Dufresne Pond

Dredge Feasibility Analysis

Granby, Massachusetts

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TABLE OF CONTENTS

<u>Section</u> <u>Page</u>

TABLES

FIGURES

APPENDICES

1.0 Introduction

Dufresne Pond is an impounded (dammed) 6.2-acre waterbody located within the Connecticut River Valley Watershed in Granby, Massachusetts. The pond drains northward through an unnamed tributary that discharges into Ingraham Brook (Figure 1). Dufresne Pond has a relatively small watershed (155-acres) that is mainly located south of the pond. The pond is located entirely within the Dufresne Recreational Area and is surrounded by maintained open fields and forested areas with walking paths along much of its shoreline. In addition to the maintained fields and recreational areas, the Dufresne Pond watershed area also consists of forested uplands and a few pocket wetlands. The pond itself is used for recreational activities including fishing, picnicking along its shores and wildlife viewing.

As with any impounded waterbody, the ponded area behind the dam accumulates sediment over time by trapping materials that are delivered to the pond from its watershed. In addition, the growth and decay of plants and other organic material will build up within the pond over time. As a result, Dufresne Pond's open water habitat value has been impacted and its ability to support larger bodied overwintering fish populations is perceived to have been reduced due to shallower water depths and lower oxygen availability under winter ice cover.

In addition, the pond experiences significant aquatic plant growth across its entire surface area each summer. Although the plants are native, the growth is excessive and leave little or no open water habitat which results in stagnant water conditions and reduced oxygen levels during overnight hours as the plants consume oxygen. The ongoing and accelerated eutrophication is likely to be impacting the fish community by stunting growth and has the potential to result in periodic fish kills during extended warm weather periods.

Summer Conditions at Dufresne Pond with Extensive Weed Growth

The Town of Granby (The Town) contracted with TRC Environmental (TRC) to assess the condition of the sediment within the pond and evaluate in-pond restoration options that will provide The Town with a long-term solution for restoring the pond's depth. Our assessment was comprised of an evaluation of the pond's current bathymetry (water depth), sediment depth, and sediment quality. The assessment's primary goal was to determine the volume and quality of sediment contained within the pond and offer feasible options for restoration of depth.

Dredging is a reliable approach for reversing the effects of pond eutrophication and restoring ecological and aesthetic characteristics of a waterbody since it restores water depths as well as removes the nutrient-rich sediments that have accumulated over time. Since Dufresne Pond is an impounded pond, the dredging program should be designed to not only remove the accumulated sediment, but also to consider deepening the pond to a depth that will preclude the growth of rooted plants from the areas of the pond that are envisioned to remain weed free. If dredging were only to target accumulated muck, the pond would soon accumulate a new layer of muck, although less thick, that would be sufficient to support the root systems for many aquatic weeds.

Ultimately, the goal for the Town's restoration of the pond is understood to be to retain the pond's historic character as an open water amenity within the town while also maintaining the site's aesthetic appeal and value as an ecological resource and open water habitat.

2.0 Bathymetry and Sediment Quality Analysis

On March 22, 2023, TRC assessed water depth, sediment depth and conducted sediment sampling at Dufresne Pond. The goal of this analysis was to quantify the volume of soft sediment accumulated within the pond and determine the soft sediment's physical and chemical properties. Methodologies are summarized below.

2.1 Sediment Depth and Water Bathymetry

TRC sampled a total of 75 locations along fifteen transects within Dufresne Pond (Figure 2). At each GPS recorded location, a tile probe was held to the pond bottom to determine water depth and then pushed into the soft sediment until refusal was achieved. Refusal is the point where the sediment probe could no longer be pushed deeper through the soft sediments and typically occurred in Dufresne Pond because of coarse sand or gravel material underlying the soft sediment. The distance between the sediment-water interface and first refusal was recorded as the soft sediment depth.

The average water depth measured across Dufresne Pond was approximately 2.2 feet, with a maximum water depth of 6.0 feet recorded near the dam (Figure 3). The pond's total water volume is approximately 4.5 million gallons. Sediment depth averaged approximately 4.1 feet, with the greatest sediment depth measured by TRC being approximately 10 feet (Figure 4). Soft sediment volume was calculated to be approximately 41,000 cubic yards. Hard sediments underlying the measured soft sediments were described as coarse materials including sand and gravel.

2.2 Sediment Sampling

Sediment Core Sample from Dufresne Pond. A thick (>1 foot) layer of accumulated organic material (e.g., roots and dead plants) makes up the top layer of soft sediment.

Sediment coring and sampling was conducted based on Massachusetts Department of Environmental Protection (MassDEP) requirements for the 401 Water Quality Certificate application, a requirement for any dredging project. On March 22, 2023, TRC obtained six sediment cores in total from the pond. Two cores were obtained from the southeastern portion of the pond and composited into a sediment sample "SC-1". Two cores were obtained from the central portion of the pond and composited into a sediment sample "SC-2". Two cores were obtained from the northern portion of the pond and composited into a sediment sample "SC-3". GPS was used to navigate to the six sample locations, and a peat corer was then used to collect sediment core samples in 2-foot intervals at each location until the full depth of soft sediment was assessed. Each 2-foot sediment core sample was photographed and described for its grain size composition, color, moisture content, and organic content (see Appendix A for core photos). Volatile organic compounds (VOCs) samples were extracted from intact single cores to minimize volatilization into the atmosphere. The remainder of the sample material was then placed in a stainless-steel bowl for compositing. Sediment coring locations are shown on Figure 4.

The three sediment samples obtained were transferred under chain-of-custody to Phoenix Environmental Laboratory (Phoenix) of Manchester, Connecticut for chemical and physical analysis. Each sample was analyzed for total organic carbon (TOC), VOCs, extractable petroleum hydrocarbons (EPH) with target polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and metals including arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc.

2.3 Sediment Testing Results

Laboratory results for chemical analysis are reported in Table 1, appended to the end of this report. Copies of the laboratory reports are included in Appendix B. Laboratory results for grain size analysis are reported in Table 2 below.

Table 2. Grain Size Analysis of Sediment Samples - Dufresne Pond March 22, 2023

Analysis	Unit	Sediment Core 1	Sediment Core 2	Sediment Core 3
Gravel	%	0	0	0
Sand	%	15.3	9.1	6.5
Silt & Clay	%	84.7	90.9	93.5

Sediment chemistry data was compared to the Massachusetts Contingency Plan (MCP) Method 1 Risk Characterization Soil Standards and Draft Interim Guidance Document for Beneficial Use Determination (BUD). These standards consider the potential risk of harm resulting from direct exposure to the hazardous constituent of the soil and provides information to assist in preparing an application for beneficial use in accordance with the Beneficial Use Regulations, respectively. The MCP defines different soil and groundwater types generally based on the exposure pathway. To be conservative, the lowest concentration level (S-1/GW-1) was used to evaluate the Dufresne Pond sediment quality data. It should be noted that the MCP Method 1 standards apply to upland soils and thus are not directly applicable to the pond sediments. However, the MCP Method 1 standards would apply to any sediment dredged from the pond intended for upland reuse or placement.

Sediment chemistry results were found to be below MCP Method 1 standards for sediment samples SC-1 and S-2. The SC-3 sample was found to have a concentration of Methyl Ethyl Ketone slightly above the MCP Method 1 standards (Table 1). Concentrations were above BUD standards for chromium for all three samples and above nickel for SC-1. Copper, lead and zinc were detected in all samples but at concentrations below both S-1/GW-1 and BUD standards.

The Methyl ethyl ketone detected in sample SC-3 may require additional sediment sampling to determine concentrations within the pond's sediments. Methyl ethyl ketone is used as a solvent and common in many industries. It is used in the manufacture of synthetic rubber, paraffin wax, and to make other chemical products (Center of Disease Control, 2023). It is unclear how the methyl ethyl ketone was introduced into Dufresne Pond as determining this was beyond the scope of our study.

Chromium (Cr) can exist in several oxidation states, but the two most stable forms Cr(III), known as trivalent, and Cr(VI), known also as hexavalent, have completely different biochemical characteristics. Cr(III) has properties that make it less mobile in soils and thus less leachable and less bioavailable and thus less toxic if it were to be placed in an upland location. Additional testing will be needed to determine which form of chromium is present in Dufresne Pond and this will likely be required by MassDEP as part of the permitting of a future dredge project.

The nickel value that was found to exceed the BUD standard was only 4.3 with the standard being set at 4.0. Given that this was only slightly higher than the standard at one location, it is expected that additional sampling would be able to show that the levels of nickel in the pond sediments do not pose a risk for upland disposal.

All other analytes were not detected above the laboratory's reporting limits. Several reported analytes were below the laboratory reporting limit; however, the reporting limit is greater than the S-1/GW-1 and/or BUD standard. Those analytes are identified in Table 1 and, depending on the selected restoration plan, specialized testing may be required in the future to confirm that concentrations are below the S-1/GW-1 and/or BUD standards.

As the sediment was found to be relatively clean, it is likely that there will be few, if any, restrictions on its reuse, although additional testing will be required before a final determination can be made. The implications of chromium, lead, and nickel in the samples will be determined through the MassDEP's 401 Water Quality Certification process. As part of the permitting process, the state will likely require additional sampling to better understand the extent of the contamination, and this will determine where the sediment may be reused or disposed. Any material that is not suitable for beneficial upland reuse would need to either be trucked to a site for disposal (e.g., to a lined landfill) or could potentially be amended with clean material from within the pond (such as by over dredging into underlying clean sands) to mitigate the concentrations to suitable levels prior to removal from the pond. It is also possible that the in-pond restoration plan could be designed to isolate and leave the contaminated material within the pond to avoid excessive costs for removing and disposing of contaminated material.

Grain size analysis (Table 2) shows that the soft sediment within the pond is primarily silt and clay sized particles (between 84.7, 90.9 and 93.5%) with sand making up the balance of the material. This material will dewater very slowly with natural evaporation and will likely require some form of advanced treatment such as geotextiles, belt filter presses, or possibly the use of coagulants to extract moisture in a manner sufficient to allow for construction to proceed at an economical pace.

3.0 Dredging Feasibility

There are a range of options for controlling excessive aquatic weed growth in ponds, including the use of herbicides or mechanical removal (e.g., harvesting or hydro-raking), however, dredging is the only approach that truly restores a pond that has filled with sediment and organic muck and is experiencing advanced stages of eutrophication. Although chemical or physical removal of aquatic weeds would achieve the goal of improving aquatic habitat and restoring open water conditions, these approaches would need to be conducted annually at a cost of between $6,000 to $20,000 depending upon the approach taken.

The dredging of Dufresne Pond will be a more expensive restoration effort, but dredging is the only approach that will restore depth to the waterbody and achieve many years of improved conditions. If the sole purpose of the dredging is explicitly for the management of rooted aquatic vegetation or improving water quality, then dredging will not be the most economical solution.

Dredging can work as a plant control technique when either a light limitation is imposed through increased water depth or when enough soft sediment is removed to reveal a less hospitable substrate for plant growth (e.g. hard bottom or other nutrient-poor substrate). Light limitation through increased depth is possible at Dufresne Pond, particularly since water clarity is already relatively low. A target depth of at least 10 feet of water depth would be needed to achieve light limitation in the pond, although dredging to the underlying hard bottom in other areas may also achieve the desired result.

Dredging can also help to improve water quality, but typically only after the source/s of nutrients to the pond are reduced to prevent rapid accumulations of new organics. It should also be confirmed that the waterbody is in fact impacted by nutrient rich sediments that are contributing disproportionately to the system’s nutrient load through internal recycling. Currently, it is unknown if this is an issue for Dufresne Pond.

3.1 Resource Areas

Although there are wetland resources associated with Dufresne Pond that would be affected by the restoration work envisioned, the impacts associated with this work are expected to be limited primarily to potential construction access areas within or near the pond margin (Land Under Water and Bank resource areas) and the end result will be an improvement to the overall wetland habitat and ecological value of the system.

There is an approximately 1.38-acre shrub swamp, located at the south end of the pond and a 6.85-acre deciduous wooded swamp to the north of the pond. Additionally, the hydrologically connected stream at the north end of the pond, south of East State Street, would need to be considered as part of any dredging impacts (Figure 5). These areas will need to be avoided if dredging is pursued and impacts could be minimized if dredging were to occur during winter (as dry dredging) or at any time if hydraulic dredging were the methodology used.

TRC has reviewed the Natural Heritage and Endangered Species Program (NHESP) database and found no portion of the pond or the Dufresne Recreational Area to be mapped as habitat associated with rare, threatened, or endangered species (Figure 6).

3.2 Potential Dredging Volume

The entire volume of soft sediment in Dufresne Pond was calculated to be about 41,000 cubic yards (cy) based on our assessment. If all soft sediment material were removed from the full 6.2 acres, the pond would nearly triple its water volume and its average depth. With an expected cost of about $50/cy, a project of this scale would cost just over $2 million to design, permit and complete. For planning purposes, an estimate for the project on the order of $2.25 million should be budgeted.

A similar, but slightly less aggressive project could also be envisioned to still achieve the Town's goals but at a lower cost. By taking into consideration some no-dredge buffer areas along the pond shoreline that are expected to be required by regulators to ensure preservation of muck for overwintering of frogs, turtles, and other species we can reduce the anticipated dredge volume. In addition, a reduction in how far south within the pond the dredging were to occur could reduce the total volume of sediment to be removed and thus save additional cost while also maintaining the very healthy wetland that is associated with the pond. Such an approach is presented as one potential conceptual design for the project (Figure 7).

The concept design presented in Figure 7 yields a total volume of sediment to be removed of just over 31,600 cubic yards while still achieving the same targeted dredge depth as a full pond dredging. This reduced dredge volume approach focuses work on the areas within the central portion of the pond to achieve desired depth contours and resulting light limitation to combat plant growth while leaving most immediate shoreline areas untouched. The reduced dredge volume will also increase the likelihood that a location of disposal/reuse of the sediment can be accomplished within the boundaries of the Dufresne Recreational Area.

Given that the reduced dredge volume approach presented in Figure 7 achieves the goals for pond restoration at a lower cost, we have assumed that this approach to restoration would be the preferred option by the Town in our analysis below.

3.3 Dredge Methodologies

Hydraulic Dredging: Hydraulic dredging is performed using a large pump on a floating vessel, where a cutterhead and pumping system are used to suck up sediment and water in a slurry form. Hydraulic dredging can thus be performed while water levels are maintained throughout the pond. Hydraulic dredging will minimize some of the ecological impacts to the pond and adjacent wetland resources while maintaining water levels for some recreational uses throughout the dredging process.

Geotubes Used for Dewatering at Onondaga Pond, NY.

Hydraulic dredging can save costs compared to conventional dry dredging for very large projects, but is often less economical than dry dredging for smaller scale projects. This is because hydraulic dredging will require a larger and more sophisticated containment area to dewater the slurry/sediment as it is removed from the pond. This approach may prove to be more cost effective and less environmentally disruptive at Dufresne Pond. However, the added water volume that is pumped to create the slurry will need to be extracted from the sediment prior to its ultimate disposal at any on site location.

When space is limited, the use of advanced dewatering techniques such as the use of Geotubes (geotextile fabric for dewatering) or a belt-filter press machine can be used to dewater the sediments, but these add additional costs over traditional dewatering containment. All external sediment dewatering options will require land adjacent to or in the vicinity (within 2 miles with pumping) of the pond to be made available for the dewatering process. An area of at least 2 acres would be required for using Geotubes, while the use of a belt filter press system would require less than 1 acre of space. The flat cleared area along the east side of the pond and south of the entrance road could easily accommodate the dewatering space needed for hydraulic dredging.

Belt Filter Press with Dewatered Sediment

Locating a potential upland site for the reuse or disposal of the dredged sediment was beyond the scope of this study but would be a logical next step toward the implementation of a dredging project for Dufresne Pond. Assuming 31,600 cubic yards are to be dredged, this would result in a nearly 20-foot increase in elevation, at least initially, to a disposal location confined to just 2 acres and likely more than a 10-foot increase after additional drying and compaction over time as the site settles. Given this, the town should realistically need to plan for a sediment disposal location within the park boundary that is on the order of 4 acres which would result in an initial 10-foot pile height that would settle to a more reasonable 5-foot elevational increase after drying and compaction over time.

A hydraulic dredging project at Dufresne Pond would cost on the order of $2.2 million for design, permitting and construction with an assumed average cost of $70/cy. These costs can vary based on the type of dredging equipment employed which will be based partly on permitting, partly on cost, and partly on the availability and proximity of space for dewatering and disposal of the sediment.

Dry Dredging: Removal of the sediment from the pond using conventional equipment such as excavators can also be a very successful approach to dredging Dufresne Pond. Dry dredging will require the pond to be drained and the water in-flows to be managed throughout the dredging process to avoid reflooding of the pond while the work is underway. This approach is quite disruptive to fish and wildlife and in many cases the permitting authorities will require fish and/or turtles to be collected and relocated during the initial draining of the system to reduce potential impacts. This can add costs if done with professional help but can also be achieved through the use of local volunteers in some instances.

For Dufresne Pond, there is only a very small amount of gravity drainage possible at the pond (perhaps less than 2 feet) that can be achieved through manipulation of the flashboards at the pond outlet. Therefore, the full pond drainage would need to be achieved through actively pumping water from the pond to the downstream. This active pumping would be an added cost to the dry dredge approach and would also add additional noise from the operation of pumps and/or generators that would need to be operated consistently to maintain low water levels. The rate of pumping would also be limited by the ability of the small outlet channel to drain downstream. Although a hydraulic analysis was not performed as part of this study, it appears that this area does not have the necessary slope to allow for the water to quickly move away from the immediate pond outlet without causing flooding. It may be possible to run the pump discharge hose further down the stream channel to a point where increased slopes allow for the discharge to flow more freely and avoid flooding outside of the existing channel.

Dry dredging will have significant impacts to aquatic life, has the potential to result in introduction of non-native plant species, and would significantly impact the ability to use the pond for several months during construction.

A major benefit of dry dredging is that there a many more local contractors available that can perform this work since the equipment is not as specialized as the equipment used for hydraulic dredging. This results in potentially more bids on the project and this often translates into a lower cost per cubic yard for the project. Costs for dry dredging are typically in the range of $40 to $50 per cubic yard in Massachusetts, although these costs vary widely with economic conditions, seasonal timing, project size and project location. Based on these considerations, dry dredging of 31,600 cy from the pond (Figure 7) could be completed for a cost on the order of $1.25 million (at $40/cy), a savings of about $950,000 over the cost for a similar scale hydraulic dredging project.

If cost is the primary factor in determining which approach to pursue, then dry dredging is the clear winner. If other factors, such as impacts to the pond wildlife or the need to maintain water levels for recreation are higher priorities, then dry dredging is not the recommended method for Dufresne Pond.

Dry dredging has a potential advantage of also finding a local contractor that may be willing to take on the work at a very competitive rate in instances where the contractor is willing to do the work at significantly reduced rates to obtain the material, which has some value. This also may allow for a reduced on-site storage or disposal area being needed since the material would ultimately be trucked away for use elsewhere.

3.4 Sediment Disposal Options

The sediment results (Table 1) show that the sediment is suitable for placement at a lined landfill with none of the landfill criteria exceeded. In fact, the material could be placed at a suitable non-landfill upland site if one could be found closer to the pond since the only exceedance of the Beneficial Use Determination (BUD) standard was for chromium, and nickel.

Confirming a suitable upland site was beyond the scope of this study and additional investigation may be warranted should The Town wish to proceed with dredging. Disposal of dredge material as close to the pond as possible will be the most economical regardless of dredge methodology chosen. It is also possible to use a site local to the pond for temporary dewatering and stockpiling and then transport the material to its ultimate disposal or reuse location, but this added step and need for space may increase the cost of the project and delay its completion. The material could be trucked to a town landfill, vacant land, cemetery, golf course, or other property with adequate space for the placement or reuse of the material. The greater the distance from the pond, the greater the trucking cost.

Any efforts planned would need to be included in the project's design and permitting. Permitting authorities, including MassDEP, will not issue a permit for dredging without knowing where the material will be stockpiled and ultimately reused.

In addition to the space required for the actual dewatering of the sediment (Section 3.3), an additional challenge for placing this much dredge material will be the ability to create a useable site following the placement of the material. Dredge material is relatively unstable and unsuitable for use as a base for truck access. It does not contain sufficiently large-grained sands or gravel and as such, will not provide sufficient drainage and permeability. Even once the water has been extracted through in-pond dewatering, filter presses or Geotubes, the material will need to be covered with additional sand and gravel or would need to have sand and gravel incorporated into it for it to become useful material.

The cost for obtaining 31,600 cy of clean sand to mix with the 31,600 cy of dredge material, should this be necessary, would add on the order of $300,000 to the project cost assuming a relatively local source is available. It will also be possible to over-dredge the pond to obtain coarse grained material from below the muck to reduce these costs, particularly if a dry dredging excavation method is used.

3.5 Alternatives to Dredging

Dredging is the only approach to pond restoration that increases depth, but dredging is also often used to reduce or eliminate the potential for rooted plant growth by increasing water depth beyond the limits of light penetration. Dredging can also be used to remove nutrient rich sediments that contribute to algal blooms, sediment suspension, and other negative water quality conditions. If increasing depth is the primary goal for The Town, then dredging is the most appropriate approach to restoring Dufresne Pond. If a goal is to also reduce the impact of the sediment on in-pond water quality, then it is worth considering alternatives to dredging such as nutrient inactivation and sediment inversion.

No Action

If Dufresne Pond is left unmanaged, the pond will eventually fill to the point where it will become a wetland. This will take tens to even hundreds of years but will accelerate over time. A pond that has been created by an impoundment, such as Dufresne Pond, will fill in faster than ponds with a natural outlet that allows sediment to move out of the system and therefore active management is necessary to maintain the pond and its function as open water habitat for fish, wildlife, and recreation. Given that the Town and local residents are already concerned with the amount of infilling that has occurred, the no action alternative is not expected to meet the goals of the community.

Nutrient Inactivation

Nutrient inactivation is typically used to control algae blooms and improve water clarity in ponds and ponds with low flushing rates, such as Dufresne Pond. This action targets dissolved phosphorus (the form most readily available to plants and algae) and traditionally involves the addition of alum (aluminum sulfate), iron (III) chloride, polyaluminum chloride (PAC) or similar aluminum-based compounds that bind to the phosphorus to allow it to settle into the pond sediments. Nutrient inactivation is usually conducted by applying alum directly to a pond as a single dose. Alum applied near the surface will initially strip available phosphorus from the water column as it settles to bottom of the pond. Once incorporated into bottom sediments, the alum will also bind phosphorus in the sediments, which results in long-term control of internal phosphorus recycling. Based on the slow flushing rate of the Dufresne Pond (>2 years), nutrient inactivation would be anticipated to benefit the pond for at least ten years and possibly longer if watershed phosphorus sources can also be significantly reduced.

Additional testing of the phosphorus content in the pond's water, assessment of the oxygen levels in the pond during stratification and testing of phosphorus levels in the sediment would be needed to determine whether alum is the correct solution and if so, to determine the correct alum application rate. These tests are needed to identify the actual dose of nutrient inactivation product that will be necessary to achieve meaningful reduction of phosphorus levels in Dufresne Pond and for filing the required Notice of Intents (NOIs) with the town of Granby. The cost for this initial study and permitting effort would be on the order of $35,000 while the cost for the actual alum application, if determined to be appropriate, is likely to be on the order of $100,000.

Nutrient inactivation would not increase the pond depth and would not reduce rooted plant growth within the pond, so this alternative would not meet all of the Town's goals.

Sediment Inversion

Sediment inversion, also known as reverse layering, is a process similar to dredging, but does not involve permanent removal of any sediments from the pond or alteration of average depth. During this process, clean sand is brought up from underlying sediment layers and used to bury the nutrient-laden fine sediments at the surface. The sediment inversion process is complex and requires a specially designed hydraulic jetting barge. One advantage of sediment inversion over dredging is that it does not require a federal permit (although other state and local permits would still be necessary). However, sediment inversion is a relatively new procedure that has not yet established a significant track record. Therefore, both the costs and risks associated with undertaking a sediment inversion project are likely to be higher than with proven methods such as dredging or nutrient inactivation.

For Dufresne Pond, an additional concern is that the soft organic material is underlain by both coarse sand and gravel. Although coarse sand would be ideal for sediment inversion, the gravel would not be as easily transferred from below the muck to on top of the muck. Additionally, the depth of the underlying sand and gravel would need to be of sufficient volume to provide for at least a 1.5 to 2-foot layer of material over the muck. Additional sediment coring with a vibracore system would be necessary to adequately assess the depth and extent of sandy material beneath Dufresne Pond's muck.

Sediment inversion is not a recommended approach over dredging since it does not increase depth and still carries a relatively high cost. Sediment inversion is not recommended over the use of alum for nutrient inactivation since it costs far more, and the results achieved have not been proven to be long lasting given that the technique is relatively new.

3.6 Permitting Process

A dredging project will require filing an Environmental Notification Form (ENF) with the Massachusetts Environmental Policy Act (MEPA) Office since more than 10,000 cubic yards of sediment would likely be dredged and the dredge footprint envisioned will exceed one half acre. TRC believes that a dredge project that accomplishes The Towns goals will not be able to avoid triggering the need for filing an ENF.

In addition to the ENF, the project will require a Notice of Intent (NOI) under the Massachusetts Wetlands Protection Act (WPA) from Granby to permit work within the buffer zone of the pond and below the water line. TRC believes that that project may be eligible to be permitted as an Ecological Restoration Limited Project. Taking advantage of this permitting pathway, which was introduced in the revised state wetland regulations, should provide a simpler path forward under this regulatory program.

Under current regulations, the fill or excavation of 100 cubic yards of sediment or more from the pond or disturbance of 5,000 square feet or more will require a 401 Water Quality Certification from MassDEP. Therefore, the work at Dufresne Pond will require 401 Water Quality Certification.

Section 404 of the Clean Water Act regulates the discharge of dredged, excavated, or fill material in wetlands, streams, rivers, and other waters of the U.S. The United States Army Corps of Engineers (USACE) is the federal agency authorized to issue Section 404 permits for certain activities conducted in wetlands or other U.S. waters.

Costs to prepare the required engineering design and supporting permit documents for all the above listed permits will be on the order of $75,000 with additional costs for site survey (~$20,000) at the areas where the pond would be accessed by dredge equipment and the areas for sediment dewatering and disposal.

4.0 Summary

Dredging at Dufresne Pond is feasible, however, the costs that would be required to fund such a project will be relatively large. Costs for dredging the priority area of Dufresne Pond, yielding 31,600 cy of soft sediment, along with its ultimate disposal at an onsite location would be on the order of $1.25 million assuming dry dredging with disposal on site. Costs for this approach will depend upon a range of factors, however finding a large available site in the immediate vicinity of the pond will be significant. Such a site would need to be at least 4 acres to contain the full amount of the sediment.

If dredging is believed to be a viable long-term restoration option, the next steps would be:

1. Assessment of specific scope and extent of dredge program including possible funding options.
2. Additional chemical and physical analysis of the sediments in areas targeted for dredging. One core will need to be collected specifically from the targeted dredge area for each 1,000 cubic yards of sediment proposed to be dredged. A project targeting the 31,600 cubic yards would thus require 32 sediment cores and up to 11 additional sediment samples for laboratory analysis within the proposed dredge footprint. MassDEP may be willing to reduce this sampling requirement based on this study which has shown that the material is relatively clean.
3. Development of an engineering design for submission to permitting authorities.
4. Initiation of the permitting process including an ENF filing for MEPA review, filing local Notices of Intent under the Wetlands Protection Act, filing for a Section 401 Water Quality Certificate from MassDEP, and seeking a USACE Section 404 Permit for dredging.

These four activities combined should be expected to cost about $105,000 for Dufresne Pond but are essential if dredging is to be advanced as a management option. Additional design costs would include final engineering design following the permitting process (incorporating any accepted changes resulting from these reviews) along with the development of a bid specification package for the project. Once the contractor has been selected, construction oversight by a third party engineer would also be recommended.

5.0 References

Center of Disease Control, "Methyl Ethyl Ketone" Accessed on April 4, 2023. (https://www.cdc.gov/niosh/topics/methylethylketone/default.html)

Table 1 and Figures

Table 1: Sediment Laboratory Results

Analyte	MCP[1]	BUD[2]	MA Landfill Criteria[3] Unlined	MA Landfill Criteria[3] Lined	Units	SC-1	SC-2	SC-3
Miscellaneous/Inorganics								
Percent Moisture					%	**87**	**89**	**89**
Percent Solid					%	**13**	**11**	**11**
Alkalinity-CaCO3					mg/L			
Total Organic Carbon					mg/kg	**217,000**	**256,000**	**269,000**
Metals, Total								
Arsenic, Total	20	11	40	40	mg/Kg	< 4.5	< 5.4	< 5.8
Cadmium, Total	70	0.8	30	80	mg/Kg	< 2.3	< 2.7	< 2.9
Chromium, Total	100	11	1000	1000	mg/Kg	**18.3**	**16.6**	**14.6**
Copper, Total (wet)					mg/kg	**19**	**18.6**	**11.9**
Lead, Total	200	19	1000	2000	mg/Kg	12.6	8.2	6.7
Mercury, Total	20	8.7	10	10	mg/Kg	0.06	< 0.23	< 0.22
Nickel, Total	600	7.2			mg/Kg	**8.5**	5.8	7.2
Zinc, Total	1000	280			mg/Kg	27.3	38.3	15.6
PCBs By SW8082A								
PCB-1016	*	*	*	*	mg/kg	<0.55	<0.88	<0.89
PCB-1221	*	*	*	*	mg/kg	<0.55	<0.88	<0.89
PCB-1232	*	*	*	*	mg/kg	<0.55	<0.88	<0.89
PCB-1242	*	*	*	*	mg/kg	<0.55	<0.88	<0.89
PCB-1248	*	*	*	*	mg/kg	<0.55	<0.88	<0.89
PCB-1254	*	*	*	*	mg/kg	<0.55	<0.88	<0.89
PCB-1260	*	*	*	*	mg/kg	<0.55	<0.88	<0.89
PCB-1262	*	*	*	*	mg/kg	<0.55	<0.88	<0.89
PCB-1268	*	*	*	*	mg/kg	<0.55	<0.88	<0.89
Volatiles By SW8260C								
1,1,1,2-Tetrachloroethane	0.1	0.025			mg/kg	<0.055	<0.065	<0.065
1,1,1-Trichloroethane	30	19			mg/kg	<0.055	<0.065	<0.065
1,1,2,2-Tetrachloroethane	0.005	0.005			mg/kg	< 0.033	< 0.039	< 0.039
1,1,2-Trichloroethane	0.1	0.005			mg/kg	<0.055	<0.065	<0.065
1,1-Dichloroethane	0.4	0.2			mg/kg	<0.055	<0.065	<0.065
1,1-Dichloroethene	3				mg/kg	<0.055	<0.065	<0.065
1,1-Dichloropropene					mg/kg	<0.055	<0.065	<0.065
1,2,3-Trichlorobenzene					mg/kg	<0.055	<0.065	<0.065
1,2,3-Trichloropropane					mg/kg	<0.055	<0.065	<0.065
1,2,4-Trichlorobenzene	2	0.66			mg/kg	<0.055	<0.065	<0.065
1,2,4-Trimethylbenzene					mg/kg	<0.055	<0.065	<0.065
1,2-Dibromo-3-chloropropane					mg/kg	<0.055	<0.065	<0.065
1,2-Dibromoethane	0.1				mg/kg	< 0.0055	< 0.0065	< 0.0065
1,2-Dichlorobenzene	9	0.66			mg/kg	<0.055	<0.065	<0.065
1,2-Dichloroethane	0.1	0.005			mg/kg	<0.055	<0.065	<0.065
1,2-Dichloropropane	0.1	0.005			mg/kg	<0.055	<0.065	<0.065
1,3,5-Trimethylbenzene					mg/kg	<0.055	<0.065	<0.065
1,3-Dichlorobenzene	3	0.66			mg/kg	<0.055	<0.065	<0.065
1,3-Dichloropropane					mg/kg	<0.055	<0.065	<0.065

Table 1: Sediment Laboratory Results

Analyte	MCP[1]	BUD[2]	MA Landfill Criteria[3]		Units	SC-1	SC-2	SC-3
			Unlined	Lined				
1,4-Dichlorobenzene	0.7	0.66			mg/kg	<0.055	<0.065	<0.065
2,2-Dichloropropane					mg/kg	<0.055	<0.065	<0.065
2-Chlorotoluene					mg/kg	<0.055	<0.065	<0.065
2-Hexanone					mg/kg	<0.28	<0.32	<0.33
2-Isopropyltoluene					mg/kg	<0.055	<0.065	<0.065
4-Chlorotoluene					mg/kg	<0.055	<0.065	<0.065
4-Methyl-2-pentanone	0.4				mg/kg	<0.28	<0.32	<0.33
Acetone	6	0.33			mg/kg	<2.8	<3.2	<3.3
Acrylonitrile					mg/kg	<0.055	<0.065	<0.065
Benzene	2	0.15			mg/kg	<0.055	<0.065	<0.065
Bromobenzene					mg/kg	<0.055	<0.065	<0.065
Bromochloromethane					mg/kg	<0.055	<0.065	<0.065
Bromodichloromethane	0.1	0.005			mg/kg	<0.055	<0.065	<0.065
Bromoform	0.1	0.007			mg/kg	<0.055	<0.065	<0.065
Bromomethane	0.5	0.01			mg/kg	<0.055	<0.065	<0.065
Carbon Disulfide					mg/kg	<0.055	<0.065	<0.065
Carbon tetrachloride	10	0.39			mg/kg	<0.055	<0.065	<0.065
Chlorobenzene	1	0.028			mg/kg	<0.055	<0.065	<0.065
Chloroethane					mg/kg	<0.055	<0.065	<0.065
Chloroform	0.4	0.005			mg/kg	<0.055	<0.065	<0.065
Chloromethane					mg/kg	<0.055	<0.065	<0.065
cis-1,2-Dichloroethene	0.3	0.013			mg/kg	<0.055	<0.065	<0.065
cis-1,3-Dichloropropene	0.01				mg/kg	<0.055	<0.065	<0.065
Dibromochloromethane	0.005	0.005			mg/kg	< 0.033	<0.039	<0.039
Dibromomethane					mg/kg	<0.055	<0.065	<0.065
Dichlorodifluoromethane					mg/kg	<0.055	<0.065	<0.065
Ethylbenzene	40	0.19			mg/kg	<0.055	<0.065	<0.065
Hexachlorobutadiene	6	0.3			mg/kg	<0.055	<0.065	<0.065
Isopropylbenzene					mg/kg	<0.055	<0.065	<0.065
p/m-Xylene	400	0.42			mg/kg	<0.055	<0.065	<0.065
Methyl Ethyl Ketone	4				mg/kg	< 0.33	< 0.39	**4.3**
Methyl t-butyl ether (MTBE)	0.1	0.14			mg/kg	<0.11	<0.13	<0.13
Methylene chloride	0.1				mg/kg	<0.11	<0.13	<0.13
Naphthalene	4	0.66			mg/kg	<0.055	<0.065	<0.065
n-Butylbenzene					mg/kg	<0.055	<0.065	<0.065
n-Propylbenzene					mg/kg	<0.055	<0.065	<0.065
o-Xylene	400				mg/kg	<0.055	<0.065	<0.065
p-Isopropyltoluene					mg/kg	<0.055	<0.065	<0.065
sec-Butylbenzene					mg/kg	<0.055	<0.065	<0.065
Styrene	3				mg/kg	<0.055	<0.065	<0.065
tert-Butylbenzene					mg/kg	<0.055	<0.065	<0.065
Tetrachloroethene	1				mg/kg	<0.055	<0.065	<0.065
Tetrahydrofuran (THF)					mg/kg	<0.11	<0.13	<0.13
Toluene	30	1.3			mg/kg	<0.055	<0.065	<0.065

Table 1: Sediment Laboratory Results

Analyte	MCP[1]	BUD[2]	MA Landfill Criteria[3]		Units	SC-1	SC-2	SC-3
			Unlined	Lined				
Total Xylenes					mg/kg	<0.055	<0.065	<0.065
trans-1,2-Dichloroethene	1	0.092			mg/kg	<0.055	<0.065	<0.065
trans-1,3-Dichloropropene	0.01				mg/kg	<0.055	<0.065	<0.065
trans-1,4-dichloro-2-butene					mg/kg	<0.11	<0.13	<0.13
Trichloroethene	0.3				mg/kg	<0.055	<0.065	<0.065
Trichlorofluoromethane					mg/kg	<0.055	<0.065	<0.065
Trichlorotrifluoroethane					mg/kg	<0.11	<0.13	<0.13
Vinyl chloride	0.9	0.28			mg/kg	<0.055	<0.065	<0.065
Polynuclear Aromatic HC By SW8270D								
2-Methylnaphthalene					mg/kg	<2.6	<6.1	<5.8
Acenaphthene	4	3.9			mg/kg	<2.6	<6.1	<5.8
Acenaphthylene	1	1.1			mg/kg	<2.6	<6.1	<5.8
Anthracene	1000	1000			mg/kg	<2.6	<6.1	<5.8
Benz(a)anthracene	7	3.7			mg/kg	<2.6	<6.1	<5.8
Benzo(a)pyrene	2	0.66			mg/kg	<2.6	<6.1	<5.8
Benzo(b)fluoranthene	7	3.7			mg/kg	<2.6	<6.1	<5.8
Benzo(ghi)perylene	1000	1000			mg/kg	<2.6	<6.1	<5.8
Benzo(k)fluoranthene	70	37			mg/kg	<2.6	<6.1	<5.8
Chrysene	70	370			mg/kg	<2.6	<6.1	<5.8
Dibenz(a,h)anthracene	0.7	0.66			mg/kg	<2.6	<6.1	<5.8
Fluoranthene	1000	1000			mg/kg	<2.6	<6.1	<5.8
Fluorene	1000				mg/kg	<2.6	<6.1	<5.8
Indeno(1,2,3-cd)pyrene	7	3.7			mg/kg	<2.6	<6.1	<5.8
Naphthalene	4	0.66			mg/kg	<2.6	<6.1	<5.8
Phenanthrene	10	10			mg/kg	<2.6	<6.1	<5.8
Pyrene	1000	1000			mg/kg	<2.6	<6.1	<5.8
Oxygenates & Dioxane By SW8260C (OXY)								
1,4-Dioxane	0.2				mg/kg	< 1.1	< 1.3	< 1.3
Diethyl ether					mg/kg	<0.055	< 64	< 64
Di-isopropyl ether					mg/kg	<0.055	< 64	< 64
Ethyl tert-butyl ether	30				mg/kg	<0.055	< 64	< 64
tert-amyl methyl ether					mg/kg	<0.055	< 64	< 64
MA EPH Aliphatic/Aromatic Ranges By MA EPH 5/2019								
C11-C22 Aromatics, Adjusted	1000				mg/Kg	< 500	< 600	< 600
C11-C22 Aromatics					mg/Kg	< 500	< 600	< 600
C19-C36 Aliphatics	3000				mg/Kg	< 500	< 600	< 600
C9-C18 Aliphatics	1000				mg/Kg	< 500	< 600	< 600
Total Petroleum Hydrocarbons	1000		2500	5000	mg/Kg	< 500	< 600	< 600
EPH Other PAH Target Analytes By MA EPH 5/2004								
Acenaphthylene	1	1.1			mg/kg	<2.6	<6.1	<5.8
Anthracene	1000	1000			mg/kg	<2.6	<6.1	<5.8
Benz(a)anthracene	7	3.7			mg/kg	<2.6	<6.1	<5.8
Benzo(a)pyrene	2	0.66			mg/kg	<2.6	<6.1	<5.8
Benzo(b)fluoranthene	7	3.7			mg/kg	<2.6	<6.1	<5.8

Table 1: Sediment Laboratory Results

Analyte	MCP[1]	BUD[2]	MA Landfill Criteria[3]		Units	SC-1	SC-2	SC-3
			Unlined	Lined				
Benzo(ghi)perylene	1000	1000			mg/kg	<2.6	<6.1	<5.8
Benzo(k)fluoranthene	70	37			mg/kg	<2.6	<6.1	<5.8
Chrysene	70	370			mg/kg	<2.6	<6.1	<5.8
Dibenz(a,h)anthracene	0.7	0.66			mg/kg	<2.6	<6.1	<5.8
Fluoranthene	1000	1000			mg/kg	<2.6	<6.1	<5.8
Fluorene	1000				mg/kg	<2.6	<6.1	<5.8
Indeno(1,2,3-cd)pyrene	7	3.7			mg/kg	<2.6	<6.1	<5.8
Pyrene	1000	1000			mg/kg	<2.6	<6.1	<5.8
EPH Diesel PAH Target Analytes By MA EPH 5/2004								
2-Methylnapthalene	0.7				mg/kg	<2.6	<6.1	<5.8
Acenaphthene	4	3.9			mg/kg	<2.6	<6.1	<5.8
Naphthalene	4	0.66			mg/kg	<2.6	<6.1	<5.8
Phenanthrene	10	10			mg/kg	<2.6	<6.1	<5.8

1: MADEP, 2014. Massachusetts Contingency Plan 310 CMR 40 S-1/GW-1 Criteria

2: MADEP, 2004. Draft Interim Guidance Document for Beneficial Use Determination Regulations 310 CMR 19.060

3: MADEP, 1997. Landfill Criteria per Policy # COMM-97-001, Reuse and Disposal of Contaminated Soil at Massachusetts

* Total PCBs: MCP Criteria - 2 mg/kg, BUD Guidance - 0.044 mg/kg, Landfill Criteria - < 2 mg/kg

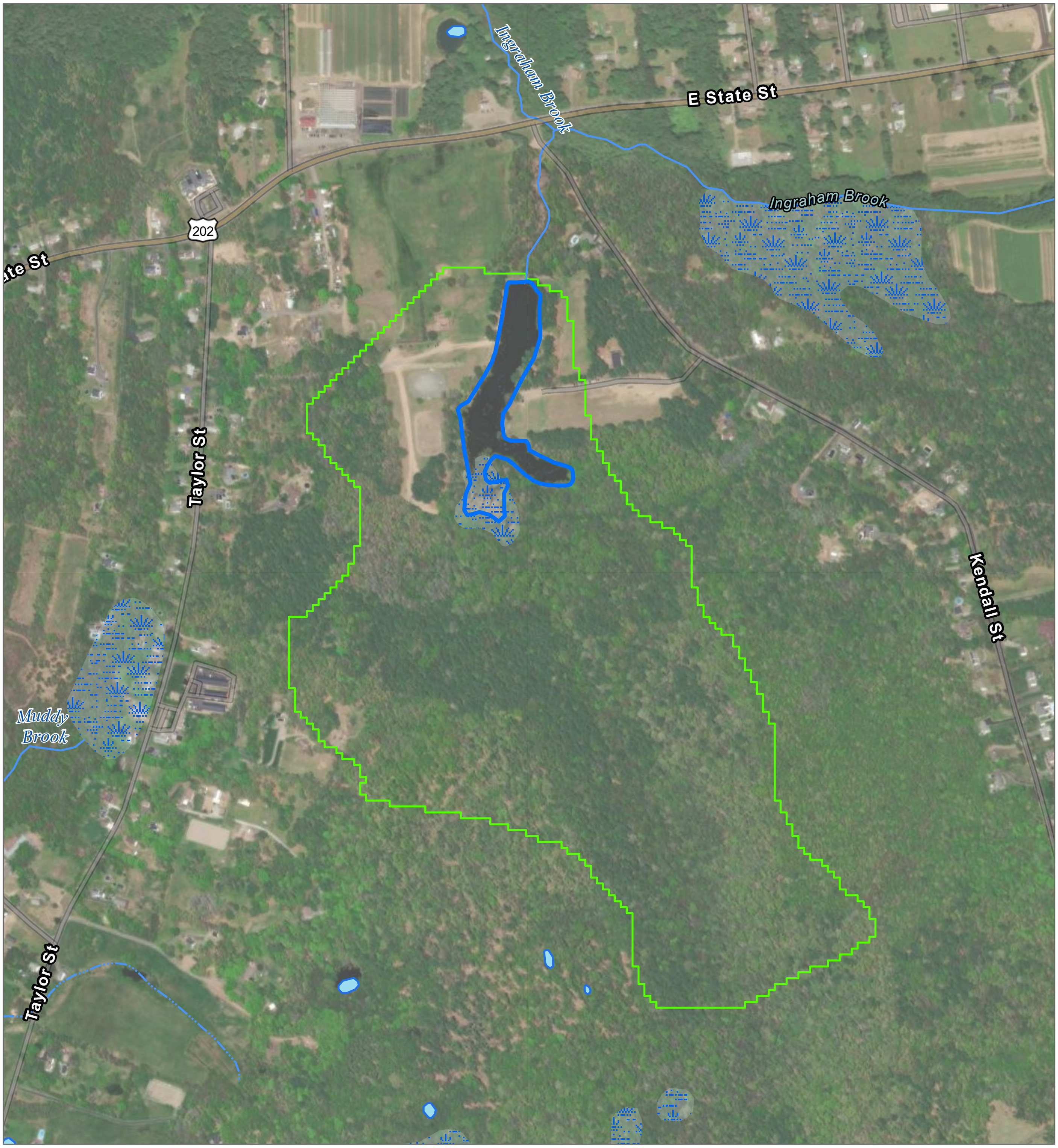
Bold concentrations exceed the laboratory reporting limit.

< = Analyte not dectected above laboratory reporting limit.

Exceedance of S-1/GW-1 Criteria

MRL above S-1/GW-1 and/or BUD Criteria

Exceedance of BUD Criteria



DUFRESNE POND

WATERSHED (155.1 ACRES)

LINEAR WATERWAYS

PERENNIAL STREAM

INTERMITTENT STREAM

OTHER WATERBODIES

POND, LAKE, OCEAN

WETLAND

N

0 400 800

FEET

1:9,600 1" = 800'

BASE MAP: ESRI WORLD IMAGERY 2021.
DATA SOURCES:
USGS, STREAMSTATS V4.13.0, MARCH 2023.
MASSGIS, MASSDEP HYDROGRAPHY (1:25000), DEC 2019.

PROJECT: **DREDGE FEASIBILITY STUDY**

DUFRESNE POND
TOWN OF GRANBY, MA

TITLE: **WATERSHED MAP**

DRAWN BY:	T. LATHAM	PROJ. NO.:	510516.0000.0000
CHECKED BY:	S. DEHAINAUT	**FIGURE 1**	
APPROVED BY:	J. TREACY		
DATE:	JUNE 2023		

TRC
10 HEMINGWAY DRIVE
2ND FLOOR
EAST PROVIDENCE, RI 02915
PHONE: 401.330.1236

FILE: DUFRESNE_POND_510516

COORDINATE SYSTEM: NAD 1983 STATEPLANE MASSACHUSETTS MAINLAND FIPS 2001; MAP ROTATION: 0
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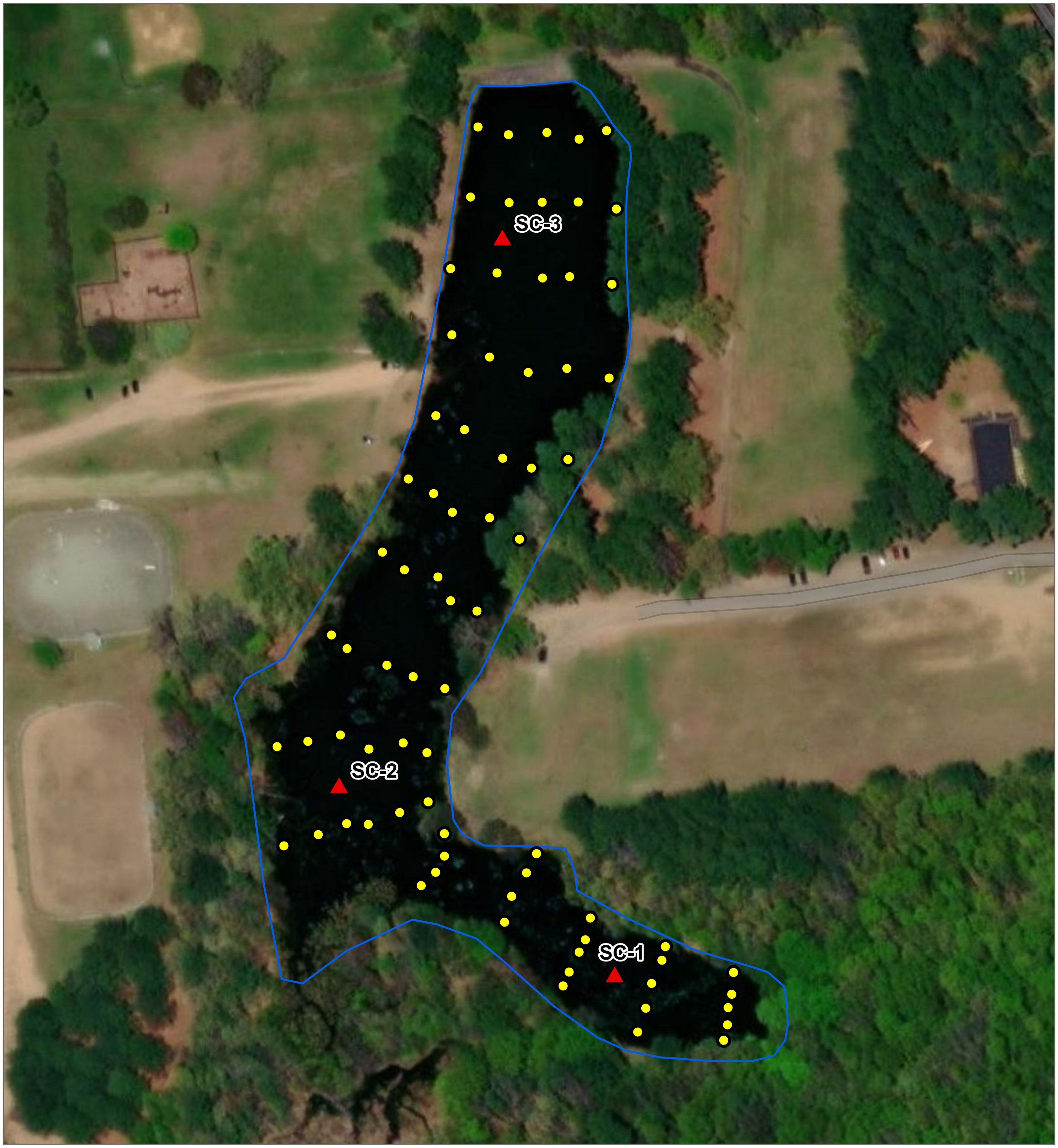

SURVEY LOCATIONS
SEDIMENT SAMPLING LOCATIONS
SHORELINE

BASE MAP: ESRI WORLD IMAGERY 2021.
DATA SOURCES:
TRC, SURVEY AND SAMPLING LOCATIONS, 2023;
MASSGIS, MASSDEP HYDROGRAPHY (1:25000), DEC 2019.

N
0 50 100
FEET
1:2,000 1" = 167'

PROJECT:	DREDGE FEASIBILITY STUDY DUFRESNE POND TOWN OF GRANBY, MA
TITLE:	BATHYMETRY AND SEDIMENT THICKNESS SURVEY AND SAMPLING LOCATIONS
DRAWN BY:	J. BERTHERMAN
CHECKED BY:	S. DEHAINAUT
APPROVED BY:	J. TREACY
DATE:	JUNE 2023
PROJ. NO.:	510516.0000.0000

FIGURE 2

TRC
10 HEMINGWAY DRIVE
2ND FLOOR
EAST PROVIDENCE, RI 02915
PHONE: 401.330.1236

FILE: DUFRESNE_POND_510516

COORDINATE SYSTEM: NAD 1983 2011 STATEPLANE MASSACHUSETTS MNLD FIPS 2001 FTUS; MAP ROTATION: 0
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BATHYMETRY CONTOURS (1 FT INTERVAL)

- 0-1 FT
- 1-2 FT
- 2-3 FT
- 3-4 FT
- 4-5 FT
- 5-6 FT
- 6 FT

BASE MAP: ESRI WORLD IMAGERY 2021.
DATA SOURCES: TRC, BATHYMETRY, 2023;
MASSGIS, MASSDEP HYDROGRAPHY (1:25000), 2019.

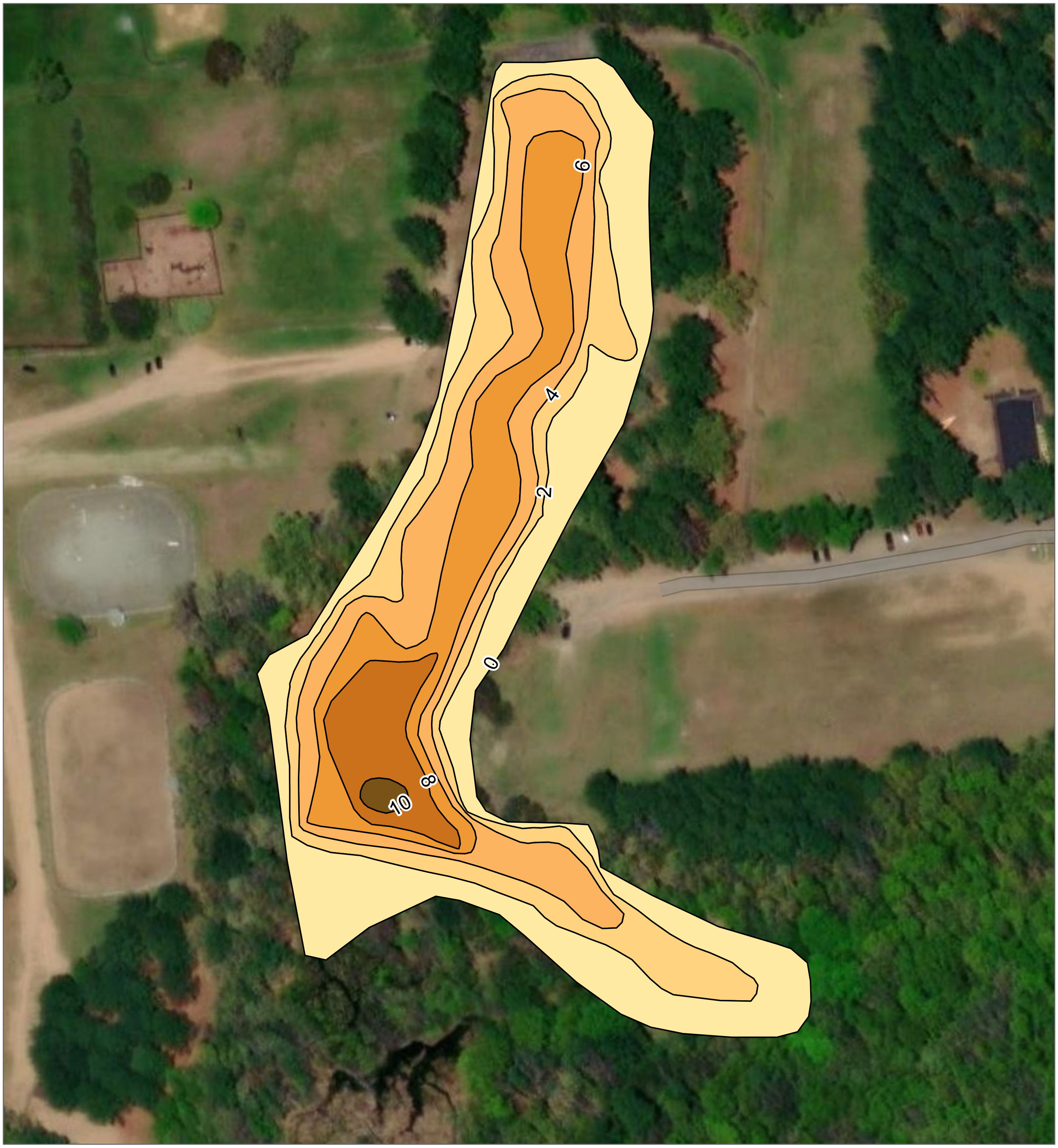
N

0 75 150
FEET
1:2,000 1" = 167'

PROJECT:	**DREDGE FEASIBILITY STUDY** DUFRESNE POND TOWN OF GRANBY, MA
TITLE:	**BATHYMETRY**
DRAWN BY:	J. BERTHERMAN
CHECKED BY:	S. DEHAINAUT
APPROVED BY:	J. TREACY
DATE:	JUNE 2023
PROJ. NO.:	510516.0000.0000
	FIGURE 3
FILE:	DUFRESNE_POND_510516

TRC
10 HEMINGWAY DRIVE
2ND FLOOR
EAST PROVIDENCE, RI 02915
PHONE: 401.330.1236

COORDINATE SYSTEM: NAD 1983 2011 STATEPLANE MASSACHUSETTS MNLD FIPS 2001 FTUS; MAP ROTATION: 0
– SAVED BY: JBERTHERMAN ON 6/5/2023, 11:28:50 AM; FILE PATH: T:\1-PROJECTS\TOWN_OF_GRANBY_MA\2-APRX\DUFRESNE_POND_510516\DUFRESNE_POND_510516.APRX; LAYOUT NAME: 510516_FIG3_DUFRESNEPOND_BATHY



COORDINATE SYSTEM: NAD 1983 STATEPLANE MASSACHUSETTS MAINLAND FIPS 2001 FEET; MAP ROTATION: 0
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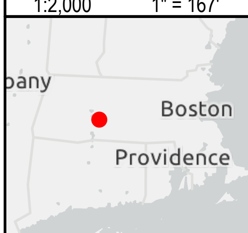
SEDIMENT THICKNESS (2 FT CONTOURS)

- 0-2 FT
- 2-4 FT
- 4-6 FT
- 6-8 FT
- 8-10 FT
- 10 FT

BASE MAP: ESRI WORLD IMAGERY 2021.
DATA SOURCES: TRC, SEDIMENT THICKNESS, 2023;
MASSGIS, MASSDEP HYDROGRAPHY (1:25000), 2019.

N

0 75 150
FEET
1:2,000 1" = 167'



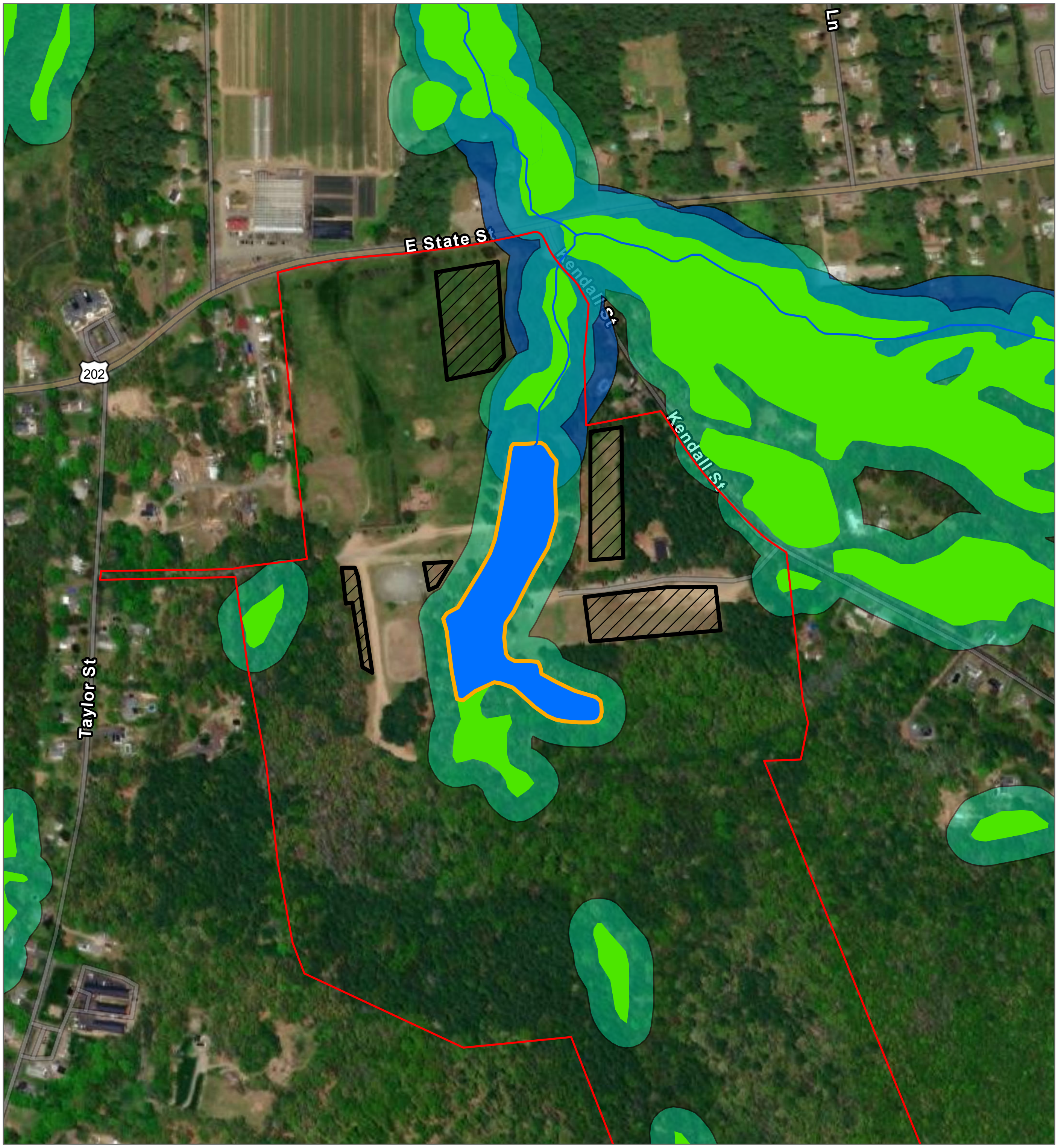
PROJECT: **DREDGE FEASIBILITY STUDY**
DUFRESNE POND
TOWN OF GRANBY, MA

TITLE: **SEDIMENT THICKNESS**

DRAWN BY:	J. BERTHERMAN	PROJ. NO.:	510516.0000.0000
CHECKED BY:	S. DEHAINAUT	FIGURE 4	
APPROVED BY:	J. TREACY		
DATE:	JUNE 2023		

TRC
10 HEMINGWAY DRIVE
2ND FLOOR
EAST PROVIDENCE, RI 02915
PHONE: 401.330.1236

FILE: DUFRESNE_POND_510516



	POTENTIAL DISPOSAL LOCATIONS
	DUFRESNE RECREATION AREA
	PERENNIAL STREAM
	INTERMITTENT STREAM
	LAND UNDER WATER
	INLAND BANK
	WETLAND
	100-FT BUFFER ZONE
	200-FT RIVERFRONT AREA

BASE MAP: ESRI WORLD IMAGERY 2021.
DATA SOURCES: TRC, POTENTIAL DISPOSAL LOCATIONS, 2023; MASSGIS, TAX PARCELS, 2023; MASSGIS, MASSDEP HYDROGRAPHY, 2019.

N

0 250 500
FEET
1:7,000 1" = 583'

PROJECT: **DREDGE FEASIBILITY STUDY**
DUFRESNE POND
TOWN OF GRANBY, MA

TITLE: **WETLAND RESOURCE AREAS AND POTENTIAL DISPOSAL LOCATIONS**

DRAWN BY:	J. BERTHERMAN	PROJ. NO.:	510516.0000.0000
CHECKED BY:	S. DEHAINAUT	**FIGURE 5**	
APPROVED BY:	J. TREACY		
DATE:	JUNE 2023		

TRC
10 HEMINGWAY DRIVE
2ND FLOOR
EAST PROVIDENCE, RI 02915
PHONE: 401.330.1236

FILE: DUFRESNE_POND_510516

COORDINATE SYSTEM: NAD 1983 2011 STATEPLANE MASSACHUSETTS MNLD FIPS 2001 FTUS; MAP ROTATION: 0
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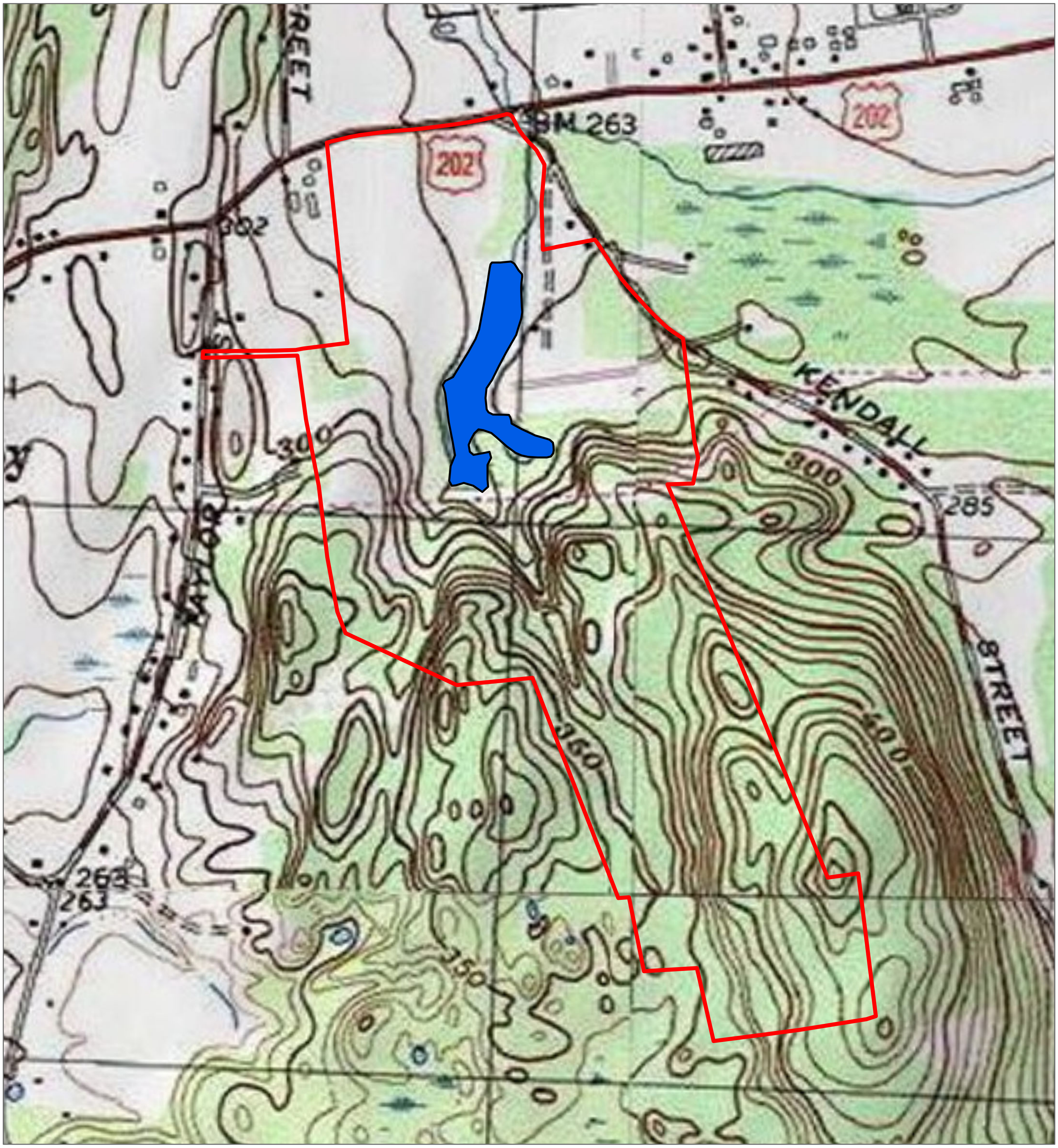


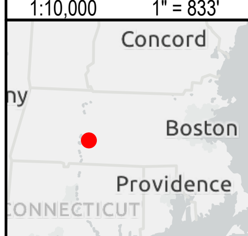
DUFRESNE POND

DUFRESNE RECREATION AREA

BASE MAP: USGS TOPOGRAPHIC MAPS 2001.
DATA SOURCES: MASSGIS, TAX PARCELS, 2023; MASSGIS, MASSDEP HYDROGRAPHY, 2019.

N

0 400 800
FEET
1:10,000 1" = 833'



PROJECT: **DREDGE FEASIBILITY STUDY**
DUFRESNE POND
TOWN OF GRANBY, MA

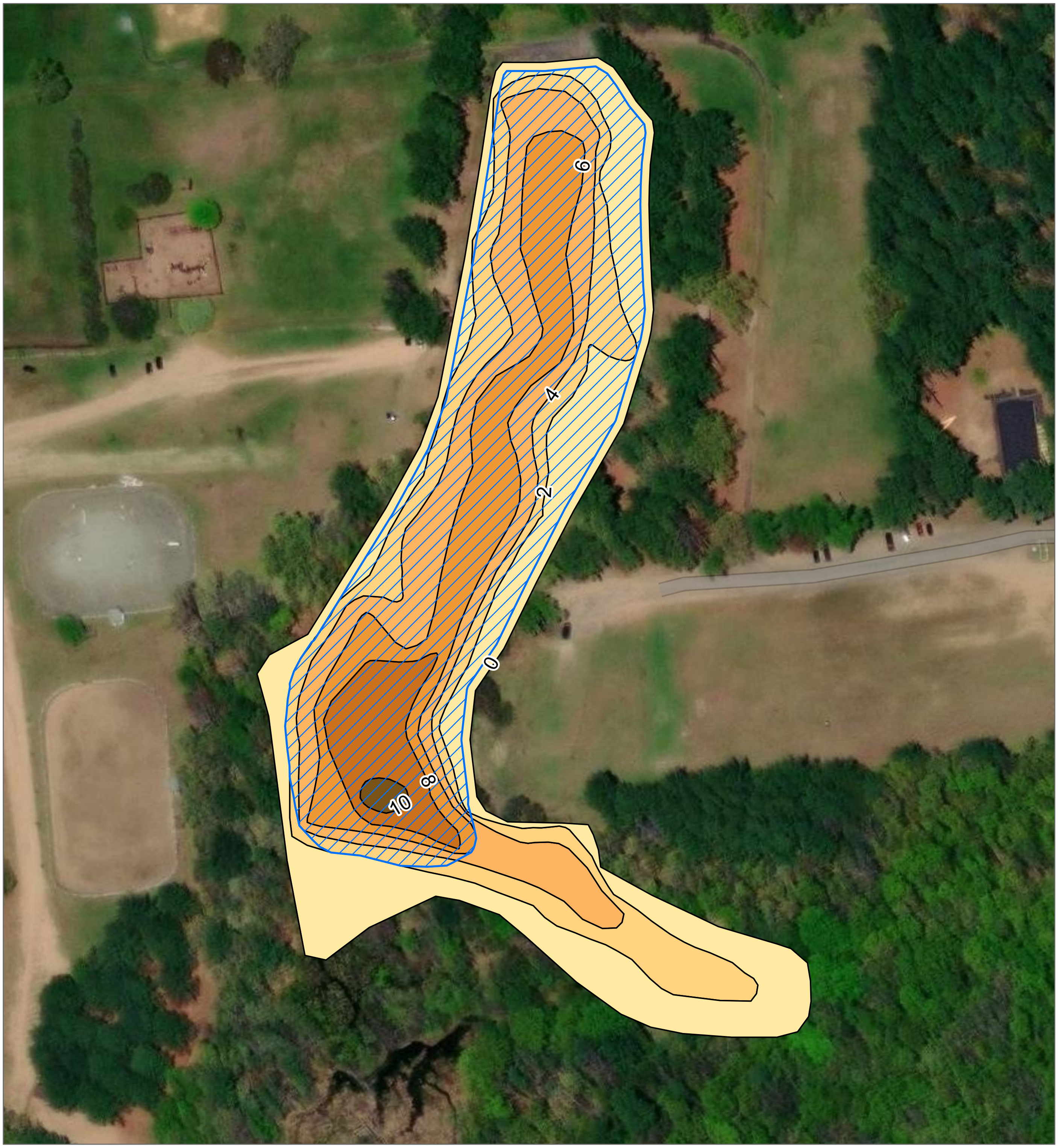
TITLE: **TOPOGRAPHIC MAP**

DRAWN BY:	J. BERTHERMAN	PROJ. NO.:	510516.0000.0000
CHECKED BY:	S. DEHAINAUT	**FIGURE 6**	
APPROVED BY:	J. TREACY		
DATE:	JUNE 2023		

10 HEMINGWAY DRIVE
2ND FLOOR
EAST PROVIDENCE, RI 02915
PHONE: 401.330.1236

FILE: DUFRESNE_POND_510516

COORDINATE SYSTEM: NAD 1983 2011 STATEPLANE MASSACHUSETTS MNLD FIPS 2001 FTUS; MAP ROTATION: 0
-- SAVED BY: JBERTHERMAN ON 6/5/2023, 11:39:45 AM; FILE PATH: T:\1-PROJECTS\TOWN_OF_GRANBY_MA\2-APRX\DUFRESNE_POND_510516\DUFRESNE_POND_510516.APRX; LAYOUT NAME: 510516_FIG06_DUFRESNEPOND_TOPO



▨	CONCEPTUAL DREDGE AREA (4.01 ACRES)

SEDIMENT THICKNESS (2 FT CONTOURS)

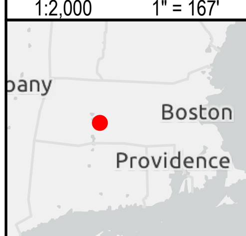
- 0-2 FT
- 2-4 FT
- 4-6 FT
- 6-8 FT
- 8-10 FT
- 10 FT

*CONCEPTUAL DREDGE VOLUME = 31,619.9 CUBIC YD

BASE MAP: ESRI WORLD IMAGERY 2021.
DATA SOURCES: TRC, SEDIMENT THICKNESS & DREDGE AREA, 2023; MASSGIS, MASSDEP HYDROGRAPHY (1:25000), 2019.

N

0 75 150
FEET
1:2,000 1" = 167'



PROJECT: **DREDGE FEASIBILITY STUDY**
DUFRESNE POND
TOWN OF GRANBY, MA

TITLE: **CONCEPTUAL DESIGN**

DRAWN BY:	J. BERTHERMAN	PROJ. NO.:	510516.0000.0000
CHECKED BY:	J. TREACY	**FIGURE 7**	
APPROVED BY:	C. NIELSEN		
DATE:	SEPTEMBER 2023		

TRC
10 HEMINGWAY DRIVE
2ND FLOOR
EAST PROVIDENCE, RI 02915
PHONE: 401.330.1236

FILE: DUFRESNE_POND_510516

COORDINATE SYSTEM: NAD 1983 STATEPLANE MASSACHUSETTS MAINLAND FIPS 2001 FEET; MAP ROTATION: 0
-- SAVED BY: JBERTHERMAN ON 9/18/2023, 15:17:46 PM; FILE PATH: T:\1-PROJECTS\TOWN_OF_GRANBY_MA\2-APRX\DUFRESNE_POND_510516\DUFRESNE_POND_510516.APRX; LAYOUT NAME: 510516_FIG7_DUFRESNEPOND_DREDGECONCEPT

Appendix A: Core Photos

Photograph No.: 1
Sample Location 1, SC-1A 0-50 cm

Photograph No.: 2
Sample Location 1, SC-1A 50-100cm

Photograph No.: 3
Sample Location 1, SC-1A 100-150 cm

Photograph No.: 4
Sample Location 2, SC-1B 0-50cm

Photograph No.: 5
Sample Location 2, SC-1B 50-100cm

Photograph No.: 6
Sample Location 3, SC-2A 0-50cm

Photograph No.: 7
Sample Location 3, SC-2A 50-100cm

Photograph No.: 8
Sample Location 3, SC-2A 100-150cm

Photograph No.: 9
Sample Location 4, SC-2B 0-50cm

Photograph No.: 10
Sample Location 4, SC-2B 50-100cm

Photograph No.: 11
Sample Location 5, SC-3A 0-50cm

Photograph No.: 12
Sample Location 5, SC-3A 50-100cm

Photograph No.: 13
Sample Location 5, SC-3A 100-150cm

Photograph No.: 14
Sample Location 6, SC-3B 0-50cm

Photograph No.: 15
Sample Location 6, SC-3B 50-100cm

Photograph No.: 16
Sample Location 6, SC-3B 100-150cm

Appendix B: Laboratory Reports

Tuesday, April 04, 2023

Attn: Carl Nielsen
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Project ID: DUFRESNE POND (#510516.0000.0000 PHASE 1
SDG ID: GCN66614
Sample ID#s: CN66614 - CN66616

This laboratory is in compliance with the NELAC requirements of procedures used except where indicated.

This report contains results for the parameters tested, under the sampling conditions described on the Chain Of Custody, as received by the laboratory. This report is incomplete unless all pages indicated in the pagination at the bottom of the page are included.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

A scanned version of the COC form accompanies the analytical report and is an exact duplicate of the original.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200. The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Sincerely yours,

Phyllis Shiller
Laboratory Director

NELAC - #NY11301
CT Lab Registration #PH-0618
MA Lab Registration #M-CT007
ME Lab Registration #CT-007
NH Lab Registration #213693-A,B

NJ Lab Registration #CT-003
NY Lab Registration #11301
PA Lab Registration #68-03530
RI Lab Registration #63
VT Lab Registration #VT11301

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Sample Id Cross Reference

April 04, 2023

SDG I.D.: GCN66614

Project ID: DUFRESNE POND (#510516.0000.0000 PHASE 1

Client Id	Lab Id	Matrix
SC-1	CN66614	SEDIMENT
SC-2	CN66615	SEDIMENT
SC-3	CN66616	SEDIMENT

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

April 04, 2023

FOR: Attn: Carl Nielsen
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information		Custody Information		Date	Time
Matrix:	SEDIMENT	Collected by:	JB	03/22/23	14:30
Location Code:	TRC-RI	Received by:	SR1	03/23/23	13:45
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCN66614
Phoenix ID: CN66614

Project ID: DUFRESNE POND (#510516.0000.0000 PHASE 1
Client ID: SC-1

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Arsenic	< 4.5	4.5	mg/Kg	1	03/28/23	TH	SW6010D
Cadmium	< 2.3	2.3	mg/Kg	1	03/28/23	TH	SW6010D
Chromium	18.3	2.3	mg/Kg	1	03/28/23	TH	SW6010D
Copper	19.0	4.5	mg/kg	1	03/28/23	TH	SW6010D
Mercury	0.06	0.05	mg/Kg	2	03/27/23	PM	SW7471B
Nickel	8.5	2.3	mg/Kg	1	03/28/23	TH	SW6010D
Lead	12.6	2.3	mg/Kg	1	03/28/23	TH	SW6010D
Zinc	27.3	4.5	mg/Kg	1	03/28/23	TH	SW6010D
Percent Moisture	87	0.1	%		03/23/23	HG	P.E.L.
Percent Solid	13		%		03/23/23	al	SW846-%Solid
Tot.Org.Carbon	217000	100	mg/kg	1	03/23/23	MI	L. Kahn
Field Extraction	Completed				03/22/23		SW5035A
Mercury Digestion	Completed				03/24/23	AL/AL	SW7471B
EPH Extraction	Completed				03/29/23	C/K	SW3545A
Soil Extraction for PCB	Completed				03/27/23	B/F	SW3546
Soil Extraction for SVOA PAH	Completed				03/27/23	H/MO	SW3546
Total Metals Digest	Completed				03/24/23	J/AG	SW3050B
Tot.Org.Carbon Preparation	Completed				03/23/23	MI	
Sieve Test	Completed	0	%		03/28/23	*	ASTM C136, C117
Ext. Petroleum Hydrocarbons	Completed				03/23/23		MADEP EPH-19
Polychlorinated Biphenyls							
PCB-1016	ND	550	ug/Kg	2	03/29/23	SC	SW8082A
PCB-1221	ND	550	ug/Kg	2	03/29/23	SC	SW8082A
PCB-1232	ND	550	ug/Kg	2	03/29/23	SC	SW8082A
PCB-1242	ND	550	ug/Kg	2	03/29/23	SC	SW8082A
PCB-1248	ND	550	ug/Kg	2	03/29/23	SC	SW8082A

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
PCB-1254	ND	550	ug/Kg	2	03/29/23	SC	SW8082A
PCB-1260	ND	550	ug/Kg	2	03/29/23	SC	SW8082A
PCB-1262	ND	550	ug/Kg	2	03/29/23	SC	SW8082A
PCB-1268	ND	550	ug/Kg	2	03/29/23	SC	SW8082A
QA/QC Surrogates							
% DCBP	68		%	2	03/29/23	SC	30 - 150 %
% DCBP (Confirmation)	67		%	2	03/29/23	SC	30 - 150 %
% TCMX	66		%	2	03/29/23	SC	30 - 150 %
% TCMX (Confirmation)	62		%	2	03/29/23	SC	30 - 150 %

Volatiles

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
1,1,1,2-Tetrachloroethane	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
1,1,1-Trichloroethane	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
1,1,2,2-Tetrachloroethane	ND	33	ug/Kg	1	03/25/23	JLI	SW8260C
1,1,2-Trichloroethane	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
1,1-Dichloroethane	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
1,1-Dichloroethene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
1,1-Dichloropropene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
1,2,3-Trichlorobenzene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
1,2,3-Trichloropropane	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
1,2,4-Trichlorobenzene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
1,2,4-Trimethylbenzene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
1,2-Dibromo-3-chloropropane	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
1,2-Dibromoethane	ND	5.5	ug/Kg	1	03/25/23	JLI	SW8260C
1,2-Dichlorobenzene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
1,2-Dichloroethane	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
1,2-Dichloropropane	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
1,3,5-Trimethylbenzene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
1,3-Dichlorobenzene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
1,3-Dichloropropane	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
1,4-Dichlorobenzene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
2,2-Dichloropropane	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
2-Chlorotoluene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
2-Hexanone	ND	280	ug/Kg	1	03/25/23	JLI	SW8260C
2-Isopropyltoluene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
4-Chlorotoluene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
4-Methyl-2-pentanone	ND	280	ug/Kg	1	03/25/23	JLI	SW8260C
Acetone	ND	2800	ug/Kg	1	03/25/23	JLI	SW8260C
Acrylonitrile	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
Benzene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
Bromobenzene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
Bromochloromethane	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
Bromodichloromethane	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
Bromoform	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
Bromomethane	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
Carbon Disulfide	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
Carbon tetrachloride	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
Chlorobenzene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
Chloroethane	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
Chloroform	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C

Project ID: DUFRESNE POND (#510516.0000.0000 PHASE 1
Client ID: SC-1

Phoenix I.D.: CN66614

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Chloromethane	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
cis-1,2-Dichloroethene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
cis-1,3-Dichloropropene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
Dibromochloromethane	ND	33	ug/Kg	1	03/25/23	JLI	SW8260C
Dibromomethane	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
Dichlorodifluoromethane	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
Ethylbenzene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
Hexachlorobutadiene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
Isopropylbenzene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
m&p-Xylene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
Methyl Ethyl Ketone	ND	330	ug/Kg	1	03/25/23	JLI	SW8260C
Methyl t-butyl ether (MTBE)	ND	110	ug/Kg	1	03/25/23	JLI	SW8260C
Methylene chloride	ND	110	ug/Kg	1	03/25/23	JLI	SW8260C
Naphthalene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
n-Butylbenzene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
n-Propylbenzene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
o-Xylene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
p-Isopropyltoluene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
sec-Butylbenzene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
Styrene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
tert-Butylbenzene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
Tetrachloroethene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
Tetrahydrofuran (THF)	ND	110	ug/Kg	1	03/25/23	JLI	SW8260C
Toluene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
Total Xylenes	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
trans-1,2-Dichloroethene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
trans-1,3-Dichloropropene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
trans-1,4-dichloro-2-butene	ND	110	ug/Kg	1	03/25/23	JLI	SW8260C
Trichloroethene	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
Trichlorofluoromethane	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
Trichlorotrifluoroethane	ND	110	ug/Kg	1	03/25/23	JLI	SW8260C
Vinyl chloride	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C
QA/QC Surrogates							
% 1,2-dichlorobenzene-d4	100		%	1	03/25/23	JLI	70 - 130 %
% Bromofluorobenzene	95		%	1	03/25/23	JLI	70 - 130 %
% Dibromofluoromethane	100		%	1	03/25/23	JLI	70 - 130 %
% Toluene-d8	98		%	1	03/25/23	JLI	70 - 130 %
Oxygenates & Dioxane							
1,4-Dioxane	ND	1100	ug/Kg	1	03/25/23	JLI	SW8260C (OXY)
Diethyl ether	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C (OXY)
Di-isopropyl ether	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C (OXY)
Ethyl tert-butyl ether	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C (OXY)
tert-amyl methyl ether	ND	55	ug/Kg	1	03/25/23	JLI	SW8260C (OXY)
Polynuclear Aromatic HC							
2-Methylnaphthalene	ND	2600	ug/Kg	1	03/28/23	HM	SW8270D
Acenaphthene	ND	2600	ug/Kg	1	03/28/23	HM	SW8270D
Acenaphthylene	ND	2600	ug/Kg	1	03/28/23	HM	SW8270D
Anthracene	ND	2600	ug/Kg	1	03/28/23	HM	SW8270D

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Benz(a)anthracene	ND	2600	ug/Kg	1	03/28/23	HM	SW8270D
Benzo(a)pyrene	ND	2600	ug/Kg	1	03/28/23	HM	SW8270D
Benzo(b)fluoranthene	ND	2600	ug/Kg	1	03/28/23	HM	SW8270D
Benzo(ghi)perylene	ND	2600	ug/Kg	1	03/28/23	HM	SW8270D
Benzo(k)fluoranthene	ND	2600	ug/Kg	1	03/28/23	HM	SW8270D
Chrysene	ND	2600	ug/Kg	1	03/28/23	HM	SW8270D
Dibenz(a,h)anthracene	ND	2600	ug/Kg	1	03/28/23	HM	SW8270D
Fluoranthene	ND	2600	ug/Kg	1	03/28/23	HM	SW8270D
Fluorene	ND	2600	ug/Kg	1	03/28/23	HM	SW8270D
Indeno(1,2,3-cd)pyrene	ND	2600	ug/Kg	1	03/28/23	HM	SW8270D
Naphthalene	ND	2600	ug/Kg	1	03/28/23	HM	SW8270D
Phenanthrene	ND	2600	ug/Kg	1	03/28/23	HM	SW8270D
Pyrene	ND	2600	ug/Kg	1	03/28/23	HM	SW8270D
QA/QC Surrogates							
% 2-Fluorobiphenyl	54		%	1	03/28/23	HM	30 - 130 %
% Nitrobenzene-d5	80		%	1	03/28/23	HM	30 - 130 %
% Terphenyl-d14	53		%	1	03/28/23	HM	30 - 130 %

EPH Other PAH Target Analytes

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Acenaphthylene	ND	2600	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
Anthracene	ND	2600	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
Benz(a)anthracene	ND	2600	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
Benzo(a)pyrene	ND	2600	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
Benzo(b)fluoranthene	ND	2600	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
Benzo(ghi)perylene	ND	2600	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
Benzo(k)fluoranthene	ND	2600	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
Chrysene	ND	2600	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
Dibenz(a,h)anthracene	ND	2600	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
Fluoranthene	ND	2600	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
Fluorene	ND	2600	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
Indeno(1,2,3-cd)pyrene	ND	2600	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
Pyrene	ND	2600	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
QA/QC Surrogates							
% 2-Fluorobiphenyl	54		%	1	03/28/23	HM	30 - 130 %
% Nitrobenzene-d5	80		%	1	03/28/23	HM	30 - 130 %
% Terphenyl-d14	53		%	1	03/28/23	HM	30 - 130 %

EPH Diesel PAH Target Analytes

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
2-Methylnaphthalene	ND	2600	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
Acenaphthene	ND	2600	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
Naphthalene	ND	2600	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
Phenanthrene	ND	2600	ug/Kg	1	03/28/23	HM	MA EPH 5/2004

MA EPH Aliphatic/Aromatic Ranges

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
C11-C22 Aromatic Hydrocarbons 1,2	ND	500	mg/Kg	1	03/31/23	AW	MA EPH 5/2019	
C11-C22 Aromatic Hydrocarbons Un	ND	500	mg/Kg	1	03/31/23	AW	MA EPH 5/2019	
C19-C36 Aliphatic Hydrocarbons 1*	ND	500	mg/Kg	1	03/31/23	AW	MA EPH 5/2019	
C9-C18 Aliphatic Hydrocarbons 1*	ND	500	mg/Kg	1	03/31/23	AW	MA EPH 5/2019	
QA/QC Surrogates								
% 1-chlorooctadecane (aliphatic)	27		%	1	03/31/23	AW	40 - 140 %	3

Ver 1

Project ID: DUFRESNE POND (#510516.0000.0000 PHASE 1 Phoenix I.D.: CN66614
Client ID: SC-1

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
% 2-Bromonaphthalene (Fractionation)	103		%	1	03/31/23	AW	40 - 140 %	
% 2-Fluorobiphenyl (Fractionation)	99		%	1	03/31/23	AW	40 - 140 %	
% o-terphenyl (aromatic)	15		%	1	03/31/23	AW	40 - 140 %	3

3 = This parameter exceeds laboratory specified limits.
Massachusetts does not offer certification for Soil/Solid matrices.

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

* See Attached. Sieve Analysis performed by Tri State Materials Testing Lab, LLC. Accredited by the National Voluntary Laboratory Accreditation Program; NVLAP Lab Code 200010-0.

MAEPH:
1* Hydrocarbon range data exclude concentrations of any surrogate(s) and/or internal standards eluting in that range.
2* C11-C22 Aromatic Hydrocarbons exclude the concentration of Target PAH analytes eluting in that range.

* % Moisture by ASTM D3173 was analyzed by Sterling Analytical Inc. MA does not certify for this analysis.

EPH Comment
Poor surrogate recovery due to sample matrix. Sample was re-extracted with similar results.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director
April 04, 2023
Reviewed and Released by: Anil Makol, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

April 04, 2023

FOR: Attn: Carl Nielsen
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information		Custody Information		Date	Time
Matrix:	SEDIMENT	Collected by:	JB	03/22/23	15:00
Location Code:	TRC-RI	Received by:	SR1	03/23/23	13:45
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCN66614
Phoenix ID: CN66615

Project ID: DUFRESNE POND (#510516.0000.0000 PHASE 1
Client ID: SC-2

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Arsenic	< 5.4	5.4	mg/Kg	1	03/28/23	TH	SW6010D
Cadmium	< 2.7	2.7	mg/Kg	1	03/28/23	TH	SW6010D
Chromium	16.6	2.7	mg/Kg	1	03/28/23	TH	SW6010D
Copper	18.6	5.4	mg/kg	1	03/28/23	TH	SW6010D
Mercury	< 0.23	0.23	mg/Kg	2	03/27/23	PM	SW7471B
Nickel	5.8	2.7	mg/Kg	1	03/28/23	TH	SW6010D
Lead	8.2	2.7	mg/Kg	1	03/28/23	TH	SW6010D
Zinc	38.3	5.4	mg/Kg	1	03/28/23	TH	SW6010D
Percent Moisture	89	0.1	%		03/23/23	HG	P.E.L.
Percent Solid	11		%		03/23/23	al	SW846-%Solid
Tot.Org.Carbon	256000	100	mg/kg	1	03/23/23	MI	L. Kahn
Field Extraction	Completed				03/22/23		SW5035A
Mercury Digestion	Completed				03/24/23	AL/AL	SW7471B
EPH Extraction	Completed				03/29/23	C/K	SW3545A
Soil Extraction for PCB	Completed				03/27/23	B/F	SW3546
Soil Extraction for SVOA PAH	Completed				03/27/23	H/MO	SW3546
Total Metals Digest	Completed				03/24/23	J/AG	SW3050B
Tot.Org.Carbon Preparation	Completed				03/23/23	MI	
Sieve Test	Completed	0	%		03/28/23	*	ASTM C136, C117
Ext. Petroleum Hydrocarbons	Completed				03/23/23		MADEP EPH-19
Polychlorinated Biphenyls							
PCB-1016	ND	880	ug/Kg	2	03/29/23	SC	SW8082A
PCB-1221	ND	880	ug/Kg	2	03/29/23	SC	SW8082A
PCB-1232	ND	880	ug/Kg	2	03/29/23	SC	SW8082A
PCB-1242	ND	880	ug/Kg	2	03/29/23	SC	SW8082A
PCB-1248	ND	880	ug/Kg	2	03/29/23	SC	SW8082A

Project ID: DUFRESNE POND (#510516.0000.0000 PHASE 1

Client ID: SC-2

Phoenix I.D.: CN66615

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
PCB-1254	ND	880	ug/Kg	2	03/29/23	SC	SW8082A
PCB-1260	ND	880	ug/Kg	2	03/29/23	SC	SW8082A
PCB-1262	ND	880	ug/Kg	2	03/29/23	SC	SW8082A
PCB-1268	ND	880	ug/Kg	2	03/29/23	SC	SW8082A
QA/QC Surrogates							
% DCBP	69		%	2	03/29/23	SC	30 - 150 %
% DCBP (Confirmation)	66		%	2	03/29/23	SC	30 - 150 %
% TCMX	72		%	2	03/29/23	SC	30 - 150 %
% TCMX (Confirmation)	72		%	2	03/29/23	SC	30 - 150 %

Volatiles

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
1,1,1,2-Tetrachloroethane	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
1,1,1-Trichloroethane	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
1,1,2,2-Tetrachloroethane	ND	39	ug/Kg	1	03/25/23	JLI	SW8260C
1,1,2-Trichloroethane	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
1,1-Dichloroethane	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
1,1-Dichloroethene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
1,1-Dichloropropene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
1,2,3-Trichlorobenzene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
1,2,3-Trichloropropane	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
1,2,4-Trichlorobenzene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
1,2,4-Trimethylbenzene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
1,2-Dibromo-3-chloropropane	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
1,2-Dibromoethane	ND	6.5	ug/Kg	1	03/25/23	JLI	SW8260C
1,2-Dichlorobenzene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
1,2-Dichloroethane	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
1,2-Dichloropropane	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
1,3,5-Trimethylbenzene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
1,3-Dichlorobenzene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
1,3-Dichloropropane	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
1,4-Dichlorobenzene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
2,2-Dichloropropane	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
2-Chlorotoluene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
2-Hexanone	ND	320	ug/Kg	1	03/25/23	JLI	SW8260C
2-Isopropyltoluene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
4-Chlorotoluene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
4-Methyl-2-pentanone	ND	320	ug/Kg	1	03/25/23	JLI	SW8260C
Acetone	ND	3200	ug/Kg	1	03/25/23	JLI	SW8260C
Acrylonitrile	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
Benzene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
Bromobenzene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
Bromochloromethane	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
Bromodichloromethane	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
Bromoform	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
Bromomethane	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
Carbon Disulfide	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
Carbon tetrachloride	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
Chlorobenzene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
Chloroethane	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
Chloroform	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Chloromethane	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
cis-1,2-Dichloroethene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
cis-1,3-Dichloropropene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
Dibromochloromethane	ND	39	ug/Kg	1	03/25/23	JLI	SW8260C
Dibromomethane	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
Dichlorodifluoromethane	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
Ethylbenzene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
Hexachlorobutadiene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
Isopropylbenzene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
m&p-Xylene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
Methyl Ethyl Ketone	ND	390	ug/Kg	1	03/25/23	JLI	SW8260C
Methyl t-butyl ether (MTBE)	ND	130	ug/Kg	1	03/25/23	JLI	SW8260C
Methylene chloride	ND	130	ug/Kg	1	03/25/23	JLI	SW8260C
Naphthalene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
n-Butylbenzene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
n-Propylbenzene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
o-Xylene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
p-Isopropyltoluene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
sec-Butylbenzene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
Styrene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
tert-Butylbenzene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
Tetrachloroethene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
Tetrahydrofuran (THF)	ND	130	ug/Kg	1	03/25/23	JLI	SW8260C
Toluene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
Total Xylenes	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
trans-1,2-Dichloroethene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
trans-1,3-Dichloropropene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
trans-1,4-dichloro-2-butene	ND	130	ug/Kg	1	03/25/23	JLI	SW8260C
Trichloroethene	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
Trichlorofluoromethane	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
Trichlorotrifluoroethane	ND	130	ug/Kg	1	03/25/23	JLI	SW8260C
Vinyl chloride	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C
QA/QC Surrogates							
% 1,2-dichlorobenzene-d4	100		%	1	03/25/23	JLI	70 - 130 %
% Bromofluorobenzene	92		%	1	03/25/23	JLI	70 - 130 %
% Dibromofluoromethane	103		%	1	03/25/23	JLI	70 - 130 %
% Toluene-d8	98		%	1	03/25/23	JLI	70 - 130 %

Oxygenates & Dioxane

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
1,4-Dioxane	ND	1300	ug/Kg	1	03/25/23	JLI	SW8260C (OXY)
Diethyl ether	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C (OXY)
Di-isopropyl ether	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C (OXY)
Ethyl tert-butyl ether	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C (OXY)
tert-amyl methyl ether	ND	65	ug/Kg	1	03/25/23	JLI	SW8260C (OXY)

Polynuclear Aromatic HC

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
2-Methylnaphthalene	ND	6100	ug/Kg	1	03/28/23	HM	SW8270D
Acenaphthene	ND	6100	ug/Kg	1	03/28/23	HM	SW8270D
Acenaphthylene	ND	6100	ug/Kg	1	03/28/23	HM	SW8270D
Anthracene	ND	6100	ug/Kg	1	03/28/23	HM	SW8270D

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
Benz(a)anthracene	ND	6100	ug/Kg	1	03/28/23	HM	SW8270D	
Benzo(a)pyrene	ND	6100	ug/Kg	1	03/28/23	HM	SW8270D	
Benzo(b)fluoranthene	ND	6100	ug/Kg	1	03/28/23	HM	SW8270D	
Benzo(ghi)perylene	ND	6100	ug/Kg	1	03/28/23	HM	SW8270D	
Benzo(k)fluoranthene	ND	6100	ug/Kg	1	03/28/23	HM	SW8270D	
Chrysene	ND	6100	ug/Kg	1	03/28/23	HM	SW8270D	
Dibenz(a,h)anthracene	ND	6100	ug/Kg	1	03/28/23	HM	SW8270D	
Fluoranthene	ND	6100	ug/Kg	1	03/28/23	HM	SW8270D	
Fluorene	ND	6100	ug/Kg	1	03/28/23	HM	SW8270D	
Indeno(1,2,3-cd)pyrene	ND	6100	ug/Kg	1	03/28/23	HM	SW8270D	
Naphthalene	ND	6100	ug/Kg	1	03/28/23	HM	SW8270D	
Phenanthrene	ND	6100	ug/Kg	1	03/28/23	HM	SW8270D	
Pyrene	ND	6100	ug/Kg	1	03/28/23	HM	SW8270D	
QA/QC Surrogates								
% 2-Fluorobiphenyl	71		%	1	03/28/23	HM	30 - 130 %	
% Nitrobenzene-d5	89		%	1	03/28/23	HM	30 - 130 %	
% Terphenyl-d14	70		%	1	03/28/23	HM	30 - 130 %	
EPH Other PAH Target Analytes								
Acenaphthylene	ND	6100	ug/Kg	1	03/28/23	HM	MA EPH 5/2004	
Anthracene	ND	6100	ug/Kg	1	03/28/23	HM	MA EPH 5/2004	
Benz(a)anthracene	ND	6100	ug/Kg	1	03/28/23	HM	MA EPH 5/2004	
Benzo(a)pyrene	ND	6100	ug/Kg	1	03/28/23	HM	MA EPH 5/2004	
Benzo(b)fluoranthene	ND	6100	ug/Kg	1	03/28/23	HM	MA EPH 5/2004	
Benzo(ghi)perylene	ND	6100	ug/Kg	1	03/28/23	HM	MA EPH 5/2004	
Benzo(k)fluoranthene	ND	6100	ug/Kg	1	03/28/23	HM	MA EPH 5/2004	
Chrysene	ND	6100	ug/Kg	1	03/28/23	HM	MA EPH 5/2004	
Dibenz(a,h)anthracene	ND	6100	ug/Kg	1	03/28/23	HM	MA EPH 5/2004	
Fluoranthene	ND	6100	ug/Kg	1	03/28/23	HM	MA EPH 5/2004	
Fluorene	ND	6100	ug/Kg	1	03/28/23	HM	MA EPH 5/2004	
Indeno(1,2,3-cd)pyrene	ND	6100	ug/Kg	1	03/28/23	HM	MA EPH 5/2004	
Pyrene	ND	6100	ug/Kg	1	03/28/23	HM	MA EPH 5/2004	
QA/QC Surrogates								
% 2-Fluorobiphenyl	71		%	1	03/28/23	HM	30 - 130 %	
% Nitrobenzene-d5	89		%	1	03/28/23	HM	30 - 130 %	
% Terphenyl-d14	70		%	1	03/28/23	HM	30 - 130 %	
EPH Diesel PAH Target Analytes								
2-Methylnaphthalene	ND	6100	ug/Kg	1	03/28/23	HM	MA EPH 5/2004	
Acenaphthene	ND	6100	ug/Kg	1	03/28/23	HM	MA EPH 5/2004	
Naphthalene	ND	6100	ug/Kg	1	03/28/23	HM	MA EPH 5/2004	
Phenanthrene	ND	6100	ug/Kg	1	03/28/23	HM	MA EPH 5/2004	
MA EPH Aliphatic/Aromatic Ranges								
C11-C22 Aromatic Hydrocarbons 1,2	ND	600	mg/Kg	1	03/31/23	AW	MA EPH 5/2019	
C11-C22 Aromatic Hydrocarbons Un	ND	600	mg/Kg	1	03/31/23	AW	MA EPH 5/2019	
C19-C36 Aliphatic Hydrocarbons 1*	ND	600	mg/Kg	1	03/31/23	AW	MA EPH 5/2019	
C9-C18 Aliphatic Hydrocarbons 1*	ND	600	mg/Kg	1	03/31/23	AW	MA EPH 5/2019	
QA/QC Surrogates								
% 1-chlorooctadecane (aliphatic)	30		%	1	03/31/23	AW	40 - 140 %	3

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
% 2-Bromonaphthalene (Fractionation)	92		%	1	03/31/23	AW	40 - 140 %	
% 2-Fluorobiphenyl (Fractionation)	98		%	1	03/31/23	AW	40 - 140 %	
% o-terphenyl (aromatic)	17		%	1	03/31/23	AW	40 - 140 %	3

3 = This parameter exceeds laboratory specified limits.
Massachusetts does not offer certification for Soil/Solid matrices.

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

* See Attached. Sieve Analysis performed by Tri State Materials Testing Lab, LLC. Accredited by the National Voluntary Laboratory Accreditation Program; NVLAP Lab Code 200010-0.

MAEPH:
1* Hydrocarbon range data exclude concentrations of any surrogate(s) and/or internal standards eluting in that range.
2* C11-C22 Aromatic Hydrocarbons exclude the concentration of Target PAH analytes eluting in that range.

* % Moisture by ASTM D3173 was analyzed by Sterling Analytical Inc. MA does not certify for this analysis.

EPH Comment
Poor surrogate recovery due to sample matrix. Sample was re-extracted with similar results.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

Phyllis Shiller, Laboratory Director
April 04, 2023
Reviewed and Released by: Anil Makol, Project Manager

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

Analysis Report

April 04, 2023

FOR: Attn: Carl Nielsen
ESS Group Inc. A TRC Company
10 Hemingway Drive 2nd Floor
Riverside, RI 02915-2224

Sample Information		Custody Information		Date	Time
Matrix:	SEDIMENT	Collected by:	JB	03/22/23	15:30
Location Code:	TRC-RI	Received by:	SR1	03/23/23	13:45
Rush Request:	Standard	Analyzed by:	see "By" below		
P.O.#:					

Laboratory Data

SDG ID: GCN66614
Phoenix ID: CN66616

Project ID: DUFRESNE POND (#510516.0000.0000 PHASE 1
Client ID: SC-3

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Arsenic	< 5.8	5.8	mg/Kg	1	03/28/23	TH	SW6010D
Cadmium	< 2.9	2.9	mg/Kg	1	03/28/23	TH	SW6010D
Chromium	14.6	2.9	mg/Kg	1	03/28/23	TH	SW6010D
Copper	11.9	5.8	mg/kg	1	03/28/23	TH	SW6010D
Mercury	< 0.22	0.22	mg/Kg	2	03/27/23	PM	SW7471B
Nickel	7.2	2.9	mg/Kg	1	03/28/23	TH	SW6010D
Lead	6.7	2.9	mg/Kg	1	03/28/23	TH	SW6010D
Zinc	15.6	5.8	mg/Kg	1	03/28/23	TH	SW6010D
Percent Moisture	89	0.1	%		03/23/23	HG	P.E.L.
Percent Solid	11		%		03/23/23	al	SW846-%Solid
Tot.Org.Carbon	269000	100	mg/kg	1	03/23/23	MI	L. Kahn
Field Extraction	Completed				03/22/23		SW5035A
Mercury Digestion	Completed				03/24/23	AL/AL	SW7471B
EPH Extraction	Completed				03/29/23	C/K	SW3545A
Soil Extraction for PCB	Completed				03/28/23	R/F	SW3546
Soil Extraction for SVOA PAH	Completed				03/27/23	H/MO	SW3546
Total Metals Digest	Completed				03/24/23	J/AG	SW3050B
Tot.Org.Carbon Preparation	Completed				03/23/23	MI	
Sieve Test	Completed	0	%		03/28/23	*	ASTM C136, C117
Ext. Petroleum Hydrocarbons	Completed				03/23/23		MADEP EPH-19
Polychlorinated Biphenyls							
PCB-1016	ND	890	ug/Kg	2	03/29/23	SC	SW8082A
PCB-1221	ND	890	ug/Kg	2	03/29/23	SC	SW8082A
PCB-1232	ND	890	ug/Kg	2	03/29/23	SC	SW8082A
PCB-1242	ND	890	ug/Kg	2	03/29/23	SC	SW8082A
PCB-1248	ND	890	ug/Kg	2	03/29/23	SC	SW8082A

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
PCB-1254	ND	890	ug/Kg	2	03/29/23	SC	SW8082A
PCB-1260	ND	890	ug/Kg	2	03/29/23	SC	SW8082A
PCB-1262	ND	890	ug/Kg	2	03/29/23	SC	SW8082A
PCB-1268	ND	890	ug/Kg	2	03/29/23	SC	SW8082A
QA/QC Surrogates							
% DCBP	69		%	2	03/29/23	SC	30 - 150 %
% DCBP (Confirmation)	66		%	2	03/29/23	SC	30 - 150 %
% TCMX	71		%	2	03/29/23	SC	30 - 150 %
% TCMX (Confirmation)	65		%	2	03/29/23	SC	30 - 150 %

Volatiles

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
1,1,1,2-Tetrachloroethane	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
1,1,1-Trichloroethane	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
1,1,2,2-Tetrachloroethane	ND	39	ug/Kg	1	03/28/23	JLI	SW8260C
1,1,2-Trichloroethane	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
1,1-Dichloroethane	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
1,1-Dichloroethene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
1,1-Dichloropropene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
1,2,3-Trichlorobenzene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
1,2,3-Trichloropropane	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
1,2,4-Trichlorobenzene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
1,2,4-Trimethylbenzene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
1,2-Dibromo-3-chloropropane	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
1,2-Dibromoethane	ND	6.5	ug/Kg	1	03/28/23	JLI	SW8260C
1,2-Dichlorobenzene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
1,2-Dichloroethane	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
1,2-Dichloropropane	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
1,3,5-Trimethylbenzene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
1,3-Dichlorobenzene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
1,3-Dichloropropane	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
1,4-Dichlorobenzene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
2,2-Dichloropropane	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
2-Chlorotoluene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
2-Hexanone	ND	330	ug/Kg	1	03/28/23	JLI	SW8260C
2-Isopropyltoluene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
4-Chlorotoluene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
4-Methyl-2-pentanone	ND	330	ug/Kg	1	03/28/23	JLI	SW8260C
Acetone	ND	3300	ug/Kg	1	03/28/23	JLI	SW8260C
Acrylonitrile	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
Benzene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
Bromobenzene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
Bromochloromethane	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
Bromodichloromethane	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
Bromoform	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
Bromomethane	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
Carbon Disulfide	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
Carbon tetrachloride	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
Chlorobenzene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
Chloroethane	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
Chloroform	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C

Project ID: DUFRESNE POND (#510516.0000.0000 PHASE 1
Client ID: SC-3

Phoenix I.D.: CN66616

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Chloromethane	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
cis-1,2-Dichloroethene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
cis-1,3-Dichloropropene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
Dibromochloromethane	ND	39	ug/Kg	1	03/28/23	JLI	SW8260C
Dibromomethane	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
Dichlorodifluoromethane	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
Ethylbenzene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
Hexachlorobutadiene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
Isopropylbenzene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
m&p-Xylene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
Methyl Ethyl Ketone	430	390	ug/Kg	1	03/28/23	JLI	SW8260C
Methyl t-butyl ether (MTBE)	ND	130	ug/Kg	1	03/28/23	JLI	SW8260C
Methylene chloride	ND	130	ug/Kg	1	03/28/23	JLI	SW8260C
Naphthalene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
n-Butylbenzene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
n-Propylbenzene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
o-Xylene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
p-Isopropyltoluene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
sec-Butylbenzene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
Styrene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
tert-Butylbenzene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
Tetrachloroethene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
Tetrahydrofuran (THF)	ND	130	ug/Kg	1	03/28/23	JLI	SW8260C
Toluene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
Total Xylenes	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
trans-1,2-Dichloroethene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
trans-1,3-Dichloropropene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
trans-1,4-dichloro-2-butene	ND	130	ug/Kg	1	03/28/23	JLI	SW8260C
Trichloroethene	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
Trichlorofluoromethane	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
Trichlorotrifluoroethane	ND	130	ug/Kg	1	03/28/23	JLI	SW8260C
Vinyl chloride	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C
QA/QC Surrogates							
% 1,2-dichlorobenzene-d4	94		%	1	03/28/23	JLI	70 - 130 %
% Bromofluorobenzene	88		%	1	03/28/23	JLI	70 - 130 %
% Dibromofluoromethane	103		%	1	03/28/23	JLI	70 - 130 %
% Toluene-d8	90		%	1	03/28/23	JLI	70 - 130 %

Oxygenates & Dioxane

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
1,4-Dioxane	ND	1300	ug/Kg	1	03/28/23	JLI	SW8260C (OXY)
Diethyl ether	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C (OXY)
Di-isopropyl ether	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C (OXY)
Ethyl tert-butyl ether	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C (OXY)
tert-amyl methyl ether	ND	65	ug/Kg	1	03/28/23	JLI	SW8260C (OXY)

Polynuclear Aromatic HC

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
2-Methylnaphthalene	ND	5800	ug/Kg	1	03/28/23	HM	SW8270D
Acenaphthene	ND	5800	ug/Kg	1	03/28/23	HM	SW8270D
Acenaphthylene	ND	5800	ug/Kg	1	03/28/23	HM	SW8270D
Anthracene	ND	5800	ug/Kg	1	03/28/23	HM	SW8270D

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Benz(a)anthracene	ND	5800	ug/Kg	1	03/28/23	HM	SW8270D
Benzo(a)pyrene	ND	5800	ug/Kg	1	03/28/23	HM	SW8270D
Benzo(b)fluoranthene	ND	5800	ug/Kg	1	03/28/23	HM	SW8270D
Benzo(ghi)perylene	ND	5800	ug/Kg	1	03/28/23	HM	SW8270D
Benzo(k)fluoranthene	ND	5800	ug/Kg	1	03/28/23	HM	SW8270D
Chrysene	ND	5800	ug/Kg	1	03/28/23	HM	SW8270D
Dibenz(a,h)anthracene	ND	5800	ug/Kg	1	03/28/23	HM	SW8270D
Fluoranthene	ND	5800	ug/Kg	1	03/28/23	HM	SW8270D
Fluorene	ND	5800	ug/Kg	1	03/28/23	HM	SW8270D
Indeno(1,2,3-cd)pyrene	ND	5800	ug/Kg	1	03/28/23	HM	SW8270D
Naphthalene	ND	5800	ug/Kg	1	03/28/23	HM	SW8270D
Phenanthrene	ND	5800	ug/Kg	1	03/28/23	HM	SW8270D
Pyrene	ND	5800	ug/Kg	1	03/28/23	HM	SW8270D
QA/QC Surrogates							
% 2-Fluorobiphenyl	72		%	1	03/28/23	HM	30 - 130 %
% Nitrobenzene-d5	86		%	1	03/28/23	HM	30 - 130 %
% Terphenyl-d14	70		%	1	03/28/23	HM	30 - 130 %

EPH Other PAH Target Analytes

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
Acenaphthylene	ND	5800	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
Anthracene	ND	5800	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
Benz(a)anthracene	ND	5800	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
Benzo(a)pyrene	ND	5800	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
Benzo(b)fluoranthene	ND	5800	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
Benzo(ghi)perylene	ND	5800	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
Benzo(k)fluoranthene	ND	5800	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
Chrysene	ND	5800	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
Dibenz(a,h)anthracene	ND	5800	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
Fluoranthene	ND	5800	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
Fluorene	ND	5800	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
Indeno(1,2,3-cd)pyrene	ND	5800	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
Pyrene	ND	5800	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
QA/QC Surrogates							
% 2-Fluorobiphenyl	72		%	1	03/28/23	HM	30 - 130 %
% Nitrobenzene-d5	86		%	1	03/28/23	HM	30 - 130 %
% Terphenyl-d14	70		%	1	03/28/23	HM	30 - 130 %

EPH Diesel PAH Target Analytes

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
2-Methylnaphthalene	ND	5800	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
Acenaphthene	ND	5800	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
Naphthalene	ND	5800	ug/Kg	1	03/28/23	HM	MA EPH 5/2004
Phenanthrene	ND	5800	ug/Kg	1	03/28/23	HM	MA EPH 5/2004

MA EPH Aliphatic/Aromatic Ranges

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference
C11-C22 Aromatic Hydrocarbons 1,2	ND	600	mg/Kg	1	03/31/23	AW	MA EPH 5/2019
C11-C22 Aromatic Hydrocarbons Un	ND	600	mg/Kg	1	03/31/23	AW	MA EPH 5/2019
C19-C36 Aliphatic Hydrocarbons 1*	ND	600	mg/Kg	1	03/31/23	AW	MA EPH 5/2019
C9-C18 Aliphatic Hydrocarbons 1*	ND	600	mg/Kg	1	03/31/23	AW	MA EPH 5/2019
QA/QC Surrogates							
% 1-chlorooctadecane (aliphatic)	44		%	1	03/31/23	AW	40 - 140 %

Parameter	Result	RL/ PQL	Units	Dilution	Date/Time	By	Reference	
% 2-Bromonaphthalene (Fractionation)	78		%	1	03/31/23	AW	40 - 140 %	
% 2-Fluorobiphenyl (Fractionation)	85		%	1	03/31/23	AW	40 - 140 %	
% o-terphenyl (aromatic)	29		%	1	03/31/23	AW	40 - 140 %	3

3 = This parameter exceeds laboratory specified limits.
Massachusetts does not offer certification for Soil/Solid matrices.

RL/PQL=Reporting/Practical Quantitation Level ND=Not Detected BRL=Below Reporting Level
QA/QC Surrogates: Surrogates are compounds (preceeded with a %) added by the lab to determine analysis efficiency. Surrogate results(%) listed in the report are not "detected" compounds.

Comments:

* See Attached. Sieve Analysis performed by Tri State Materials Testing Lab, LLC. Accredited by the National Voluntary Laboratory Accreditation Program; NVLAP Lab Code 200010-0.

MAEPH:
1* Hydrocarbon range data exclude concentrations of any surrogate(s) and/or internal standards eluting in that range.
2* C11-C22 Aromatic Hydrocarbons exclude the concentration of Target PAH analytes eluting in that range.

* % Moisture by ASTM D3173 was analyzed by Sterling Analytical Inc. MA does not certify for this analysis.

EPH Comment
Poor surrogate recovery due to sample matrix. Sample was re-extracted with similar results.

All soils, solids and sludges are reported on a dry weight basis unless otherwise noted in the sample comments.

If you are the client above and have any questions concerning this testing, please do not hesitate to contact Phoenix Client Services at ext.200.
The contents of this report cannot be discussed with anyone other than the client listed above without their written consent.

Phyllis Shiller, Laboratory Director
April 04, 2023
Reviewed and Released by: Anil Makol, Project Manager

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

QA/QC Report

April 04, 2023

QA/QC Data

SDG I.D.: GCN66614

Parameter	Blank	Blk RL	Sample Result	Dup Result	Dup RPD	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 669553 (mg/kg), QC Sample No: CN66607 2X (CN66614, CN66615, CN66616)													
Mercury - Soil	BRL	0.03	0.28	0.32	13.3	112	105	6.5	89.0			75 - 125	20
Comment:													
Additional Mercury criteria: LCS acceptance range for waters is 80-120% and for soils is 75-125%													
QA/QC Batch 669646 (mg/kg), QC Sample No: CN66746 (CN66614, CN66615, CN66616)													
ICP Metals - Soil													
Arsenic	BRL	0.67	1.86	1.32	NC	110	109	0.9	98.6			75 - 125	35
Cadmium	BRL	0.33	1.46	1.31	NC	103	104	1.0	101			75 - 125	35
Chromium	BRL	0.33	21.2	15.9	28.6	106	106	0.0	99.9			75 - 125	35
Copper	BRL	0.67	16.6	17.8	7.00	103	102	1.0	99.4			75 - 125	35
Lead	BRL	0.33	9.8	9.54	2.70	110	108	1.8	104			75 - 125	35
Nickel	BRL	0.33	11.3	10.3	9.30	105	105	0.0	100			75 - 125	35
Zinc	BRL	0.67	33.0	32.0	3.10	109	106	2.8	110			75 - 125	35
Comment:													
Additional: LCS acceptance range is 80-120% MS acceptance range 75-125%.													

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

QA/QC Report

April 04, 2023

QA/QC Data

SDG I.D.: GCN66614

Parameter	Blank	Blk RL	Sample Result	Dup Result	Dup RPD	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 669522 (mg/kg), QC Sample No: CN66615 (CN66614, CN66615, CN66616)													
Tot.Org.Carbon	BRL	100	256000	270000	5.30	104						75 - 125	30

Comment:

Additional: LCS acceptance range is 85-115% MS acceptance range 75-125%.

PHOENIX

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102

QA/QC Report

April 04, 2023

QA/QC Data

SDG I.D.: GCN66614

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits	
QA/QC Batch 670247 (mg/kg), QC Sample No: CN70533 (CN66614, CN66615, CN66616)											
Extractable Petroleum Hydrocarbons - Sediment											
C11-C22 Aromatic Hydrocarbons U	ND	3.3							40 - 140	25	
C9-C18 Aliphatic Hydrocarbons 1*	ND	3.3	59	61	3.3	53	42	23.2	40 - 140	25	
C19-C36 Aliphatic Hydrocarbons 1*	ND	3.3	78	80	2.5	73	68	7.1	40 - 140	25	
C11-C22 Aromatic Hydrocarbons 1	ND	3.3	61	62	1.6	64	53	18.8	40 - 140	25	
C9 - Nonane	ND	0.67	35	38	8.2	29	13	76.2	40 - 140	25	l,m,r
C-10 Decane	ND	0.67	46	50	8.3	42	25	50.7	40 - 140	25	m,r
C12 - Dodecane	ND	0.67	53	57	7.3	50	38	27.3	40 - 140	25	m,r
C14 - Tetradecane	ND	0.67	65	67	3.0	59	51	14.5	40 - 140	25	
C16 - Hexadecane	ND	0.67	72	74	2.7	64	57	11.6	40 - 140	25	
C18 - Octadecane	ND	0.67	81	84	3.6	73	66	10.1	40 - 140	25	
C19 - Nonadecane	ND	0.67	79	81	2.5	71	65	8.8	40 - 140	25	
C20 - Eicosane	ND	0.67	80	82	2.5	72	66	8.7	40 - 140	25	
C22 - Docosane	ND	0.67	82	84	2.4	75	69	8.3	40 - 140	25	
C24 - Tetracosane	ND	0.67	83	85	2.4	77	72	6.7	40 - 140	25	
C26 - Hexacosane	ND	0.67	82	84	2.4	77	73	5.3	40 - 140	25	
C28 - Octacosane	ND	0.67	83	84	1.2	77	74	4.0	40 - 140	25	
C30 - Tricotane	ND	0.67	82	84	2.4	77	76	1.3	40 - 140	25	
C36 - Hexatriacontane	ND	0.67	57	58	1.7	53	52	1.9	40 - 140	25	
% 1-chlorooctadecane (aliphatic)	92	%	78	80	2.5	72	64	11.8	40 - 140	25	
% o-terphenyl (aromatic)	81	%	76	78	2.6	65	57	13.1	40 - 140	25	
% 2-Fluorobiphenyl (Fractionation)	88	%	90	87	3.4	81	76	6.4	40 - 140	25	
% 2-Bromonaphthalene (Fractionati	87	%	82	77	6.3	80	71	11.9	40 - 140	25	
% 2-Methylnaphthalene BT		%	0	0	NC				0 - 5		
% Naphthalene BT		%	0	0	NC				0 - 5		

Comment:

Additional EPH fractionation criteria: Breakthrough criteria (BT) is 0 to 5%

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 669837 (ug/Kg), QC Sample No: CN65866 2X (CN66614, CN66615)										
Polychlorinated Biphenyls - Sediment										
PCB-1016	ND	33	86	91	5.6	98	97	1.0	40 - 140	30
PCB-1221	ND	33							40 - 140	30
PCB-1232	ND	33							40 - 140	30
PCB-1242	ND	33							40 - 140	30
PCB-1248	ND	33							40 - 140	30
PCB-1254	ND	33							40 - 140	30
PCB-1260	ND	33	89	94	5.5	94	94	0.0	40 - 140	30
PCB-1262	ND	33							40 - 140	30
PCB-1268	ND	33							40 - 140	30
% DCBP (Surrogate Rec)	98	%	93	98	5.2	90	91	1.1	30 - 150	30
% DCBP (Surrogate Rec) (Confirm	96	%	95	101	6.1	92	94	2.2	30 - 150	30
% TCMX (Surrogate Rec)	70	%	81	84	3.6	89	88	1.1	30 - 150	30

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
% TCMX (Surrogate Rec) (Confirm	80	%	88	89	1.1	95	93	2.1	30 - 150	30
QA/QC Batch 670019 (ug/Kg), QC Sample No: CN67140 2X (CN66616)										
Polychlorinated Biphenyls - Sediment										
PCB-1016	ND	33	101	108	6.7	111	106	4.6	40 - 140	30
PCB-1221	ND	33							40 - 140	30
PCB-1232	ND	33							40 - 140	30
PCB-1242	ND	33							40 - 140	30
PCB-1248	ND	33							40 - 140	30
PCB-1254	ND	33							40 - 140	30
PCB-1260	ND	33	101	107	5.8	105	102	2.9	40 - 140	30
PCB-1262	ND	33							40 - 140	30
PCB-1268	ND	33							40 - 140	30
% DCBP (Surrogate Rec)	100	%	99	107	7.8	100	100	0.0	30 - 150	30
% DCBP (Surrogate Rec) (Confirm	97	%	102	110	7.5	102	100	2.0	30 - 150	30
% TCMX (Surrogate Rec)	74	%	85	91	6.8	94	89	5.5	30 - 150	30
% TCMX (Surrogate Rec) (Confirm	84	%	92	100	8.3	102	97	5.0	30 - 150	30
QA/QC Batch 669835 (ug/kg), QC Sample No: CN67251 (CN66614, CN66615, CN66616)										
Polynuclear Aromatic HC - Sediment										
2-Methylnaphthalene	ND	230	78	80	2.5	77			40 - 140	30
Acenaphthene	ND	230	69	72	4.3	68			40 - 140	30
Acenaphthylene	ND	230	72	76	5.4	71			40 - 140	30
Anthracene	ND	230	77	84	8.7	73			40 - 140	30
Benz(a)anthracene	ND	230	68	76	11.1	69			40 - 140	30
Benzo(a)pyrene	ND	230	85	92	7.9	81			40 - 140	30
Benzo(b)fluoranthene	ND	230	72	78	8.0	73			40 - 140	30
Benzo(ghi)perylene	ND	230	78	87	10.9	62			40 - 140	30
Benzo(k)fluoranthene	ND	230	67	74	9.9	68			40 - 140	30
Chrysene	ND	230	70	79	12.1	70			40 - 140	30
Dibenz(a,h)anthracene	ND	230	78	86	9.8	64			40 - 140	30
Fluoranthene	ND	230	69	74	7.0	63			40 - 140	30
Fluorene	ND	230	78	82	5.0	76			40 - 140	30
Indeno(1,2,3-cd)pyrene	ND	230	86	96	11.0	70			40 - 140	30
Naphthalene	ND	230	71	72	1.4	70			40 - 140	30
Phenanthrene	ND	230	72	78	8.0	70			40 - 140	30
Pyrene	ND	230	67	73	8.6	63			40 - 140	30
% 2-Fluorobiphenyl	67	%	71	73	2.8	69			30 - 130	30
% Nitrobenzene-d5	70	%	80	80	0.0	83			30 - 130	30
% Terphenyl-d14	67	%	66	72	8.7	64			30 - 130	30

Comment:

This batch consists of a Blank, LCS, LCSD and MS.

Additional 8270 criteria: 10% of compounds can be outside of acceptance criteria as long as recovery is at least 10%. (Acid surrogates acceptance range for aqueous samples: 10-110%, for soils 30-130%)

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
QA/QC Batch 669889 (ug/kg), QC Sample No: CN67968 (CN66614, CN66615)										
Volatiles - Sediment (Low Level)										
1,1,1,2-Tetrachloroethane	ND	5.0	109	107	1.9	94	96	2.1	70 - 130	20
1,1,1-Trichloroethane	ND	5.0	100	98	2.0	94	95	1.1	70 - 130	20
1,1,2,2-Tetrachloroethane	ND	3.0	90	91	1.1	87	85	2.3	70 - 130	20
1,1,2-Trichloroethane	ND	5.0	98	98	0.0	93	90	3.3	70 - 130	20
1,1-Dichloroethane	ND	5.0	95	93	2.1	91	89	2.2	70 - 130	20
1,1-Dichloroethene	ND	5.0	93	91	2.2	90	88	2.2	70 - 130	20
1,1-Dichloropropene	ND	5.0	95	90	5.4	95	93	2.1	70 - 130	20

QA/QC Data

SDG I.D.: GCN66614

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits	
1,2,3-Trichlorobenzene	ND	5.0	88	85	3.5	66	60	9.5	70 - 130	20	m
1,2,3-Trichloropropane	ND	5.0	94	96	2.1	88	85	3.5	70 - 130	20	
1,2,4-Trichlorobenzene	ND	5.0	86	80	7.2	67	62	7.8	70 - 130	20	m
1,2,4-Trimethylbenzene	ND	1.0	91	87	4.5	87	83	4.7	70 - 130	20	
1,2-Dibromo-3-chloropropane	ND	5.0	124	129	4.0	103	105	1.9	70 - 130	20	
1,2-Dibromoethane	ND	5.0	103	104	1.0	96	93	3.2	70 - 130	20	
1,2-Dichlorobenzene	ND	5.0	92	87	5.6	78	76	2.6	70 - 130	20	
1,2-Dichloroethane	ND	5.0	95	95	0.0	88	85	3.5	70 - 130	20	
1,2-Dichloropropane	ND	5.0	97	96	1.0	96	93	3.2	70 - 130	20	
1,3,5-Trimethylbenzene	ND	1.0	91	87	4.5	90	86	4.5	70 - 130	20	
1,3-Dichlorobenzene	ND	5.0	89	83	7.0	78	75	3.9	70 - 130	20	
1,3-Dichloropropane	ND	5.0	99	99	0.0	94	91	3.2	70 - 130	20	
1,4-Dichlorobenzene	ND	5.0	86	81	6.0	77	73	5.3	70 - 130	20	
1,4-dioxane	ND	100	103	94	9.1	95	91	4.3	40 - 160	20	
2,2-Dichloropropane	ND	5.0	102	108	5.7	95	105	10.0	70 - 130	20	
2-Chlorotoluene	ND	5.0	92	87	5.6	87	85	2.3	70 - 130	20	
2-Hexanone	ND	25	96	101	5.1	85	83	2.4	40 - 160	20	
2-Isopropyltoluene	ND	5.0	94	89	5.5	89	85	4.6	70 - 130	20	
4-Chlorotoluene	ND	5.0	88	83	5.8	84	81	3.6	70 - 130	20	
4-Methyl-2-pentanone	ND	25	101	103	2.0	93	90	3.3	40 - 160	20	
Acetone	ND	10	83	79	4.9	67	64	4.6	40 - 160	20	
Acrylonitrile	ND	5.0	99	95	4.1	70	77	9.5	70 - 130	20	
Benzene	ND	1.0	95	93	2.1	93	92	1.1	70 - 130	20	
Bromobenzene	ND	5.0	92	89	3.3	84	82	2.4	70 - 130	20	
Bromochloromethane	ND	5.0	99	99	0.0	94	94	0.0	70 - 130	20	
Bromodichloromethane	ND	5.0	100	100	0.0	89	91	2.2	70 - 130	20	
Bromoform	ND	5.0	107	109	1.9	83	88	5.8	70 - 130	20	
Bromomethane	ND	5.0	93	92	1.1	80	77	3.8	40 - 160	20	
Carbon Disulfide	ND	5.0	83	81	2.4	78	76	2.6	70 - 130	20	
Carbon tetrachloride	ND	5.0	103	99	4.0	88	93	5.5	70 - 130	20	
Chlorobenzene	ND	5.0	93	89	4.4	88	86	2.3	70 - 130	20	
Chloroethane	ND	5.0	91	89	2.2	85	85	0.0	70 - 130	20	
Chloroform	ND	5.0	93	92	1.1	91	89	2.2	70 - 130	20	
Chloromethane	ND	5.0	87	87	0.0	82	79	3.7	40 - 160	20	
cis-1,2-Dichloroethene	ND	5.0	95	94	1.1	95	90	5.4	70 - 130	20	
cis-1,3-Dichloropropene	ND	5.0	104	101	2.9	93	94	1.1	70 - 130	20	
Dibromochloromethane	ND	3.0	107	108	0.9	90	94	4.3	70 - 130	20	
Dibromomethane	ND	5.0	97	98	1.0	92	91	1.1	70 - 130	20	
Dichlorodifluoromethane	ND	5.0	77	72	6.7	69	67	2.9	40 - 160	20	
Diethyl ether	ND	5.0	86	89	3.4	80	79	1.3	70 - 130	20	
Di-isopropyl ether	ND	5.0	94	96	2.1	92	89	3.3	70 - 130	20	
Ethyl tert-butyl ether	ND	5.0	103	109	5.7	108	105	2.8	70 - 130	20	
Ethylbenzene	ND	1.0	94	91	3.2	95	91	4.3	70 - 130	20	
Hexachlorobutadiene	ND	5.0	90	84	6.9	69	66	4.4	70 - 130	20	m
Isopropylbenzene	ND	1.0	92	89	3.3	94	90	4.3	70 - 130	20	
m&p-Xylene	ND	2.0	93	89	4.4	91	89	2.2	70 - 130	20	
Methyl ethyl ketone	ND	5.0	86	89	3.4	75	72	4.1	40 - 160	20	
Methyl t-butyl ether (MTBE)	ND	1.0	99	101	2.0	94	90	4.3	70 - 130	20	
Methylene chloride	ND	5.0	91	90	1.1	86	85	1.2	70 - 130	20	
Naphthalene	ND	5.0	99	100	1.0	73	69	5.6	70 - 130	20	m
n-Butylbenzene	ND	1.0	90	85	5.7	84	81	3.6	70 - 130	20	
n-Propylbenzene	ND	1.0	92	86	6.7	90	87	3.4	70 - 130	20	
o-Xylene	ND	2.0	94	90	4.3	92	88	4.4	70 - 130	20	

QA/QC Data

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
p-Isopropyltoluene	ND	1.0	93	88	5.5	90	86	4.5	70 - 130	20
sec-Butylbenzene	ND	1.0	93	88	5.5	90	86	4.5	70 - 130	20
Styrene	ND	5.0	95	92	3.2	87	84	3.5	70 - 130	20
tert-amyl methyl ether	ND	5.0	105	108	2.8	103	102	1.0	70 - 130	20
tert-Butylbenzene	ND	1.0	95	90	5.4	92	88	4.4	70 - 130	20
Tetrachloroethene	ND	5.0	93	88	5.5	93	90	3.3	70 - 130	20
Tetrahydrofuran (THF)	ND	5.0	91	95	4.3	88	86	2.3	70 - 130	20
Toluene	ND	1.0	94	93	1.1	94	92	2.2	70 - 130	20
trans-1,2-Dichloroethene	ND	5.0	94	90	4.3	91	90	1.1	70 - 130	20
trans-1,3-Dichloropropene	ND	5.0	107	105	1.9	91	94	3.2	70 - 130	20
trans-1,4-dichloro-2-butene	ND	5.0	115	117	1.7	93	97	4.2	70 - 130	20
Trichloroethene	ND	5.0	96	91	5.3	93	92	1.1	70 - 130	20
Trichlorofluoromethane	ND	5.0	90	85	5.7	85	83	2.4	70 - 130	20
Trichlorotrifluoroethane	ND	5.0	83	78	6.2	84	81	3.6	70 - 130	20
Vinyl chloride	ND	5.0	86	84	2.4	81	79	2.5	70 - 130	20
% 1,2-dichlorobenzene-d4	99	%	101	101	0.0	101	100	1.0	70 - 130	20
% Bromofluorobenzene	97	%	99	100	1.0	98	98	0.0	70 - 130	20
% Dibromofluoromethane	99	%	99	102	3.0	98	97	1.0	70 - 130	20
% Toluene-d8	98	%	100	100	0.0	100	100	0.0	70 - 130	20

Comment:

Additional 8260 criteria: 10% of compounds can be outside of acceptance criteria as long as recovery is 10%.
The RPD criteria for the LCS/LCSD is 20%,
The MS/MSD RPD criteria is listed above.

QA/QC Batch 669979 (ug/kg), QC Sample No: CN69129 (CN66616)

Volatiles - Sediment (Low Level)

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
1,1,1,2-Tetrachloroethane	ND	5.0	112	113	0.9	111	114	2.7	70 - 130	20
1,1,1-Trichloroethane	ND	5.0	97	102	5.0	102	105	2.9	70 - 130	20
1,1,2,2-Tetrachloroethane	ND	3.0	97	102	5.0	102	100	2.0	70 - 130	20
1,1,2-Trichloroethane	ND	5.0	102	103	1.0	103	102	1.0	70 - 130	20
1,1-Dichloroethane	ND	5.0	96	101	5.1	102	105	2.9	70 - 130	20
1,1-Dichloroethene	ND	5.0	96	97	1.0	99	102	3.0	70 - 130	20
1,1-Dichloropropene	ND	5.0	104	104	0.0	108	107	0.9	70 - 130	20
1,2,3-Trichlorobenzene	ND	5.0	108	110	1.8	111	110	0.9	70 - 130	20
1,2,3-Trichloropropane	ND	5.0	92	100	8.3	99	97	2.0	70 - 130	20
1,2,4-Trichlorobenzene	ND	5.0	103	103	0.0	104	107	2.8	70 - 130	20
1,2,4-Trimethylbenzene	ND	1.0	102	103	1.0	107	108	0.9	70 - 130	20
1,2-Dibromo-3-chloropropane	ND	5.0	120	126	4.9	120	117	2.5	70 - 130	20
1,2-Dibromoethane	ND	5.0	106	109	2.8	105	107	1.9	70 - 130	20
1,2-Dichlorobenzene	ND	5.0	103	104	1.0	105	108	2.8	70 - 130	20
1,2-Dichloroethane	ND	5.0	97	98	1.0	97	97	0.0	70 - 130	20
1,2-Dichloropropane	ND	5.0	102	103	1.0	104	104	0.0	70 - 130	20
1,3,5-Trimethylbenzene	ND	1.0	104	105	1.0	110	110	0.0	70 - 130	20
1,3-Dichlorobenzene	ND	5.0	101	102	1.0	105	107	1.9	70 - 130	20
1,3-Dichloropropane	ND	5.0	100	103	3.0	102	103	1.0	70 - 130	20
1,4-Dichlorobenzene	ND	5.0	101	102	1.0	104	106	1.9	70 - 130	20
1,4-dioxane	ND	100	104	112	7.4	113	118	4.3	40 - 160	20
2,2-Dichloropropane	ND	5.0	103	105	1.9	105	107	1.9	70 - 130	20
2-Chlorotoluene	ND	5.0	108	108	0.0	113	113	0.0	70 - 130	20
2-Hexanone	ND	25	84	87	3.5	83	80	3.7	40 - 160	20
2-Isopropyltoluene	ND	5.0	105	106	0.9	111	112	0.9	70 - 130	20
4-Chlorotoluene	ND	5.0	103	104	1.0	109	110	0.9	70 - 130	20
4-Methyl-2-pentanone	ND	25	88	92	4.4	90	84	6.9	40 - 160	20

QA/QC Data

SDG I.D.: GCN66614

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits
Acetone	ND	10	65	71	8.8	62	61	1.6	40 - 160	20
Acrylonitrile	ND	5.0	86	91	5.6	87	88	1.1	70 - 130	20
Benzene	ND	1.0	103	104	1.0	105	105	0.0	70 - 130	20
Bromobenzene	ND	5.0	110	111	0.9	114	117	2.6	70 - 130	20
Bromochloromethane	ND	5.0	98	103	5.0	102	104	1.9	70 - 130	20
Bromodichloromethane	ND	5.0	107	110	2.8	107	109	1.9	70 - 130	20
Bromoform	ND	5.0	116	121	4.2	108	112	3.6	70 - 130	20
Bromomethane	ND	5.0	81	86	6.0	84	83	1.2	40 - 160	20
Carbon Disulfide	ND	5.0	93	95	2.1	93	97	4.2	70 - 130	20
Carbon tetrachloride	ND	5.0	104	108	3.8	107	109	1.9	70 - 130	20
Chlorobenzene	ND	5.0	102	104	1.9	103	106	2.9	70 - 130	20
Chloroethane	ND	5.0	78	79	1.3	81	86	6.0	70 - 130	20
Chloroform	ND	5.0	94	97	3.1	98	100	2.0	70 - 130	20
Chloromethane	ND	5.0	87	88	1.1	86	87	1.2	40 - 160	20
cis-1,2-Dichloroethene	ND	5.0	98	103	5.0	106	108	1.9	70 - 130	20
cis-1,3-Dichloropropene	ND	5.0	112	114	1.8	111	112	0.9	70 - 130	20
Dibromochloromethane	ND	3.0	115	117	1.7	111	116	4.4	70 - 130	20
Dibromomethane	ND	5.0	106	107	0.9	107	105	1.9	70 - 130	20
Dichlorodifluoromethane	ND	5.0	80	81	1.2	80	81	1.2	40 - 160	20
Diethyl ether	ND	5.0	75	78	3.9	79	81	2.5	70 - 130	20
Di-isopropyl ether	ND	5.0	92	96	4.3	97	90	7.5	70 - 130	20
Ethyl tert-butyl ether	ND	5.0	92	96	4.3	96	98	2.1	70 - 130	20
Ethylbenzene	ND	1.0	103	104	1.0	106	108	1.9	70 - 130	20
Hexachlorobutadiene	ND	5.0	113	111	1.8	121	121	0.0	70 - 130	20
Isopropylbenzene	ND	1.0	110	111	0.9	115	116	0.9	70 - 130	20
m&p-Xylene	ND	2.0	102	104	1.9	104	107	2.8	70 - 130	20
Methyl ethyl ketone	ND	5.0	74	81	9.0	76	76	0.0	40 - 160	20
Methyl t-butyl ether (MTBE)	ND	1.0	86	90	4.5	89	90	1.1	70 - 130	20
Methylene chloride	ND	5.0	84	87	3.5	88	91	3.4	70 - 130	20
Naphthalene	ND	5.0	108	111	2.7	108	107	0.9	70 - 130	20
n-Butylbenzene	ND	1.0	103	103	0.0	110	112	1.8	70 - 130	20
n-Propylbenzene	ND	1.0	107	108	0.9	114	115	0.9	70 - 130	20
o-Xylene	ND	2.0	103	106	2.9	108	108	0.0	70 - 130	20
p-Isopropyltoluene	ND	1.0	106	106	0.0	112	114	1.8	70 - 130	20
sec-Butylbenzene	ND	1.0	105	106	0.9	111	112	0.9	70 - 130	20
Styrene	ND	5.0	96	97	1.0	97	99	2.0	70 - 130	20
tert-amyl methyl ether	ND	5.0	97	99	2.0	97	97	0.0	70 - 130	20
tert-Butylbenzene	ND	1.0	108	109	0.9	114	115	0.9	70 - 130	20
Tetrachloroethene	ND	5.0	111	109	1.8	116	115	0.9	70 - 130	20
Tetrahydrofuran (THF)	ND	5.0	81	89	9.4	87	83	4.7	70 - 130	20
Toluene	ND	1.0	104	105	1.0	108	107	0.9	70 - 130	20
trans-1,2-Dichloroethene	ND	5.0	94	97	3.1	99	102	3.0	70 - 130	20
trans-1,3-Dichloropropene	ND	5.0	114	113	0.9	109	110	0.9	70 - 130	20
trans-1,4-dichloro-2-butene	ND	5.0	129	130	0.8	122	121	0.8	70 - 130	20
Trichloroethene	ND	5.0	106	106	0.0	107	108	0.9	70 - 130	20
Trichlorofluoromethane	ND	5.0	89	90	1.1	93	96	3.2	70 - 130	20
Trichlorotrifluoroethane	ND	5.0	91	91	0.0	99	101	2.0	70 - 130	20
Vinyl chloride	ND	5.0	85	87	2.3	86	86	0.0	70 - 130	20
% 1,2-dichlorobenzene-d4	98	%	102	101	1.0	102	102	0.0	70 - 130	20
% Bromofluorobenzene	96	%	96	96	0.0	94	94	0.0	70 - 130	20
% Dibromofluoromethane	96	%	99	103	4.0	104	102	1.9	70 - 130	20
% Toluene-d8	93	%	100	100	0.0	100	99	1.0	70 - 130	20

QA/QC Data

SDG I.D.: GCN66614

Parameter	Blank	Blk RL	LCS %	LCSD %	LCS RPD	MS %	MSD %	MS RPD	% Rec Limits	% RPD Limits

Comment:

Additional 8260 criteria: 10% of compounds can be outside of acceptance criteria as long as recovery is 10%.
The RPD criteria for the LCS/LCSD is 20%,
The MS/MSD RPD criteria is listed above.

l = This parameter is outside laboratory LCS/LCSD specified recovery limits.
m = This parameter is outside laboratory MS/MSD specified recovery limits.
r = This parameter is outside laboratory RPD specified recovery limits.

If there are any questions regarding this data, please call Phoenix Client Services at extension 200.

RPD - Relative Percent Difference
LCS - Laboratory Control Sample
LCSD - Laboratory Control Sample Duplicate
MS - Matrix Spike
MS Dup - Matrix Spike Duplicate
NC - No Criteria
Intf - Interference

Phyllis Shiller, Laboratory Director
April 04, 2023

Tuesday, April 04, 2023

Criteria: None

State: MA

Sample Criteria Exceedances Report

GCN66614 - TRC-RI

SampNo	Acode	Phoenix Analyte	Criteria	Result	RL	Criteria	RL Criteria	Analysis Units

*** No Data to Display ***

Phoenix Laboratories does not assume responsibility for the data contained in this exceedance report. It is provided as an additional tool to identify requested criteria exceedences. All efforts are made to ensure the accuracy of the data (obtained from appropriate agencies). A lack of exceedence information does not necessarily suggest conformance to the criteria. It is ultimately the site professional's responsibility to determine appropriate compliance.

Environmental Laboratories, Inc.
587 East Middle Turnpike, P.O.Box 370, Manchester, CT 06045
Tel. (860) 645-1102 Fax (860) 645-0823

NY # 11301

Analysis Comments

April 04, 2023 SDG I.D.: GCN66614

The following analysis comments are made regarding exceptions to criteria not already noted in the Analysis Report or QA/QC Report:

VOA Narration

CHEM18 03/27/23-2: CN66616

The following Initial Calibration compounds did not meet RSD% criteria: 1,2-Dibromo-3-chloropropane 26% (20%), Acetone 29% (20%), Bromoform 28% (20%), cis-1,3-Dichloropropene 21% (20%), Dibromochloromethane 24% (20%), trans-1,3-Dichloropropene 24% (20%), trans-1,4-dichloro-2-butene 37% (20%)
The following Initial Calibration compounds did not meet maximum RSD% criteria: None.
The following Initial Calibration compounds did not meet recommended response factors: Bromoform 0.082 (0.1), Tetrachloroethene 0.197 (0.2)
The following Initial Calibration compounds did not meet minimum response factors: None.

The following Continuing Calibration compounds did not meet % deviation criteria: trans-1,4-dichloro-2-butene 36%H (30%)
The following Continuing Calibration compounds did not meet Maximum % deviation criteria: None.

Up to eight compounds can be outside of ICAL %RSD criteria and up to sixteen compounds can be outside of CCAL %Dev criteria if less than 40%.

CHEM26 03/24/23-2: CN66614, CN66615

The following Initial Calibration compounds did not meet RSD% criteria: 1,1,1,2-Tetrachloroethane 22% (20%), 1,2-Dibromo-3-chloropropane 31% (20%), Acetone 33% (20%), Bromoform 28% (20%), Dibromochloromethane 22% (20%), trans-1,3-Dichloropropene 25% (20%), trans-1,4-dichloro-2-butene 36% (20%)
The following Initial Calibration compounds did not meet maximum RSD% criteria: None.
The following Initial Calibration compounds did not meet recommended response factors: 1,2-Dibromo-3-chloropropane 0.049 (0.05), Bromoform 0.085 (0.1), Tetrachloroethene 0.172 (0.2)
The following Initial Calibration compounds did not meet minimum response factors: 1,2-Dibromo-3-chloropropane 0.049 (0.05)

Up to eight compounds can be outside of ICAL %RSD criteria and up to sixteen compounds can be outside of CCAL %Dev criteria if less than 40%.

CHAIN OF CUSTODY RECORD

PHOENIX Environmental Laboratories, Inc.

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Email Makrina Nolan: makrina@phoenixlabs.com Fax (860) 645-0823
Client Services (860) 645-1102

Cooler: Yes [x] No [ ]
Coolant: IPK [x] ICE [ ] No [ ]
Temp 2.5 °C Pg of

Data Delivery/Contact Options:
- [ ] Fax:
- [ ] Phone: → cnielsen@trccompanies.com
- [x] Email: [crossed out]

Customer: TRC Companies
Address: 10 Hemingway Drive
East Providence, RI 02915

Project: Dufresne Pond (#510516.0000.0000 Phase 1)
Project P.O:
Report to: jtreacy@trccompanies.com; cnielsen@trccompanies.com
Invoice to: bcabral@trccompanies.com
QUOTE #

This section MUST be completed with Bottle Quantities.

Client Sample - Information - Identification

Sampler's Signature: Joseph Beattie Date: 3/22/23

Matrix Code:
DW=Drinking Water GW=Ground Water SW=Surface Water WW=Waste Water
RW=Raw Water SE=Sediment SL=Sludge S=Soil SD=Solid W=Wipe OIL=Oil
B=Bulk L=Liquid X = ______(Other)

Analysis Request

PHOENIX USE ONLY SAMPLE #	Customer Sample Identification	Sample Matrix	Date Sampled	Time Sampled	Grain size	% water	TOC	Metals (As, Cd, Cr, Cu, Pb, Hg, Ni, Zn)	PCB	PAH	EPH	% Solids	Hi and low level VOC	MS/MSD *	GL Amber 4oz	Soil VOA Vials [ ] methanol [✓] H2O	GL Soil container (32) oz	GL Soil container (8) oz	40 ml VOA Vial [ ] As is [ ] HCL	GL Amber 1000ml [ ] As is [ ] H2SO4	PL As is [ ] 250ml [ ] 500ml [ ] 1000ml	PL H2SO4 [ ] 250ml [ ] 500ml	PL HNO3 250ml	PL NaOH 250ml	Bacteria Bottle w/thio	Bacteria Bottle as is	GL Soil 4oz clear
666614	SC-1	SE	3/22/23	1430	X	X	X	X	X	X	X	X	X		1	3	1	2									1
666615	SC-2	SE	3/22/23	1500	X	X	X	X	X	X	X	X	X		1	3	1	2									1
666616	SC-3	SE	3/22/23	1530	X	X	X	X	X	X	X	X	X		1	3	1	2									1

Relinquished by:	Accepted by:	Date:	Time:
Joseph Beattie (signature)	(signature)	3/23/23	1009
(signature)	(signature)	3/23/23	13:45

Comments, Special Requirements or Regulations:

*MS/MSD are considered site samples and will be billed as such in accordance with the prices quoted.

Turnaround Time:
- [ ] 1 Day*
- [ ] 2 Days*
- [ ] 3 Days*
- [x] Standard
- [ ] Other

* SURCHARGE APPLIES

RI
- [ ] (Residential) Direct Exposure
- [ ] (Comm/Industrial) Direct Exposure
- [ ] GA Leachability
- [ ] GB Leachability
- [ ] GA-GW Objectives
- [ ] GB-GW Objectives

CT
- [ ] RCP Cert
- [ ] GW Protection
- [ ] SW Protection
- [ ] GA Mobility
- [ ] GB Mobility
- [ ] Residential DEC
- [ ] I/C DEC
- [ ] Other

MA
- [ ] MCP Certification
- [ ] GW-1
- [ ] GW-2
- [ ] GW-3
- [ ] S-1 GW-1 [ ] S-1 GW-2 [ ] S-1 GW-3
- [ ] S-2 GW-1 [ ] S-2 GW-2 [ ] S-2 GW-3
- [ ] S-3 GW-1 [ ] S-3 GW-2 [ ] S-3 GW-3
- [ ] SW Protection
- [ ] MWRA eSMART
- [ ] S-1 10% CALC

State where samples were collected: MA

Data Format
- [x] Excel
- [x] PDF
- [ ] GIS/Key
- [ ] EQuIS
- [ ] Other

Data Package
- [ ] Tier II Checklist
- [ ] Full Data Package*
- [x] Phoenix Std Report
- [ ] Other

* SURCHARGE APPLIES

PEL-126 REV. 03/22

GRAIN SIZE DISTRIBUTION TEST DATA

3/28/2023

Client: : Phoenix Environmental Laboratories, Inc
Date: 03/28/2023
Project: : GCN 66614
Project Number: : GCN 66614
Location: Onsite
Depth: N/A
Sample Number: 217-23
Material Description: Marine Sediments
Liquid Limit: N/A
Plastic Limit: N/A
USCS Classification: N/A
AASHTO Classification: N/A
Test Date: 03/28/2023
Testing Remarks: ASTM C 117, ASTM C 136 (Sample ID= CN 66614)
Tested by: IC
Checked by: HC
Test Date: 03/28/2023 **Technician:** IC
Test remarks: ASTM C 117, ASTM C 136 (Sample ID= CN 66614)

Sieve Test Data (ASTM C117 & C136)

Post #200 Wash Test Weights (grams): Dry Specimen+Tare = 17.20
Tare Wt. = 0.00

Minus #200 from wash = 84.5%

Specimen Weights
Dry specimen+tare (gms.) = 111.30
Tare (gms.) = 0.00

Cumulative pan tare (gms.) = 0.00

Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Passing	Percent Retained
#4	0.00	100.0	0.0
#10	0.00	100.0	0.0
#40	5.00	95.5	4.5
#60	9.00	91.9	8.1
#100	15.20	86.3	13.7
#200	17.00	84.7	15.3

Pan + tare = 0 Tare = 0 Loss during sieving = 0.2%
Total loss (wash+pan/specimen) = 84.5%

Results

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.0	4.5	10.8	15.3			84.7

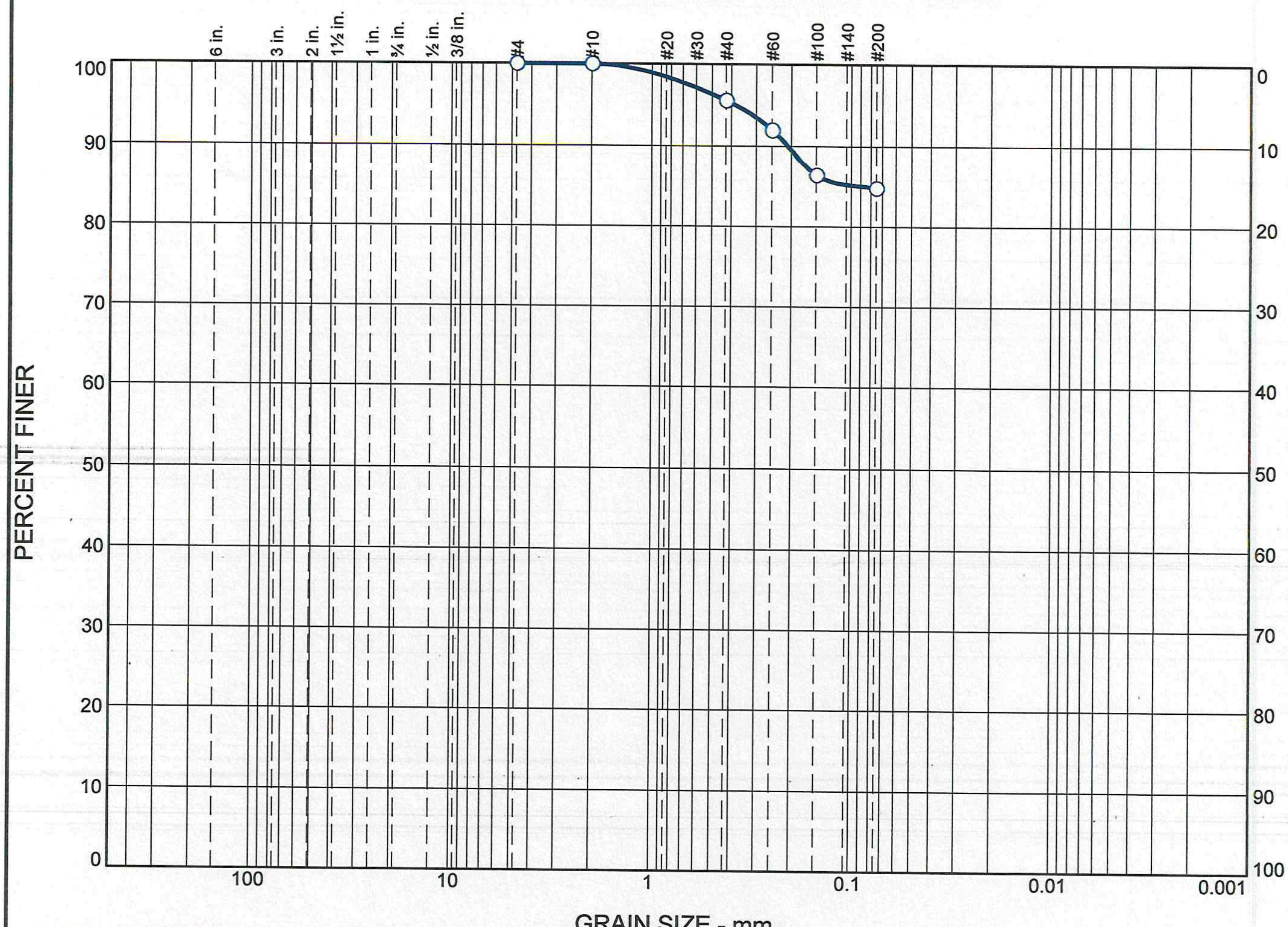
Distribution Data

Val	Diameter (mm.)
D_{5}	
D_{10}	
D_{15}	
D_{20}	
D_{30}	
D_{40}	
D_{50}	
D_{60}	
D_{80}	
D_{85}	0.0900
D_{90}	0.2100
D_{95}	0.3853

Fineness Modulus

0.24

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
o	0.0	0.0	0.0	0.0	4.5	10.8	84.7	

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	N/A	N/A	0.0900							

MATERIAL DESCRIPTION	TEST DATE	USCS	NM
o Marine Sediments	03/28/2023	N/A	

Project No. : GCN 66614 **Client:** : Phoenix Environmental Laboratories, Inc Date: 03/28/2023

Project: : GCN 66614

o **Source of Sample:** Onsite **Depth:** N/A **Sample Number:** 217-23

Remarks:

o ASTM C 117, ASTM C 136 (Sample ID= CN 66614)

Tri State Materials Testing Lab

Berlin, Connecticut

Figure

Tested By: IC **Checked By:** HC

GRAIN SIZE DISTRIBUTION TEST DATA **3/28/2023**

Client: : Phoenix Environmental Laboratories, Inc Date: 03/28/2023
Project: : GCN 66614
Project Number: : GCN 66614
Location: Onsite
Depth: N/A **Sample Number:** 218-23
Material Description: Marine Sediments
Liquid Limit: N/A **Plastic Limit:** N/A
USCS Classification: N/A **AASHTO Classification:** N/A
Test Date: 03/28/2023
Testing Remarks: ASTM C 117, ASTM C 136 (Sample ID= CN 66615)
Tested by: IC **Checked by:** HC
Test Date: 03/28/2023 **Technician:** IC
Test remarks: ASTM C 117, ASTM C 136 (Sample ID= CN 66615)

Sieve Test Data (ASTM C117 & C136)

Post #200 Wash Test Weights (grams): Dry Specimen+Tare = 7.30
Tare Wt. = 0.00

Minus #200 from wash = 90.7%

Specimen Weights
Dry specimen+tare (gms.) = 78.70
Tare (gms.) = 0.00

Cumulative pan tare (gms.) = 0.00

Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Passing	Percent Retained
#4	0.00	100.0	0.0
#10	0.00	100.0	0.0
#40	2.40	97.0	3.0
#60	3.40	95.7	4.3
#100	5.50	93.0	7.0
#200	7.20	90.9	9.1

Pan + tare = 0 Tare = 0 Loss during sieving = 0.1%
Total loss (wash+pan/specimen) = 90.7%

Tri State Materials Testing Lab

Results

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.0	3.0	6.1	9.1			90.9

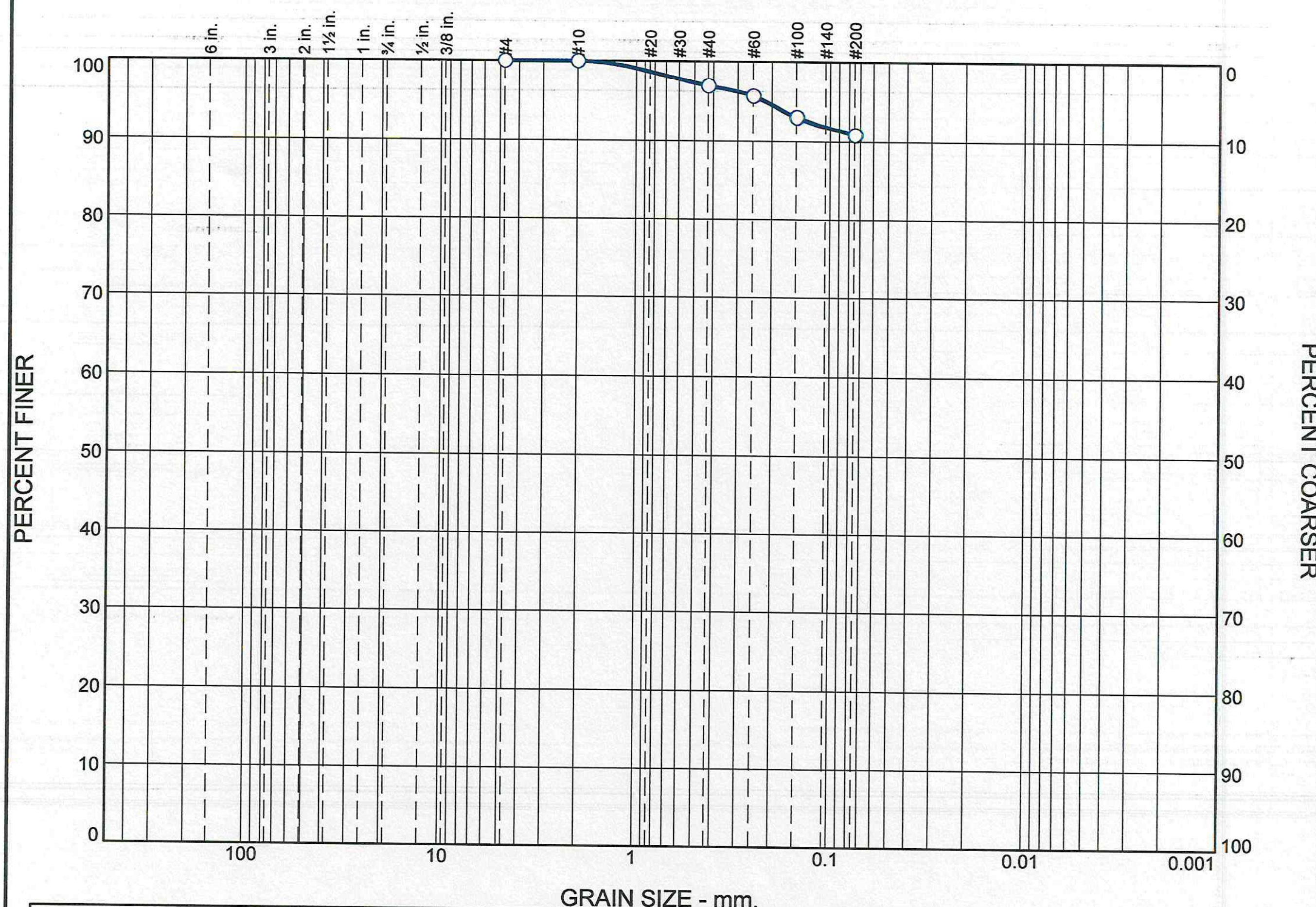
Distribution Data

Val	Diameter (mm.)
D_5	
D_{10}	
D_{15}	
D_{20}	
D_{30}	
D_{40}	
D_{50}	
D_{60}	
D_{80}	
D_{85}	
D_{90}	
D_{95}	0.2164

Fineness Modulus

0.14

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
o	0.0	0.0	0.0	0.0	3.0	6.1	90.9	

☒	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
o	N/A	N/A								

MATERIAL DESCRIPTION	TEST DATE	USCS	NM
o Marine Sediments	03/28/2023	N/A	

Project No. : GCN 66614 **Client:** : Phoenix Environmental Laboratories, Inc Date: 03/28/2023

Project: : GCN 66614

o **Source of Sample:** Onsite **Depth:** N/A **Sample Number:** 218-23

Remarks:

o ASTM C 117, ASTM C 136 (Sample ID= CN 66615)

Tri State Materials Testing Lab

Berlin, Connecticut

Figure

Tested By: IC **Checked By:** HC

GRAIN SIZE DISTRIBUTION TEST DATA

3/28/2023

Client: : Phoenix Environmental Laboratories, Inc

Date: 03/28/2023

Project: : GCN 66614

Project Number: : GCN 66614

Location: Onsite

Depth: N/A

Sample Number: 219-23

Material Description: Marine Sediments

Liquid Limit: N/A

Plastic Limit: N/A

USCS Classification: N/A

AASHTO Classification: N/A

Test Date: 03/28/2023

Testing Remarks: ASTM C 117, ASTM C 136 (Sample ID= CN 66616)

Tested by: IC

Checked by: HC

Test Date: 03/28/2023 **Technician:** IC

Test remarks: ASTM C 117, ASTM C 136 (Sample ID= CN 66616)

Sieve Test Data (ASTM C117 & C136)

Post #200 Wash Test Weights (grams): Dry Specimen+Tare = 4.40
Tare Wt. = 0.00

Minus #200 from wash = 93.3%

Specimen Weights
Dry specimen+tare (gms.) = 65.90
Tare (gms.) = 0.00

Cumulative pan tare (gms.) = 0.00

Sieve Opening Size	Cumulative Weight Retained (grams)	Percent Passing	Percent Retained
#4	0.00	100.0	0.0
#10	0.00	100.0	0.0
#40	0.60	99.1	0.9
#60	1.20	98.2	1.8
#100	2.50	96.2	3.8
#200	4.30	93.5	6.5

Pan + tare = 0 Tare = 0 Loss during sieving = 0.2%

Total loss (wash+pan/specimen) = 93.3%

Results

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.0	0.9	5.6	6.5			93.5

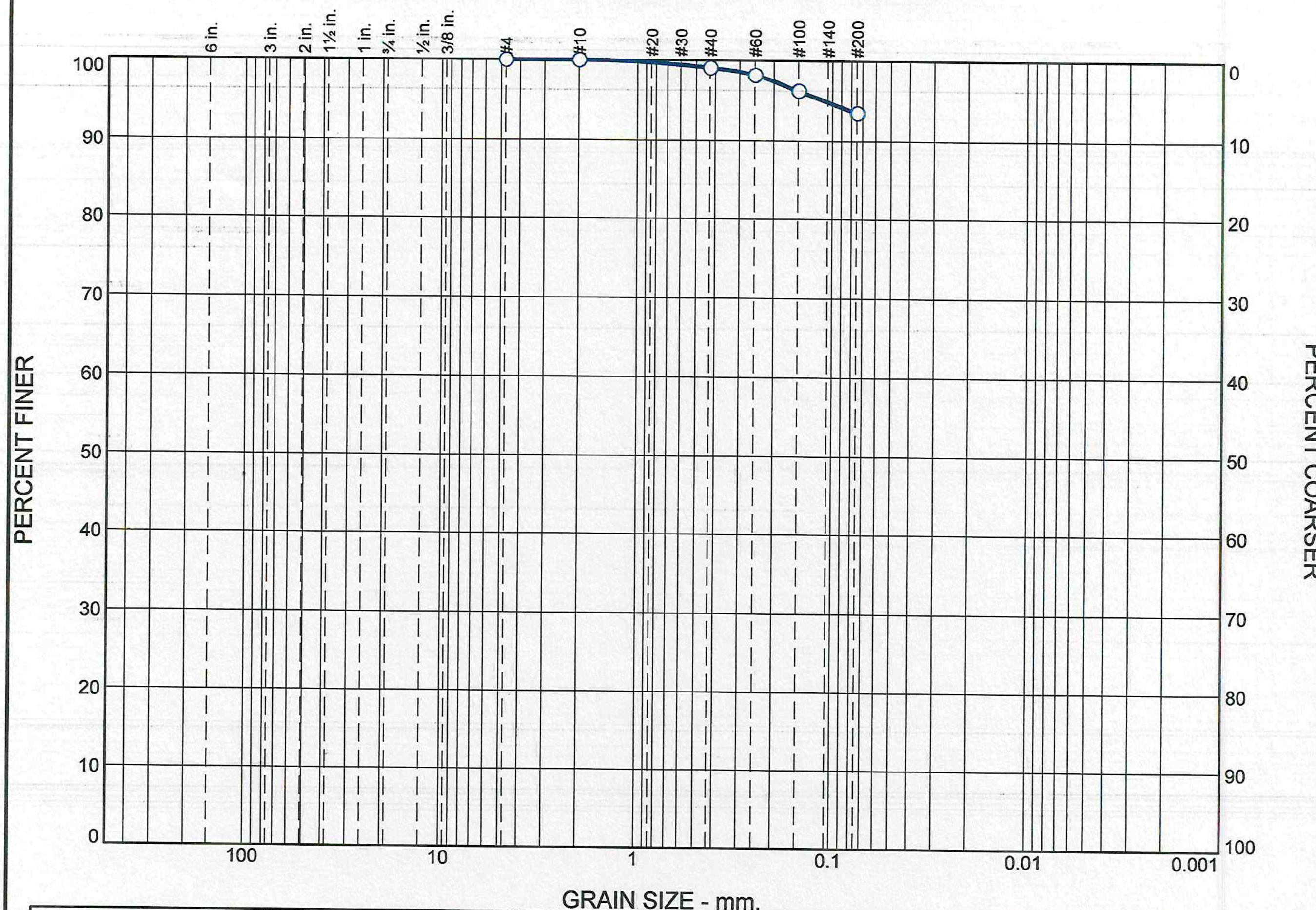
Distribution Data

Val	Diameter (mm.)
D_5	
D_{10}	
D_{15}	
D_{20}	
D_{30}	
D_{40}	
D_{50}	
D_{60}	
D_{80}	
D_{85}	
D_{90}	
D_{95}	0.1103

Fineness Modulus

0.06

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.0	0.9	5.6	93.5	

☒	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	N/A	N/A								

MATERIAL DESCRIPTION	TEST DATE	USCS	NM
○ Marine Sediments	03/28/2023	N/A	

Project No. : GCN 66614 **Client:** : Phoenix Environmental Laboratories, Inc Date: 03/28/2023

Project: : GCN 66614

○ **Source of Sample:** Onsite **Depth:** N/A **Sample Number:** 219-23

Remarks:

○ASTM C 117, ASTM C 136 (Sample ID= CN 66616)

Tri State Materials Testing Lab

Berlin, Connecticut

Figure

Tested By: IC **Checked By:** HC

Cooler: Yes ☐ No ☐
Coolant: IPK ☐ ICE ☐ No ☐
Temp °C Pg of

PHOENIX Environmental Laboratories, Inc.

CHAIN OF CUSTODY RECORD

Page 1 of 1

587 East Middle Turnpike, P.O. Box 370, Manchester, CT 06040
Email: info@phoenixlabs.com Fax (860) 645-0823
Client Services (860) 645-8726

Contact Options:
☐ Fax: 860-645-0823
☐ Phone: 800-827-5426
☐ Email: HelenG@PhoenixLabs.com

Customer: Tri State Materials Testing Lab
Address: 60 Woodland Rd
Berlin, CT
(203) 949-7733

Project #: GCN66614
Report to: HelenG@PhoenixLabs.com / Helen Geoghegan
Invoice to: AccountsPayable@PhoenixLabs.com
Quote# :

Project P.O: GCN66614

This section MUST be completed with Bottle Quantities.

Client Sample - Information - Identification

Sampler's Signature ________ Date: ________

Matrix Code:
DW=Drinking Water **GW**=Ground Water **SW**=Surface Water **WW**=Waste Water
RW=Raw Water **SE**=Sediment **SL**=Sludge **S**=Soil **SD**=Solid **W**=Wipe
OIL=Oil **B**=Bulk **L**=Liquid

Analysis Request

Phoenix Sample ID	Sample Comment	Sample Matrix	Date Sampled	Time Sampled	Sieve Test ASTM C136, C117	32 oz Glass Jar
CN66614		SED	3/22/2023	2:30 PM	x	1
CN66615		SED	3/22/2023	3:00 PM	x	1
CN66616		SED	3/22/2023	3:30 PM	x	1

Relinquished by:	Accepted by:	Date:	Time:
Kok Bailey		3-24-23	

Comments, Special Requirements or Regulations:

Turnaround:
☐ 1 Day
☐ 2 Days
☐ 3 Days
☐ 5 Days
☐ 10 Days
☒ Standard
☐ Other____

Report Type:
☒ Standard PDF
☐ Full Data Package
☐ NJ Reduced Deliverable
☐ NJ Full Deliverable
☐ NY ASP B

EDD Format:
☐ Excel
☐ GIS/Key
☐ EQuIS
☐ NJ Hazsite EDD
☐ NY EZ EDD (ASP)
☐ Other:____

State Criteria:

What State were samples collected? MA

Please send notice as soon as possible not exceeding 24 hours of obtaining valid data, of the results of all drinking water samples that exceed any EPA or Department-established maximum contaminant level, maximum residual disinfectant level or reportable concentration.

Please notify Phoenix Environmental Laboratories, Inc. immediately and prior to conducting analysis if certification is not held for the analyses requested.