permitted within the state at the Four Hills Landfill and other landfills within the State.

10. *A comprehensive evaluation of the leachate system's capacity was not provided. Demonstrate that the existing leachate discharge system downstream of Phases I-IV is adequately sized to handle leachate flows from routine operations in Phases I-IV and the contingency event acting on Phases I-IV, or propose design changes accordingly.*

Further, clarify whether the downstream systems include the items required by Env-Sw 805.06(o) and (p). Provide calculations, drawings and details as appropriate.

A “comprehensive evaluation” is not required by the New Hampshire Solid Waste Rules, nor is one required for this Type I-A PMA. Rather, consistent with Env-Sw 805.06(h), leachate from the Four Hills Landfill is directly connected to the City’s permitted wastewater treatment facility. As discussed during the permitting of Phase III and noted in our March 4, 2019 Permit Conditions Response Letter, leachate from the Four Hills landfill is conveyed to the Trestle Brook pump station. According to the City (see enclosed letter dated March 1, 2019) the Trestle Brook pump station has ample capacity to handle the contingency flow and can manage the required contingency discharge rate of 200 gpm.

With respect to Env-Sw 805.06(o), based on information provided by the City’s Wastewater Treatment Plant personnel, the Trestle Brook Pump Station was upgraded in 2020 and includes two (2) 24 HP Gorman Rupp Submersible Pumps for redundancy and an emergency generator. The pump station also has an alarm/telemetry system that that can be monitored locally and at the plant for liquid levels, pump activation setpoints, runtimes, etc.

There are no tanks, sumps, or other storage units outside of the landfill units, so Env-Sw 805.06(p) does not apply to this project.

11. *Access to leachate cleanout pipes in Phases I-II is to be maintained by extending the cleanout pipes using a 90-degree bend (comprised of two 45-degree elbows), which will then be extended to the edge of Phase IV’s “Limit of Waste Containment.” Demonstrate that the configuration meets the requirement in Env-Sw 805.06(i)(2) relative to cleaning. Clarify if these are the only access points to the subject leachate collection system pipes.*

The two (2) 45-degree elbow configuration proposed to extend the four (4) Phase I leachate cleanout pipes was selected for the express purpose of providing a means to high-pressure jet or clean out the leachate pipes. Cleaning devices used for such purposes typically get stuck in a single 90-degree fitting, hence the two (2) 45-degree elbow configuration provides a larger arc for the jetting device to traverse. These are the only access points to the Phase I leachate collection system pipes. The Phase II leachate collection pipes are not proposed to be altered.

12. *Pursuant to Env-Sw 805.09(f), provide the freeboard for the 25-year / 24-hour storm event for Ponds #2 and #4. Provide calculations as appropriate.*

Information relative to Env-Sw 805.09(f) is provided in Appendix A, Attachment A, Calculation F.1. Specifically, Page 29 of the Post-Development HydroCAD Model Output (page 396 of the Type I PMA pdf) documents that for the 25-year, 24-hour storm event (i.e., 5.55 inches of rainfall), the peak elevation of Pond 2 is 180.16 feet and the flood elevation is 181.50 feet, providing a freeboard of 1.34 feet. Also, Page 31 of the same output (page 396 of the Type I PMA pdf), documents that for the same storm event, the peak elevation of Pond 4 is 203.00 feet and the flood elevation is 208.00 feet, providing a freeboard of 5.0 feet.

As noted above, the pond freeboard requirement of Env-Sw 805.06(f) is satisfied for both Ponds 2 and 4.

13. Pursuant to Env-Sw 805.09(g), provide the peak surface runoff for the 25-year storm event.

Information relative to Env-Sw 805.09(g) was provided in the Type I-A PMA in Appendix A, Attachment A, Calculation F.1. Specifically, for the 25-year, 24-hour storm event (i.e., 5.55 inches of rainfall) the pre- and post-development peak surface runoff rates, included on Pages 29 and 31 of both the Pre- and Post-Development HydroCAD Model Output for Ponds 2 and 4, respectively. For convenience, these values are tabulated below:

25-year, 24-hour Storm Results	Pre-Development Runoff Flowrate (cfs)	Post-Development Runoff Flowrate (cfs)
Pond 2	10.92	10.83
Pond 4	7.54	6.62

As noted above, the post-development flowrates are less than the pre-development flowrates, thereby satisfying Env-Sw 805.06(g).

14. Define "buffer sand," a term used throughout the design calculations and drawings but not defined in the technical specifications.

The term "buffer sand" relates to the existing cap material located beneath the existing textured geomembrane of the Unlined Landfill cap system, is shown as an existing feature on the Drawings, as a component of the permitted landfill cap section, and is not a proposed construction material for the construction of the Phase IV liner system. "Buffer sand" is defined in the City's existing Closure Plan and the City is not proposing any changes to the already permitted and approved final cover system.

15. Clarify whether the "Limit of Waste Containment" shown on the drawings is synonymous with the "limit of waste." If not, show both on the drawings.

The "limit of waste containment" is the "limit of waste." The two terms are used synonymously.

16. Provide a plan showing the locations of existing decomposition gas monitoring probes (i.e., landfill gas monitoring wells). Provide an evaluation of the adequacy of the existing monitoring program relative to also servicing the proposed expansion to assure that the requirements in Env-Sw 806.07 will be met by the existing program. If not, provide plans for expanding the monitoring network or otherwise modifying the monitoring program.

The Phase IV Type I PMA does not propose any changes to the landfill gas monitoring defined in the approved Operating Plan. Because Phase IV will be located between two (2) existing landfills and is configured to contain waste within the general area of existing waste disposal, no additional gas monitoring locations are proposed. However, to address the concern raised by this comment, enclosed is a Gas Monitoring Well Location Plan that depicts the existing gas monitoring network.

17. *Affirm that the facility has been designed to provide the capability to operate in a manner that promotes rapid biological stabilization of landfilled wastes pursuant to Env-Sw 805.12(b).*

Although the City does not intend to recirculate leachate, the Phase IV liner system was designed in accordance with the Rules related to liner system design (Env-Sw 805.05 and 805.06), and therefore, the City has the capability to promote rapid biological stabilization by recirculating leachate or as operating as a bioreactor landfill.

18. *Address the requirements in Env-Sw 1003.01 relative to providing proper post-closure inspection, monitoring and maintenance, including repair, of the closed, unlined landfill if the expansion is permitted; and Env-Sw 1004.04 relative to protection of the unlined landfill's closure system if the expansion is permitted.*

Constructing a overfill landfill as proposed for the Phase IV project is a common method to best using existing areas designated for solid waste operations. For the Phase IV project, the City and the State of New Hampshire gain a significant solid waste resource during a time when such resources in the state and adjacent states are dwindling. Development of the Phase IV project best using existing solid waste infrastructure and avoids disturbing greenfield areas for developing new and needed municipal solid waste disposal capacity.

With respect to the post-closure status of the existing Unlined Landfill, the Phase IV project, whose double geomembrane liner system will be constructed above the existing cap geomembrane will further reduce the potential for precipitation to contact the solid waste and will not alter the existing collection of landfill gas and groundwater monitoring (being an unlined landfill, there is no leachate collection system). Rather, by adding a two (2) additional layers of geomembrane material above an existing cap system, the system is better protected. Hence, constructing the Phase IV liner system over the closed Unlined Landfill cap does not physically interfere with the proper operation of the closed Unlined Landfill.

19. *Phase IV is proposed to be, effectively, an approximately 21-acre cell, with one location for monitoring and removing leachate. Address how the design comports with Env-Sw 805.07, specifically as it relates to providing a means for isolating the potential location of a leak per Env-Sw 805.07(b)(2). NHDES notes that the secondary leachate collection system is the leak detection and location system for the primary liner, and the secondary liner is not required to have a leak detection and location system because it incorporates a drainage geocomposite pursuant to Env-Sw 805.07(a)(1).*

Env-Sw 805.07 does not provide a limitation to the size of landfill phase or cell. Rather, the regulation speaks to the physical characteristics of the leak detection and location system components. As illustrated on the Drawings and demonstrated by calculation (see Appendix A, Attachment A, Calculation B.5 [Secondary Travel Time]), the Phase IV liner system comports with these and other related regulations. Compliance with Env-Sw 805.07(a), which states that the leak detection and location system does not need to be designed to detect and isolate a leak in the liner system if either Env-Sw 805.07(a)(1) or (2) is met, is acknowledged by the comment. As such, because compliance with Env-Sw 805.07(a) is

achieved (i.e., the leak detection and location system does not need to be designed to detect and isolate a leak in the liner system), then Env-Sw 805.07(b)(2) no longer applies as it is specific to isolation of leaks.

20. *Add a proposed capping sequence to the fill sequencing plans.*

An Anticipated Capping Sequence Plan is enclosed as requested.

21. *Revise the closure cost estimate to include the following: a. Settlement monuments and surveying costs.*

The Financial Assurance Plan was revised to include the installation of 20 settlement monuments (\$10,000). We note that the cost for survey is already included in the Post Closure Cost estimate. The revised Financial Assurance Plan is enclosed.

22. *Revise the post-closure cost estimate to include the following:*
a. The cost for disposal of leachate.
b. The cost for destruction of landfill gas from the active gas extraction system. Pursuant to Env-Sw 806.07(h), the City must "maintain authority for complete operational control of any and all gas extraction wells and blower systems, together with at least one mechanism for destroying the gas." Therefore, the City must include the cost for management and destruction of decomposition gas from the active gas extraction system.
c. The cost for semi-annual inspections required pursuant to Env-Sw 807.05(g).

The estimated post-closure costs prepared for the Phase IV project are based on previously submitted and accepted cost estimates. Because the City owns both the Four Hills Landfill and the Nashua Wastewater Treatment Plant, there is no cost associated with disposal of leachate and a cost for disposal of leachate has never been included in any of the previously approved post-closure costs prepared for the City.

With respect to the destruction of landfill gas, as previously approved in previous Financial Assurance Plan updates, the City contracts through a 3rd-party who operates the on-site landfill-gas-to-energy facility, which includes a backup flare designed to manage the projected landfill gas flow. The contract between the City and the 3rd party serves as the City's authority over the landfill gas management. Please note that the City owns the flare station and has the ability to independently destruct the landfill gas.

The costs associated with site inspections are accounted for under Section VII (Inspections) of the Post Closure form.

23. *The public benefit demonstration does not make an adequate demonstration regarding RSA 149- M:11,III(b) and does not address the requirements of RSA 149-M:11,III(c). NHDES notes that the public benefit demonstration indicates that the current operations are not achieving or advancing the waste reduction goal in RSA 149-M:2 and, in fact, shows no significant improvement in waste reduction over the three years discussed in the demonstration; proposes no changes to the status quo of reliance on*

landfilling, the least preferred method in the waste management hierarchy; and fails to discuss the requirements in RSA 149-M:11,III(c), specifically as they relate to the goals of the state and district solid waste management plans. Address the requirements of RSA 149-M:11,III(b) and (c).

The public benefit demonstration provided in the Type I PMA was prepared as required by Env-Sw 1005.05 and consistent with the definition of “public benefit” as presented in Env-Sw 104.15 and RSA 149-M:4, XVII, the later referencing RSA 149-M:11. Because the Four Hills Landfill is a limited public facility (Env-Sw 103.37), the public benefit demonstration need only address RSA 149-M11, III(b) and (c) [Env-Sw 1005.05(c)]. We note that both RSA 149-M:11, III(b) and (c) clearly state that the facility is to “assist” the state in achieving the goals, not that the facility is “responsible for achieving” the goals as implied in the above comment. Considering the above comment, a revised public benefit statement is enclosed that addresses concerns relative to the public benefit demonstration.

24. *The included waiver application proposes an “alternative procedure” of no change from current practices of landfilling wastes in Phases I and II, where the liner is penetrated at a low-point for purposes of discharging leachate from the system by gravity feed. The application provides no written documentation or data to support this alternative, such as information to demonstrate that the current system meets the purpose and intent of the rule requested for waiver. The rule needing waiver is Env-Sw 805.17(a)(1) as it relates to Env-Sw 805.05(j). Note that the purpose and intent of the rule is to ensure protection of public health, safety and the environment by precluding the use of liner systems that no longer meet rule requirements. Provide a demonstration that the proposed alternative procedure meets the purpose and intent of the rule requested for waiver. Ensure that the proposal meets the criteria in Env-Sw 202.04.*

The Application for Waiver included with the Phase IV PMA was prepared in compliance with the criteria outlined in Env-Sw 202.04. Furthermore, the Application for Waiver is not proposing “an ‘alternative procedure.’” Rather, as requested by the NHDES in pre-application meeting, the waiver application recognizes that additional waste will be placed within the limits of currently active Phases I and II, which were designed, permitted, constructed, and approved by the NHDES with a liner penetration that complied with the regulatory framework applicable at that time, yet does not comply with the current New Hampshire Solid Waste Rules, specifically Env-Sw 805.05(j).

Regarding the NHDES’s comment statement that “*The application provides no written documentation or data to support this alternative, such as information to demonstrate that the current system meets the purpose and intent of the rule requested for waiver,*” the statement is correct in that the Phase IV application is not proposing to install liner penetrations. As mentioned, a liner penetration already exists, which was approved by the NHDES. Considering that the NHDES approved the liner penetration for an active and operating waste disposal area, one of several in the State of New Hampshire, continued operation of Phases I and II does not pose a negative impact on public health, safety, and the environment as demonstrated by the operational and compliance record on file with the NHDES.

The Application for Waiver submitted with the Phase IV application and the Phase IV application itself provides the supporting information that demonstrates that continued operation of Phases I and II with the Phase IV expansion is acceptable.

As illustrated on the drawings, the proposed additional waste associated with the vertical expansion portion of the Phase IV expansion will not be placed over the location of the liner penetration. Said another way, the thickness of waste, or waste column, over the liner penetration does not change between the current permitted final grades and the final grades associated with the Phase IV project. Furthermore, the function of the leachate collection and removal system in Phase I will continue as designed and permitted, which includes monitoring of leachate head in the penetration area. In summary, there will be no additional stresses to the penetration area due to waste loading or leachate management; therefore, there is no need for an alternate procedure, method, or activity. Considering that there will be no additional stresses placed on the currently permitted and operating sump, and because there is no evidence that there is an operational issue with the current system, which has been in place for over 20 years, there is no reason to deny the waiver request.

As submitted, the Application for Waiver addresses technically possible alternatives to the current permitted operation of the Phase I sump. As noted in the waiver application, modifying the current sump to comply with Env-Sw 805.05(j) would pose a significant threat to construction worker safety as well as public health, safety, and the environment, and would also negatively impact the overall waste operation at the landfill.

Considering the above, we respectfully request that the NHDES reconsider its comment in light of the Phase IV application in its entirety.

25. *The City has not documented notification of the Nashua Regional Solid Waste Management District of its applications for a Type I-A permit modification and waiver, as required by Env-Sw 303.07(a)(2). Provide proof pursuant to Env-Sw 315.05(k).*

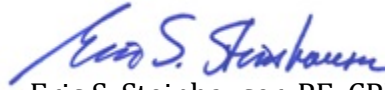
The certified mail receipt from the Nashua Regional Solid Waste Management District is enclosed.

We trust that the information provide herein satisfies your request for additional information. Please do not hesitate to contact Edward Galvin at (603) 415-6132 should you require additional information.

Very truly yours,
SANBORN, HEAD & ASSOCIATES, INC.



Edward A. Galvin, PE
Project Manager



Eric S. Steinhauser, PE, CPESC, CPSWQ
Senior Vice President

ESS/EAG/BAG/AEA:eag

Enclosures:

- Comment 1 Revised Four Hills Landfill Proposed Monitoring Well Location Plan
- Comment 3 Revised Anticipated Site Conditions Prior to Landfill Construction (Sheet 3 of 28)
- Comment 4 NHB Report, dated April 27, 2020
USDA Grassland Bird Survey
Gove Wildlife Habitat Assessment, dated December 2020
- Comment 6 Settlement Calculation
- Comment 7 Section 3.4.3 of the Revised Operating Plan
- Comment 10 Proposed Maximum Allowable Leachate Discharge Rate Increase Letter
- Comment 16 Gas Monitoring Well Location Plan
- Comment 20 Anticipated Capping Sequence Plan
- Comment 21 Revised Financial Assurance Plan
- Comment 23 Revised Public Benefit Statement
- Comment 24 Revised Additional Information - Application for Waiver
- Comment 25 Certified Mail Receipt

Copies to: Lisa Fauteux, City of Nashua
Jeff Lafleur, City of Nashua
Kerry Converse, City of Nashua

Comment #1

Revised Four Hills Landfill Proposed Monitoring Well Location Plan

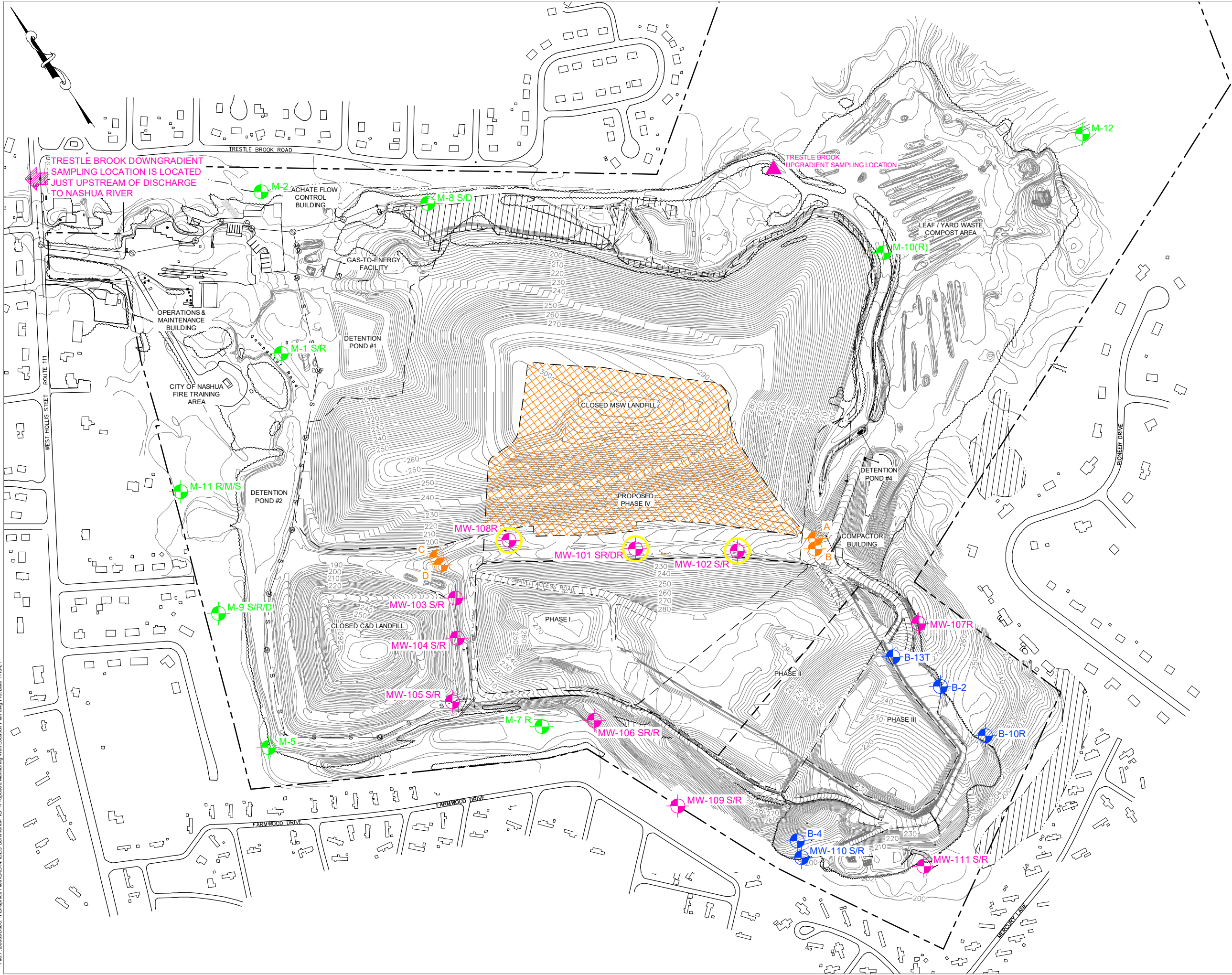


Figure 1
**Four Hills Landfill
Proposed Monitoring
Well Location Plan**
Hydrogeologic Report
Phase IV Secure Landfill Expansion
Four Hills Landfill
City of Nashua, New Hampshire
Nashua, New Hampshire

Drawn By: S. Santiago
Designed By: A. Ashton
Reviewed By: E. Steinhauer
Project No: 3066.12
Date: July 2021

Figure Narrative
This figure shows the approximate locations of major site features, site monitoring wells based on information provided by the City of Nashua, and locations of proposed replacement groundwater release detection wells.

- Notes**
1. The existing topography and site features are based on ground field survey performed by WSP USA, Inc. of Nashua, New Hampshire on July 20, 2017 and July 21, 2017. Horizontal Datum: NAD83 (2001). Horizontal Projection: NH State Plane. Vertical Datum: NGVD 29.
 2. Refer to text for additional details.

Legend

- MW-102S Groundwater release detection wells
- M-1S Groundwater management wells
- B-2 Groundwater elevation measurement location
- Surface Water Sampling Location
- Wetland
- Proposed Phase IV Limit of Waste
- Well proposed for decommissioning as part of proposed Phase IV construction
- Proposed Replacement Groundwater Release Detection Well
- Proposed Phase IV overlay liquid monitoring area



Comment #3

Revised Anticipated Site Conditions Prior to Landfill Construction

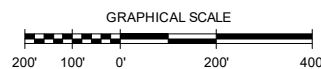
FILE: P:\3000s\3066.11\Graphics\Files\CAD\Type 1A App Drawings\202-03 - Site and Pre-Dev Plan\REV.dwg
 AOUT: D03 Pre Development Plan



NOTES:

1. REFER TO SHEET 1 FOR ADDITIONAL NOTES AND LEGEND.

SANBORN || HEAD

[illegible]

DRAWN BY: L. TRACY
DESIGNED BY: J. GRACE
REVIEWED BY: E. STEINHAUSER
PROJECT MGR: E. GALVIN
PIC: E. STEINHAUSER
DATE: JULY 2020

PHASE IV DESIGN DRAWINGS
TYPE I-A PERMIT MODIFICATION APPLICATION
FOUR HILLS LANDFILL
CITY OF NASHUA
NASHUA, NEW HAMPSHIRE

ANTICIPATED SITE CONDITIONS
PRIOR TO LANDFILL CONSTRUCTION

PROJECT NUMBER:
3066.11

SHEET NUMBER:
3 OF 28

Comment #4

**NHB Report
USDA Grassland Bird Survey
Gove Wildlife Habitat Assessment**

CONFIDENTIAL – NH Dept. of Environmental Services review

Memo



NH NATURAL HERITAGE BUREAU
NHB DATACHECK RESULTS LETTER

To: Lisa Damiano, Sanborn, Head & Associates Inc.
20 Foundry Street
Concord, NH 03301

From: Amy Lamb, NH Natural Heritage Bureau

Date: 4/27/2020 (valid for one year from this date)

Re: Review by NH Natural Heritage Bureau

NHB File ID: NHB20-1026

Town: Nashua

Location: Tax Maps: Tax Map D, Lot 54

Description: The City of Nashua is proposing to construct the Phase IV Expansion of the existing Four Hills Landfill in an area previously disturbed between two existing landfill phases.

Modifications to existing stormwater management infrastructure are also anticipated.

cc: Kim Tuttle

As requested, I have searched our database for records of rare species and exemplary natural communities, with the following results.

Comments: Please contact the NH Fish & Game Department

Vertebrate species

	State ¹	Federal	Notes
Blanding's Turtle (<i>Emydoidea blandingii</i>)	E	--	Contact the NH Fish & Game Dept (see below).
Eastern Box Turtle (<i>Terrapene carolina</i>)	E	--	Contact the NH Fish & Game Dept (see below).
Eastern Hognose Snake (<i>Heterodon platirhinos</i>)	E	--	Contact the NH Fish & Game Dept (see below).
Eastern Meadowlark (<i>Sturnella magna</i>)	T	--	Contact the NH Fish & Game Dept (see below).
Northern Black Racer (<i>Coluber constrictor constrictor</i>)	T	--	Contact the NH Fish & Game Dept (see below).

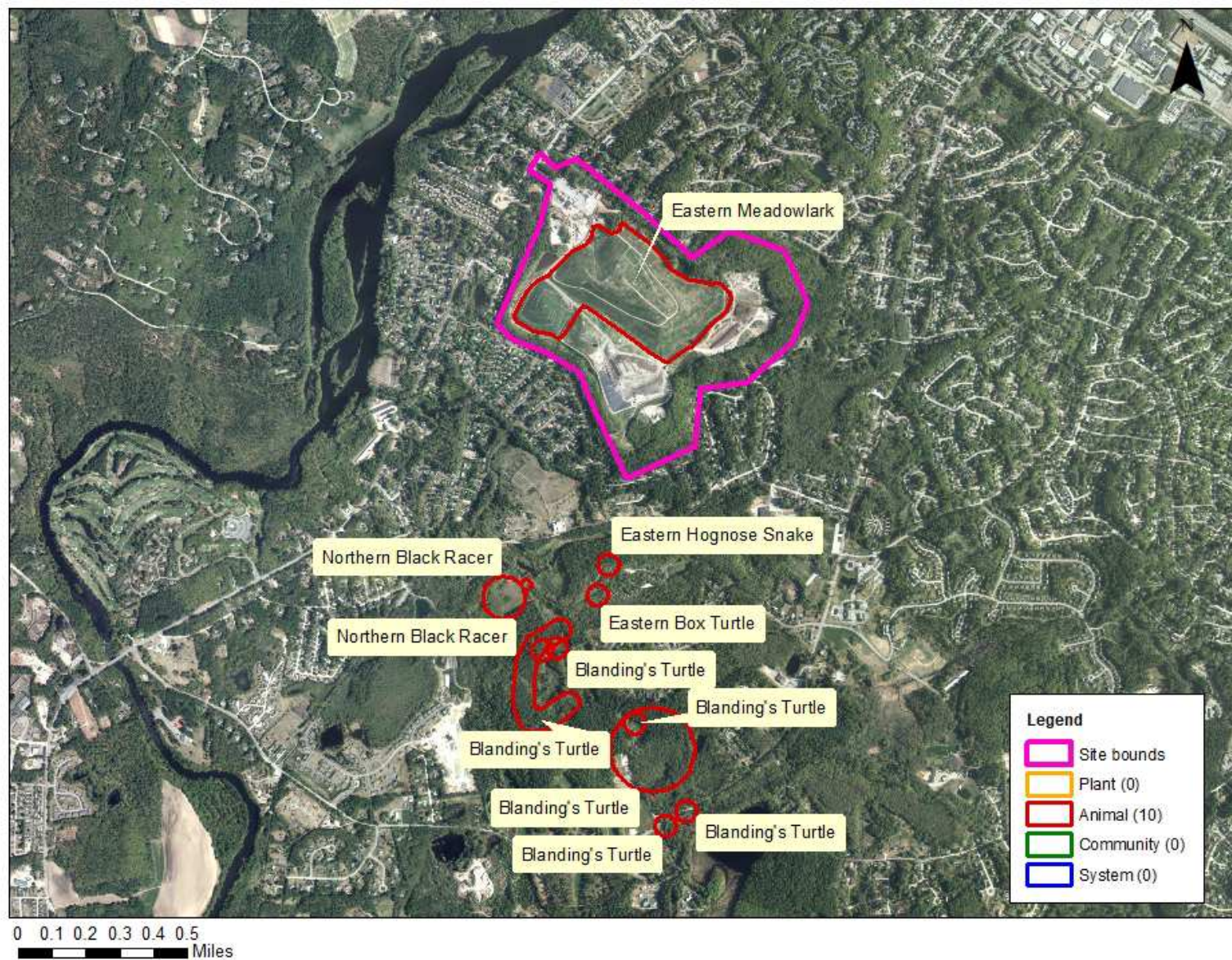
¹Codes: "E" = Endangered, "T" = Threatened, "SC" = Special Concern, "--" = an exemplary natural community, or a rare species tracked by NH Natural Heritage that has not yet been added to the official state list. An asterisk (*) indicates that the most recent report for that occurrence was more than 20 years ago.

Contact for all animal reviews: Kim Tuttle, NH F&G, (603) 271-6544.

A negative result (no record in our database) does not mean that a sensitive species is not present. Our data can only tell you of known occurrences, based on information gathered by qualified biologists and reported to our office. However, many areas have never been surveyed, or have only been surveyed for certain species. An on-site survey would provide better information on what species and communities are indeed present.

CONFIDENTIAL – NH Dept. of Environmental Services review

NHB20-1026



New Hampshire Natural Heritage Bureau - Animal Record

Blanding's Turtle (*Emydoidea blandingii*)**Legal Status**

Federal: Not listed
State: Listed Endangered

Conservation Status

Global: Apparently secure but with cause for concern
State: Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank: --

Detailed Description: 2017: Area 14377: 1 adult observed, sex unknown.
General Area: 2017: Area 14377: In wooded swamp/pond.
General Comments: --
Management: --
Comments:

Location

Survey Site Name: Four Hills, Nashua
Managed By:

County: Hillsborough
Town(s): Nashua
Size: 1.9 acres

Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2017: Area 14377: Yudicky Farm Park, Nashua.

Dates documented

First reported: 2017-05-11 Last reported: 2017-05-11

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

New Hampshire Natural Heritage Bureau - Animal Record

Blanding's Turtle (*Emydoidea blandingii*)**Legal Status**

Federal: Not listed
State: Listed Endangered

Conservation Status

Global: Apparently secure but with cause for concern
State: Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank: --

Detailed Description: 2009: Area 12360M: 1 observed on 4/19; 1 observed on 4/22; 3 observed on 4/28; 1 observed on 5/19; 1 female observed on 6/2.

General Area: 2009: Area 12360M: Swamp.

General Comments: --

Management: --

Comments:

Location

Survey Site Name: Four Hills, Nashua
Managed By: Terrell Farm

County: Hillsborough

Town(s): Nashua

Size: 19.7 acres

Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2009: Area 12360M: Swamp Trail in Yudicky Farm Park.

Dates documented

First reported: 2009-04-19

Last reported: 2009-06-02

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

New Hampshire Natural Heritage Bureau - Animal Record

Blanding's Turtle (*Emydoidea blandingii*)**Legal Status**

Federal: Not listed
State: Listed Endangered

Conservation Status

Global: Apparently secure but with cause for concern
State: Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank: --

Detailed Description: 2009: Area 12365: 1 observed.
General Area: 2009: Area 12365: Wooded swamp.
General Comments: --
Management: --
Comments:

Location

Survey Site Name: Four Hills, Nashua
Managed By: Yudicky Farm - Conservation Area

County: Hillsborough
Town(s): Nashua
Size: 30.8 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2009: Area 12365: Southeastern part of Yudicky Farm Park. Wooded swamp east of paved road.

Dates documented

First reported: 2009-07-18 Last reported: 2009-07-18

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

New Hampshire Natural Heritage Bureau - Animal Record

Blanding's Turtle (*Emydoidea blandingii*)**Legal Status**

Federal: Not listed
State: Listed Endangered

Conservation Status

Global: Apparently secure but with cause for concern
State: Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank: --

Detailed Description: 2012: Area 13029: 1 adult female observed.
General Area: 2012: Area 13029: Crossing road.
General Comments: --
Management: --
Comments:

Location

Survey Site Name: Lovewell Pond
Managed By: Nashua, City of

County: Hillsborough
Town(s): Nashua
Size: 1.9 acres

Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2012: Area 13029: Gregg Road, Nashua, near intersection with Rte. 101A.

Dates documented

First reported: 2012-06-13 Last reported: 2012-06-13

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

New Hampshire Natural Heritage Bureau - Animal Record

Blanding's Turtle (*Emydoidea blandingii*)**Legal Status**

Federal: Not listed
State: Listed Endangered

Conservation Status

Global: Apparently secure but with cause for concern
State: Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank: --

Detailed Description: 2012: Area 13043: 1 adult observed.
General Area: 2012: Area 13043: Crossing road.
General Comments: --
Management: --
Comments:

Location

Survey Site Name: Four Hills, Nashua
Managed By: Yudicky Farm - Conservation Area

County: Hillsborough
Town(s): Nashua
Size: 1.9 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2012: Area 13043: Rte. 111A at Yudicky Farm Conservation Area, Nashua. Near Lovewell Pond, crossing the road.

Dates documented

First reported: 2012-05-31 Last reported: 2012-05-31

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

New Hampshire Natural Heritage Bureau - Animal Record

Blanding's Turtle (*Emydoidea blandingii*)**Legal Status**

Federal: Not listed
State: Listed Endangered

Conservation Status

Global: Apparently secure but with cause for concern
State: Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank: --

Detailed Description: 2011: Area 13128: 2 adults observed.
General Area: 2011: Area 13128: Wooded swamp.
General Comments: --
Management: --
Comments:

Location

Survey Site Name: Four Hills, Nashua
Managed By:

County: Hillsborough
Town(s): Nashua
Size: 1.9 acres

Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2011: Area 13128: Southwest Park - Yudicky Farm, Nashua.

Dates documented

First reported: 2011-04-11 Last reported: 2011-04-11

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

New Hampshire Natural Heritage Bureau - Animal Record

Eastern Box Turtle (*Terrapene carolina*)**Legal Status**

Federal: Not listed
State: Listed Endangered

Conservation Status

Global: Demonstrably widespread, abundant, and secure
State: Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank: --

Detailed Description: 2016: Area 14164: 1 adult male observed.
General Area: 2016: Area 14164: Trailside in a hiking/mountain biking park.
General Comments: --
Management: --
Comments:

Location

Survey Site Name: Hollis Depot, east of
Managed By:

County: Hillsborough
Town(s): Nashua
Size: 1.9 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2016: Area 14164: Southwest Park - Yudicky Farm, Nashua.

Dates documented

First reported: 2016-08-14 Last reported: 2016-08-14

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

New Hampshire Natural Heritage Bureau - Animal Record

Eastern Hognose Snake (*Heterodon platirhinos*)**Legal Status**

Federal: Not listed
State: Listed Endangered

Conservation Status

Global: Demonstrably widespread, abundant, and secure
State: Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank: --

Detailed Description: 2013: Area 13447: 1 adult observed, sex unknown.
General Area: 2013: Area 13447: Trail in coniferous forest.
General Comments: --
Management: --
Comments:

Location

Survey Site Name: Hollis Depot, east of
Managed By:

County: Hillsborough
Town(s): Nashua
Size: 1.9 acres

Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: --

Dates documented

First reported: 2013-05-04 Last reported: 2013-05-04

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

New Hampshire Natural Heritage Bureau - Animal Record

Eastern Meadowlark (*Sturnella magna*)

Legal Status

Federal: Not listed
State: Listed Threatened

Conservation Status

Global:	Demonstrably widespread, abundant, and secure
State:	Not ranked (need more information)

Description at this Location

Conservation Rank:	Not ranked
Comments on Rank:	--

Detailed Description:	2007: Species observed on 6/12.
General Area:	--
General Comments:	--
Management	--
Comments:	

Location

Survey Site Name: Nashua Landfill
Managed By:

County: Hillsborough
Town(s): Nashua
Size: 86.6 acres

Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: --

Dates documented

First reported:	2007-06-12	Last reported:	2007-06-12
-----------------	------------	----------------	------------

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

New Hampshire Natural Heritage Bureau - Animal Record

Northern Black Racer (*Coluber constrictor constrictor*)**Legal Status**

Federal: Not listed
State: Listed Threatened

Conservation Status

Global: Demonstrably widespread, abundant, and secure
State: Imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank: --

Detailed Description: 2014: Area 13631: 1 adult observed, sex unknown.
2011: Area 13127: 1 adult observed.
2010: Area 12768: 1 adult observed.

General Area: 2014: Area 13631: In grass under an old rusty car hood.
2011: Area 13127: Grassland.
2010: Area 12768: Mixed forest.

General Comments: --
Management: --
Comments:

Location

Survey Site Name: Hollis Depot, east of
Managed By: Terrell Farm

County: Hillsborough
Town(s): Nashua
Size: 10.1 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2014: Area 13631: Southwest Park, Nashua.
2011: Area 13127: SW Park - Yudicky Farm.
2010: Area 12768: Yudicky Farm, Nashua.

Dates documented

First reported: 2010-05-30 Last reported: 2014-05-27

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.



United States
Department of
Agriculture

Marketing and
Regulatory
Programs

59 Chenell Dr.
Suite 7
Concord, NH
03301

City of Nashua, Four Hills Landfill Grassland Bird Survey Report

The following report summarizes bird species and activity observed at the Four Hills Landfill, Nashua NH on the dates of May 26 and June 1, 2020. Four survey point count stations, spaced 200-250m apart within the project area were utilized.

Site #	Lat	Long	
Site 1	42.727433°	-71.522786°	250 meters
Site 2	42.728704°	-71.520020°	250 meters
Site 3	42.728166°	-71.517045°	250 meters
Site 4	42.727886°	-71.514611°	200 meters

Each point count station was surveyed for 10 minutes with locations of target and non-target bird species mapped onto an aerial map of the survey area, including a record of the bird behavior. Target species for this survey included, upland sandpiper, grasshopper sparrow, savanna sparrow, bobolink and eastern meadowlark. Other birds species observed during survey counts were included.

Survey 1 (May 26, 2020)

Observers: Joshua Janicke, Cody Symonds

Time Start: 0910 Time End: 1025

Wind Speed: 2

Temperature: 75

(Target Species in Bold)

Observation Point 1

Time	Species	# Observed	Behavior
0910	RWBL	4	Move
0911	SAVS	1	Pequ
0918	RWBL	1	Pequ

Observation Point 2

Time	Species	# Observed	Behavior
0935	SAVS	1	Call
0941	TRES	1	Move
0938	RWBL	1	Move

Observation Point 3

Time	Species	# Observed	Behavior
0955	SAVS	3	Pequ
0958	WITU	3	Fora
0959	LEFL	1	Move

Observation Point 4

Time	Species	# Observed	Behavior
1018	RWBL	1	Move
1022	MODO	1	Move
1023	RWBL	1	Move

Survey 2 (June 1, 2020)

Observers: Joshua Janicke, Cody Symonds

Time Start: 0748 Time End: 0910

Wind Speed: 1

Temperature: 46

(Target Species in Bold)

Observation Point 1

Time	Species	# Observed	Behavior
0748	RWBL	1	Call
0750	TUVU	1	Move
0750	TRES	1	Move
0752	KILL	1	Call
0753	RTHA	1	Move
0754	SAVS	1	Pequ

Observation Point 2

Time	Species	# Observed	Behavior
0815	RWBL	3	Move
0816	SAVS	1	Call
0817	TRES	1	Move
0822	KILL	1	Move
0824	WITU	3	Fora

Observation Point 3

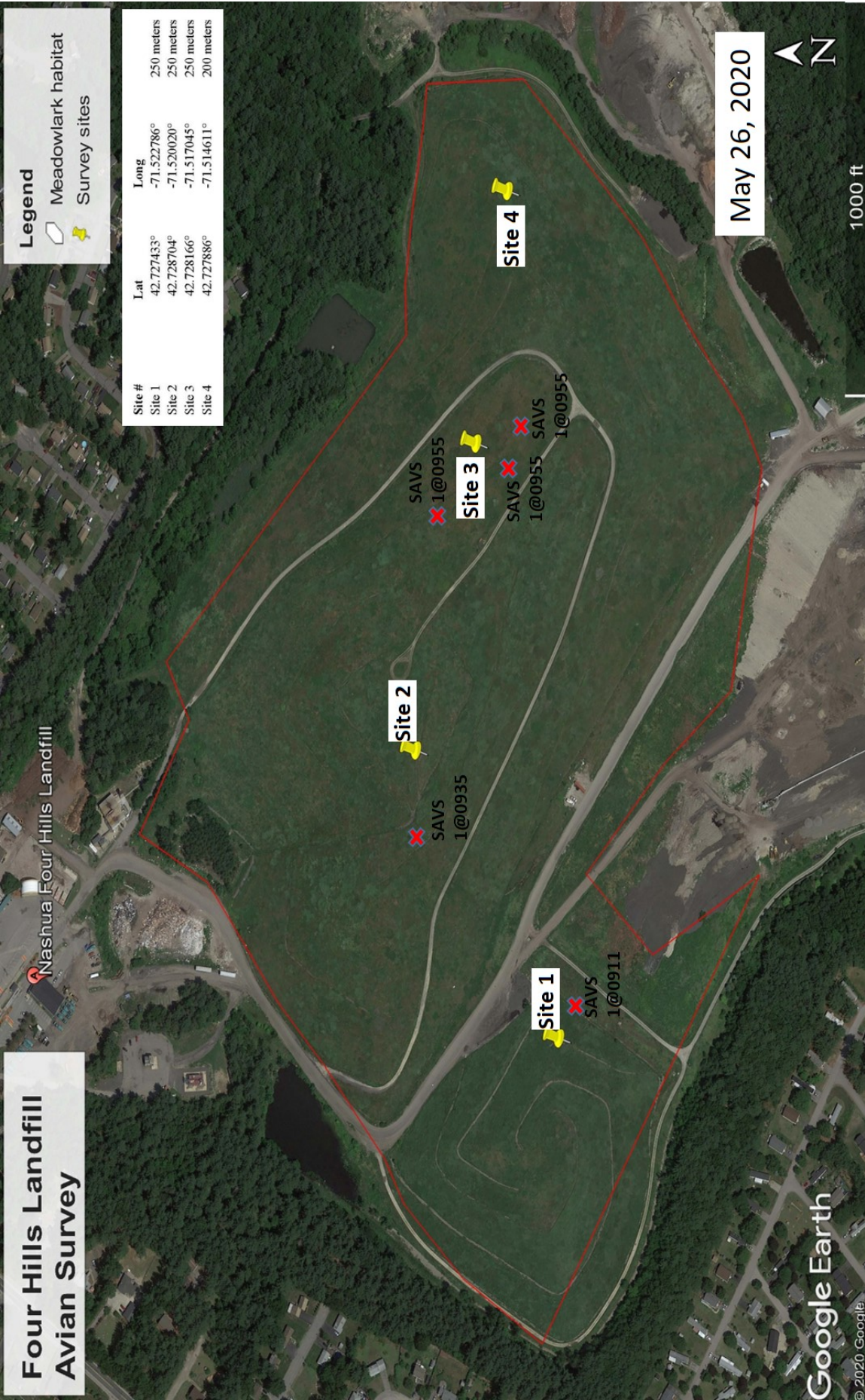
Time	Species	# Observed	Behavior
0833	BOBO	1	Call
0836	SAVS	1	Pequ
0837	RWBL	1	Pequ
0837	TRES	1	Move

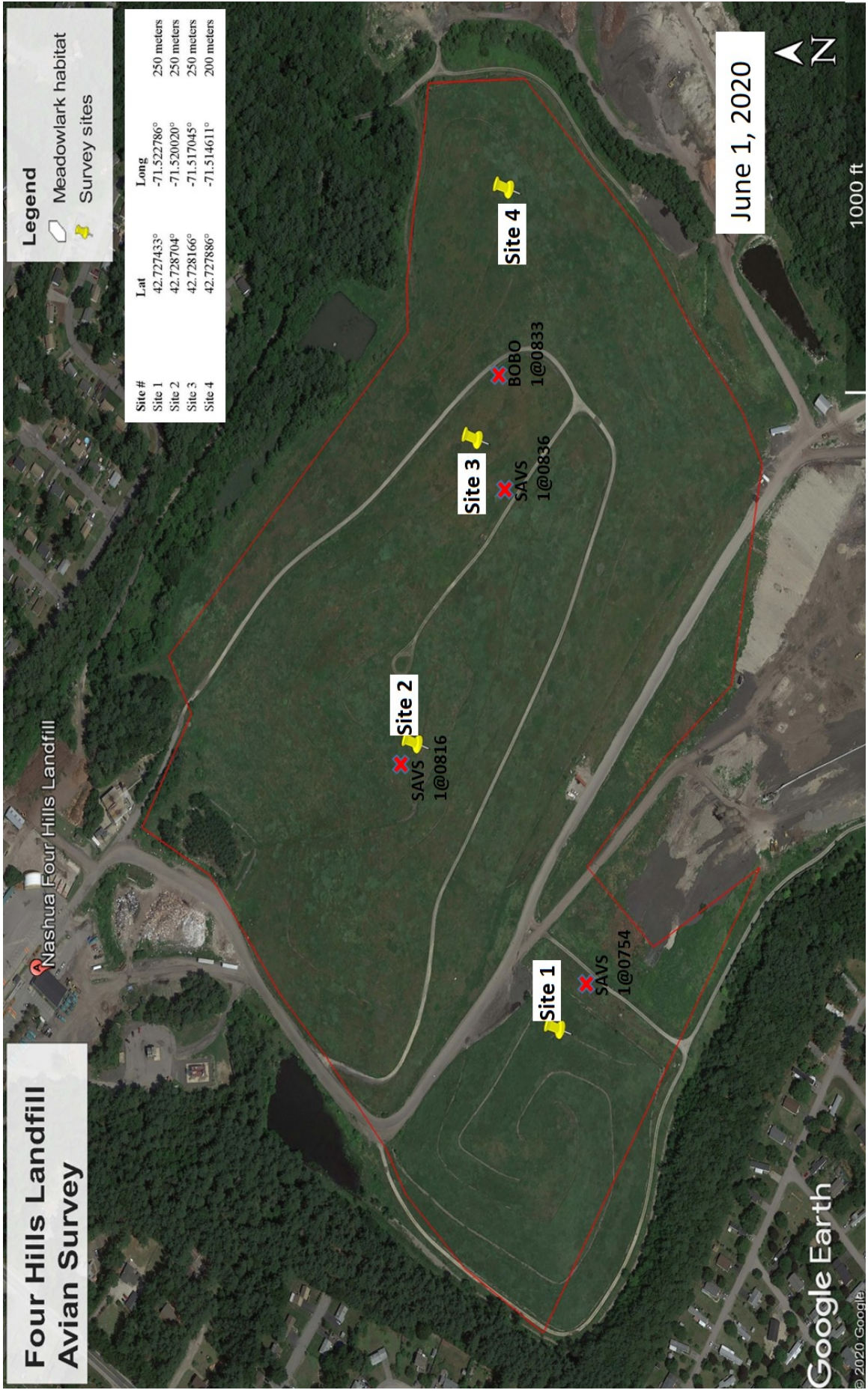
Observation Point 4

Time	Species	# Observed	Behavior
0900	RWBL	1	Pequ
0900	BARS	3	Move
0901	BAOR	1	Move
0904	CHSW	2	Move
0909	TRES	2	Move

A total of 47 individuals comprised of 13 different species were observed during the site visits. Of those, 9 individuals and 2 species (1 BOBO, 8 SAVS) were indicated as target species for the survey. There were no observations of UPSA, EAME, or GRSP during the site visits.

This concludes the results for the grassland bird survey for the Four Hills Landfill.







GOVE ENVIRONMENTAL SERVICES, INC.

Wetlands and Soil Mapping

WILDLIFE HABITAT ASSESSMENT

for a

Municipal Project
Four Hills Landfill
City of Nashua
Nashua, New Hampshire
December 2020

8 Continental Dr Bldg 2 Unit H, Exeter, NH 03833-7526

Ph (603) 778 0644 / Fax (603) 778 0654

www.gesinc.biz

info@gesinc.biz



Index:

Part 1: Findings and Summary

Part 2: NHB Datacheck Results Letter, Figures, Site Photographs

Part 3: Detailed Evaluation

Proposed Project

Project Site and Surrounding Land Use Description

Threatened and Endangered Species and Wildlife Habitat Evaluation

Potential Impacts and Proposed Conservation Measures

Part 4: Appendices

Aerial Photo

USGS Topo Map

WAP Habitat Cover Map

WAP Highest Ranked Wildlife Habitat Map

Conservation Parcels Map

NRCS Soils

NHB20-1026



PART 1: SUMMARY AND FINDINGS

Wildlife Biologist: Luke Hurley	NHB20-1026
Gove Environmental Services, Inc.	Municipal Development
8 Continental Drive, Exeter, NH 03833	Four Hills Landfill, Nashua
lhurley@gesinc.biz	Applicant: City of Nashua
603-770-5114	AOT Application

PROPOSED PROJECT:

The proposed project is for the expansion of the existing landfill facility. This is for the Phase IV portion.

PHASE I Threatened and Endangered Wildlife and Habitat Assessment Findings:

Check one

☐ No threatened and endangered wildlife and habitat present, no threatened or endangered wildlife, habitat, or wildlife corridors likely to be impacted by project activities.

☒ Threatened and endangered wildlife and habitat present; HOWEVER, NO threatened or endangered wildlife, habitat, or wildlife corridors likely to be impacted by project activities. No conservation measures are proposed.

☐ Threatened and endangered wildlife and habitat present or wildlife corridors present.

Proposed actions have the potential for impacts. Conservation measures incorporated into the proposed project or project design.



THREATENED AND ENDANGERED WILDLIFE AND HABITAT:

NHB20-1026 identified the following species on or in the vicinity of the project.

Blanding's turtle SE, SGCN

This turtle is found in wetland habitats with permanent shallow water and emergent vegetation such as marshes, swamps, bogs, and ponds. Use vernal pools extensively in spring and while traveling through the landscape. May use slow rivers and streams as mechanisms for dispersal between wetlands. Extensive use of terrestrial habitats for nesting and travel among wetlands.

Eastern box turtle SE, SGCN

Terrestrial areas such as dry and moist woodlands, old fields, pastures, power-line corridors, and edges of marshes, bogs, and shallow streams. During hot weather, may rest in water or burrow under logs and moist vegetation.

Eastern hognose snake E

Requires sandy, gravelly soils such as open fields, river valleys, pine forests, and upland hillsides. Feeds predominately on toads; therefore, needs breeding habitat (e.g., wetlands, vernal pools) for amphibians.

Eastern meadowlark T

Eastern meadowlarks breed in a variety of grassland habitats, including natural grasslands, hayfields, pastures, abandoned grassy fields, and airports.

Northern black racer, ST, SGCN

Found in a variety of habitats including dry brushy pastures, powerline corridors, rocky ledges, and woodlands. Have large home ranges and require large patches of suitable habitat.

The below list identifies those species that may be present in habitats onsite based on desk top analysis and field assessment. Some are species that could be expected to occur in the specific habitat type. No vernal pools are present on site. Significant habitat is Appalachian oak pine, shrubland and wetlands.

American kestrel, SC, SGCN

Open habitats such as fields, meadows, pastures and parks with sparse trees or power lines to perch on.

Bobolink, SGCN

Bobolinks breed in a variety of grassland habitats, although these generally contain a mix of tall grasses and scattered leafy forbs such as legumes or dandelions

Smooth green snake, SC, SGCN

This snake is found in upland grassy fields, pastures, meadows, blueberry barrens, and forest openings



Wood turtle SC, SGCN

This turtle is found in slow-moving streams and channels with sandy bottoms. Extensive use of terrestrial habitats during summer, including floodplains, meadows, woodlands, fields, as well as wetlands.

American bumblebee SGCN

Rusty Patched bumblebee FE, SE, SGCN

Yellow-banded bumble bee SGCN

Yellow bumble bee SGCN

Bumble bees can be found statewide in a variety of habitats that support flower production. They are in agricultural settings, backyards, gardens, meadows, and forested areas. A considerable portion of the site now has flowering plants which may attract any of these species of bumble bees. The prior forested area would not have had suitable habitat; however, the cutting of the site has created a shrubland cover type with flowering herbaceous plants.

PROPOSED CONSERVATION MEASURES:

The project is not proposing any conservation measures.

Ideal methods for erosion control around the perimeter of the work areas is mulch berms. These are natural and often readily available for development sites. These are easy to install and do not need to be removed once the project is complete. The use of mulch berms does not act as a barrier to wildlife as they are able to easily walk over the berms with no issues. The use of welded plastic or 'biodegradable plastic' netting or thread in erosion control matting should be avoided. There are numerous documented cases of snakes and other wildlife being trapped and killed in erosion control matting with synthetic netting and thread. The use of erosion control berm, white Filtrexx Degradable Woven Silt Sock, or several 'wildlife friendly' options such as woven organic material (e.g., coco or jute matting such as North American Green SC150BN or equivalent) are readily available.

Map by NH GRANIT



Legend

- State
- County
- City/Town

Map Scale

1: 6,494

© NH GRANIT, www.granit.unh.edu
Map Generated: 12/14/2020



Notes





1. Looking south over active landfill area.



2. Looking west over capped landfill and valley to be filled.



3. Looking west over existing capped landfill.



4. Additional southern view of valley area between active and capped landfills.



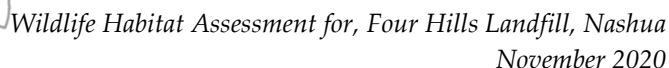
5. View of landfill gas collection wells and over top of capped landfill looking to the north.



6. View looking east over access road on top of capped landfill.



7. View looking northwest over capped landfill.



NHB20-1026
Municipal Development
Four Hills Landfill, Nashua
Applicant: City of Nashua
AOT Application

Luke Hurley
Name – printed

11/30/2020
Date



Signature

Check Applicable Requested Action

X Request for NHFG Concurrence with Findings in compliance with Env. Wq. 1503.19(h)(1)a

- ☐ Request for NHFG Concurrence with Findings and Proposed Conservation Measures in compliance with Env. Wq. 1503.19(h)(1)b*
- ☐ Requests further coordination with NHFG to discuss proposed conservation measures and/or, potential focused survey needs (Phase II) *

*New Hampshire Fish and Game’s review and recommendations are based on the information provided in this assessment. Changes to project scope may affect NHFG and/or NHDES determination on potential impacts and whether conservation measures and project design modifications proposed are still applicable or sufficient.

Other:



PART 2: NHB Datacheck Results Letter, Figures, Site Photographs

NHB Datacheck Results Letter

Aerial Figure

Topographic Figure

NH Wildlife Action Plan - Land Cover Figure

NH Wildlife Action Plan - Habitat Rankings and Conservation Parcels Figure

Conservation Parcels

NRCS Soils

Site photographs with photograph location plan



CONFIDENTIAL – NH Dept. of Environmental Services review

Memo



NH NATURAL HERITAGE BUREAU
NHB DATACHECK RESULTS LETTER

To: Lisa Damiano, Sanborn, Head & Associates Inc.
20 Foundry Street
Concord, NH 03301

From: Amy Lamb, NH Natural Heritage Bureau

Date: 4/27/2020 (valid for one year from this date)

Re: Review by NH Natural Heritage Bureau

NHB File ID: NHB20-1026

Town: Nashua

Location: Tax Maps: Tax Map D, Lot 54

Description: The City of Nashua is proposing to construct the Phase IV Expansion of the existing Four Hills Landfill in an area previously disturbed between two existing landfill phases.

Modifications to existing stormwater management infrastructure are also anticipated.

cc: Kim Tuttle

As requested, I have searched our database for records of rare species and exemplary natural communities, with the following results.

Comments: Please contact the NH Fish & Game Department

Vertebrate species

	State ¹	Federal	Notes
Blanding's Turtle (<i>Emydoidea blandingii</i>)	E	--	Contact the NH Fish & Game Dept (see below).
Eastern Box Turtle (<i>Terrapene carolina</i>)	E	--	Contact the NH Fish & Game Dept (see below).
Eastern Hognose Snake (<i>Heterodon platirhinos</i>)	E	--	Contact the NH Fish & Game Dept (see below).
Eastern Meadowlark (<i>Sturnella magna</i>)	T	--	Contact the NH Fish & Game Dept (see below).
Northern Black Racer (<i>Coluber constrictor constrictor</i>)	T	--	Contact the NH Fish & Game Dept (see below).

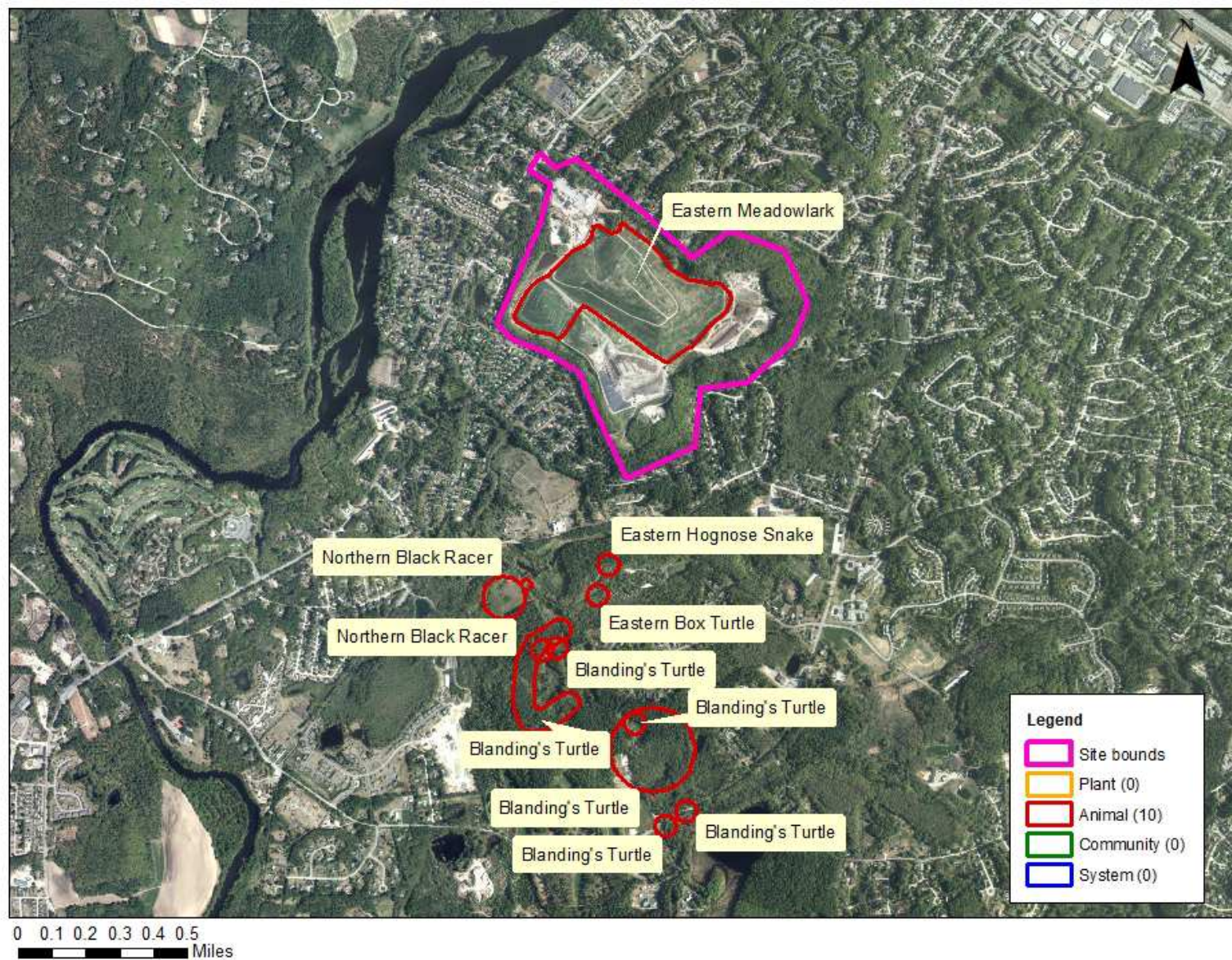
¹Codes: "E" = Endangered, "T" = Threatened, "SC" = Special Concern, "--" = an exemplary natural community, or a rare species tracked by NH Natural Heritage that has not yet been added to the official state list. An asterisk (*) indicates that the most recent report for that occurrence was more than 20 years ago.

Contact for all animal reviews: Kim Tuttle, NH F&G, (603) 271-6544.

A negative result (no record in our database) does not mean that a sensitive species is not present. Our data can only tell you of known occurrences, based on information gathered by qualified biologists and reported to our office. However, many areas have never been surveyed, or have only been surveyed for certain species. An on-site survey would provide better information on what species and communities are indeed present.

CONFIDENTIAL – NH Dept. of Environmental Services review

NHB20-1026



New Hampshire Natural Heritage Bureau - Animal Record

Blanding's Turtle (*Emydoidea blandingii*)**Legal Status**

Federal: Not listed
State: Listed Endangered

Conservation Status

Global: Apparently secure but with cause for concern
State: Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank: --

Detailed Description: 2017: Area 14377: 1 adult observed, sex unknown.
General Area: 2017: Area 14377: In wooded swamp/pond.
General Comments: --
Management: --
Comments:

Location

Survey Site Name: Four Hills, Nashua
Managed By:

County: Hillsborough
Town(s): Nashua
Size: 1.9 acres

Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2017: Area 14377: Yudicky Farm Park, Nashua.

Dates documented

First reported: 2017-05-11 Last reported: 2017-05-11

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

New Hampshire Natural Heritage Bureau - Animal Record

Northern Black Racer (*Coluber constrictor constrictor*)**Legal Status**

Federal: Not listed
State: Listed Threatened

Conservation Status

Global: Demonstrably widespread, abundant, and secure
State: Imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank: --

Detailed Description: 2014: Area 13631: 1 adult observed, sex unknown.
2011: Area 13127: 1 adult observed.
2010: Area 12768: 1 adult observed.

General Area: 2014: Area 13631: In grass under an old rusty car hood.
2011: Area 13127: Grassland.
2010: Area 12768: Mixed forest.

General Comments: --
Management: --
Comments:

Location

Survey Site Name: Hollis Depot, east of
Managed By: Terrell Farm

County: Hillsborough
Town(s): Nashua
Size: 10.1 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2014: Area 13631: Southwest Park, Nashua.
2011: Area 13127: SW Park - Yudicky Farm.
2010: Area 12768: Yudicky Farm, Nashua.

Dates documented

First reported: 2010-05-30 Last reported: 2014-05-27

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

New Hampshire Natural Heritage Bureau - Animal Record

Blanding's Turtle (*Emydoidea blandingii*)**Legal Status**

Federal: Not listed
State: Listed Endangered

Conservation Status

Global: Apparently secure but with cause for concern
State: Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank: --

Detailed Description: 2009: Area 12360M: 1 observed on 4/19; 1 observed on 4/22; 3 observed on 4/28; 1 observed on 5/19; 1 female observed on 6/2.

General Area: 2009: Area 12360M: Swamp.

General Comments: --

Management: --

Comments:

Location

Survey Site Name: Four Hills, Nashua
Managed By: Terrell Farm

County: Hillsborough

Town(s): Nashua

Size: 19.7 acres

Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2009: Area 12360M: Swamp Trail in Yudicky Farm Park.

Dates documented

First reported: 2009-04-19

Last reported: 2009-06-02

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

New Hampshire Natural Heritage Bureau - Animal Record

Blanding's Turtle (*Emydoidea blandingii*)**Legal Status**

Federal: Not listed
State: Listed Endangered

Conservation Status

Global: Apparently secure but with cause for concern
State: Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank: --

Detailed Description: 2009: Area 12365: 1 observed.
General Area: 2009: Area 12365: Wooded swamp.
General Comments: --
Management: --
Comments:

Location

Survey Site Name: Four Hills, Nashua
Managed By: Yudicky Farm - Conservation Area

County: Hillsborough
Town(s): Nashua
Size: 30.8 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2009: Area 12365: Southeastern part of Yudicky Farm Park. Wooded swamp east of paved road.

Dates documented

First reported: 2009-07-18 Last reported: 2009-07-18

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

New Hampshire Natural Heritage Bureau - Animal Record

Blanding's Turtle (*Emydoidea blandingii*)**Legal Status**

Federal: Not listed
State: Listed Endangered

Conservation Status

Global: Apparently secure but with cause for concern
State: Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank: --

Detailed Description: 2012: Area 13029: 1 adult female observed.
General Area: 2012: Area 13029: Crossing road.
General Comments: --
Management: --
Comments:

Location

Survey Site Name: Lovewell Pond
Managed By: Nashua, City of

County: Hillsborough
Town(s): Nashua
Size: 1.9 acres

Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2012: Area 13029: Gregg Road, Nashua, near intersection with Rte. 101A.

Dates documented

First reported: 2012-06-13 Last reported: 2012-06-13

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

New Hampshire Natural Heritage Bureau - Animal Record

Blanding's Turtle (*Emydoidea blandingii*)**Legal Status**

Federal: Not listed
State: Listed Endangered

Conservation Status

Global: Apparently secure but with cause for concern
State: Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank: --

Detailed Description: 2012: Area 13043: 1 adult observed.
General Area: 2012: Area 13043: Crossing road.
General Comments: --
Management: --
Comments:

Location

Survey Site Name: Four Hills, Nashua
Managed By: Yudicky Farm - Conservation Area

County: Hillsborough
Town(s): Nashua
Size: 1.9 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2012: Area 13043: Rte. 111A at Yudicky Farm Conservation Area, Nashua. Near Lovewell Pond, crossing the road.

Dates documented

First reported: 2012-05-31 Last reported: 2012-05-31

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

New Hampshire Natural Heritage Bureau - Animal Record

Blanding's Turtle (*Emydoidea blandingii*)**Legal Status**

Federal: Not listed
State: Listed Endangered

Conservation Status

Global: Apparently secure but with cause for concern
State: Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank: --

Detailed Description: 2011: Area 13128: 2 adults observed.
General Area: 2011: Area 13128: Wooded swamp.
General Comments: --
Management: --
Comments:

Location

Survey Site Name: Four Hills, Nashua
Managed By:

County: Hillsborough
Town(s): Nashua
Size: 1.9 acres

Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2011: Area 13128: Southwest Park - Yudicky Farm, Nashua.

Dates documented

First reported: 2011-04-11 Last reported: 2011-04-11

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

New Hampshire Natural Heritage Bureau - Animal Record

Eastern Box Turtle (*Terrapene carolina*)**Legal Status**

Federal: Not listed
State: Listed Endangered

Conservation Status

Global: Demonstrably widespread, abundant, and secure
State: Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank: --

Detailed Description: 2016: Area 14164: 1 adult male observed.
General Area: 2016: Area 14164: Trailside in a hiking/mountain biking park.
General Comments: --
Management: --
Comments:

Location

Survey Site Name: Hollis Depot, east of
Managed By:

County: Hillsborough
Town(s): Nashua
Size: 1.9 acres

Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: 2016: Area 14164: Southwest Park - Yudicky Farm, Nashua.

Dates documented

First reported: 2016-08-14 Last reported: 2016-08-14

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

New Hampshire Natural Heritage Bureau - Animal Record

Eastern Hognose Snake (*Heterodon platirhinos*)**Legal Status**

Federal: Not listed
State: Listed Endangered

Conservation Status

Global: Demonstrably widespread, abundant, and secure
State: Critically imperiled due to rarity or vulnerability

Description at this Location

Conservation Rank: Not ranked
Comments on Rank: --

Detailed Description: 2013: Area 13447: 1 adult observed, sex unknown.
General Area: 2013: Area 13447: Trail in coniferous forest.
General Comments: --
Management: --
Comments:

Location

Survey Site Name: Hollis Depot, east of
Managed By:

County: Hillsborough
Town(s): Nashua
Size: 1.9 acres

Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: --

Dates documented

First reported: 2013-05-04 Last reported: 2013-05-04

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.

New Hampshire Natural Heritage Bureau - Animal Record

Eastern Meadowlark (*Sturnella magna*)**Legal Status**

Federal: Not listed
State: Listed Threatened

Conservation Status

Global: Demonstrably widespread, abundant, and secure
State: Not ranked (need more information)

Description at this Location

Conservation Rank: Not ranked
Comments on Rank: --

Detailed Description: 2007: Species observed on 6/12.
General Area: --
General Comments: --
Management: --
Comments:

Location

Survey Site Name: Nashua Landfill
Managed By:

County: Hillsborough
Town(s): Nashua
Size: 86.6 acres Elevation:

Precision: Within (but not necessarily restricted to) the area indicated on the map.

Directions: --

Dates documented

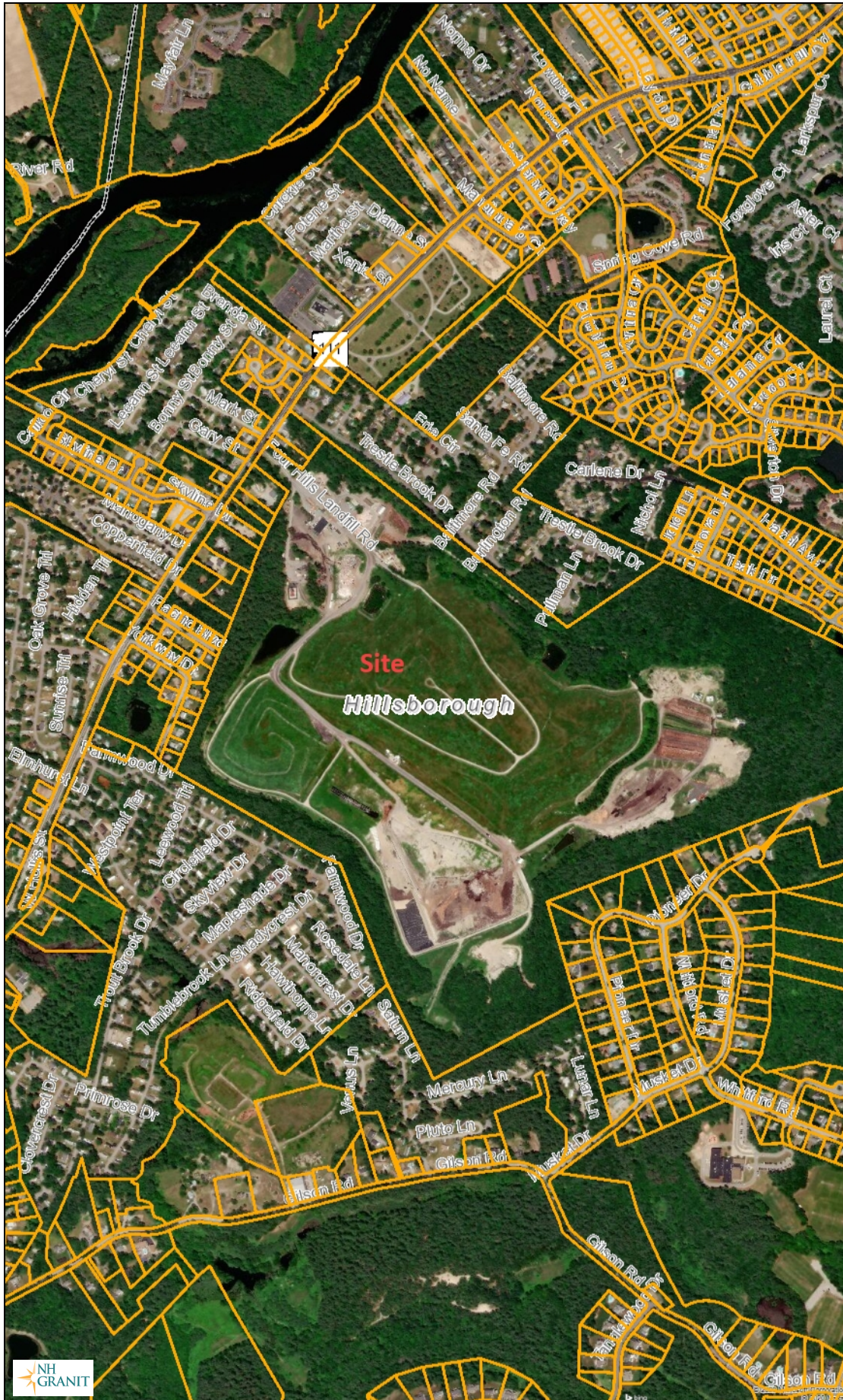
First reported: 2007-06-12 Last reported: 2007-06-12

The New Hampshire Fish & Game Department has jurisdiction over rare wildlife in New Hampshire. Please contact them at 11 Hazen Drive, Concord, NH 03301 or at (603) 271-2461.



Aerial Photo

Aerial



Legend

- Polygons
- State
- County
- City/Town

Map Scale

1: 12,988

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Map Generated: 11/30/2020



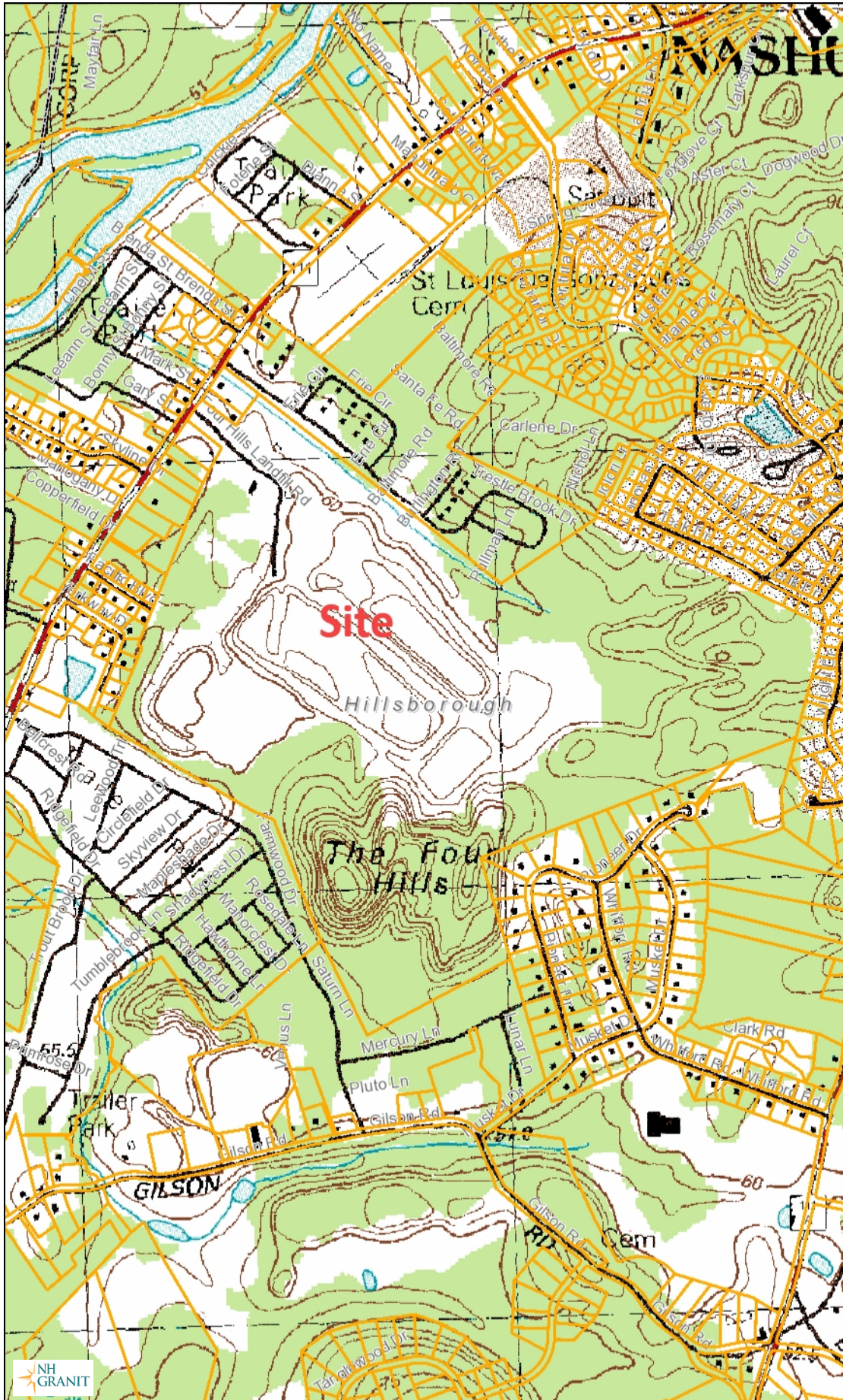
Notes





USGS Topo Map

USGS



Legend

- Polygons
- State
- County
- City/Town

Map Scale

1: 12,988

© NH GRANIT, www.granit.unh.edu

Map Generated: 12/14/2020



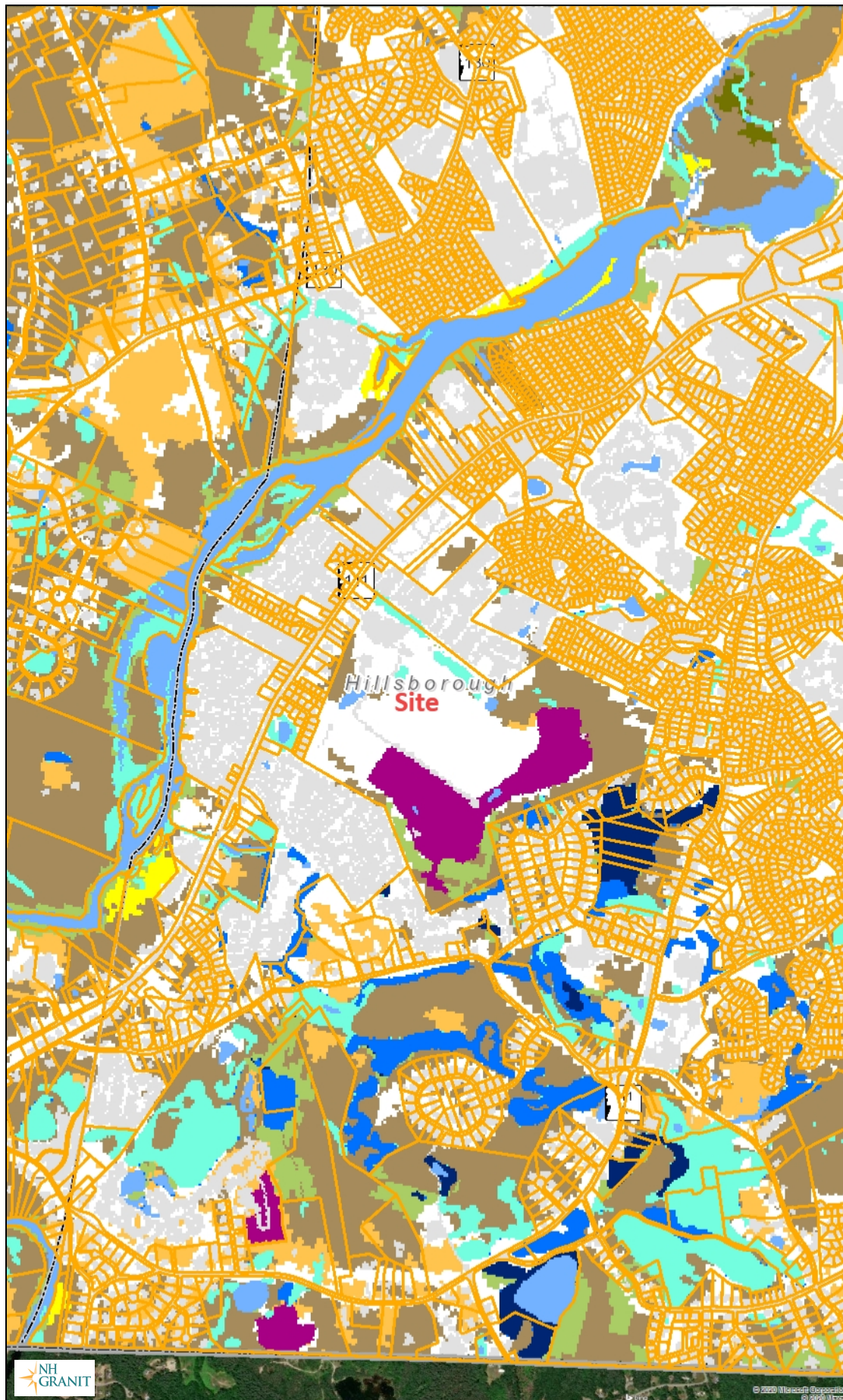
Notes





NH Wildlife Action Plan
Land Cover Figure

WAP 2020: Wildlife Habitat Land Cover



Legend

- Polygons
 - State
 - County
 - City/Town
- WAP 2020: Wildlife Habitat Land Cover**
- Alpine
 - Appalachian oak-pine
 - Cliff and Talus slope
 - Coastal island and Rocky coast
 - Developed Impervious
 - Developed or Barren land
 - Dune
 - Floodplain forest
 - Grassland
 - Hemlock-hardwood-pine
 - High-elevation spruce-fir
 - Lowland spruce-fir
 - Northern hardwood-conifer
 - Northern swamp
 - Open water
 - Peatland
 - Pine barren
 - Rocky ridge
 - Salt marsh
 - Sand/Gravel
 - Temperate swamp
 - Marsh and shrub wetland

Map Scale

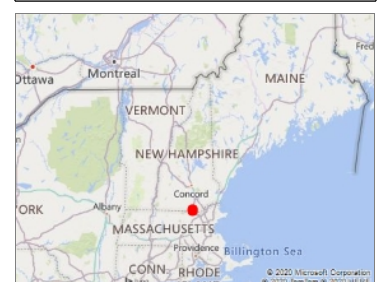
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© NH GRANIT, www.granit.unh.edu

Map Generated: 11/30/2020



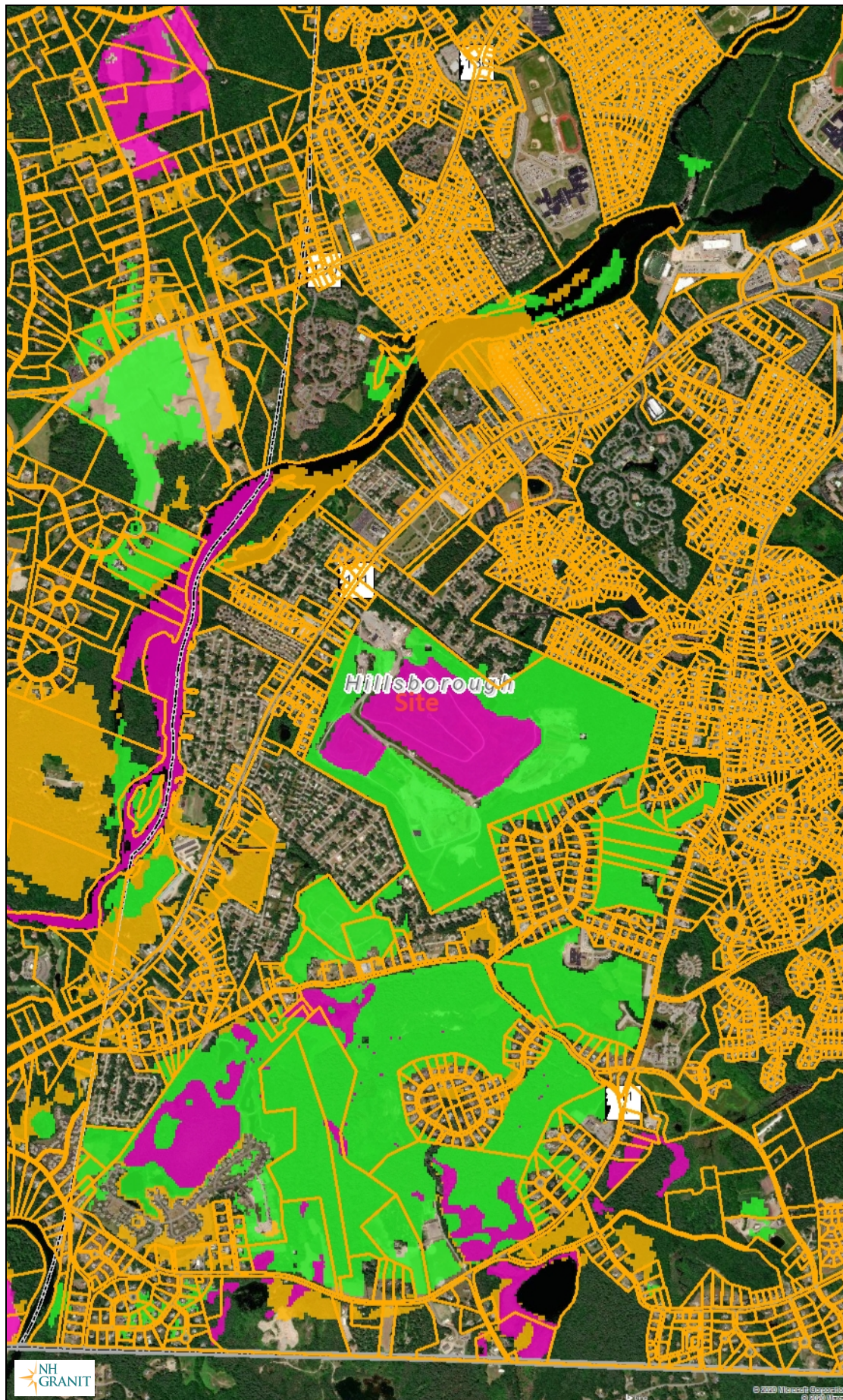
Notes





**NH Wildlife Action Plan
Habitat Rankings**

WAP 2020: Highest Ranked Wildlife Habitat



Legend

- Polygons
 - State
 - County
 - City/Town
- WAP 2020: Highest Ranked Wildlife Habitat
- 1 Highest Ranked Habitat in NH
 - 2 Highest Ranked Habitat in Region
 - 3 Supporting Landscape

Map Scale

1: 25,977

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Map Generated: 11/30/2020



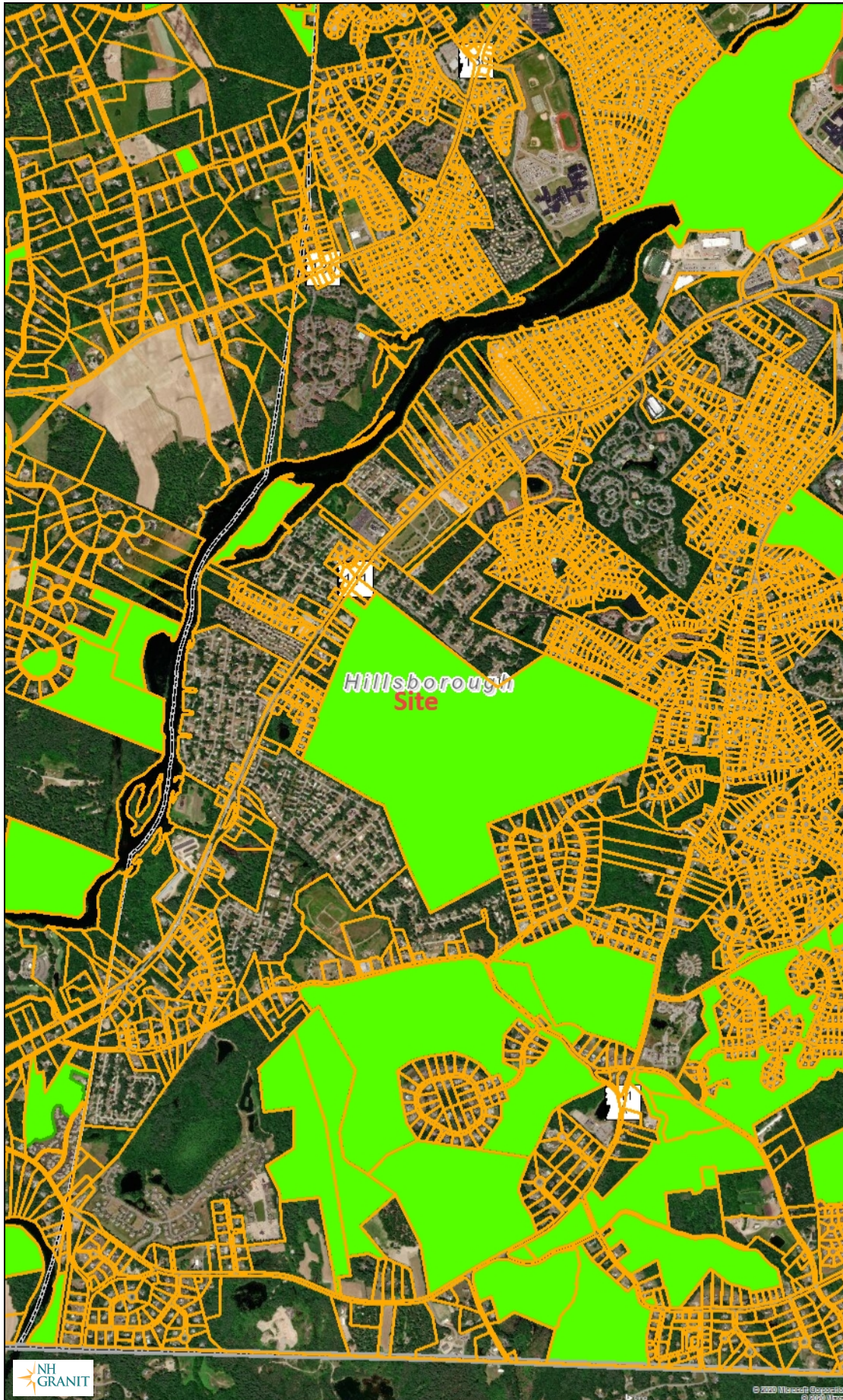
Notes





Conservation Parcels

Conservation Lands



Legend

- Polygons
- State
- County
- City/Town
- Conservation and Public Land

Map Scale

1: 25,977

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Map Generated: 11/30/2020



Notes



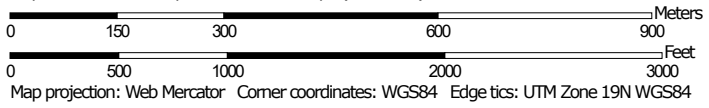


Soil Map—Hillsborough County, New Hampshire, Eastern Part



Soil Map may not be valid at this scale.

Map Scale: 1:10,600 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 19N WGS84



**Natural Resources
Conservation Service**

Web Soil Survey
National Cooperative Soil Survey


MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features



Blowout



Borrow Pit



Clay Spot



Closed Depression



Gravel Pit



Gravelly Spot



Landfill



Lava Flow



Marsh or swamp



Mine or Quarry



Miscellaneous Water



Perennial Water



Rock Outcrop



Saline Spot



Sandy Spot



Severely Eroded Spot



Sinkhole



Slide or Slip



Sodic Spot



Spoil Area



Stony Spot



Very Stony Spot



Wet Spot



Other



Special Line Features

Water Features



Streams and Canals

Transportation



Rails



Interstate Highways



US Routes



Major Roads



Local Roads

Background



Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

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

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

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

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Hillsborough County, New Hampshire, Eastern Part

Survey Area Data: Version 22, May 29, 2020

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

Date(s) aerial images were photographed: May 22, 2015—Jun 14, 2017

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CaB	Canton fine sandy loam, 0 to 8 percent slopes	1.9	0.8%
CaC	Canton fine sandy loam, 8 to 15 percent slopes	0.1	0.1%
CmB	Canton fine sandy loam, 0 to 8 percent slopes, very stony	6.4	2.7%
CmC	Canton fine sandy loam, 8 to 15 percent slopes, very stony	15.4	6.4%
CmD	Canton fine sandy loam, 15 to 25 percent slopes, very stony	5.0	2.1%
DeA	Deerfield loamy fine sand, 0 to 3 percent slopes	10.8	4.5%
Dp	Dumps	107.0	44.5%
HsA	Hinckley loamy sand, 0 to 3 percent slopes	15.9	6.6%
HsB	Hinckley loamy sand, 3 to 8 percent slopes	19.5	8.1%
HsC	Hinckley loamy sand, 8 to 15 percent slopes	3.8	1.6%
PbC	Paxton fine sandy loam, 8 to 15 percent slopes	8.5	3.5%
PfD	Paxton fine sandy loam, 15 to 25 percent slopes, very stony	28.0	11.6%
PfE	Paxton fine sandy loam, 25 to 35 percent slopes, very stony	6.0	2.5%
PiA	Pipestone loamy sand, 0 to 3 percent slopes	0.5	0.2%
WdA	Windsor loamy sand, 0 to 3 percent slopes	9.7	4.0%
WnC	Windsor-Urban land complex, 3 to 15 percent slopes	1.8	0.8%
Totals for Area of Interest		240.4	100.0%



United States
Department of
Agriculture

Marketing and
Regulatory
Programs

59 Chenell Dr.
Suite 7
Concord, NH
03301

City of Nashua, Four Hills Landfill Grassland Bird Survey Report

The following report summarizes bird species and activity observed at the Four Hills Landfill, Nashua NH on the dates of May 26 and June 1, 2020. Four survey point count stations, spaced 200-250m apart within the project area were utilized.

Site #	Lat	Long	
Site 1	42.727433°	-71.522786°	250 meters
Site 2	42.728704°	-71.520020°	250 meters
Site 3	42.728166°	-71.517045°	250 meters
Site 4	42.727886°	-71.514611°	200 meters

Each point count station was surveyed for 10 minutes with locations of target and non-target bird species mapped onto an aerial map of the survey area, including a record of the bird behavior. Target species for this survey included, upland sandpiper, grasshopper sparrow, savanna sparrow, bobolink and eastern meadowlark. Other birds species observed during survey counts were included.

Survey 1 (May 26, 2020)

Observers: Joshua Janicke, Cody Symonds

Time Start: 0910 Time End: 1025

Wind Speed: 2

Temperature: 75

(Target Species in Bold)

Observation Point 1

Time	Species	# Observed	Behavior
0910	RWBL	4	Move
0911	SAVS	1	Pequ
0918	RWBL	1	Pequ

Observation Point 2

Time	Species	# Observed	Behavior
0935	SAVS	1	Call
0941	TRES	1	Move
0938	RWBL	1	Move

Observation Point 3

Time	Species	# Observed	Behavior
0955	SAVS	3	Pequ
0958	WITU	3	Fora
0959	LEFL	1	Move

Observation Point 4

Time	Species	# Observed	Behavior
1018	RWBL	1	Move
1022	MODO	1	Move
1023	RWBL	1	Move

Survey 2 (June 1, 2020)

Observers: Joshua Janicke, Cody Symonds

Time Start: 0748 Time End: 0910

Wind Speed: 1

Temperature: 46

(Target Species in Bold)

Observation Point 1

Time	Species	# Observed	Behavior
0748	RWBL	1	Call
0750	TUVU	1	Move
0750	TRES	1	Move
0752	KILL	1	Call
0753	RTHA	1	Move
0754	SAVS	1	Pequ

Observation Point 2

Time	Species	# Observed	Behavior
0815	RWBL	3	Move
0816	SAVS	1	Call
0817	TRES	1	Move
0822	KILL	1	Move
0824	WITU	3	Fora

Observation Point 3

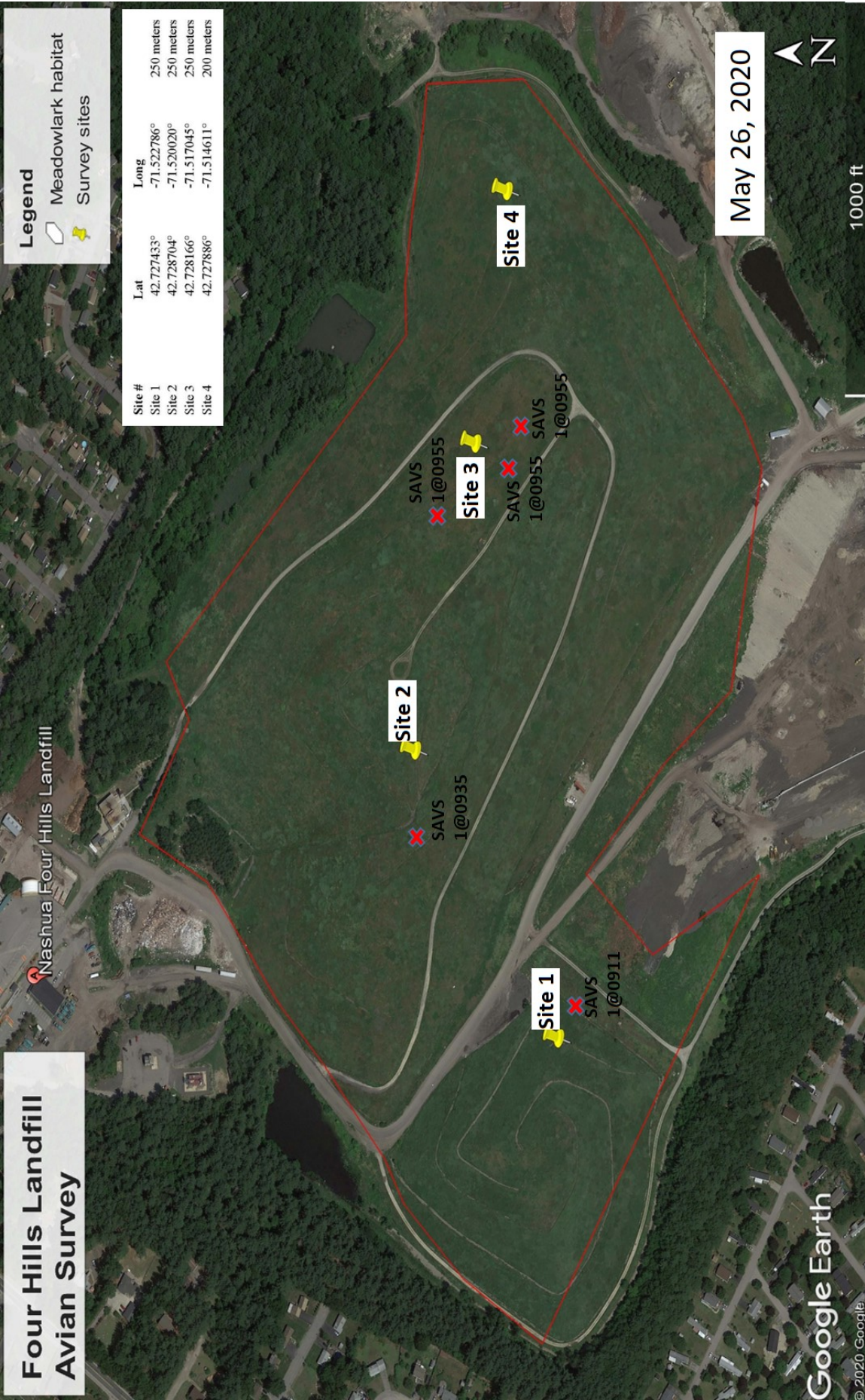
Time	Species	# Observed	Behavior
0833	BOBO	1	Call
0836	SAVS	1	Pequ
0837	RWBL	1	Pequ
0837	TRES	1	Move

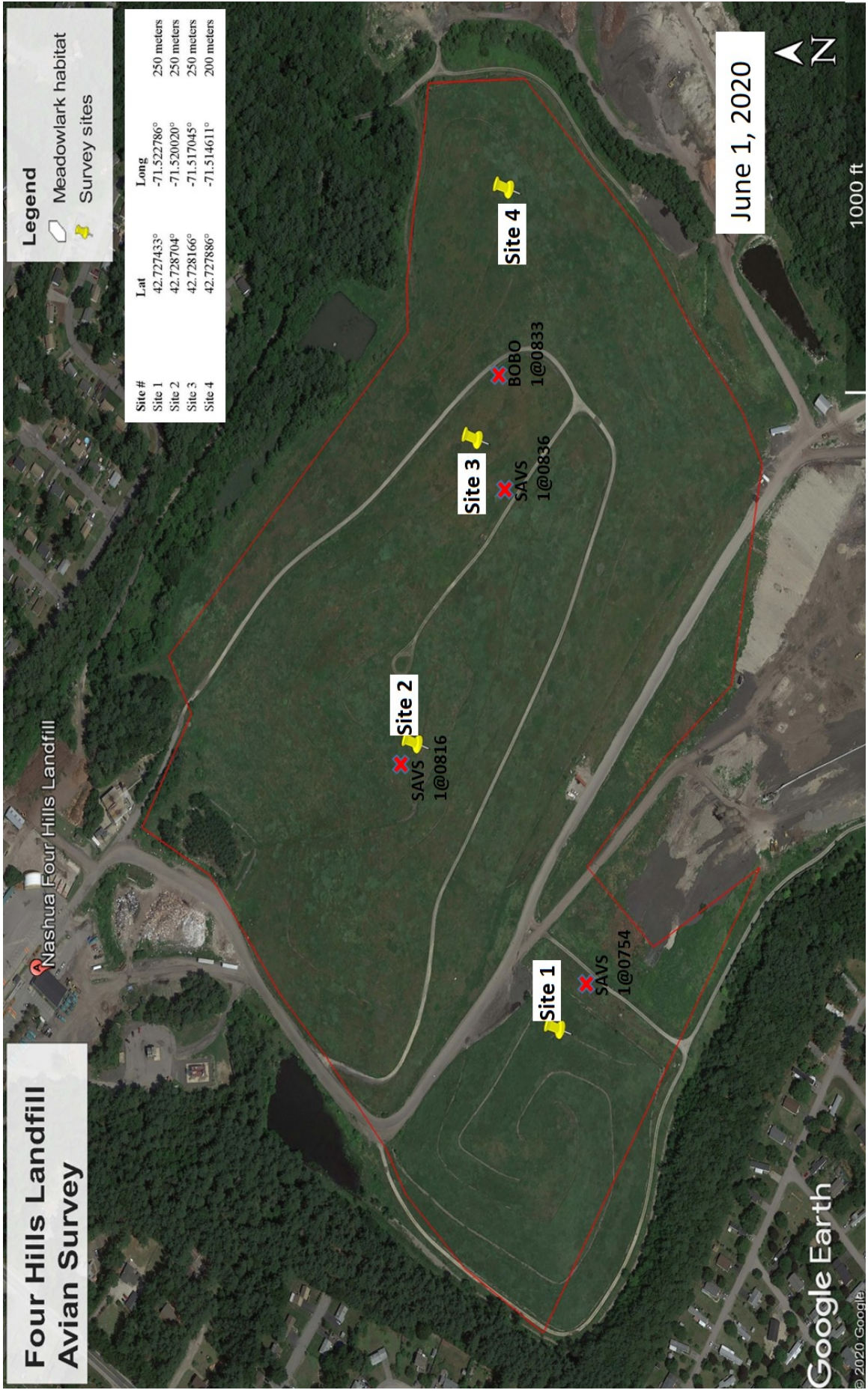
Observation Point 4

Time	Species	# Observed	Behavior
0900	RWBL	1	Pequ
0900	BARS	3	Move
0901	BAOR	1	Move
0904	CHSW	2	Move
0909	TRES	2	Move

A total of 47 individuals comprised of 13 different species were observed during the site visits. Of those, 9 individuals and 2 species (1 BOBO, 8 SAVS) were indicated as target species for the survey. There were no observations of UPSA, EAME, or GRSP during the site visits.

This concludes the results for the grassland bird survey for the Four Hills Landfill.







PROPOSED PROJECT:

Since 1971, the City has operated the Facility for the disposal of MSW and construction and demolition debris (C&D). The approximately 11-acre C&D landfill was active until 1994 and was closed between 1997 and 1998. The approximately 60-acre unlined MSW landfill was operated until August 2003 and was closed in the fall of 2003. MSW disposal operations began in the active landfill in 2003.

The City of Nashua proposes to construct the Phase IV Secure Landfill Expansion at the Four Hills Landfill Facility in Nashua, New Hampshire located at 840 West Hollis Street. The Landfill is owned and operated by the City under Solid Waste Permit No. DES-SW-95- 002, issued on June 26, 1995 and last modified on February 27, 1998. The Phase IV Expansion will cover approximately 32.4 acres including about 16.9 acres on the southwestern side of the closed, unlined MSW landfill, 11.3 acres on the northeastern side of Phases I and II, and the 4.2-acre area in between the two disposal areas, which currently consists of an existing access road and miscellaneous infrastructure.

The Phase IV expansion was designed as double-lined facility in accordance with Env-Sw 805.05. The Phase IV expansion requires construction of new liner and leachate collection systems over the existing closed, unlined MSW landfill and over the area between the closed, unlined MSW landfill, and the lined Phases I and II. The area over Phases I and II is considered a vertical expansion over a permitted lined disposal area.

Phase IV is proposed to be constructed in four stages (Stages I through IV) with the succeeding stage being constructed as waste is placed in the preceding stage. The first construction stage includes the following activities:

- Excavation of soil in the base area to achieve the foundation on which the liner and leachate collection systems will be constructed;
- Decommission and/or removal of existing infrastructure located in the base area including: (i) groundwater monitoring wells; (ii) landfill gas collection and conveyance infrastructure; and (iii) leachate cleanout pipes.
- Construction of the perimeter berm and access roads;
- Construction of the liner and leachate collection systems in the base area, with a connection to like systems in Phase I; and
- Construction of a new leachate pumping system and associated infrastructure to transfer the liquid to the existing leachate management system.

As waste is placed in the base area of Phase IV, the liner and leachate collection systems, along with the perimeter berm, will be extended, over the course of Stages II through IV, up the sideslope of the existing closed, unlined MSW landfill. The proposed Phase IV expansion is projected to provide approximately 30 years of additional airspace for the City. Construction of the proposed 4 stages will likely occur over a roughly 20-year period.

As required by the Landfill Gas Collection System Enhanced Monitoring Protocol and Standard Operating Procedures (EMP/SOP) for Four Hills Landfill, date March 2011, surface emission monitoring (SEM) must be performed at least annually (and more frequently based on SEM



results). SEM monitoring measures the methane concentration at the surface of the landfill and requires the use of a flame ionization detector (FID). The FID must be held 2 to 4 inches from the surface of the landfill during monitoring per the methods outlined in the New Source performance Standards (NSPS) for Municipal Solid Waste Landfills (40 CFR Code of Federal Regulations [CFR] Part 60, Subpart WWW). As such, the landfill must be mowed prior to completing the SEM, which may occur at varied times throughout the year. The adherence to the EMP/SOP is required per the Landfill's Title V Operating Permit (TV-0047), issued June 30, 2016.

PROJECT SITE AND SURROUNDING LAND USE DESCRIPTION:

The site is approximately 294+/- acres located in the southwest corner of Nashua. Access to the site is from West Hollis street to the north. The site is fully surrounded by dense residential neighborhoods. This is the current landfill facility in the city. The site is fully active with residential and contract waste being brought to the facility. Portions of where the work is to occur is the current access road to the rear area of the site where activity from large trucks occurs daily. The landfill to the north is currently capped, loamed and seeded and well vegetated with grass. The additional area where the expansion is to take place is an active municipal solid waste landfill..

FIELD ANALYSIS

The site was visited on October 26, 2020 and potential for TE species and potential habitat, as well as overall site conditions were assessed and documented. The assessment was conducted over 4 hours under cloudy skies and 45 degrees (F). Assessment was performed by slowly walking the parcel. Resources used in this assessment: NH Wildlife Action Plan, Wildlife Action Plan – Community Maps (Habitat, Scoring, and SGCN by Town), NHFG Endangered and Threatened Wildlife of NH, Rare Animals, and Exemplary Natural Communities in New Hampshire Towns, Taking Action for Wildlife, NH GRANIT GIS clearinghouse, USDA Web Soil Survey.

Grassland Habitat

WAP maps show this area as developed or barren land. On site field analysis revealed the area of the current capped portion of the landfill site to be fully grassed and as grassland habitat. The remaining area is active landfill and has no wildlife habitat potential.

SOILS AND GEOLOGY

The NRCS Web Soil Survey Mapping shows this area as primarily dump, with surrounding soils as Canton, Hinckley, and Windsor loamy sands.

CONSERVATION LANDS

Nashua does not have any conservation lands in this area of the city.

WILDLIFE TRAVEL CORRIDOR

The parcel is surrounded by varying levels of residential development and roads. While this area is under conservation it does not provide a corridor to or from this site to other areas, though portion of the site are undeveloped to the far western portions.



THREATENED AND ENDANGERED WILDLIFE AND HABITAT EVALUATION:
NHB20-1026 identified the following TE species or habitats onsite.

Overall, it would be expected that any impacts to the below species would be from the work associated with the slow accumulation of material in the valley, as it filled and ultimately capped. This would be a slow process and ultimately, any displaced wildlife potentially using the site could come back and continue to use it. Significant area will be left as grassland as it is not slated for expansion. This area is on the northeast portion of the site. This area may provide enough area for any displaced species in the area of the project to continue to use the area successfully.

Blanding's turtle SE, SGCN

This turtle is found in wetland habitats with permanent shallow water and emergent vegetation such as marshes, swamps, bogs, and ponds. Use vernal pools extensively in spring and while traveling through the landscape. May use slow rivers and streams as mechanisms for dispersal between wetlands. Extensive use of terrestrial habitats for nesting and travel among wetlands. Potential impacts would be from the temporary disruption of habitat use on the capped area during nesting

Eastern box turtle SE, SGCN

Terrestrial areas such as dry and moist woodlands, old fields, pastures, power-line corridors, and edges of marshes, bogs, and shallow streams. During hot weather, may rest in water or burrow under logs and moist vegetation. Potential impacts would be from the temporary disruption of habitat use on the capped area during nesting

Eastern hognose snake E

Requires sandy, gravelly soils such as open fields, river valleys, pine forests, and upland hillsides. Feeds predominately on toads; therefore, needs breeding habitat (e.g., wetlands, vernal pools) for amphibians. Potential impacts would be from the temporary disruption of habitat use on the capped area during nesting.

Eastern meadowlark T

Eastern meadowlarks breed in a variety of grassland habitats, including natural grasslands, hayfields, pastures, abandoned grassy fields, and airports. Impacts would be from loss of structural habitat during all seasons, as this species uses this habitat type for feeding, breeding, and nesting.

Northern black racer, ST, SGCN

Found in a variety of habitats including dry brushy pastures, powerline corridors, rocky ledges, and woodlands. Have large home ranges and require large patches of suitable habitat. Potential impacts would be from the temporary disruption of habitat use on the capped area during nesting

The below list identifies those species that may be present in habitats onsite based on desk top analysis and field assessment. Some are species that could be expected to occur in the specific habitat type. No vernal pools are present on site. Significant habitat is Appalachian oak pine, shrubland and wetlands.



American kestrel, SC, SGCN

Open habitats such as fields, meadows, pastures and parks with sparse trees or power lines to perch on. Impacts to this species would be minimal as there is considerable area on the remaining land to hunt.

Bobolink, SGCN

Bobolinks breed in a variety of grassland habitats, although these generally contain a mix of tall grasses and scattered leafy forbs such as legumes or dandelions. Impacts would be from loss of structural habitat during all seasons, as this species uses this habitat type for feeding, breeding, and nesting.

Smooth green snake, SC, SGCN

This snake is found in upland grassy fields, pastures, meadows, blueberry barrens, and forest openings. Potential impacts would be from the temporary disruption of habitat use on the capped area during nesting.

Wood turtle SC, SGCN

This turtle is found in slow-moving streams and channels with sandy bottoms. Extensive use of terrestrial habitats during summer, including floodplains, meadows, woodlands, fields, as well as wetlands. Potential impacts to this species would be from loss of habitat while the area is active.

American bumblebee SGCN

Rusty Patched bumblebee FE, SE, SGCN

Yellow-banded bumble bee SGCN

Yellow bumble bee SGCN

Bumble bees can be found statewide in a variety of habitats that support flower production. They are in agricultural settings, backyards, gardens, meadows, and forested areas. A considerable portion of the site now has flowering plants which may attract any of these species of bumble bees. The prior forested area would not have had suitable habitat; however, the cutting of the site has created a shrubland cover type with flowering herbaceous plants. Impacts to this species would be through the slow loss of flowering plants.

CONSERVATION MEASURES

The project is not proposing any conservation measures.

Erosion Control

Ideal methods for erosion control around the perimeter of the work areas is mulch berms. These are natural and often readily available for development sites. These are easy to install and do not need to be removed once the project is complete. The use of mulch berms does not act as a barrier to wildlife as they are able to easily walk over the berms with no issues. The use of welded plastic or 'biodegradable plastic' netting or thread in erosion control matting should be avoided. There are numerous documented cases of snakes and other wildlife being trapped and killed in erosion control matting with synthetic netting and thread. The use of erosion control berm, white Filtrex Degradable Woven Silt Sock, or several 'wildlife friendly' options such as woven organic material

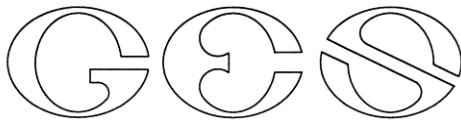


(e.g., coco or jute matting such as North American Green SC150BN or equivalent) are readily available.



PART 4: Appendices

Resume of qualified wildlife biologist.



LUKE D. HURLEY
CSS, CWS, CESWII,
Vice President

Senior Wetland Scientist, Soil Scientist, Ecologist, and Project Field Coordinator

EXPERIENCE

2001–Present	Vice President <i>Gove Environmental Services, Inc., Exeter, NH</i>
2000–2001	Environmental/Wetland Scientist, <i>Acton Survey & Engineering, Acton, MA</i>
1999–2000	Staff Naturalist, <i>Massachusetts Audubon Society, Lincoln, MA</i>
1998–1999	Environmental Inorganic Chemist, <i>Severn Trent Laboratories, Billerica, MA</i>

EDUCATION

B.S. in Environmental Biology, University of Massachusetts, 1996. Concentration in Ornithology, Field Ecology & Biology, Entomology, Invertebrate Zoology, Botany, Wetland Ecology and Limnology.

CERTIFICATIONS

Certified Wetland Scientist, State of New Hampshire (*No 232*)
Certified Soil Scientist, State of New Hampshire (*No. 095*)
Certified Erosion, Sediment, and Storm Water Inspector

PROFESSIONAL SOCIETIES

Association of Massachusetts Wetland Scientists (AMWS)
International Erosion Control Association (IECA)
Massachusetts Association of Conservation Commissions (MACC)
New Hampshire Association of Natural Resource Scientists (NHANRS)

PROFESSIONAL EXPERIENCE SYNOPSIS

Luke Hurley has worked in the field of wetland science and ecology since 1999. As a Senior Wetland and Soil Scientist and Ecologist and Project Manager at GES, he is responsible for over-seeing and implementing all phases of large-scale commercial retail and residential development including preliminary land evaluations, permitting and alternatives analysis under all aspects of local, state and federal regulations. Mr. Hurley is also responsible for coordinating and performing field wetland and soil analyses, delineating wetlands, wetland functions and values and project environmental impact assessments, vernal pool certification, wetland mitigation and restoration design and monitoring, wildlife habitat assessments, threatened and endangered species assessments, inventories and permitting documents. He specializes in permitting under the NH DES Wetlands Bureau and NH DES Shoreland Protection Act, as well as the US Army Corps of Engineers and US Environmental Protection Agency, ME DEP Natural Resource Protection, and Massachusetts Wetlands Protection Act, through Notice's of Intent, as well as additional wetland related permitting through Notice of Resource area Delineations (NRAD) and Abbreviated NRAD (ANRAD), Determination of Applicability and represents clients at hearings with local conservation

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commissions and other state and federal agencies. Mr. Hurley has a Bachelor of Science Degree in Environmental Biology from the University of Massachusetts. He is certified as Wetland Scientist and Soil Scientist by the State of New Hampshire.

PROFESSIONAL SPECIALIZATION

New Hampshire Department of Environmental Services

- Dredge and Fill Applications
- Shoreland Protection Act
- Wildlife Habitat Assessments
- Threatened and Endangered Species Assessments

Massachusetts Wetlands Protection Act (MWPA) & Massachusetts Environmental Policy Act (MEPA) Permitting including:

- NOI (Notice of Intent)
- ANOI (Abbreviated Notice of Intent)
- NRAD (Notice of Resource Area Delineation)
- ANRAD (Abbreviated Notice of Resource Area Delineation)
- RDA (Request of the Determination of Applicability)
- Water Quality Certification
- Ecological Impact Assessments
- Critical Habitat Evaluation in Terrestrial Aquatic Ecosystems; Wildlife Ecology

Massachusetts Endangered Species Act (MESA) Regulations and Massachusetts Natural Heritage & Endangered Species Program including:

- Priority/Estimated Habitat Certification
- Vernal Pool Assessment and Certification
- Rare, Threatened & Endangered Species Inventories
- Natural Communities & Habitat Classification
- Qualified Biologist for Rare, Threatened and Endangered Species Collection

ME DEP Natural Resource Protection

- Ch 305 Permit by Rule
- Ch 310 Wetlands
- Ch 315 Assessing and Mitigating Impacts to Scenic and Aesthetic Uses
- Ch 335 Significant Wildlife Habitat

Wildlife Habitat Assessments and Threatened & Endangered Species Assessments

Threatened and endangered plant transplant projects for State: threatened sweet goldenrod and yellow star grass.

Extensive Wildlife Habitat Assessments, Environmental Impact Assessments and threatened and endangered species assessments, following protocols set forth by UNH Cooperative Extension and EPA EcoBox.

Typical protocols are based on: *Natural Resource Inventories: A Guide for New Hampshire Communities*. Durham, NH: University of New Hampshire Cooperative Extension. This method

is primarily focused on for overall habitat assessment with varying micro habitats to document the existing conditions, as well as directly observed and potential species using that habitat based on desk top analysis and field work.

1.0 Introduction; site location, proposed project, existing conditions, and surrounding area land use, i.e. residential, urban, agriculture

2.0 Water resources; wetlands, vernal pools, lakes/ponds, rivers/streams, aquifers, etc.

3.0 Wildlife and Habitats known and potential species, TE, NHB Habitats

4.0 NRCS and Site-Specific Soils

5.0 Slopes and Rock Outcrops

6.0 Scenic Resources

7.0 Historic and Cultural resources, i.e., stone walls, cellar holes, stone foundations, etc.

8.0 Conservation lands

9.0 Potential threats and conservation measures

Additional protocols are created for individual TE, species, i.e., spotted turtles, Blanding's turtles, wood turtles, hognose snake, black racer, NE Cottontail, woodcock, and vernal pool Assessments. These species-specific assessments focus on individual species and their habitats. These assessments focus on overall habitat, and whether the specific habitat is onsite to support the various needs, for nesting/denning, feeding, and breeding, rearing, and fledging of juveniles. Protocol creation is like the outline through the EPA EcoBox ERA including:

1. Planning and problem formulation
2. Identifying stressors, most often physical through development
3. Identifying receptors of endangered species or critical habitat
4. Identifying potential ecological effects
5. Proposing minimization and/or mitigation of potential impacts

SAMPLE PROJECTS:

2001- Exeter, NH-Wildlife habitat assessment on 62 acres for a proposed commercial retail development. Included documentation of onsite existing conditions of forest habitat cover, existing species occurring on site and potential wildlife species occurring on site. Assessment for TE species was also performed.

2004- Windham, NH-Wildlife habitat assessment on 126 acres for a proposed development. Included documentation of onsite existing conditions of forest habitat cover, existing species occurring on site and potential wildlife species occurring on site. Assessment for TE species was also performed. Specific assessment for Eastern box turtle and Dry- Appalachian Oak-Hickory Forest State of NH Exemplary Community.

2005-Nashua, NH-Wildlife habitat assessment on 50 acres for a proposed commercial retail development. Included documentation of onsite existing conditions of forest habitat cover, existing species occurring on site and potential wildlife species occurring on site. Assessment for TE species was also performed. Specific assessment was done for the bald eagle.

2005-Hooksett, NH-Woodcock habitat assessment and species assessment and management plan for protected land as part of 24.5 acre proposed commercial project.

2006-Pelham, NH-Wildlife habitat assessment on 305 acres as part of a proposed residential subdivision. Documentation was made of existing conditions on site of habitat type and vegetation cover, as well as wildlife species occurring on site and those potentially occurring on site based on habitat type. Specific focus was on the presence of the State listed Blanding's and spotted turtle for occurrence and habitat.

2011-Salem, NH-Wildlife habitat assessment on 70 acres for a proposed residential development. Assessment and assessment were for habitat and cover type, as well as existing and potential wildlife species on site based on the cover type and specific focus was on the swamp white oak flood plain forest and State listed spotted turtle.

2011-Hudson, NH, -Wildlife Habitat and upland community analysis on 290 acres for the presence of dry-Appalachian oak hickory forest and the potential for the State listed New England Cottontail.

2012-North Hampton, NH-Wildlife habitat assessment on 55 acres for a proposed residential development. Assessment and assessment were for habitat and cover type, as well as existing and potential wildlife species on site based on the cover type.

2013-Epping, NH-Wildlife habitat assessment on 198 acres for a proposed development. Focus was on the existing conditions of the site through assessment and documentation of the upland and wetland habitat, as well as existing and potential wildlife species on site.

2013-Newmarket, NH-Wildlife habitat assessment on 105 acres for a proposed development. Focus was on the existing conditions of the site through assessment and documentation of the upland and wetland habitat, and cover type, as well as existing and potential wildlife species on site. Specific attention was paid to the presence of Low-gradient silty-sandy riverbank system and specific species Assessment of State listed Blanding's and spotted turtles.

2014- Newmarket, NH-Wildlife habitat assessment on 25 acres for a proposed development. Focus was on the existing conditions of the site through assessment and documentation of the upland and wetland habitat, and cover type, as well as existing and potential species on site.

2016-Exeter-NH-Wildlife habitat assessment on 62 acres for a proposed development. Focus was on the existing conditions of the site through assessment and documentation of the upland and wetland habitat, and cover type, as well as existing and potential wildlife species on site.

2018-Phillips Exeter Academy, NH-Wildlife habitat assessment on 15 acres for assessment of existing community types and existing and potential wildlife use as part of a management plan and wildlife habitat improvement project.

2018-Alpine habitat survey in Rangeley Maine on a 10 acre portion of alpine land to assess for Bicknell thrush and habitat and specific habitats of Alpine Cliff, Bilberry - Mountain-heath Alpine Snowbank, Cotton-grass - Heath Alpine Bog, Crowberry - Bilberry Summit Bald, Diapensia Alpine Ridge, Dwarf Heath - Graminoid Alpine Ridge, Heath - Lichen Subalpine Slope Bog, Mountain Alder - Bush-honeysuckle Subalpine Meadow, Spruce - Fir - Birch Krummholz

2019- Portsmouth, NH-Wildlife habitat assessment on 66 acres for a proposed development. Focus was on the existing conditions of the site through assessment and documentation of the upland and wetland habitat, and cover type, as well as existing and potential species on site.

2020- York, Maine-Wildlife habitat assessment on 85 acres for a proposed development. Focus was on the existing conditions of the site through assessment and documentation of the upland and wetland habitat, and cover type, as well as existing and potential species on site. Specific assessment was for Blanding's and spotted turtles.

2020-Nottingham, NH-Wildlife habitat assessment 20 acres for a proposed development. Focus was on the existing conditions of the site through assessment and documentation of the upland and wetland habitat, and cover type, as well as existing and potential species on site. Specific assessment was for Blanding's and spotted turtles, Jefferson/Blue Spotted Salamander Complex, and black racer.

SUMMARY OF WILDLIFE ASSESSMENTS:

Mr. Hurley has performed wildlife habitat assessments and threatened and endangered plant Assessments on thousands of acres of land throughout the states of NH, MA, and ME. Additional individual assessments for state listed threatened and endangered plants and habits throughout MA and northern New England. All assessments habitat assessments, or individual plant or animal species were at the request of MA Natural Heritage Program, Vermont Nongame and Natural Heritage Program, New Hampshire Fish and Game and NH Natural Heritage Bureau and various local land use boards as part of the project review and conducted per the above two protocols.

Comment #6

Settlement Calculation

PURPOSE:

Waste filling within Phase IV will occur above a high-density polyethylene (HDPE) geomembrane that overlies a closed landfill (overlay liner). Estimate the induced strain on the overlay liner geomembrane caused by settlement within the closed landfill under the new load.

GIVEN:

See the enclosed plan view and cross-sections showing depth of waste above the overlay liner. Cross sections A-A', B-B', and C-C' were used to evaluate the effects of differential settlement on the liner.

Since 1971, the City has operated the Unlined Landfill for the disposal of MSW. The approximately 60-acre unlined MSW landfill was operated until August 2003 and was closed with a geomembrane cap system by 2004.

ASSUMPTIONS:

Assume MSW is homogeneous and material properties are as follows:

- Unit Weight, $\gamma_{MSW} = 85$ pcf [Ref. 1]
- Primary Compression Ratio, $CR = 0.1^1$ [Ref. 2]
- Secondary Compression Index, $C_\alpha = 0.07^2$ [Ref. 2]

Assume the maximum allowable strain (MAS) for the HDPE geomembrane is 4 percent [Ref. 3, p. 18].

METHOD:

1. Use the Sowers Method to calculate the primary and secondary consolidation of the existing MSW under the new MSW load from Phase IV. Use computer programming to perform this calculation on an evenly spaced 25-foot grid over the area of overlay liner.

Sowers Equation:

$$\Delta H = \underbrace{H \cdot C_r \log \left(\frac{\sigma_0 + \Delta \sigma}{\sigma_0} \right)}_{\text{Primary}} + \underbrace{H \cdot C_\alpha \log \left(\frac{t_2}{t_1} \right)}_{\text{Secondary}} \quad [\text{Ref. 2}]$$

¹ Due to the age of the existing waste within the Unlined Landfill (initial waste placement began approximately 50 years ago) and that it has already experienced primary settlement and is well into its secondary settlement phase, Sanborn Head selected a CR value lower than the typical published range of 0.163 and 0.205.

² Sanborn Head performed several iterations of the Sowers equation to back calculate the secondary compression index. By comparing the closure grades to actual ground survey data, we were able to identify how much the Unlined Landfill has settled over time. By knowing the actual secondary settlement and the time it took, the specific secondary compression index is calculated for the actual settlement.

where:

H = height of existing waste layer
 CR = primary compression ratio
 σ_o = existing overburden pressure at the midpoint of the layer
 $\Delta\sigma$ = increase in overburden pressure
 $C\alpha$ = secondary compression ratio
 t_1 = time at start of interval
 t_2 = time of interest (end of interval)

- Use the calculated settlements from Step 1 to calculate the strain induced on the overlay liner in increments along cross sections A-A', B-B', and C-C'.

$$\varepsilon = (l_F - l_0) / l_0 \times 100$$

where:

ε = Strain (percent)
 l_0 = Original length of geomembrane
 l_F = Length of geomembrane after settlement

$$l_0 = (\Delta \text{Elev}_0^2 + l_H^2)^{1/2}$$

where:

ΔElev_0 = Elevation difference between two points prior to settlement
 l_H = Horizontal distance between points

$$l_F = (\Delta \text{Elev}_F^2 + l_H^2)^{1/2}$$

where:

ΔElev_F = Elevation difference between two points after settlement has occurred

- Compare this strain to the MAS for HDPE geomembrane.

CALCULATION:

- Using the Sowers Method, the settlement calculation was performed at each individual grid point within the AutoCAD Civil 3D surface. The settled surfaces are presented within the section views in Attachment A.

Sample Calculation at STA 3+50 of Alignment B-B' shown on Attachment A:

Unlined Landfill Base El. = 213.5 ft
 Overlay Liner El. = 279.0 ft
 Final Grade El. = 420.0 ft
 H = Overlay Liner El. – Unlined Landfill Base El. = 65.5 ft

Primary Consolidation of the existing MSW:

$$\begin{aligned}\sigma_o &= (\gamma_{MSW}) * (H/2) = (85\text{pcf}) * (65.5\text{ft}/2) = 2,783.8 \text{ psf} \\ \Delta\sigma &= [\gamma_{MSW} * (\text{Final Grade El.} - \text{Overlay Liner El.})] = [85\text{pcf} * (141 \text{ ft})] = 11,985 \text{ psf} \\ S_p &= (65.5 \text{ ft})(0.1) * \log[(2,783.8\text{psf} + 11,985\text{psf})/2,783.8\text{psf}] = \underline{4.75 \text{ ft}}\end{aligned}$$

Secondary Consolidation of Existing MSW from t1 to t2:

$$S_s = (65.5 \text{ ft})(0.07) * \log(10,950\text{days}/25 \text{ days}) = \underline{12.11 \text{ ft}}$$

$$\text{Cumulative Consolidation: } S = S_c + S_s = \underline{16.86 \text{ ft}}$$

2. Use the calculated settlements from Step 1 to calculate the strain induced on the overlay liner in 25 ft increments along cross sections A-A', B-B', and C-C'. By inspection, the maximum strain on the liner should occur where the greatest differential settlement occurs. A summary of the calculated strain values is presented in the enclosed Strain Calculation Summary Tables. A sample calculation for the largest calculated strain for the cross sections analyzed is provided below.

Sample Calculation for Alignment B-B between stations 6+50 and 6+75:

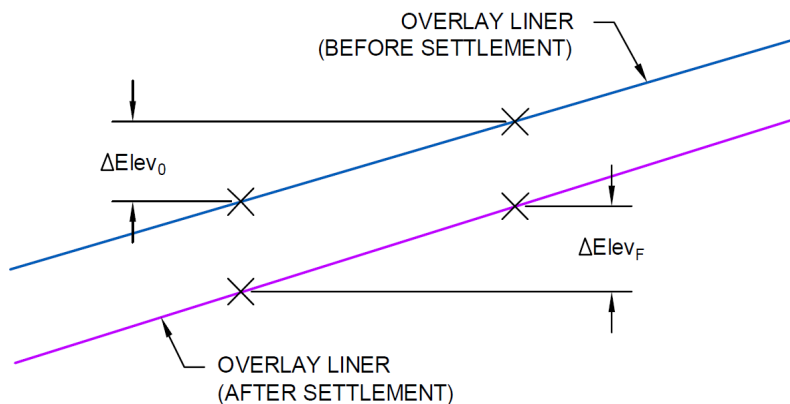


FIGURE 2

$$\begin{aligned}\Delta\text{Elev}_0 &= \text{Elevation difference between the two points prior to settlement} \\ &= 307.91 \text{ ft} - 306.64 \text{ ft} = \underline{1.27 \text{ ft}}\end{aligned}$$

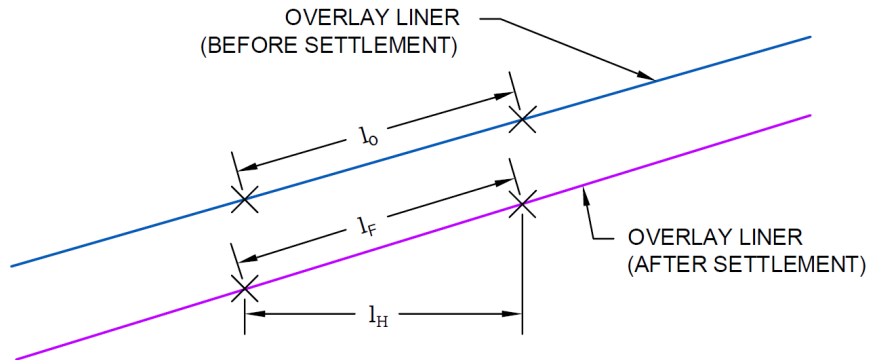


FIGURE 3

l_H = Horizontal distance between points = use 25 ft spacing

l_0 = Original length of geomembrane

$$l_0 = (\Delta \text{Elev}_0^2 + l_H^2)^{1/2}$$

$$l_0 = [(1.27\text{ft})^2 + (25\text{ft})^2]^{1/2} = \underline{25.03\text{ ft}}$$

ΔElev_F = Elevation difference between the two points after settlement has occurred
 = 290.32 ft – 287.76 ft = 2.56 ft

l_F = Length of geomembrane after settlement

$$l_F = (\Delta \text{Elev}_F^2 + l_H^2)^{1/2}$$

$$l_F = [(2.56\text{ ft})^2 + (25\text{ ft})^2]^{1/2} = \underline{25.13\text{ ft}}$$

Therefore:

$$\varepsilon = (l_F - l_0)/l_0 \times 100\%$$

$$\varepsilon = (25.13\text{ ft} - 25.03\text{ft})/25.03\text{ft} \times 100\% = \underline{0.4\%}$$

3. Compare this strain with the MAS for HDPE geomembrane.

$$0.4\% < 4\% \quad \text{OKAY}$$

RESULTS:

In many instances, as shown in the enclosed Strain Calculation Summary Tables, settlement results in the relaxation of the geomembrane (i.e., negative strain values). In other areas, differential settlement induces tensile strain on the geomembrane. As shown in the tabulated strain calculations in Appendix E, the tensile strain calculated along cross sections A-A', B-B', and C-C' is below the MAS for HDPE of approximately 4 percent.

REFERENCES:

- [1] Qian, X., Koerner, R. M., and Gray, D. H, Geotechnical Aspects of Landfill Design and Construction, Prentice-Hall, Inc., 2002, p. 184. (Refer to Attachment B).
- [2] Babu, G. L. S., Reddy, K. R., Chouskey, S. K., and Kulkarni, H. S., "Prediction of Long-Term Municipal Solid Landfill Settlement Using Constitutive Model," in Practice Periodical of Hazardous, Toxic, and Radioactive Waste Management, ASCE, 2010, p. 140. (Refer to Attachment C).
- [3] Peggs, I. D., Schmucker, B., and Carey, P., "Assessment of Maximum Allowable Strains in Polyethylene and Polypropylene Geomembranes," p. 18. (Refer to Attachment D).

ALIGNMENT A

ALIGNMENT B

ALIGNMENT C

[illegible]

DRAWN BY: E. GALVIN
DESIGNED BY: E. GALVIN
REVIEWED BY: E. STEINHAUSER
PROJECT MGR: E. GALVIN
PIC: E. STEINHAUSER
DATE: MAY 2021

TYPE I-A PERMIT MODIFICATION APPLICATION
FOUR HILLS LANDFILL
NASHUA, NEW HAMPSHIRE

PHASE IV SETTLEMENT SECTIONS

2 OF 2

Strain Calculation Summary

Cross Section A-A'							
Station	Ex. Elev.(ft)	Settled Elev.(ft)	Elev. Change(ft)	Orig. Length(ft)	Settled Length(ft)	Delta Length(ft)	Strain(%)
0+75.00	214.57	214.18	-0.39				
1+0.00	220.24	217.96	-2.28	25.63	25.28	-0.35	-1.4%
1+25.00	227.73	223.43	-4.30	26.10	25.59	-0.51	-1.9%
1+50.00	234.86	228.8	-6.06	26.00	25.57	-0.43	-1.6%
1+75.00	241.26	233.69	-7.57	25.81	25.47	-0.33	-1.3%
2+0.00	246.46	237.88	-8.58	25.54	25.35	-0.19	-0.7%
2+25.00	249.45	239.78	-9.67	25.18	25.07	-0.11	-0.4%
2+50.00	254.76	244.14	-10.62	25.56	25.38	-0.18	-0.7%
2+75.00	261.82	249.7	-12.12	25.98	25.61	-0.37	-1.4%
3+0.00	268.28	254.8	-13.48	25.82	25.51	-0.31	-1.2%
3+25.00	275.00	260.12	-14.88	25.89	25.56	-0.33	-1.3%
3+50.00	281.27	265.24	-16.03	25.77	25.52	-0.26	-1.0%
3+75.00	286.94	269.65	-17.29	25.63	25.39	-0.25	-1.0%
4+0.00	290.30	272.41	-17.89	25.22	25.15	-0.07	-0.3%
4+25.00	293.33	274.98	-18.35	25.18	25.13	-0.05	-0.2%
4+50.00	296.72	277.76	-18.96	25.23	25.15	-0.07	-0.3%
4+75.00	298.71	279.04	-19.67	25.08	25.03	-0.05	-0.2%
5+0.00	299.95	280.52	-19.43	25.03	25.04	0.01	0.1%
5+25.00	301.18	281.61	-19.57	25.03	25.02	-0.01	0.0%
5+50.00	302.42	282.72	-19.70	25.03	25.02	-0.01	0.0%
5+75.00	303.66	283.86	-19.80	25.03	25.03	0.00	0.0%
6+0.00	304.90	285.11	-19.79	25.03	25.03	0.00	0.0%
6+25.00	306.14	286.32	-19.82	25.03	25.03	0.00	0.0%
6+50.00	307.37	287.72	-19.65	25.03	25.04	0.01	0.0%
6+75.00	308.61	289.01	-19.60	25.03	25.03	0.00	0.0%
7+0.00	309.85	290.44	-19.41	25.03	25.04	0.01	0.0%
7+25.00	311.85	292.89	-18.96	25.08	25.12	0.04	0.2%

Strain Calculation Summary

Cross Section B-B'							
Station	Ex. Elev.(ft)	Settled Elev.(ft)	Elev. Change(ft)	Orig. Length(ft)	Settled Length(ft)	Delta Length(ft)	Strain(%)
0+50.00	216.05	215.01	-1.04				
0+75.00	220.18	217.76	-2.42	25.34	25.15	-0.19	-0.7%
1+0.00	225.17	221.22	-3.95	25.49	25.24	-0.25	-1.0%
1+25.00	230.12	224.79	-5.33	25.49	25.25	-0.23	-0.9%
1+50.00	235.48	228.63	-6.85	25.57	25.29	-0.27	-1.1%
1+75.00	242.21	233.67	-8.54	25.89	25.50	-0.39	-1.5%
2+0.00	248.85	238.68	-10.17	25.87	25.50	-0.37	-1.4%
2+25.00	254.50	242.93	-11.57	25.63	25.36	-0.27	-1.1%
2+50.00	256.84	244.8	-12.04	25.11	25.07	-0.04	-0.2%
2+75.00	261.35	248.28	-13.07	25.40	25.24	-0.16	-0.6%
3+0.00	267.63	253.17	-14.46	25.78	25.47	-0.30	-1.2%
3+25.00	273.61	257.88	-15.73	25.71	25.44	-0.27	-1.0%
3+50.00	279.00	262.14	-16.86	25.57	25.36	-0.21	-0.8%
3+75.00	283.79	265.97	-17.82	25.45	25.29	-0.16	-0.6%
4+0.00	287.89	269.41	-18.48	25.33	25.24	-0.10	-0.4%
4+25.00	291.71	272.57	-19.14	25.29	25.20	-0.09	-0.4%
4+50.00	295.00	275.45	-19.55	25.22	25.17	-0.05	-0.2%
4+75.00	297.87	277.51	-20.36	25.16	25.08	-0.08	-0.3%
5+0.00	299.18	279.18	-20.00	25.03	25.06	0.02	0.1%
5+25.00	300.42	280.72	-19.70	25.03	25.05	0.02	0.1%
5+50.00	301.67	282.04	-19.63	25.03	25.03	0.00	0.0%
5+75.00	302.91	283.4	-19.51	25.03	25.04	0.01	0.0%
6+0.00	304.15	284.79	-19.36	25.03	25.04	0.01	0.0%
6+25.00	305.40	286.25	-19.15	25.03	25.04	0.01	0.0%
6+50.00	306.64	287.76	-18.88	25.03	25.05	0.01	0.1%
6+75.00	307.91	290.32	-17.59	25.03	25.13	0.10	0.4%
7+0.00	313.67	293.33	-20.34	25.65	25.18	-0.47	-1.8%

Strain Calculation Summary

Cross Section C-C'							
Station	Ex. Elev.(ft)	Settled Elev.(ft)	Elev. Change(ft)	Orig. Length(ft)	Settled Length(ft)	Delta Length(ft)	Strain(%)
0+25.00	221.13	218.51	-2.62				
0+50.00	223.42	220.13	-3.29	25.10	25.05	-0.05	-0.2%
0+75.00	226.68	222.48	-4.20	25.21	25.11	-0.10	-0.4%
1+0.00	231.16	225.77	-5.39	25.40	25.22	-0.18	-0.7%
1+25.00	236.09	229.45	-6.64	25.48	25.27	-0.21	-0.8%
1+50.00	241.4	233.48	-7.92	25.56	25.32	-0.23	-0.9%
1+75.00	247.03	237.98	-9.05	25.63	25.40	-0.22	-0.9%
2+0.00	253.65	242.98	-10.67	25.86	25.50	-0.37	-1.4%
2+25.00	260.73	248.57	-12.16	25.98	25.62	-0.37	-1.4%
2+50.00	267.3	253.8	-13.50	25.85	25.54	-0.31	-1.2%
2+75.00	270.91	256.73	-14.18	25.26	25.17	-0.09	-0.3%
3+0.00	273.92	259.18	-14.74	25.18	25.12	-0.06	-0.2%
3+25.00	279.46	263.71	-15.75	25.61	25.41	-0.20	-0.8%
3+50.00	284.29	267.69	-16.60	25.46	25.31	-0.15	-0.6%
3+75.00	288.34	271.05	-17.29	25.33	25.22	-0.10	-0.4%
4+0.00	290.91	273.21	-17.70	25.13	25.09	-0.04	-0.2%
4+25.00	292.85	274.83	-18.02	25.08	25.05	-0.02	-0.1%
4+50.00	294.57	276.3	-18.27	25.06	25.04	-0.02	-0.1%
4+75.00	295.9	277.49	-18.41	25.04	25.03	-0.01	0.0%
5+0.00	297.08	278.73	-18.35	25.03	25.03	0.00	0.0%
5+25.00	298.25	280.03	-18.22	25.03	25.03	0.01	0.0%
5+50.00	299.43	281.39	-18.04	25.03	25.04	0.01	0.0%
5+75.00	300.79	283.46	-17.33	25.04	25.09	0.05	0.2%
6+0.00	301.97	284.97	-17.00	25.03	25.05	0.02	0.1%
6+25.00	308.95	290.46	-18.49	25.96	25.60	-0.36	-1.4%

Comment #7

Section 3.4.3 of the Revised Operating Plan

fibers, personal exposure to asbestos fibers, and direct contact with asbestos fibers by personnel and equipment. Water will be used as necessary to maintain wet placement of asbestos waste. Following the placement of waste in the disposal area, asbestos waste shall be covered with at least a 3-foot thick layer of non-asbestos waste, or an 18-inch thick layer of soil. The Four Hills Landfill will compile records to include a map of the disposal area identifying the location, depth, area, and quantity of asbestos waste landfilled at the facility.

The co-disposal of asbestos work will comply with the requirements of Env-Sw 901.04, and applicable Federal regulations.

3.4.1.3 Hot Loads

Hot loads may be caused by improper disposal of ashes and coals in trash, or chemical reactions caused by improper disposal of hazardous materials.

In the event that a vehicle with a hot load enters the facility, it will be diverted to the Nashua Fire Rescue training ground. The load will be dumped on pavement near the existing fire hydrant. Nashua Fire Rescue will be called and landfill personnel will assist fire crews in extinguishing the fire.

3.4.2 Waste Inspection

The equipment operator at the working face will provide continuous observation of discharging loads of waste. Observations will include assessing loads for the obvious presence of unacceptable waste. The level of observation will not provide for complete inspection of all parts of every load, although most loads will be observed.

Material which is identified as unacceptable for landfilling will be immediately removed from the fill. In general, the hauler bringing such material will be responsible for removal. In the event the hauler cannot be identified, the City will be responsible for removal and proper disposal. The removal of unacceptable material will be conducted such that the hauler, or anyone else involved with the removal of unacceptable material, is not put at personal risk.

Each incoming load of waste crosses the facility scales and is recorded with respect to amount, type, and generator. In the event that the delivered waste must be removed due to its unacceptability for landfilling, such waste will similarly be weighed, identified, and recorded. In general, unacceptable waste will be removed during the operating day in which that it was been identified. The storage capacity will be limited by a designated "set aside" area near the working face of the landfill. In general, this capacity will be limited to 10 to 20 cubic yards. As soon as landfill operators determine that unacceptable waste is present, the operators will move the waste to the set-aside area. The operations manager will be notified and the transport and final disposal location will be determined. If the City directly disposes unacceptable waste at remote locations, the City will determine that the disposal/management facility is permitted for such use, the transportation method is acceptable, and record the amount of waste deposited. The City will keep records of any contingency disposal which may occur.

3.4.3 Construction of Initial Lifts

Heavy equipment will be restricted from traveling directly on the 18-inch thick sand drainage layer directly

over the primary liner. Operating equipment and vehicle deliveries will access new daily cells by traveling only on waste that ~~has been~~was previously placed and compacted or, where that is not possible, on a 24 to 30-inch thick layer of compacted gravel installed above the 18-inch thick sand blanket.

The first landfill lift to be constructed above the 18-inch thick sand blanket will be a minimum of ~~eight-ten~~ (810) feet thick throughout all areas of the landfill and shall be constructed carefully so as not to damage the geomembrane liner below. Prior to depositing waste on the sand, the load will be deposited over previously landfilled waste, when possible, and spread out. Any large metal objects such as rods or other potential items that may puncture the liner will be removed. The waste will then be placed on the sand layer and compacted using only one pass of the operating equipment.

For the initial lift over any stage, a single lift thickness will generally be ~~eight-ten~~ (810) feet. If damage to the liner or leachate collection pipes is suspected in any way, waste shall not be placed and the liner and/or pipes shall be inspected and repaired.

3.4.4 Subsequent Lift Construction

Subsequent landfill lifts will be constructed with a total lift height of six (6) to eight (8) feet. The working face should have a width of about fifty (50) feet with a final slope at the face at the end of the day of about two horizontal to one vertical (2H:1V). Each two (2)-foot thick layer of waste should be compacted with four (4) passes of the steel-wheeled landfill machine. The lifts are to be constructed over a minimum horizontal ~~square footage~~area to the grades described in the drawings in Appendix A, to allow runoff over the perimeter berms, after the installation of intermediate or temporary cover.

3.4.5 Cover Systems

No less frequently than at the end of each working day, at least a six- (6-) inch thick layer of daily soil cover shall be applied on the active waste disposal areas utilizing soil or approved alternative daily cover materials. Sources of soil may be from excavations or stockpiles of previous excavations on-site, or from off-site sources. A working stockpile of a minimum of one to two weeks' capacity of daily cover material will be maintained on or near the landfill footprint at all times. Cover materials will be applied in a manner and at the frequency required to achieve the following performance objectives:

- Minimize-Limit the dispersal of offensive odors;
- Minimize-Limit the potential to attract and harbor vectors;
- Control drainage;
- Control unsightly conditions;
- Reduce the potential for fire;
- Provide stability; and,
- Assist in the proper development of final grades.

On-site soil (glacial till) is anticipated to be satisfactory for much of this daily cover requirement and to achieve the performance objectives listed above. Material with more sand/gravel may be generated from on-site sources or brought from off-site for areas of equipment movement and traffic, particularly during wet periods. The City also regularly uses sand, till, wood chips, or compost materials for daily cover.

The City currently uses approved alternative daily cover (ADC) from several sources; and plans to continue

Comment #10

**Proposed Maximum Allowable Leachate
Discharge Rate Increase Letter**



THE CITY OF NASHUA

*Wastewater Treatment Facility
Department of Public Works*

"The Gate City"

March 1, 2019

Re: Proposed Maximum Allowable Leachate Discharge Rate Increase

To whom it may concern,

This letter is to support the need to increase the maximum allowable leachate discharge rate for the Four Hills Landfill (Landfill) due to the development of Phase III.

The Nashua Wastewater Facility is in receipt of a letter from Sandborn, Head & Associates, Inc., dated February 25, 2019; which contains a recommendation that the leachate discharge limit for the Landfill be increased from 154 gpm to 200 gpm.

The Landfill is currently permitted by the Wastewater Facility under its pretreatment program (Industrial Wastewater Discharge Permit #I-190); which allows them to discharge a Peak Sewage Flow of 155 gpm. The discharge from the Landfill passes through the City's Trestle Brook pump station before entering the wastewater treatment facility and this pump station is equipped with two pumps rated for 650 gpm.

Having reviewed recent analysis results from the Landfill leachate and specifications of the pumps at the Trestle Brook pump station, the wastewater facility is in support of the recommended leachate discharge rate increase.

Should you have any questions please feel free to contact me.

Sincerely,

David L. Boucher
Wastewater Superintendent
Nashua, NH 03060

Comment #16

Gas Monitoring Well Location Plan

© 2021 SANBORN HEAD & ASSOCIATES, INC.

MAKES: C Long plan file 001\Nashua\FourHills\W001.DWG

PROJECT: 3066.11 - GAS MONITORING WELLS
DRAWN: O. Hernandez
DESIGNED: O. Hernandez
REVIEWED: E. Steinhauser
PROJECT MGR: E. Galvin
DATE: JULY 2021

FILE: P:\3066.11\3066.11\GAS MONITORING WELLS\W001.DWG
LAYOUT: DR
PLOT DATE: 7/2/21 7:59 AM



NOTES:

- THE BASE MAP, INCLUDING LOCATIONS OF SUBSURFACE UTILITIES, PROPERTY LINES, AND LANDFILL LIMIT INFORMATION, WAS OBTAINED FROM A DRAWING PREPARED BY CMA ENGINEERS INC. OF PORTSMOUTH, NH (CMA), TITLED, "CITY OF NASHUA, NH, FOUR HILLS LANDFILL, PHASE II SECURE SOLID WASTE, PHASE II OPERATING PLAN, FILLING SEQUENCE DRAWINGS, PHASE II, STAGE 1- INITIAL LIFT," DATED JUNE 2010.

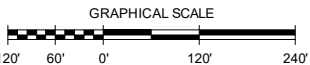
HORIZONTAL DATUM: NAD83 (2001)
HORIZONTAL PROJECTION: NH STATE PLANE
VERTICAL DATUM: NGVD 1929
- RESIDENTIAL BUILDING LOCATIONS WERE SUPPLEMENTED WITH ELECTRONIC GIS DATA OBTAINED FROM THE CITY OF NASHUA, NH GIS DEPARTMENT'S OPEN DATA SITE ON MARCH 22, 2017.
- WETLAND AREA LIMITS WERE OBTAINED FROM THE US FISH AND WILDLIFE SERVICE NATIONAL WETLAND INVENTORY WETLANDS MAPPER.
- EXISTING GAS EXTRACTION WELL AND COLLECTION TRENCHES NOT SHOWN FOR CLARITY.
- GAS MONITORING WELL LOCATIONS WERE PROVIDED BY THE CITY AND SHOULD BE CONSIDERED APPROXIMATE.
- OPERATING PLAN STATES THAT MONITORING WILL ALSO BE PERFORMED AT VAULTS AND LEACHATE CONTROL STRUCTURES.

LEGEND:

- GMW-4
- EXISTING GAS MONITORING WELL
 - LFG EXTRACTION WELL
 - LFG EXTRACTION PIPE

- NOT FOR CONSTRUCTION -
FOR PERMITTING PURPOSES ONLY

SANBORN HEAD



NO.	DATE	DESCRIPTION	BY

DRAWN BY: O. HERNANDEZ
DESIGNED BY: O. HERNANDEZ
REVIEWED BY: E. STEINHAUSER
PROJECT MGR: E. GALVIN
PIC: E. STEINHAUSER
DATE: JULY 2021

TYPE I-A PERMIT MODIFICATION APPLICATION
FOUR HILLS LANDFILL
CITY OF NASHUA
NASHUA, NEW HAMPSHIRE

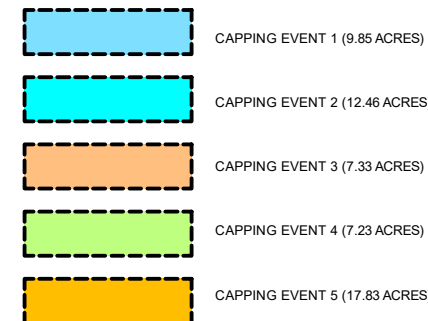
GAS MONITORING WELL
LOCATION PLAN

PROJECT NUMBER:
3066.11

FIGURE NUMBER:
1

Comment #20

Anticipated Capping Sequence Plan



- NOT FOR CONSTRUCTION -
FOR PERMITTING PURPOSES ONLY

PHASE IV DESIGN DRAWINGS
TYPE I-A PERMIT MODIFICATION APPLICATION
FOUR HILLS LANDFILL
CITY OF NASHUA
NASHUA, NEW HAMPSHIRE

ANTICIPATED CAPPING SEQUENCE PLAN

PROJECT NUMBER:

3066.11

FIGURE NUMBER:

1

SANBORN ||| HEAD

GRAPHICAL SCALE

A graphical scale bar with a total length of 240 feet. It is divided into four equal segments of 60 feet each. The segments are marked with alternating black and white squares. The scale is labeled with '120'', '60'', '0'', '120'', and '240'' at the corresponding positions.

NO.	DATE	DESCRIPTION	BY

DRAWN BY: O. HERNANDEZ
DESIGNED BY: O. HERNANDEZ
REVIEWED BY: E. STEINHAUSER
PROJECT MGR: E. GALVIN
PIC: E. STEINHAUSER
DATE: JULY 2021

PROJECT NUMBER:

3066.11

FIGURE NUMBER:

1

Comment #21

Revised Financial Assurance Plan

FINANCIAL ASSURANCE UPDATE

PHASE IV EXPANSION

*Four Hills Landfill
Nashua, New Hampshire
Solid Waste Permit No. DES-SW-SP-95-002*



Nashua
NEW HAMPSHIRE'S GATE CITY

*Prepared for the City of Nashua
File No. 3066.11
Revised July 2021*

TABLE OF CONTENTS

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2.0	BACKGROUND	1
3.0	CLOSURE COSTS.....	1
4.0	POST-CLOSURE COSTS.....	2
5.0	CLOSING.....	2

TABLES

Table 1	Post Closure Cost Reductions
Table 2	Sinking Fund for Combined Closure & Post Costs (30 Years) Fund

APPENDICES

Appendix A	Cost Estimate Form for Closure of a Lined Landfill
Appendix B	Cost Estimate Form for Post Closure of a Landfill
Appendix C	Post Closure Costs Supporting Documentation

1.0 INTRODUCTION

Sanborn, Head & Associates, Inc. (Sanborn Head) prepared this financial assurance update for the closure and post-closure monitoring and maintenance of the Phases I – IV Landfill (Landfill) at the Four Hills Landfill (Facility) in Nashua, New Hampshire. The update was prepared as part of the Type I-A Permit Modification Application for the Phase IV expansion in accordance with Env-SW 1403.02 of the New Hampshire Department of Environmental Services (NHDES) Solid Waste Rules.

2.0 BACKGROUND

The City of Nashua owns and operates the Facility for the express purpose of providing municipal solid waste services to the residents and business of Nashua. The City's currently waste disposal operations are within Phases I, II, and III. Waste disposal in Phase IV is not anticipated begin until around 2030 and the anticipated operating life is estimated to be about 30 years. Closure construction is anticipated to occur over multiple years as described in the Landfill's Closure Plan and is not anticipated to begin until after Phase IV becomes operational.

Sanborn Head understands that the City of Nashua (the City) maintains a capital reserve fund for expenses associated with Closure and Post-Closure for the Landfill. The current account balance of the capital reserve fund is \$6,391,294.00 (as of the end of 2019). The City makes annual contributions to the capital reserve fund, the last of which was made in 2019 (FY 2020) in the amount of \$355,000. The contribution was in accordance with the previously prepared financial assurance plan update. The City will continue to make annual contributions to the capital reserve fund for each year the Landfill accepts waste.

3.0 CLOSURE COSTS

The closure cost estimate forms in Appendix A were prepared using available applicable cost estimating data, including New Hampshire Department of Transportation Weighted Average Unit Prices, R.S. Means construction cost data, manufacturer quotations, and reflect Sanborn Head's opinion of costs. Please note that in developing the opinion of costs, assumptions were made as to the means, methods, and extent of labor, equipment, and materials that a contractor might employ to perform the work. Actual costs may vary from our estimate due to variations in contractor techniques for determining prices, market conditions at the time the work is performed, and other factors over which we have limited or no control.

Amendments to the financial assurance rules (Env-Sw 1400) became effective on July 1, 2014 and were incorporated in the calculations. These amendments required the inclusion of additional closure costs for replacing 20 percent of the existing active gas collection system and for having a qualified professional oversee all closure activities (Env-Sw 1403.02 [g][3] and [7]).

The Closure Cost Estimate is summarized on the enclosed NHDES Cost Estimate Form for Closure of a Lined Landfill and presents our opinion of the closure costs in year 2020 dollars. As indicated, the estimated cost to close the Facility, including a 10 percent contingency is

about \$14,195,000. This is an increase of approximately \$5,487,000 from the 2020 financial assurance update. The increase in closure costs is attributed to the inclusion of Phase IV.

4.0 POST-CLOSURE COSTS

The NHDES Cost Estimate Form for Post-Closure of a Landfill provided as Appendix B presents expected post-closure costs in 2020 dollars. The costs presented were developed based on Sanborn Head's experience in conjunction with unit cost data provided by the City and represent Sanborn Head's opinion of the post-closure costs associated with the identified items. According to our calculations, the annual post-closure cost is expected to be about \$116,483. Extending these costs over a 30-year post-closure period and accounting for cost reductions and increases over time, the total post-closure cost, in 2020 dollars, is expected to be about \$3,477,000.

Expected post-closure cost reductions and increases are presented in Table 1. To be conservative, we assumed most of the items will remain constant over the 30-year period; however, the cost for repairs and site maintenance will be lower over time, consistent with the reduced burden on the gas collection and control (GCCS) system. We understand that the GCCS infrastructure inside and outside of the landfill up to the landfill gas-to-energy (LFGTE) facility will be maintained and operated by the City; however, the LFGTE facility and utility flare will be maintained and operated by a third party under contract to the City. Furthermore, we understand that the expansion of the GCCS infrastructure will be made throughout the active life of the landfill and that no additional GCCS infrastructure will be required at closure. As noted above, an allowance was included in the closure cost to replace 20 percent of the well field at that time.

A sinking fund calculation was prepared and is presented as Table 2. The sinking fund calculation is combined for both closure and post-closure needs and assumes an investment interest rate of 1.23 percent¹ and an annual inflation rate of 1.55 percent, which is based on the average inflation rate over the previous 5 years. Our calculations indicate that the City has set aside sufficient funds and is on track to satisfy closure and post-closure requirements for Phases I – IV, assuming an increase in annual deposits to the fund as shown in Table 2.

5.0 CLOSING

Considering the NHDES's April 10, 2020 approval of the previous Financial Assurance Plan, this update includes the capping of Phases I through IV. This area was added to the cost estimate forms and we understand that the City affirms that they will adjust deposits into their capital reserve fund based on this change, as indicated in the attached Table 2.

P:\3000s\3066.11\Source Files\Type I-A PMA\App F - Financial\Financial Assurance - Phase IV.docx

¹ Conservative rate based on financial information provided to Sanborn Head by the City.

NHDES COST ESTIMATE FORMS

Cost Estimate Form for Closure of a Lined Landfill

Facility Name: City of Nashua Four Hills Landfill Expansion - Phases I - IV	
Address of Facility: 840 West Hollis Street, Nashua, New Hampshire 03061	
Owner: City of Nashua, New Hampshire	
Phase: Phase I - IV	
Acreage: 54.7 acres (planimetric), 57.4 acres (3-dimensional)	
DES Permit #: DES-SW-SP-95-002	
Site # (DES Use Only)	Facility # (DES Use Only)

LOG# (DES use only)

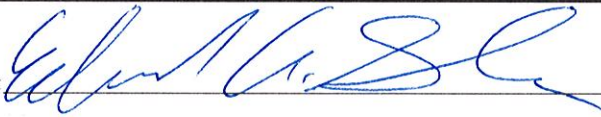
State of New Hampshire
Department of Environmental Services
Waste Management Division
 29 Hazen Drive, PO Box 95, Concord, NH 03302-0095
PHONE (603) 271-2925 FAX (603) 271-2456
EMAIL solidwasteinfo@des.nh.gov
TDD Access: Relay NH 1-800-735-2964

Complete this form in accordance with the NH Solid Waste Rules Part Env-Sw 1400.

Task	DES Use Only	Unit	Unit Cost	Quantity	Total Cost
I Design of Final Closure Plans	Cat 1				
Engineering Cost	100	LS	\$317,000.00	1	\$317,000.00
Plans	110	LS			\$0.00
Modification/Closure Plan Review Fees	120	LS	\$15,000.00	1	\$15,000.00
II Mobilization, Demobilization & Insurance	Cat 2				
Total Cost	200	LS	\$367,000.00	1	\$367,000.00
Other	210				\$0.00
III Erosion Control	Cat 3				
Silt Fence	300	LF			\$0.00
Erosion Matting/ Blanket	310				\$0.00
Hay Bale Sediment Barrier	320	LF	\$5,400.00	1	\$5,400.00
Hay Mulch Cover	330				\$0.00
Check Dams	340	EA			\$0.00
Other	350				\$0.00
IV Waste Relocation	Cat 4				
Test Pits (to define limits of refuse and/or ground water to refuse contact)	400	DAY			\$0.00
Clearing & Grubbing	410	SY			\$0.00
Waste Regrading (Refuse Excavation/Relocation & Compaction)	420	CY			\$0.00
Other (Misc. Grading)	430	LS	\$48,000.00	1	\$48,000.00
V Capping	Cat 5				
A Cap (Material and Installation)	500				\$0.00
Geomembrane	510	SF	\$0.48	2,499,282	\$1,199,655.36
Soil	520	CY			\$0.00
Testing	530				\$0.00
Anchor Trench	540				\$0.00
Other - Drainage Net Composite	550	SF	\$0.75	2,499,282	\$1,874,461.50
B Gas Vents Devices	Cat 6				\$0.00
Gas Vents/Wells	600	EA			\$0.00
Other - Replacing 20% of the Active Gas Collection System (Vertical Wells)	610	LF	\$150.00	1760	\$264,000.00
C Layers	Cat 7				\$0.00
Drainage Layer - Free Draining Sand - 18" thick	700	CY	\$29.36	46,283	\$1,358,868.88
Intermediate Cover Placement	710	CY	\$13.00	23,142	\$300,846.00
Sand - Protective Gas Venting Layer - 12" thick	720	CY	\$29.36	92,566	\$2,717,737.76
Topsoil/Loam or Manufactured Soil	730	CY	\$24.90	46,283	\$1,152,446.70
Other - Moisture Retention Layer - 6" thick	740	CY	\$24.90	46,283	\$1,152,446.70
VI Stabilization, Run-off Control	Cat 8				
Seed & Mulch (Include Lime, Fertilizer, Seed & Hay Mulch)	800	AC	\$3,200.00	57.4	\$183,680.00
Surface Water Diversion Swales	810	LF	\$24.35	14,792	\$360,185.20
Stone Rip-Rap	820	CY			\$0.00
Catch Basins, Manholes & Drop Inlets	830				\$0.00
Toe Drain	840	LF	\$28.50	6,946	\$197,961.00
Detention Pond and Associated Outlet Devices	850				\$0.00
Other - Downchute	860	LF	\$240.00	1461	\$350,640.00
VII Monitoring Devices	Cat 9				
Settlement Monuments/Plates	900	EA			\$0.00
Groundwater Monitoring Wells	910	EA			\$0.00
Gas Monitoring Probes	920				\$0.00
Other	930				\$0.00
VIII Roadway	Cat 10				
Access Roadway	1000	LF	\$107.00	3,200	\$342,400.00
Drainage Ditches	1010				\$0.00
Culvert Inlet & Outlet Headwalls	1020				\$0.00
Guide Rail	1030	LF			\$0.00
Dust Control - Calcium Chloride	1040				\$0.00
New/Replaced Pavement	1050	SY			\$0.00
Other	1060				\$0.00

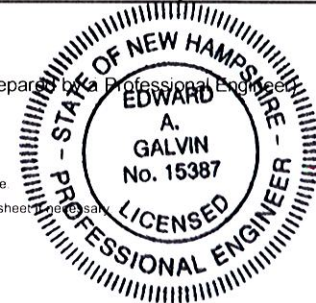
Task	DES Use Only	Unit	Unit Cost	Quantity	Total Cost
IX Miscellaneous	Cat 11				
Signs	1100	LS			\$0.00
Perimeter Fence	1110	LF			\$0.00
Entry Gate - Double Unit	1120	EA			\$0.00
Miscellaneous Work and Cleanup	1130	LS	\$41,700.00	1	\$41,700.00
Ledge Removal	1140	CY			\$0.00
Other	1150				\$0.00
X Surveying	Cat 12				
Baseline, Bench Marks, and Survey Control	1200				\$10,000.00
Other	1210				\$0.00
XI Construction Phase Testing	Cat 13				
Compaction Testing	1300				\$0.00
QAQC	1310	AC	\$10,000.00	27.5	\$275,000.00
Other	1320				\$0.00
XII Engineering	Cat 14				
Resident Engineer, Project Manager, Project Engineer	1400	LS	\$250,000.00	1	\$250,000.00
Record Drawings/ As-Built	1410	LS	\$20,000.00	1	\$20,000.00
Other	1420				\$0.00
Qualified Professional Oversight of all Closure Activities	1430	LS	\$100,000.00	1	\$100,000.00
XIII Other (list)	Cat 15				
	1500				\$0.00
	1510				\$0.00
	1520				\$0.00
XIV Contingency (minimum 10%)	Cat 16				
	1600	LS	10%		\$1,290,442.91
Total Cost					\$14,195,000.00

Signature of Preparer



(Must be prepared by a Professional Engineer)

Date: 7/7/2021



This form provides a basis for cost estimating closure costs for a lined landfill. This form is not inclusive of all costs that may be associated with the landfill closure.

The cost estimate must include all items needed to comply with all DES permits. Please use the spaces provided above noted as "Other" or attach an additional sheet if needed.

Date of Last Form Revision: 7/1/14

Cost Estimate Form for Post Closure of a Landfill

(lined or unlined)

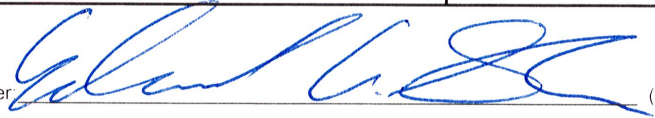
Facility Name: City of Nashua Four Hills Landfill Expansion - Phases I - IV	
Address of Facility: 840 West Hollis Street, Nashua, New Hampshire 03061	
Owner: City of Nashua, New Hampshire	
Phase: Phase I - IV	
Acreage: 54.7 acres (planimetric), 57.4 acres (3-dimensional)	
DES Permit #: DES-SW-SP-95-002	
Site # (DES Use Only)	Facility # (DES Use Only)

LOG# (DES use only)

State of New Hampshire
Department of Environmental Services
Waste Management Division
29 Hazen Drive, PO Box 95, Concord, NH 03302-0095
PHONE (603) 271-2925 FAX (603) 271-2456
EMAIL solidwasteinfo@des.nh.gov
TDD Access: Relay NH 1-800-735-2964

Complete this form in accordance with the NH Solid Waste Rules Part Env-Sw 1400.

Task	Unit	Unit Cost	Quantity	Total Cost
I Water Monitoring				
Surface Water Sampling & Analysis	LS	\$1,284.00	1	\$1,284.00
Other (Permit Requirement)				\$0.00
Ground Water Sampling & Analysis	LS	\$26,135.00	1	\$26,135.00
Other (Permit Requirement)				\$0.00
Other (Annual Report)	LS	\$5,000.00	1	\$5,000.00
II Gas Monitoring				
Landfill Gas Migration Monitoring	LS	\$2,500.00	1	\$2,500.00
Replacing 20% of the Active Gas Collection System				\$0.00
Other				\$0.00
III Settlement Monitoring				
Field Survey	LS	\$5,700.00	1	\$5,700.00
Data Tabulation				\$0.00
Other				\$0.00
IV Leachate Collection/Monitoring				
Sewer Charges				\$0.00
Electricity	LS	\$11,500.00	1	\$11,500.00
Maintenance of Collection System	LS	\$4,080.00	1	\$4,080.00
Sampling & Analysis	LS	\$4,410.00	1	\$4,410.00
Other				\$0.00
V Clean Air Act Requirements				
Monitoring & Analysis	LS	\$4,305.00	1	\$4,305.00
Emissions Fees				\$0.00
VI Repair & Site Maintenance Costs				
Snow Removal	LS	\$4,260.00	1	\$4,260.00
Roadway Maintenance				\$0.00
Mowing	LS	\$5,470.00	1	\$5,470.00
Soil Cover Maintenance and Planting	LS	\$3,200.00	1	\$3,200.00
Maintenance of Gas System	LS	\$17,110.00	1	\$17,110.00
Subsidence Repair	LS	\$1,140.00	1	\$1,140.00
Stormwater Maintenance	LS	\$3,000.00	1	\$3,000.00
Other				\$0.00
VII Inspections				
Annual Report	LS	\$3,000.00	1	\$3,000.00
Annual Site Inspections	LS	\$1,800.00	1	\$1,800.00
Other				\$0.00
VIII Other				
Third Party Management of Post-Closure Activities	LS	\$2,000.00	1	\$2,000.00
				\$0.00
				\$0.00
IX Contingency (10 % minimum)				
	LS	10%		\$10,589.40
Total Yearly Cost				\$116,483.40
Total 30-Year Cost *				\$3,477,000.00

Signature of Preparer: 

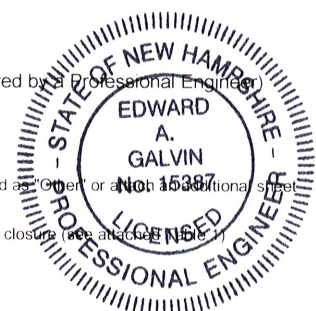
(Must be prepared by a Professional Engineer)

Date: 7/17/2020

The cost estimate must include all expenses associated with compliance of all DES permits. Please use the spaces provided above noted as "Other" or attach additional sheet if necessary.

* The 30-year total costs (2020 dollars) assumes reductions in the repairs and maintenance costs beginning in the eleventh year following closure (see attached sheet).

Date of Last Form Revision: 7/1/14



TABLES

TABLE 1
Post-Closure Cost Reductions
Four Hills Landfill
Nashua, New Hampshire

Item		Annual Cost Year 1-10	Annual Cost Year 11-30
I	Water Monitoring	\$32,419	\$32,419
II	Gas Monitoring	\$2,500	\$2,500
III	Settlement Monitoring	\$5,700	\$5,700
IV	Leachate Collection/Monitoring	\$19,990	\$19,990
V	Clean Air Act Requirements	\$4,305	\$4,305
VI	Repair and Site Maintenance Costs	\$34,180	\$33,380
VII	Inspections	\$4,800	\$4,800
VIII	Other	\$2,000	\$2,000
IX	Contingency (10%)	\$10,589	\$10,509
TOTAL		\$116,483	\$115,603

Notes:

1. Task designations are consistent with those identified on NHDES Cost Estimate Form For Post Closure of a Landfill.
2. Costs are 2020 dollars.

TABLE 2
Sinking Fund for Combined
Closure & Post-Closure (30-Years) Fund
Four Hills Landfill
Nashua New Hampshire

Sinking Fund for CLOSURE and POST CLOSURE of Phases I, II, III and IV
Assumes Phase III is the Last Phase Built

ASSUMPTIONS

Inflation Rate ¹	1.55%
Interest Rate Projected for 2020	1.23%

FUND REQUIREMENTS

Combined fund balance as of November 2019 for Closure & Post Closure	\$6,391,294
Base Contribution (in 2020\$) for 2020	\$0
Base Contribution (in 2020\$) annually after 2020 =	varies (see below)
Landfill Closure Cost (in 2020\$)	\$14,195,000

	Year	Closure/Post Closure Cost (2020 value)	Closure/Post Closure Cost with Inflation	Deposit to Fund by City (2020 value)	Interest Accumulated by Fund	Balance of Fund (end of year)
Begin Phase I Oper.	2002					
	2003					
	2004					
	2005					
	2006					
	2007					
	2008					
	2009					
Begin Phase II Oper.	2010					
	2011					
	2012					
	2013					
	2014					
	2015					
	2016					
	2017					
	2018					
	2019					
Begin Phase III Oper.	2020					\$6,391,294
	2021			\$405,000	\$81,104	\$6,877,398
	2022			\$430,000	\$87,236	\$7,394,634
	2023			\$435,000	\$93,629	\$7,923,263
End Phase II Oper.	2024			\$435,000	\$100,131	\$8,458,395
	2025			\$435,000	\$106,714	\$9,000,108
	2026			\$435,000	\$113,377	\$9,548,485
	2027			\$435,000	\$120,122	\$10,103,606
	2028			\$435,000	\$126,950	\$10,665,556
	2029			\$435,000	\$133,862	\$11,234,418
Begin Phase IV Oper.	2030			\$435,000	\$140,859	\$11,810,276
	2031			\$435,000	\$147,942	\$12,393,218
	2032			\$435,000	\$155,112	\$12,983,330
	2033			\$435,000	\$162,370	\$13,580,700
End Phase III Oper.	2034			\$435,000	\$169,718	\$14,185,418
	2035			\$435,000	\$177,156	\$14,797,574
	2036			\$435,000	\$184,685	\$15,417,259
	2037			\$435,000	\$192,308	\$16,044,567
	2038			\$435,000	\$200,023	\$16,679,590
	2039			\$435,000	\$207,834	\$17,322,424
	2040			\$435,000	\$215,741	\$17,973,165
	2041			\$435,000	\$223,745	\$18,631,911
	2042			\$435,000	\$231,848	\$19,298,758
	2043			\$435,000	\$240,050	\$19,973,808
	2044			\$435,000	\$248,353	\$20,657,161
	2045			\$435,000	\$256,758	\$21,348,920
	2046			\$440,000	\$265,298	\$22,054,217
	2047			\$440,000	\$273,973	\$22,768,190
	2048			\$440,000	\$282,755	\$23,490,945
	2049			\$440,000	\$291,645	\$24,222,590
	2050			\$440,000	\$300,644	\$24,963,234
	2051			\$440,000	\$309,754	\$25,712,987
	2052			\$440,000	\$318,976	\$26,471,963
	2053			\$440,000	\$328,311	\$27,240,274
	2054			\$440,000	\$337,761	\$28,018,036
	2055			\$440,000	\$347,328	\$28,805,363
	2056			\$440,000	\$357,012	\$29,602,375
	2057			\$440,000	\$366,815	\$30,409,191
	2058			\$440,000	\$376,739	\$31,225,930
	2059			\$440,000	\$386,785	\$32,052,715
Close Phases I-IV	2060			\$440,000	\$396,954	\$32,889,669
Start Post Closure - Yr 1	2061	\$14,195,000	\$26,669,350		\$404,543	\$6,624,862
Post Closure - Yr 2	2062	\$116,483	\$222,239		\$81,486	\$6,484,108
Post Closure - Yr 3	2063	\$116,483	\$225,684		\$79,755	\$6,338,179
Post Closure - Yr 4	2064	\$116,483	\$229,182		\$77,960	\$6,186,956
Post Closure - Yr 5	2065	\$116,483	\$232,735		\$76,100	\$6,030,321
Post Closure - Yr 6	2066	\$116,483	\$236,342		\$74,173	\$5,868,152
Post Closure - Yr 7	2067	\$116,483	\$240,005		\$72,178	\$5,700,325
Post Closure - Yr 8	2068	\$116,483	\$243,725		\$70,114	\$5,526,714
Post Closure - Yr 9	2069	\$116,483	\$247,503		\$67,979	\$5,347,189
Post Closure - Yr 10	2070	\$116,483	\$251,339		\$65,770	\$5,161,621
Post Closure - Yr 11	2071	\$116,483	\$255,235		\$63,488	\$4,969,873
Post Closure - Yr 12	2072	\$115,603	\$257,233		\$61,129	\$4,773,770
Post Closure - Yr 13	2073	\$115,603	\$261,220		\$58,717	\$4,571,267
Post Closure - Yr 14	2074	\$115,603	\$265,269		\$56,227	\$4,362,224
Post Closure - Yr 15	2075	\$115,603	\$269,381		\$53,655	\$4,146,499
Post Closure - Yr 16	2076	\$115,603	\$273,556		\$51,002	\$3,923,945
Post Closure - Yr 17	2077	\$115,603	\$277,796		\$48,265	\$3,694,413
Post Closure - Yr 18	2078	\$115,603	\$282,102		\$45,441	\$3,457,752
Post Closure - Yr 19	2079	\$115,603	\$286,475		\$42,530	\$3,213,808
Post Closure - Yr 20	2080	\$115,603	\$290,915		\$39,530	\$2,962,422
Post Closure - Yr 21	2081	\$115,603	\$295,424		\$36,438	\$2,703,436
Post Closure - Yr 22	2082	\$115,603	\$300,003		\$33,252	\$2,436,685
Post Closure - Yr 23	2083	\$115,603	\$304,653		\$29,971	\$2,162,002
Post Closure - Yr 24	2084	\$115,603	\$309,376		\$26,593	\$1,879,220
Post Closure - Yr 25	2085	\$115,603	\$314,171		\$23,114	\$1,588,163
Post Closure - Yr 26	2086	\$115,603	\$319,041		\$19,534	\$1,288,657
Post Closure - Yr 27	2087	\$115,603	\$323,986		\$15,850	\$980,522
Post Closure - Yr 28	2088	\$115,603	\$329,007		\$12,060	\$663,575
Post Closure - Yr 29	2089	\$115,603	\$334,107		\$8,162	\$337,630
Post Closure - Yr 30	2090	\$115,603	\$339,286		\$4,153	\$2,497

Notes:
1. Inflation rate based on the average of the last 10 years of historical annual U.S. inflation rate data.

POST CLOSURE COSTS SUPPORTING DOCUMENTATION

The following assumptions were made in developing the post-closure cost estimate summarized in the New Hampshire Department of Environmental Services (NHDES) Post Closure Form and Table 1. The tasks identified on Table 1, and discussed below, are consistent with the tasks presented on the NHDES forms. Table 1 is provided, as the NHDES Post Closure form does not allow for consideration of reduced costs that are likely to occur over time.

Task I Water Monitoring

Years 1 Through 30

- The current program of annual water quality monitoring involves biannual sampling of:
 - 19 release detection wells associated with Phases I-IV of the landfill at an annual cost of \$16,000;
 - 15 groundwater management wells sampled biannually at an annual cost of \$10,135; and
 - 2 surface water sampling points sampled biannually at an annual cost of \$1,284.
- Assume the current program of annual and semiannual water quality monitoring continues at an annual cost of \$27,419 per year (price information provided by the City of Nashua).
- Assume annual report is prepared at a cost of \$5,000.
- With these assumptions, the annual cost for years 1 through 30 is estimated to be \$32,419.

Task II Gas Monitoring

- Assume an annual cost of \$2,500 for the quarterly monitoring of landfill gas will continue throughout the post-closure monitoring period (inflated based on Eastern Analytical, Inc. quote dated 1/20/15 and information provided by the City of Nashua). NHDES may permit some reductions to the frequency and locations after several years; however, such reductions should not be relied upon.

Task III Settlement Monitoring

Years 1 through 30

- Assume an annual cost of \$5,700 for settlement survey based upon information provided by the City of Nashua.

Task IV Leachate Collection/Monitoring

- Currently, the City of Nashua does not pay leachate disposal costs because leachate is discharged directly to the City of Nashua sewer system. Assume this agreement continues through the post-closure time period.
- Maintenance of the collection system is assumed to be an annual lump sum amount of \$4,080 (Assume bi-yearly manhole cleaning at \$1,800 and leachate pipe cleaning every 5 years at

\$4,500, and \$2,280 each year for routine maintenance of the Phase III and IV leachate pumps; therefore, a total yearly costs of \$4,080).

- The current program of tri-annual sampling of the primary and secondary leachate has an annual total cost of \$4,410. Assume this program continues at this same cost.
- Assume the annual electrical costs for the secondary leachate pump (0.4 hp submersible pump) used to transfer secondary leachate into the primary leachate discharge pipe, and electricity use by the flow control building (including heat) is \$1,900.
- Assume the annual electrical costs for the Phase III sump riser building pumping system is \$9,600 (based actual costs of an equivalent NH landfill pumping system).
- With these assumptions, the annual cost for years 1 through 30 is estimated to be \$19,990.

Task V Clean Air Act Requirements

- Currently, the City of Nashua completes air monitoring (surface emissions monitoring) and reporting utilizing landfill employees. Assume it takes a field technician/engineer 41 hours each year to complete these tasks.
- Assume this program continues with the same scope and an hourly rate of \$105 for an outside company to complete the monitoring/reporting.
- With these assumptions, the annual costs for years 1 through 30 is estimated to be \$4,305.00

Task VI Repair and Site Maintenance Costs

Assume limited maintenance will be required to include; mowing the cap, snow removal, and repairs to soil cover and stormwater features. We understand that the City will maintain the GCCS infrastructure and utility flare.

Years 1 through 10

- Snow removal is assumed to be an annual lump sum amount of \$4,260 (assumes plowing 3 times a year at \$1,420/plowing).
- Mowing assumed to be \$100/acre annually, the site is 54.7 acres, annual mowing cost is \$5,470.
- Soil Cover Maintenance and Planting is assumed to be an annual lump sum amount of \$3,200 (assumes Seeding & Mulching 1 Acre/year @ \$3,200/acre).
- Maintenance/Operation of GCCS Infrastructure:
 - Routine maintenance of control system, monthly monitoring of collection system, and well field balancing. Assumed 15 hours per month for monthly maintenance tasks and

balancing the well field. Assuming an hourly rate of \$60/hour, the annual cost is approximately \$10,800 per year.

- Assume \$1,600/year for minor repairs to wellheads that may be required.
- Assume that a condensate knockout pump will need to be replaced once every two years at a cost of \$2,700 (based on a price quotation from QED on November 6, 2019). This equates to a cost of \$1,350 per year.
- Semi-annual maintenance of blower bearings, testing automated devices, gas canister maintenance/refill, and coordinating any unscheduled maintenance. Assumed 4 hours at \$60/hour labor per event or \$240 per year.
- Replacement of blower/flare/control parts. Assumed 8 hours labor at \$60/hour and \$1,200 parts or total of \$1,680 per year.
- Unscheduled responses to alarm conditions, expected to occur 4 times per year. Assumed 6 hours labor at \$60/hour per event, which equates to an annual cost of \$1,440.

Totaling these items, the annual cost of Maintenance/Operation of GCCS Infrastructure is \$14,950.

- During the 30year post closure period, following closure of Phases I, II, and III, the City assumes a third party will continue to be responsible for operating the landfill gas-to-energy (LFGTE) facility.
- Subsidence Repair (\$5,700/5 years) is assumed to be an annual lump sum amount of \$1,140 (assume 1 day of bull dozer work @ \$2,400/day and \$3,300 of soil materials).
- Stormwater Maintenance is assumed to be an annual lump sum amount of \$3,000.
- With these assumptions, the annual cost for years 1 through 10 is estimated to be \$26,300.

Years 11 through 30

- Assume \$800/year (reduced by about half from years 1-10) for minor repairs to wellheads that may be required.
- All other maintenance and repair costs will remain unadjusted.
- With these assumptions, the annual cost for years 11 through 30 is estimated to be \$25,500.00.

Task VII Inspections

- Assume an annual facility report may be prepared at a lump sum annual cost of \$3,000.
- Assume annual site inspections at a lump sum annual cost of \$1,800.

- Therefore, the annual cost for years 1 through 30 for post-closure inspections and reporting is estimated to be \$4,800.

Task VIII Other

- Assume \$2,000 annual cost for third party management of post-closure activities.

Task IX Contingency (10 percent)

- Assume 10 percent contingency.

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Comment #23

Revised Public Benefit Statement

TABLE OF CONTENTS

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2.0	WASTE GENERATION.....	2
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4.0	CONFORMANCE WITH RSA 149-M:11, III (c).....	6
5.0	SUMMARY	7

1.0 INTRODUCTION

The City and Sanborn Head prepared this public benefit demonstration as part of the application for a Type I-A Modification to Solid Waste Management Facility Permit (Type I-A PMA) for the Phase IV Secure Landfill Expansion (Phase IV expansion), a proposed double-lined disposal area at the Four Hills Landfill Facility (Facility) located in Nashua, New Hampshire. The Facility is a limited public facility, serving only the residents and businesses of the City of Nashua (City).

This document was prepared to fulfill the requirements of Env-Sw 1005.05(c), which requires that the City demonstrate that the Phase IV expansion at the Facility provides a substantial public benefit meeting the criteria listed under RSA 149-M:11 III (b) and (c), which are listed below.

(b) The ability of the proposed facility to assist the state in achieving the implementation of the hierarchy and goals under RSA 149-M:2 and RSA 149-M:3.

(c) The ability of the proposed facility to assist in achieving the goals of the state solid waste management plan, and one or more solid waste management plans submitted to and approved by the department under RSA 149-M:24 and RSA 149-M:25.

Because the Four Hills Facility is a limited public facility (Nashua residents and businesses only), NHDES determined that the proposed Phase IV expansion is not subject to the 20-year planning period requirements of RSA 149-M III(a) and V. The City, however, notes that in reviewing the NHDES *Biennial Solid Waste Report*, dated October 2019, NHDES projects that there will be a statewide disposal capacity shortfall after 2025. The construction and operation of the proposed Phase IV expansion will ease this deficit by removing the waste disposal needs of Nashua from the State's future waste disposal deficit.

Since 1971, the City has operated the Facility for the disposal of municipal solid waste (MSW) and construction and demolition debris (C&D). On June 26, 1995, the New Hampshire Department of Environmental Services (NHDES) issued Solid Waste Permit No. DES-SW-95-002 for the development and operation of a "Secure Landfill." At the time of the original permit, the Secure Landfill consisted of double-lined disposal areas Phases I, II, and III. MSW disposal operations began in the lined Phase I area in 2003 and in the lined Phase II area in 2009. MSW disposal operations in the lined Phase III area began in May 2020. Currently, the permitted disposal capacity (airspace) is anticipated to be exhausted by 2030, and, as such, the City anticipates that the Phase IV expansion will need to be operational no later than 2028.

The City of Nashua has a well-developed and integrated solid waste management program for the residents and businesses of the City. The City promotes waste reduction, material reuse, recycling, and composting; provides for curbside single-stream recycling; and maintains a recycling center and a yard waste composting operation at the Facility. The Facility also has a landfill gas to energy facility, a residential drop-off area, and manages numerous other waste materials (e.g., recyclables, electronic waste, bulky waste, white goods, scrap metal, tires, etc.). Because not all waste materials can be reused, recycled, or

composted (e.g., MSW, C&D, asbestos, contaminated soil), the City needs a secure disposal facility.

A key provision of the Solid Waste permit was that the Secure Landfill provided at least 20 years of disposal capacity and that the City expand its recycling efforts. As noted above, the Secure Landfill will provide more than 20 years of disposal capacity and the City has a robust recycling program. Considering the upcoming end of service life of the Secure Landfill, the Phase IV expansion is a benefit to the City residents and business and does not place a burden on other waste disposal locations in the State of New Hampshire. The proposed Phase IV expansion would provide the City with an estimated 30 years of new disposal capacity.

The remainder of this document provides the required demonstration of public benefit of the continued operation of double-lined disposal areas at the Facility.

2.0 WASTE GENERATION

At present, the City estimates an upper end MSW generation rate of approximately 80,000 tons per year. Based on reports to the NHDES, and as summarized in the table below, waste generation in Nashua, which appears to be tied to economic conditions, has been relatively steady for the past few years at between 67,000 and 68,000 tons per year, despite increases in housing units and population. We note that even with a decrease of approximately 5,000 tons of MSW in 2020, most likely due to the COVID-19 pandemic, material diversion increased in 2020.

Year	Population ¹ (estimate)	Waste Generation Projection ² (tons)	MSW Landfilled (tons)	Materials Diverted (tons)	Percent Diversion ³
2017	89,246	94,467	67,925	7,292	28.1
2018	89,663	94,908	67,135	6,750	29.3
2019	90,080	95,350	67,669	6,178	29.0
2020	90,323	95,607	62,354	6,824	34.8

Notes:

1. Population estimate from <https://worldpopulationreview.com/us-cities/nashua-nh-population/>
2. Waste generation projection calculated based on the product of the population estimate times the 5.8 pounds of waste generated per person per day (based on data from NHDES 2019 Biennial Solid Waste Report, see Footnote 1), times 365 days, divided by 2000 pounds per ton.
3. Percent diversion was calculated as the difference in the waste generation projection and the MSW landfilled, divided by the waste generation projection, times 100.

As noted above, the City recycling and waste diversion initiatives reduce the volume of materials disposed of in the Secure Landfill. To the degree practical, recyclables, electronics, tires, white goods, textiles, batteries, digital media (CDs, DVDs, VHS tapes, etc.), and other materials are diverted from the landfill and managed by appropriate and permitted means. The City also hosts and participates in regional household hazardous waste collection events, which are held several times a year. In 2020, 40% of the participants in the collection events were from Nashua and a total of 129,965 pounds of household hazardous wastes were

diverted from the waste stream. By hosting this event, the City assists neighboring communities in the Nashua Regional Solid Waste Management District (Mont Vernon, Amherst, Milford, Brookline, Hollis, Merrimack, Litchfield, Hudson, Windham, and Pelham) increase their waste diversion efforts. The City intends to continue these important initiatives to extend the life expectancy of the disposal resource provided by the Secure Landfill and reduce the toxicity of the waste stream.

3.0 CONFORMANCE WITH RSA 149-M:11, III (b)

RSA 149-M:11, III (b) requires a proposed facility to assist the state in achieving the implementation of the hierarchy and goals under RSA 149-M:2 and RSA 149-M:3.

RSA 149-M:2 (effective July 20, 1999) established statewide waste reduction goal (i.e., waste diversion from landfills and incinerators) of 40% by year 2000. RSA 149-M:3 endorses the following waste management hierarchy:

- I. Source reduction.
- II. Recycling and reuse.
- III. Composting.
- IV. Waste-to-energy technologies (including incineration).
- IV. Incineration without resource recovery.
- V. Landfilling.

The NHDES *Biennial Solid Waste Report*, dated October 2019, concluded that the status of the 40% diversion goal could not be adequately assessed based on lack of resources and data. This report further concludes that the original intent of the goal has been obscured and it is unclear what the goal intends to measure or how it should be defined. Therefore, the City cannot accurately gauge our diversion efforts relative to this expired and undefined waste reduction goal.

However, the City, through its well-developed and managed integrated solid waste management program, actively seeks to reduce the amount of waste disposed of at the Facility. According to scale data from 2017, 2018, 2019, and 2020, (see table in Section 2.0) the City's waste diversion rate is estimated to be between 20 and 34 percent. The City believes that the actual diversion rate is on the higher side of these values due to the fact that:

- The unit weight of recycles has been on a decreasing trend as manufactures are reducing the amount of materials used;
- Actions taken by businesses and residents to reduce their overall generation of waste is not measured;
- Reuse of materials; and
- The City sold approximately 10,000, 96-gallon dedicated recycling toters to Nashua residents since 2009. The toters are picked up curbside and allow for increased

residential recycling volumes. The toters are offered as an option to the two 18-gallon bins the City issues to eligible households.

Despite the current difficulties in the recycling markets due to the China National Sword policy, the City has maintained its recycling programs with no reductions in service. The City has absorbed the increased costs for the recycling program and continues to encourage residents and businesses to reuse and recycle over landfilling. The City has also taken steps to increase the value of recyclable materials collected in Nashua. These include increased public outreach and education on how to recycle right, and investment in the construction of a canopy over the recycling storage area to keep the materials dry.

The waste diversion and disposal methods (recycling and landfilling) employed by the City are currently the best available practices in solid waste management in New Hampshire. The proposed Phase IV expansion, along with the existing recycling and waste diversion programs, will continue to provide a safe and economical solution to the waste disposal needs of the City of Nashua.

The City of Nashua, through its operations and activities at the Facility, assists the State towards its waste reduction and diversion goals. As previously noted, the City maintains a robust recycling and composting operations and promotes material reuse. The City does not own or operate a waste-to-energy facility or other incinerator, nor is there one within the City limits. However, there is a landfill gas-to-energy operation at the Facility that is fueled by the decomposition gases extracted from the closed, unlined MSW landfill and the Secure Landfill. The landfill-gas-to energy plant has a total generating capacity of 2.4 megawatts, which is enough energy to power approximately 1500 homes. Landfill gas generated by the proposed Phase IV expansion would continue to supply this facility well into the future.

While listed last in the waste management hierarchy, landfills are a necessary and required component for the disposal of waste that cannot be safely or economically managed in other ways. The City, through its Facility operations, takes proactive steps to preserve disposal capacity by using alternate daily cover (ADC) materials to replace virgin soil daily cover when appropriate. The City currently uses approved ADC materials from several sources and plans to continue to use ADC materials as sources become approved, and its use is effective. ADC materials included:

- Natural soil;
- Street wastes (catch basin debris, roadside ditch soils, street sweepings, and asphalt grindings)
- Wood chips;
- Compost pursuant to Env-Sw 1503.10;
- Bottom ash from wood fired boilers (NHDES Certified Waste Derived Product No. 10);
- Synthetic tarps (Tarpomatic);
- Construction/demolition (C/D) fines mixed with soil;

- C/D residuals mixed with soil (Certified Waste Derived Product No. 6);
- Non-hazardous, low level contaminated soil; and
- Aggregate for Construction Made with Crushed glass (Certified Waste-Derived Product No. 11).

The operating the Secure Landfill also provides a safe disposal location for asbestos waste generated in Nashua. This is an important resource considering Nashua has a large number of asbestos disposal sites that may be subject to future remediation.

Another important consideration is that the existing Secure Landfill and proposed Phase IV expansion provide the City with the resources necessary to efficiently manage large amounts of waste that may be generated by natural disasters or catastrophic storm events. This would also relieve stress on other disposal facilities in the state in cleaning up and disposing of disaster debris.

The City is aware of currently proposed legislation in House Bill 413 that would redefine the waste diversion goal in RSA 149-M:2 to a solid waste disposal reduction goal. The bill also proposes the formation of a Solid Waste Working Group to be made up of representatives from business, industry, and government. The goal of this group is to provide long range planning, develop guidance, and make recommendations, among other things, in regard to solid waste disposal and the reduction of solid waste generated in New Hampshire. The bill acknowledges that solid waste disposal capacity in New Hampshire is rapidly diminishing to the detriment and expense of the state's citizens, municipalities, and businesses. It also directs the NHDES to develop rules for composting and update the state's Solid Waste Plan.

The proposed waste reduction goals in HB 413 call for a 25% reduction in waste disposal by 2030, and 40% by 2050, based on waste quantities recorded in 2018. In 2018, 67,135 tons of waste were landfilled in Nashua (see table in Section 2.0). The City's waste disposal quantities would have to be reduced by nearly 17,000 tons by 2030, and 27,000 tons by 2050 to meet the proposed waste disposal reduction goals. The City's current solid waste management program was detailed above. Additional efforts to reduce waste disposal beyond the existing program may be developed and implemented, subject to approval by the City's Board of Public Works and Board of Alderman. These include, but are not limited to, diverting C/D waste from Nashua to recycling facilities and implementing mandatory recycling for Nashua businesses and residents. Also, assuming HB 413 is passed by the legislature and signed by the Governor, the City looks forward to future guidance and recommendations from the Solid Waste Working Group that could be implemented to further reduce waste disposal in Nashua.

Any future reduction of waste generated and disposed in Nashua would result in preserving disposal capacity and extending the life of the proposed Phase IV expansion thereby, assisting the State in achieving its waste disposal reduction goals.

4.0 CONFORMANCE WITH RSA 149-M:11, III (c)

The State of New Hampshire Solid Waste Plan, dated April 2003 addresses five goals to achieve safe, environmentally sound, and economically viable management of solid waste. The goals and the City's response to each are listed below.

1. Reduce the volume of the waste stream:

As presented above, the City operates a comprehensive integrated solid waste management program for the residents and businesses of Nashua. This program, which promotes and prioritizes recycling and reuse over landfilling, has allowed the City to extend the projected life of the existing Phases I/II/III approximately 7 years beyond the permit required life span of 20 years. The Facility also provides for secure disposal of asbestos waste generated in Nashua and uses approved ADCs that have no other disposal or diversion options.

2. Reduce the toxicity of the waste stream;

As presented above, the City participates in an annual regional household hazardous waste collection program, and collects and recycles other potentially toxic materials, such as electronics, batteries, used oil, automotive anti-freeze, mercury containing devices, and fluorescent light bulbs.

3. Maximize diversion of residential and commercial/industrial solid wastes;

As presented above, the City operates a robust recycling program for residents, which includes curbside, single-stream recycling collection, the option for residents to use large, 96-gallon dedicated recycling totes, and provides a recycling drop-off location at the Four Hills facility. The City has maintained its recycling program despite the China National Sword policy and has absorbed the associated costs without any reduction in service.

4. Assure disposal capacity for New Hampshire; and

The proposed Phase IV expansion will provide up to 30 years of disposal capacity for the residents and businesses of the City of Nashua only and will not add to the State's projected capacity shortfall.

5. Assure that solid waste management activities are conducted in a manner protective of human health and the environment.

The proposed Phase IV expansion will be a double-lined landfill designed, constructed, and operated in accordance with all applicable local, state, and federal rules and statutes. The City has nearly 20 years of experience operating a permitted, lined landfill (Phase I/II/III Secure Landfill Expansion), and has a trained, experienced staff with a focus on environmental protection and compliance.

5.0 SUMMARY

The Phase IV expansion provides the provides a substantial public benefit City and the State of New Hampshire by allowing the City to continue to serve it residents and businesses with a safe and economical MSW disposal location well into the future. The solid waste management operations at the Facility will continue to comply with application statues and regulations and will work toward fulfilling the objectives of the State Solid Waste Management Plan and the proposed solid waste disposal reduction goals described in HB 413.

Comment #24

Revised Additional Information – Application for Waiver

**Additional Information
Application for Waiver
Four Hills Landfill – Phase IV
Permit No. DES-SW-SP-95-002**

The information below is provided in the order referenced in the Application for Waiver form.

Section V. Reason for Requesting the Waiver

This Application for Waiver is associated with the proposed Phase IV Secure Landfill Expansion (Phase IV expansion) that includes the construction of a new double-lined disposal area at the City of Nashua's Four Hills Landfill (Facility). The Phase IV expansion will be located between the closed, unlined municipal solid waste (MSW) landfill and the lined active disposal area Phases I and II. The Phase IV expansion project includes the construction of liner, leachate collection and conveyance, landfill gas (LFG), and stormwater management systems design in accordance with the New Hampshire Solid Waste Rules (Rules or Env-Sw). The Phase IV expansion project will secure approximately 30 years of additional safe and efficient solid waste disposal capacity for the City.

The Phase IV expansion was designed as double-lined facility in accordance with Env-Sw 805.05. The Phase IV expansion requires construction of new liner and leachate collection systems over the existing closed, unlined MSW landfill (herein referred to as the "overlay area") [pursuant to Env-Sw 805.17(a)(2)] and over the area between the closed, unlined MSW landfill and the lined Phases I and II (herein referred to as the "base area").

The portion of the Phase IV expansion over Phases I and II is considered a vertical expansion over a permitted, lined disposal area [see Env-Sw 805.17(a)(1)] and, as such, there is no need to construct additional liner or leachate collection systems over this area. However, because Phases I and II were permitted in 1995 and constructed in 2003 and 2009, respectively, with liner penetrations as part of their leachate collection system, at the request of the New Hampshire Department of Environmental Services, Waste Management Division, this Application for Waiver addresses the continued use of Phases I and II during landfilling in Phase IV because the Phases I and II liner system does not specifically meet the requirements of Env-Sw 805.05(j), which became effective in 2014.

When originally permitted, Phases I and II complied with the requirements of the Rules in force at that time. The Phase IV expansion does not include a liner penetration nor does it alter or impact the design, performance, or operation of the Phases I and II liner system or the existing liner penetration. Furthermore, the existing liner system is compliant with current standards for leak detection and groundwater monitoring, and there are no indications of an issue related to the existing penetration.

Applying the Env-Sw 805.05(j) requirement to the existing Phases I and II because of the proposed Phase IV expansion would result in a hardship to the City for the following reasons:

- Prohibiting the vertical expansion component of the Phase IV expansion overall Phase I and II would drastically reduce the disposal capacity making the Phase IV expansion economically infeasible.
- Requiring the construction of an additional double liner system over the existing Phases I and II area, which is a permitted, double-lined facility that otherwise meets current standards, is considered an unnecessary use of resources and City funding and also would reduce the disposal capacity of Phase IV, the combination of which would make the Phase IV expansion economically infeasible.
- Requiring a modification to the constructed and filled Phases I and II would result in removing hundreds of thousands of tons of landfilled solid waste to access and modify the existing, well-functioning leachate management system. Excavation of the landfilled solid waste would result in a lengthy project that would: (i) expose construction workers to unnecessary health and safety risks; (ii) expose nearby residents to odors; (iii) impact the daily operations of the landfill; (iv) potentially damage the existing, well-functioning liner and leachate collection system; and (v) reduce the disposal capacity of the facility. The expense of such an undertaking is considered economically infeasible.

As part of the Phase IV expansion, the City proposes to continue to place waste in Phases I and II as addressed in the Phase IV Type-I-A Application for a Solid Waste Management Facility. By doing so, the City will continue to provide its residents and businesses with a safe and cost effective municipal solid waste disposal resource for years to come.

Waste placement in Phases I and II associated with the Phase IV expansion does not involve placing additional waste vertically over the liner penetration and as such there is no additional waste loading over the penetration area. Furthermore, the function of the leachate collection and removal system in Phase I will continue as designed and permitted, which includes monitoring of leachate head in the penetration area. In summary, there will be no additional stresses to the penetration area due to waste loading or leachate management; therefore, there is no need for an alternate procedure, method, or activity.

Section VI. Proposed Alternate Procedure, Method, or Activity

Because of the reasons stated in Section V of this Application for Wavier, the City does not propose alternate procedure, method, or activity because the waste to be placed in Phases I and II associated with the Phase IV expansion will not detrimentally impact the performance of the existing liner and leachate collection systems. Rather, the City will continue its normal operation of the facility which includes leachate head monitoring in Phase I as well as groundwater monitoring.

Section VIII. Demonstration of Criteria

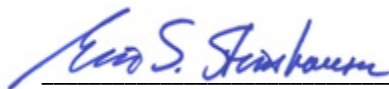
Granting a waiver from Env-Sw 805.05(j) for the Phase IV expansion complies with the criteria of Env-Sw 202.04 because exemption from complying with the rule will:

- Not result in an adverse effect to the environment or natural resources of the state, public health or to public safety because the vertical expansion will be located on a well-functioning, permitted double-lined landfill that otherwise meets the requirements of the Rules;
- Not result in an impact on abutting properties that is more significant than that which would result from complying with the rule because there is no change to the established setbacks; and
- Be in keeping with the intent and purpose of the rule being waived because there will be no change to the current operation of Phases I and II nor will there be a detrimentally impact to the performance of the existing liner and leachate collection systems.

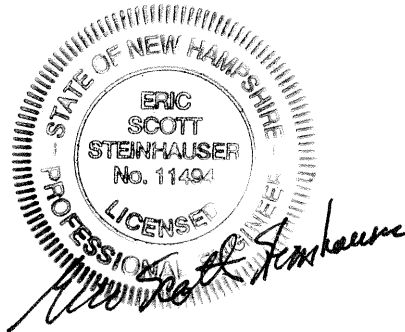
Also, strict compliance with Env-Sw 805.05(j) will provide no benefit to the public and will cause an operational or economic hardship to the applicant and may cause a health and environmental impact to workers, nearby residents, and/or the environment as noted in the responses to Sections V and VI above.

Closing

The contents of this Application for Waiver were prepared under the direction of Eric S. Steinhauser, a New Hampshire licensed Professional Engineer experienced in solid waste facility design. The information presented herein meets the requirements of the New Hampshire Solid Waste Rules (Env-Sw 800) and are consistent with the current state of practice in the solid waste industry in New Hampshire.



Eric S. Steinhauser, PE, CPESC, CPSWQ



7/12/2021

Date

Comment #25

Certified Mail Receipt



THE CITY OF NASHUA

Division of Public Works

Solid Waste Department

"The Gate City"

Nashua Regional Solid Waste Management District
30 Temple Street, Suite 310
Nashua, NH 03060

June 10, 2020
File No. 3066.11

Re: Four Hills Landfill
Nashua, New Hampshire
Type I-A Permit Modification
DES-SW-SP-95-002

To Whom it May Concern:

The purpose of this correspondence is to notify you that The City of Nashua (City) filed a Type I-A permit modification application with the New Hampshire Department of Environmental Services (NHDES) on July 17, 2020. This application is being filed to obtain permit approval for the proposed Phase IV expansion at the Four Hills Landfill located at 840 West Hollis Street in Nashua, New Hampshire.

The facility, and the land where it is located, is owned and operated by the City's Department of Public Works. This notice is being provided in accordance with the RSA 149-M and the NHDES Solid Waste Rules.

This project is proposed to be constructed on the Four Hills Landfill property between two existing landfill units. The type of material managed, and the operation of the facility, are not proposed to change as part of this permit modification. Only waste generated within the City of Nashua is accepted at the facility including municipal solid waste, construction and demolition debris, and special non-hazardous wastes that are approved by NHDES. The project will add about 3.9 million cubic yards of capacity and extend the facility's site life by approximately 30 years.

Copies of this permit application will be available for review at the Four Hills Landfill office building, City of Nashua Town Hall, and at the NHDES office located at 29 Hazen Drive in Concord, New Hampshire. Appointments to review the application will be made with the City Solid Waste Department (603-589-3410), the City Clerk's Office (603-589-3010), or the NHDES Public Information & Permitting Office (603-271-2919) to review a hard copy of the permit application.

As part of this application, the City of Nashua is required to inform you of the basic steps that will be involved in the processing of this permit application. Upon receipt of this application, the NHDES will review its contents and determine whether it is complete and that it contains all the information required for their approval. If the application is complete, a technical review will then be made to determine whether the proposed activity meets all application requirements of the New Hampshire Solid Waste Rules. If it is decided that the application satisfies these requirements, then it will be approved, and the permit will be issued. A public hearing on this application is required

and will be scheduled upon completion of the technical review. Please refer to the enclosed application flow chart.

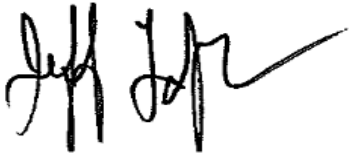
Included with the Type I-A permit modification is an Application for Waiver specific to Env-Sw 805.05(j).

Information regarding this application may be obtained by calling Ms. Jaime Colby, P.E., NHDES Permit Engineer, at (603) 271-5185, Jaime.Colby@des.nh.gov, or by writing to her at the following address:

NH Department of Environmental Services
Waste Management Division
PO Box 95
Concord, NH 03301

If you have any questions or comments regarding the application, please contact me at (603) 589-3410 or LafleurJ@nashuanh.gov. You may also contact Ms. Jamie Colby, P.E. at the NHDES, 29 Hazen Drive, Concord, New Hampshire 03301.

Very truly yours,
The City of Nashua



Jeffrey Lafleur
Superintendent of Solid Waste

Copies to: Jaime Colby – NHDES
Lisa Fauteux – City of Nashua
Kerry Converse – City of Nashua
Eddie Galvin – Sanborn, Head & Associates, Inc.

Enclosure: Permit Application Flow Chart
Type I-A Permit Application for Solid Waste Management Facility

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<p>1. Article Addressed to: Nashua Regional Solid Waste Management District 30 Temple Street, Suite 310 Nashua, NH 03060</p>	<p>3. Service Type</p> <p><input type="checkbox"/> Adult Signature <input type="checkbox"/> Priority Mail Express®</p> <p><input type="checkbox"/> Adult Signature Restricted Delivery <input type="checkbox"/> Registered Mail™</p> <p><input type="checkbox"/> Certified Mail® <input type="checkbox"/> Registered Mail Restricted Delivery</p> <p><input type="checkbox"/> Certified Mail Restricted Delivery <input type="checkbox"/> Return Receipt for Merchandise</p> <p><input type="checkbox"/> Collect on Delivery <input type="checkbox"/> Signature Confirmation™</p> <p><input type="checkbox"/> Collect on Delivery Restricted Delivery <input type="checkbox"/> Signature Confirmation Restricted Delivery</p> <p><input type="checkbox"/> Insured Mail <input type="checkbox"/> Restricted Delivery</p> <p><input type="checkbox"/> Mail-Restricted Delivery (0)</p>
<p>2. Article Number (Transfer from service label) 7020 0090 0001 1004 7519</p>	<p>Barcode: 9590 9402 5942 0062 9171 17</p>

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