
Soil Management



DARTMOUTH

Table of Contents

Section 1 – Purpose	3
Section 2 - Background	3
Section 3 – Regulatory Requirements	3
Section 4 – Project Planning	5
Section 5 – Soil Sampling	6
Section 6 – Soil Excavation	7
Section 7 – Soil Stockpile Management	9
Section 8 – Stormwater Management at Construction Sites	11
Section 9 – Soil Reuse	11
Section 10 – Importation of Soil	12
Section 11 – Transportation and Disposal of Soil	12
Section 12 – Training and Document Review	13
Figure 1: Soil Management and Disposal Flowchart	14
Appendix A: Soil Management Summary	15

Section 1 – Purpose

This document outlines the general requirements for soil management on properties owned by Dartmouth College when excavation or soil removal is planned¹. Minor soil management activities² are not subject to this guidance unless evidence of contamination is observed during work. The intended audience for this document is Dartmouth project managers, facility managers, and Facilities, Operations, and Management (FO&M) employees who manage soil. The term soil management refers to excavation, stockpiling, reuse, transportation, disposal, and importation of soil to and from Dartmouth's property. Typically, soil management is associated with construction, renovation, utility upgrades, or landscaping improvements. This guidance aims to develop and maintain a consistent soil management decision framework and procedures to assist soil excavation/handling projects across the campus. While this document is specific to New Hampshire's soil regulations, projects in Vermont involving soil management would adhere to the equivalent Vermont regulations.

Section 2 - Background

Contaminants can be present in the environment from a wide variety of sources and transportation methods, including anthropogenic sources (for example, pesticide application, fires, chemical spills, or leaking oil tanks), natural sources (such as naturally occurring arsenic), air deposition (from stack emissions or general atmospheric deposition), releases to water (such as aquatic oil spills), or other sources.

The soil management process assists in identifying and managing regulated environmental contaminants to limit potential environmental and human exposures and unintended environmental liability.

Section 3 – Regulatory Requirements

In New Hampshire, off-site soil management is regulated by Env-Or 600 Contaminated Site Management and Env-Sw 903 Contaminated Soils. The New Hampshire Department of Environmental Services (NHDES) oversees and enforces these regulations. This policy is intended to meet the requirements of Env-Or 600 and Env-Or 900, as applicable. The Contaminated Site Management Regulations have specific response processes if contaminants are released to ground surfaces or water. This document does not include those requirements or processes; an environmental consultant can be engaged to provide guidance if there is a release to grounds surface or water.

¹ This guidance document applies if the project involves Dig Safe notification and soil excavation; other scenarios can be evaluated on a case-by-case basis.

² Minor soil management activities are generally understood to be those that do not require removing soil from Dartmouth's property, and are limited in size and scope, such as a limited landscaping activity.

According to Env-Or 602.07, contamination “means the presence of any regulated contaminant, as defined herein, other than naturally occurring substances at naturally occurring or background levels, in soil, groundwater, soil gas, air, sediment, surface water, construction/excavation debris, or any other material.”

Chemical testing of soil is required only if Dartmouth knows or suspects that a release or discharge of a regulated contaminant to land, groundwater, or surface water has occurred in or near the excavation area. Evidence of a release can include documentation or knowledge of a prior release³, visual and olfactory observations of conditions that could indicate contamination, or debris consistent with a discharge. Chemical testing is not required when there is no reason to suspect that a release has occurred.

Soil Remediation Standards (SRS) have been established by NHDES for certain contaminants, and, under most circumstances, soil with contaminant concentrations above the SRS has well-defined remediation and reporting requirements set forth in the Env-Or 600 regulations.

By regulation, soil exceeding the SRS must be appropriately managed either onsite (with some restrictions and approval from NHDES) or disposed of in a regulated facility permitted to accept such wastes, such as a landfill. Stockpiling this soil onsite is limited to four months, after which it must be moved to a regulated facility permitted to receive it.

A soil management flowchart is provided in Figure 1.

Generally, there are three categories of soil that may be generated on Dartmouth properties:

Unrestricted Reuse Soils

Unrestricted reuse soils are those soils where the available information does not indicate the potential for contamination, and visual and olfactory observation of the excavation and stockpiling of soil does not show evidence of contamination.

Dartmouth has documentation of naturally occurring arsenic concentrations above SRS. If soils are native and the presence of arsenic is due solely to naturally occurring background, the soils do not need to be managed in accordance with Env-Or 600 Contaminated Sites management or Env-Sw 903 Contaminated Soil Management.

Unrestricted reuse soils may be reused on campus or taken off-campus by the earthwork contractor for reuse at non-Dartmouth properties.

³ Reasonable steps will be taken to review information about a potential release or discharge of a regulated contaminant, including, as appropriate, review of internal spill response records, internal current and historic underground and aboveground storage tank records, and the NHDES One Stop website.

Limited Reuse Soils

Limited reuse soils are those soils with contaminants exhibiting either natural background or anthropogenic background (i.e. historic fill) conditions consistent with Env-Or 602.03 or soil with concentrations of contaminants below SRS.

Limited reuse soils may be reused on campus or disposed of at a facility permitted to accept the soil, such as a regulated landfill. Permitted facilities may have specific requirements regarding sampling frequency and chemical analytes. These soils may have specific placement requirements to be reused on campus, such as being placed at a sufficient depth so that people will not easily contact them.

Regulated Soils

Regulated soils are those with contaminant concentrations above the SRS. Identification of such contaminated soils must be reported to NHDES in accordance with the notice requirements in Env-Or 600 and must be disposed of at a facility permitted to accept the soil. Permitted facilities may have specific requirements regarding sampling frequency and chemical analytes. These soils may not be reused on or off campus without NHDES approval. EHS is responsible for reviewing documentation before it is submitted to NHDES.

Section 4 – Project Planning

Dartmouth project managers, facility managers, and FO&M employees should consider how soil will be managed as part of the project and budget early in the project process. EHS should be engaged early to assist with this process and to share any existing information about site conditions.

Project planning includes a review of information regarding the project, including, but not limited to:

- the approximate volume of soil to be removed from the site;
- the potential for soil and/or groundwater contamination at the site based on historical information and site use;
- identification of potential contaminant transport pathways during excavation and management of soil where contaminants are potentially present;
- the selection and design of procedures to control contaminant transport and exposure to contaminants; and
- communication about soil management requirements to architects, engineers, contractors, and construction managers.

Dartmouth project managers, facility managers, and FO&M employees should assess whether there is evidence of a release in the project area. The results of this assessment will determine the next step. EHS can assist with this assessment, if needed.

No Evidence of a Release

If there is no evidence of a release in the project area, soil sampling is not required unless an environmental condition is discovered during the project (such as an underground storage tank, chemical odor, soil staining, etc.). If an environmental condition is discovered, EHS should be informed, and an environmental consultant must be involved to help determine appropriate next steps.

Evidence of a Release

If there is evidence of a release in the project area, Dartmouth project managers, facility managers, and FO&M employees should plan to engage with an environmental consultant for soil sampling and/or soil related guidance. The environmental consultant's budget could include the following tasks:

- review of historic environmental reports, information regarding current and past site use, and building materials known or assumed to be present at the site;
- review of design or construction drawings;
- pre-characterization sampling with a data summary report;
- disposal facility data summary letters;
- review of the contractor or construction manager's proposed soil budget; and
- development of soil management specifications.

Project managers should be aware that additional scope may be required if an environmental condition is discovered, which could result in schedule and budget impacts. Furthermore, some environmental conditions may drive the need for specialty contractors, more costly soil disposal facilities, and additional oversight by the environmental consultant.

Section 5 – Soil Sampling

Soil sampling is only required when there is evidence of a release, or another reason to suspect a release has occurred. If there is no evidence of a release, the soil is considered unrestricted reuse soil. This section provides additional information on how soil sampling should be conducted, if required.

Soil sampling should occur once the approximate volume of soil to be disposed of from the site is well understood and can be collected before excavation starts (as part of a test pit or drilling activities) or from soil stockpiled during or after excavation.

Soil with evidence of a release must be chemically sampled in accordance with the Env-Or 600 regulations for contaminated site management and for disposal analytes as required by receiving facilities⁴. For in-situ soil sampling, at least one sample shall be

⁴ Soil receiving facilities can require different chemical analyses for soils but typically include semi-volatile organic compounds, volatile organic compounds, total petroleum hydrocarbons, herbicides, pesticides, polychlorinated biphenyls, metals, ignitability, reactivity, and general chemistry (such as pH).

collected for every 200 tons destined for off-site treatment or disposal up to 2,000 tons, plus at least one composite sample for every 500 tons above the initial 2,000 tons. For stockpiled soil, at least one composite sample shall be collected for every 200 tons destined for off-site treatment or disposal up to 2,000 tons, plus at least one composite sample for every 500 tons above the initial 2,000 tons⁵. Some disposal facilities may require a higher sampling frequency and specific chemical testing requirements. The environmental consultant will determine the best locations for soil borings based on the lateral and vertical extent of the excavation and the number of soil samples needed to meet the required sampling frequency.

Soil-receiving facilities can only accept soil data that is less than a year old. Depending on schedule and/or other constraints, combining environmental sampling with geotechnical assessment, if needed, may be cost-effective.

Soil sampling may only occur on Dartmouth College property. Permission will need to be obtained before sampling other properties, including but not limited to roadways owned by others.

Soil sampling results should be incorporated into the project documents. Depending on the results, the environmental consultant may recommend that language regarding excavation management be incorporated into the project specifications. Pre-characterization sampling results must also be provided to EHS.

Depending on the initial soil sampling results, additional work may be needed. This work may include:

- additional soil sampling to delineate areas where elevated concentrations of certain chemicals were observed;
- reporting to NHDES about elevated concentrations of chemicals;
- additional soil sampling (and potentially excavation or remediation) outside of the project scope to address any discovered contamination; or
- expanding the scope of the environmental consultant to include soil management or oversight.

Section 6 – Soil Excavation

All excavations must be managed to prevent sediment transport in stormwater, surface water, or air, regardless of the presence or absence of potential contaminants. Engineering controls, such as erosion controls and tarps, must be used as appropriate, and should be incorporated into the specifications for the project. Section 8 has additional information about stormwater controls.

⁵ For soil stockpiles, a composite sample consists of at least 8 discrete samples collected from the stockpile and comingled.

Oversight of soil excavation

Conditions where observation of excavation by an environmental professional is not required include:

- Excavation at sites or areas within sites where the available environmental, chemical, and/or historic use information does not indicate the potential presence of contaminated soil; or
- Excavation where soil chemical composition is consistent throughout the excavation area (meaning the soil will not need to be segregated).

When an environmental professional is not needed to observe/document excavation, the earthwork contractor is responsible for documenting soil excavation and management activities. This requirement should be incorporated into the earthwork specification.

Observation by the environmental consultant is required when chemical testing indicates soils at the project site have chemical concentrations both below and above the SRS (i.e., they involve two or more categories of soil, one of which is regulated soil) and thus require careful segregation. This observation includes visual and olfactory observation of soil for staining, odors, and debris⁶.

The person observing soil management must document activities in a daily field report (DFR), including the location and volume excavated, results of field screening, samples collected, and any issues regarding compliance with this soil management guidance.

Monitoring soil excavation

Where the available information indicates the potential presence of soil with concentrations of contaminants above the SRS, monitoring⁷ of soil excavation and soil stockpiling by an environmental or soil consultant may be required based on the information collected regarding the potential presence of contaminants. Field screening of soil quality may be required to direct excavation and management (segregation) of soil with concentrations of chemicals above the SRS or when the available information indicates contaminants are potentially present. Basic requirements for field screening may include visual and olfactory observation of soil or use of a photoionization detector (PID) to screen for total volatile organic compounds (VOCs) when VOCs are potentially present. Additionally, field screening methods may be required to evaluate if potential soil contamination may be present or for personal health and safety.

Quantitative dust monitoring may be required if contamination is anticipated in excavated soil. Depending on the potential contaminant, appropriate health and safety procedures (e.g., use of personal protective equipment) may be necessary. The environmental consultant will make these determinations

⁶ Soil receiving facilities expect soil excavation to be monitored to ensure the soil being loaded for disposal at their facility is consistent with the soil proposed for disposal at their facility.

⁷ Observation of soil refers to visual assessment only. Monitoring of soil typically involves using additional equipment, such as a dust meter, a photoionization detector, or a 4-gas meter. Monitoring typically occurs when contamination is believed to be present.

Additional sampling

Confirmatory soil and/or groundwater sampling and laboratory analysis may be required when contamination is present. If this is required, the environmental consultant will develop a sampling and analysis plan, document the conditions encountered, and characterize soil or groundwater for disposal or treatment.

Where soil contamination is identified above the SRS, it may be necessary to excavate beyond what is required for the project to remove contaminated soil, as required by regulation. This will require careful planning to minimize cost and construction delays. Where appropriate, the collection of soil samples for characterization and use in pre-planning prior to construction should be performed. Methods of in situ treatment or stabilization may be considered in these cases; however, plans for in situ treatment or stabilization must be developed by an environmental consultant and approved by Dartmouth EHS and may require approval by the New Hampshire Department of Environmental Services (NHDES). Dartmouth EHS is responsible for all communication with NHDES related to contaminated soil excavation and disposal.

If an unexpected condition is observed

Sometimes during soil excavation an unexpected environmental condition is observed, such as the presence of an underground storage tank, chemical odor, debris, or soil staining. Dartmouth EHS should be informed immediately if these conditions are observed so that any required notice may be made and the condition can be investigated and documented. Observing staining, odors, or debris in soils previously classified as unrestricted or limited-reuse soils may indicate soil sampling is needed and an environmental consultant should be engaged.

Section 7 – Soil Stockpile Management

Regardless of size, stockpiled soil must be managed to prevent sediment transport in stormwater, surface water, or air, as required by the site's erosion control plan or stormwater pollution prevention plan. Section 8 has additional details about stormwater controls. This requirement should be incorporated into the project specifications regardless of the presence or absence of potential contaminants. Erosion controls, berms, and tarps could be used as appropriate to meet this requirement.

The following general requirements for soil stockpiles represent best management practices. Additional practices may be required by specific permits or regulations.

- Locate stockpiles a minimum of 50 feet away from concentrated flows of stormwater, drainage courses, and inlets.
- Protect stockpiles from stormwater run-on using temporary perimeter measures such as diversions, berms, sandbags, or other approved practice.
- Stockpiles should be surrounded by sediment barriers to prevent migration of material beyond the immediate confines of the stockpiles.

- Implement wind erosion control practices as appropriate on stockpiled material.
- Soil and erosion control measures should be regularly inspected and adjusted immediately to respond to ongoing construction operations. Delivery of new materials or removal of materials may require modification and updates to protective measures.
- Inactive soil stockpiles should be covered with anchored tarps or protected with soil stabilization measures (temporary seed and mulch or other temporary stabilization practice) and temporary perimeter sediment barriers at all times. Note: inactive is defined as no material added to or removed from the stockpile within 14 days.
- Soil stockpiles must have signage displaying the following information:
 - Soil description;
 - Project manager's name and contact information;
 - Date brought to site; and
 - Date planned for removal from site.

Where the space available or sequence of work limits the ability to manage soil stockpiles on site, soil may be temporarily stockpiled at a suitable location on the Dartmouth College Campus, subject to the following conditions:

- The soil cannot contain visible oil-coated or liquid petroleum products or have a petroleum or chemical-like odor.
- The soil cannot be a regulated soil.
- Transportation of the soil must conform to all New Hampshire (NH) and US Department of Transportation (US DOT) requirements.
- Engineering controls must be in place to prevent soil transport or erosion.

Regulated Soils

Stockpiled soil with concentrations of contaminants above the SRS must be managed in a manner that prevents the soil from coming in contact with the ground, precipitation, and storm water run-off, and covered with a chemically compatible impermeable material. This intent could be met by storing soil on an impermeable surface with appropriate cover to prevent precipitation infiltration, such as polyethylene sheeting (minimum 6-mil). Alternatively, contaminated soil can be placed within a covered, watertight roll-off container or other container capable of preventing the migration of contaminants from the contaminated soil. The environmental consultant and contractor should be able to provide guidance on which method is more cost-effective for the project.

Soil stockpiles must be inspected at least weekly or as required by the stormwater pollution prevention plan, and conditions must be documented in a DFR. The condition of erosion controls and evidence of uncontrolled soil transport must be documented in the DFR. This documentation can be done by the environmental consultant or the contractor, as specified in the contract documents.

Stockpiled soil with concentrations of contaminants above the SRS or which otherwise

exhibits clear and objective evidence of a release must remain near the initial site of generation until it either is disposed of at a facility (such as a landfill) permitted to accept the material or reused at the site of generation (pending NHDES approval).

Section 8 – Stormwater Management at Construction Sites

Where applicable, stormwater must be managed during soil disturbing activities in accordance with the EPA's Construction General Permit (CGP), the NHDES rules for Alteration of Terrain (AOT) as described in ENV-WQ 1500, the OR-600 rules, and/or the New Hampshire Stormwater Manual. A brief summary of applicability is below.

The EPA's National Pollutant Discharge Elimination System (NPDES) program is designed to reduce water pollutants by requiring controls for point source discharges of pollutants into waters of the United States. The Construction General Permit is a NPDES permit which authorizes the discharge of stormwater from construction sites which disturb one acre or more of land, and from smaller sites which are part of a larger, common plan of development. This permit requires operators of such construction sites to implement stormwater controls and develop a Stormwater Pollution Prevention Plan (SWPPP) to minimize the amount of sediment and other pollutants associated with construction sites from being discharged in stormwater runoff. A consultant should be engaged to review if a CGP is required.

The AOT regulations apply to projects engaging in dredging, excavating, placing fill, mining, transporting forest products, or undertaking construction in or on the borders of surface waters of the state; or projects which significantly alter the characteristics of the terrain in such a manner as to impede the natural runoff or create an unnatural runoff. A permit is required for projects intended to disturb more than 100,000 square feet of contiguous terrain (50,000 square feet, if any portion of the project is within a protected shoreland). Disturbances greater than 2,500 square feet, over terrain with grades of greater than 25%, may also require these permits. It is up to the Project Manager to determine if their project is required to have a permit, as described in ENV-WQ 1503.

The ENV-OR 600 rules apply to soils that are known or determined, following investigation, to be contaminated, or that have been chemically tested and have regulated contaminants above the SRS.

The New Hampshire Stormwater Manual describes best practices for stormwater management in New Hampshire, and guidance on stormwater design criteria required by various local, state, and federal regulations and permitting programs.

Section 9 – Soil Reuse

Unrestricted reuse soils may be reused on campus or taken off-campus by the earthwork contractor for reuse at non-Dartmouth properties.

Limited reuse soils may be reused on campus at locations with similar soil profiles. These soils may have specific placement requirements to be reused on campus, such as at a sufficient depth that people will not easily contact these soils.

Regulated soils are those soils with concentrations of contaminants above the SRS. Regulated soils may not be reused any location unless it is part of an NHDES-approved Remedial Action Plan.

Section 10 – Importation of Soil

Soil imported to Dartmouth's campus must be free of contaminants above the SRS. Specifications involving imported soil (such as earthwork, fill, or landscaping specifications) should include this requirement. A statement from contractors certifying that imported materials are free of contaminants about the SRS is sufficient to meet this requirement.

Section 11 – Transportation and Disposal of Soil

Unrestricted reuse soils may be transported off-campus by the earthwork contractor or their designee for reuse at non-Dartmouth properties.

Limited reuse soils may be transported on campus for reuse by the earthwork contractor or their designee at a location with similar soil profiles. Limited reuse soils can be disposed of at a permitted facility such as a landfill.

Regulated soil must be disposed of at a permitted facility permitted to receive it.

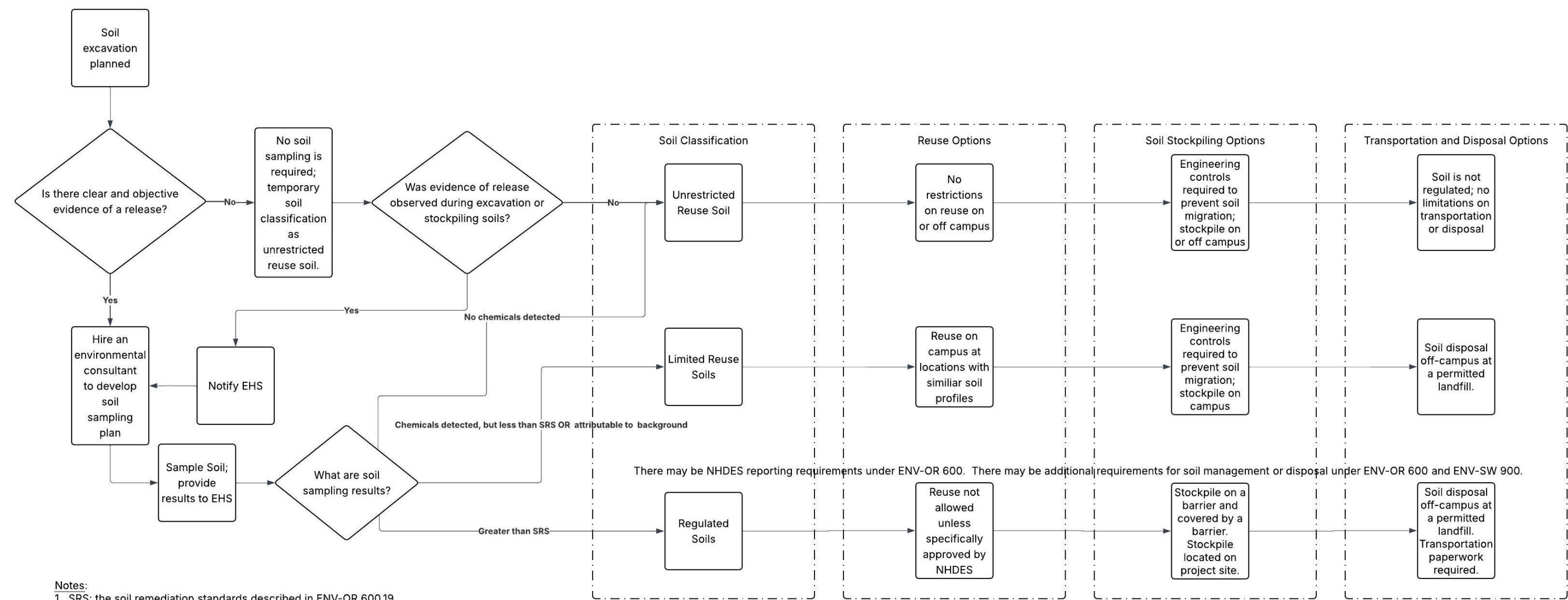
The process of disposing of soil at a permitted facility should start several months in advance. Typically, the earthwork contractor or soil transporter proposes the facility. The environmental consultant prepares a letter/application to the facility describing the site, the chemical composition of the soil to be disposed of at the facility, the volume of soil to be disposed of at the facility, and any other pertinent information. If a soil profile is required by the facility, the environmental consultant will prepare the profile, and Dartmouth EHS will sign it. After reviewing the letter, the facility will decide whether to accept the soil. It may be prudent for the earthwork contractor or transporter to identify several facilities, as some facilities may place limits on the volume of soil they can accept each day.

Transportation of all soil must conform to all NH and US DOT requirements. Regulated soil should be shipped to disposal facilities by transport companies that hold all appropriate licenses, and using appropriate paperwork, including, but not limited to, Bills of Lading, Non-Hazardous Waste Manifests, and/or Hazardous Waste Manifests. EHS is responsible for reviewing and signing shipping paperwork for regulated soils. Soil disposed of as hazardous waste may be subject to additional requirements.

Section 12 – Training and Document Review

EHS is responsible for maintaining this document, reviewing it annually, and updating it whenever regulations change. EHS is also responsible for developing training for Dartmouth employees whose work includes soil management. Appendix A provides a high-level summary of the topics to be covered in this training.

Figure 1: Soil Management and Disposal Flowchart



Appendix A: Soil Management Summary

- Contaminated soil is regulated by the New Hampshire Department of Environmental Services (NHDES). Soil Remediation Standards (SRS) have been established by NHDES, and under most circumstances, soil with concentrations of contaminants above the SRS has well-defined remediation and reporting requirements.
- At the start of a project, there should be an assessment of whether there is clear and objective evidence of a release. This can take the form of a document review to determine if there are any known releases; as soil is excavated or stockpiles, evidence of a release could be observed. Observations of a release can be visual (such as sheen or odd color), olfactory (chemical or other strong odor), the presence of debris, or the presence of an other environmental concern (such as an underground storage tank).
- Chemical testing is required when there is clear and objective evidence of a release.
- The types of soil present on Dartmouth's campus are:
 - Unrestricted reuse: soil that either has no objective evidence of a release or has chemical testing that show no chemical concentrations above the SRS. Unrestricted reuse soils may be reused on campus or taken off-campus by the earthwork contractor for reuse at non-Dartmouth properties.
 - Limited reuse soils: soil with contaminants exhibiting either natural background or anthropogenic background (i.e. historic fill) conditions consistent with Env-Or 602.03 or soil with concentrations of contaminants below SRS. Limited Reuse Soils may be reused on campus or disposed of at a facility permitted to accept the soil, such as a regulated landfill. These soils may have specific placement requirements to be reused on campus, such as at a sufficient depth that people will not easily contact these soils.
 - Regulated soils: soils with concentrations of contaminants above the SRS. These soils must be disposed of at a facility permitted to accept the soil, such as a regulated landfill. These soils may not be reused on or off campus without NHDES approval.
- Soil without a clear and objective evidence of release is considered unrestricted reuse soil.
- Soil with clear and objective evidence of release must be chemically tested to determine what contaminants are present. An environmental consultant must be hired to develop the sampling plan and to collect the soil samples. (See more information below about the role of an environmental consultant.)
 - The chemical testing will determine what types of soil are present at the project site.
- Soil excavation must be managed to prevent soil migration off the project site.
- Soil excavation must be documented in a daily field report.
- Soil stockpiling of regulated soils have specific requirements to prevent contamination migration and cannot be moved from the project site until they are

disposed.

- Stockpiles of soil should be labeled with the following information:
 - Soil description;
 - Project manager's name and contact information;
 - Date brought to site; and
 - Date planned for removal from site.
- Soil imported to Dartmouth Campus must not contain concentrations above the SRS.
- Environmental consultants should be hired by Dartmouth to:
 - Provide guidance on potential budget or schedule impacts based on known or assumed environmental conditions.
 - Chemically sample soil.
 - Provide a report describing soil conditions and identifying soil management options and provide plans and specifications as appropriate.
 - Write and submit reports to NHDES when a reportable condition is identified. EHS will need to review these reports before they are submitted to NHDES.
 - Monitor soil excavation activities when both contaminated and non-contaminated soil is present.
 - Develop soil facility acceptance packages, which include:
 - A letter drafted to the receiving facility from the environmental consultant describing the soil to be disposed of at their facility, including any relevant site history and attaching the relevant soil disposal data.
 - A special waste profile (the facility's document) filled out with the following information:
 - Generator: Dartmouth College, 37 Dewey Field Rd., HB 6216, Hanover NH 03755. Contact name: Jason Angell, Associate Director, Jason.M.Angell@dartmouth.edu , (603) 646-1794
 - Bill to: Group or individual managing the project
 - Consultant: Information about who is writing the letter report/collected the samples
 - Delivery and Quantity: information from the company delivering the soil to the facility
 - Waste Stream Information: filled out by the consultant
 - Generator Certification: Jason Angell is the only person currently authorized to sign a soil profile on behalf of Dartmouth
 - Note: The package must be complete (both the letter and the waste profile) must be complete and filled out for Jason to be able to properly review.