Diagnostic and Feasibility Study for Hopedale Pond

Hopedale, Massachusetts

Prepared for:

Mr. Eugene Phillips
Town of Hopedale
Town Hall
Hopedale, MA 01747

Prepared by:

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ESS Project No. H153-000

May 11, 2009

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1.0 INTRODUCTION

ESS Group, Inc. (ESS) was contracted by the Town of Hopedale ("the Town") to conduct an investigation of Hopedale Pond and its watershed. The field assessment portion of the study was initiated during May 2008 and concluded in January 2009. Work was initiated to address potential sources of water quality impairment to the Town beach at the pond as well as to address the ongoing issue of invasive aquatic plants. The goal of the study was to provide sensible and long-term recommendations for improving conditions at the pond to benefit wildlife habitat and recreational opportunity.

Given that Hopedale Pond had not been thoroughly assessed in many years, an added benefit of this investigation was that high quality data was collected from both the pond and its watershed that can be reliably used to make sound management recommendations for improving conditions at the pond and to establish a set of reliable baseline data by which future improvements can be measured.

The current investigation was prompted by the Town of Hopedale, Massachusetts to provide information necessary to evaluate the hydrologic, nutrient, sediment, and other pollutant loading to Hopedale Pond and to develop short- and long-term management actions for the pond. These field investigations, combined with our review of several previously conducted studies of the pond, serve as the basis for the development of this Diagnostic and Feasibility Study.

The investigation of Hopedale Pond consisted of eighteen major components as originally defined by the town in their scope of services for the project:

1. Summary of all historical studies and previously implemented management actions for the pond and its watershed; including an evaluation of the current watershed management issues and practices;
2. Development of a Quality Assurance Project Plan (QAPP) for field sampling and laboratory analysis
3. Assessment of water quality within the pond and its watershed, including selected stormwater outfalls;
4. Creating a hydrologic and nutrient budget for the pond;
5. Mapping and assessment of the aquatic plant community;
6. Assessment of *E. coli* bacteria sources in the watershed;
7. Documenting pond rights and possible ramifications on recommended restoration activities;
8. Updating bathymetry of the pond and conducting a dredging feasibility analysis;
9. Development of a list of aquatic plant and sediment removal options with costs;
10. Review of past aquatic plant treatments and performance of a literature review of potential biological treatments, including bacteria and enzymes;
11. Identification of major storm drains discharging to the pond;
12. Developing and conducting a public education plan for the pond;

13. Recommending Canada goose control options for the pond;

14. Conducting a watershed survey to identify and document nonpoint sources of sediment and nutrients to the pond;

15. Drafting a diagnostic/feasibility study reporting including management recommendations

16. Conducting a seepage survey to test the existing sewer system along the eastern shoreline of the pond;

17. Assisting with public outreach;

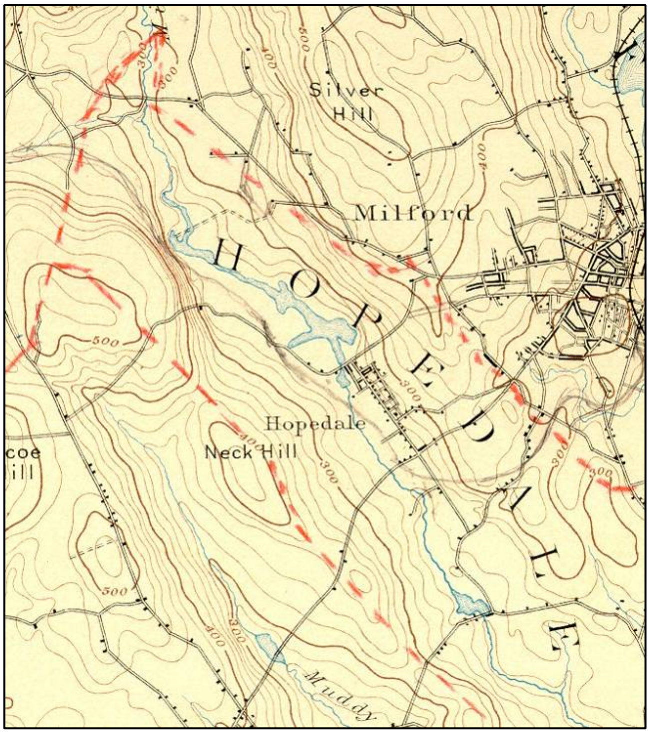
18. Developing a pilot program to address Canada goose issues.

The management plan provided at the end of the document has been specifically designed to 1) improve water quality conditions, particularly at the Town beach and 2) control nuisance aquatic vegetation, including the exotic invasive variable-leaf milfoil (*Myriophyllum heterophyllum*) and fanwort (*Cabomba caroliniana*). Although the fieldwork components of this study were concluded in January 2009, public education and outreach based on the results of the diagnostic/feasibility study is planned for summer of 2009.

2.0 METHODS AND APPROACH

This section of the report describes the specific protocols and procedures adopted throughout the course of the diagnostic and feasibility study of Hopedale Pond. A copy of the QAPP and the Standard Operating Guidelines (SOGs) that served as guidance for the collection and analysis of data for this project are included as Appendix A. A brief description of the data validation efforts for this project is provided with these documents in Appendix A.

2.1 Historical Issues and Previous Management of Hopedale Pond and its Watershed



Historical map of Hopedale (circa 1895).

ESS consulted The Hopedale Parks Department, Hopedale Board of Health and Massachusetts Department of Environmental Protection (MassDEP) to gather reports from previously performed studies as well as to obtain readily available data or information pertaining to Hopedale Pond and its watershed. The following sources were also reviewed:

1. Information on land use history and development in the watershed was compiled from a variety of sources, including historical land use and United States Geological Survey (USGS) topographic maps as well as Massachusetts forestry reports.

2. A review of previous findings and recommendations pertaining to Hopedale Pond and its watershed was conducted. This included a review of available reports and and correspondence dating back to 1899. Major historical studies and previous management actions at Hopedale Pond were summarized. This information was used to help evaluate past management recommendations and determine the relative degree of success any implemented actions had.

3. Information on current watershed and pond features was compiled from existing sources, including the most recent USGS topographic maps, wellhead protection maps and Massachusetts Geographic Information System (MassGIS) land-use data. Storm sewer maps provided by the Town of Hopedale were also reviewed. In addition, long-term climate information was compiled for the Hopedale Pond area from National Climate Data Center records.

The review of historical issues and past management actions allowed construction of a timeline of events in the history of Hopedale Pond and the Town Parklands that abut it. Hopedale Pond has a long history of problems with nuisance aquatic vegetation and a number of management actions have been taken over the years with varying degrees of success, including dredging, herbicide treatments, hydroraking, and wildlife management. Details on the results of this review are presented in Section 4.1.

2.2 Water Quality

An approach consistent with that outlined in the project specific QAPP (Appendix A), was used to sample surface water from Hopedale Pond and its tributaries. Throughout the study "dry weather" was defined as a period of at least 72 hours (3 days) with less than 0.1 inches of precipitation recorded, "wet weather" was defined as the first rain event that produces runoff (normally >0.25 inches) after a minimum period of 72 hours with less than 0.1 inches recorded. Weather data, forecasts and precipitation totals were tracked for the Hopedale Pond watershed through internet weather services, including the National Weather Service (www.weather.gov) and Weather Underground (www.wunderground.com). A summary of estimated daily precipitation in the Hopedale Pond watershed is included in Appendix B.

Water samples were collected in order to characterize water quality conditions at two in-pond stations, three tributary stations, and five selected storm water outfalls (Figure 1). The Hopedale Pond watershed was delineated and subdivided into major sub-basins, each of which corresponds to a tributary or in-pond sampling station (Figure 1). The storm water outfalls have very small sub-basins which are not depicted on the watershed map.

Sampling was conducted monthly during the months of May to November 2008 and in January 2009, unless otherwise noted. The following key tasks were completed:

1. **In-pond dissolved oxygen assessment:** The pond was surveyed at the pond's deepest location (Site 1) in the southern basin to document dissolved oxygen and temperature profiles during dry weather conditions throughout the period of study. These field-measured parameters were recorded at 0.5 meter intervals, from the water surface to the bottom of the pond.

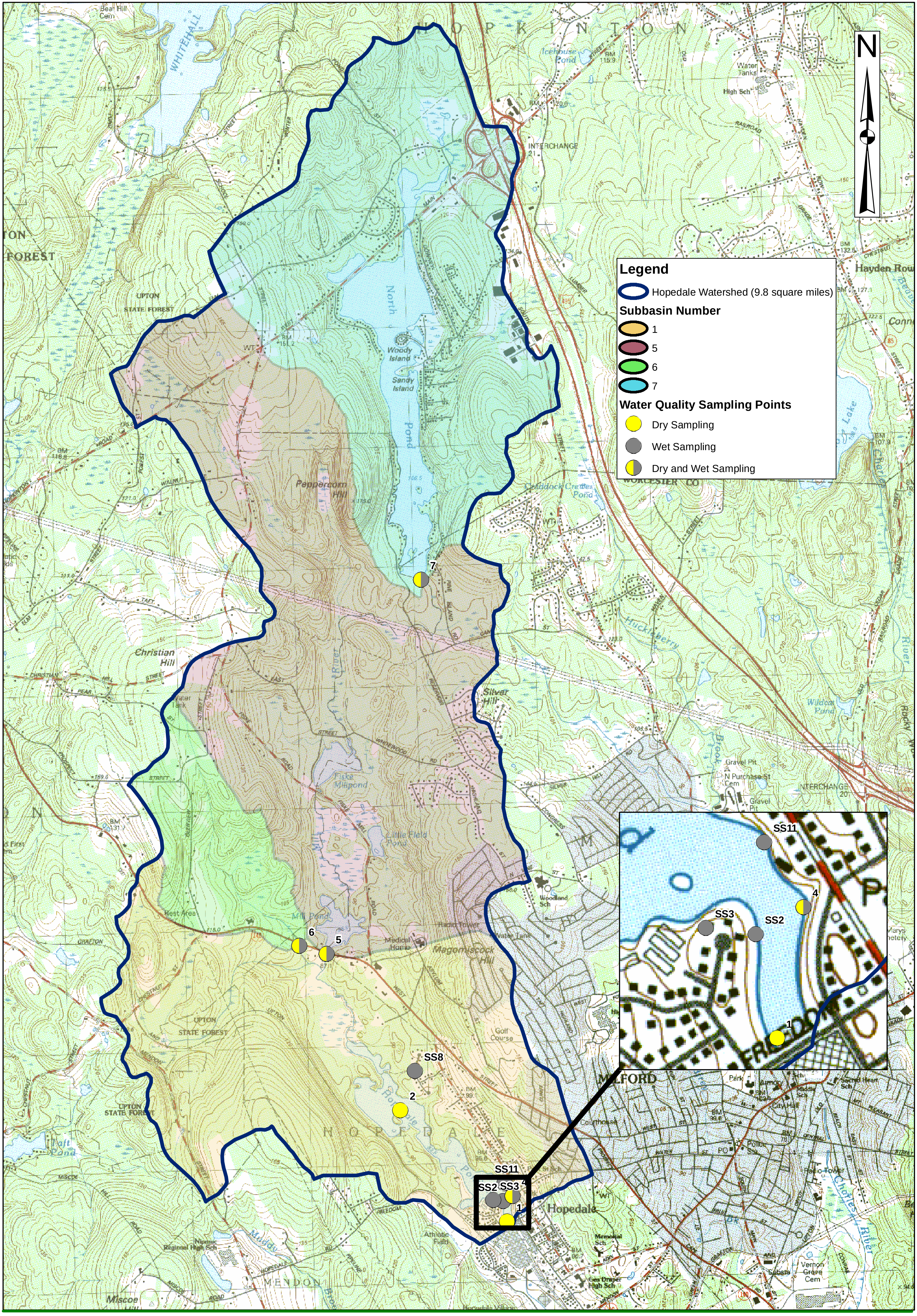
2. **In-pond water quality:** The pond was sampled at two locations (Sites 1 and 2) within its main basin to measure water quality characteristics during dry weather. Photographs of each site are presented in Appendix C. At Site 1, samples were collected from both the surface and bottom of the pond. Water samples were collected from the surface of the pond using grab sampling techniques and from the pond bottom using a Van Dorn style sampler. The samples were analyzed for *E. coli* bacteria (surface sample only), total suspended solids (TSS), chlorophyll *a* (surface sample only), total iron (bottom sample only), total phosphorus, dissolved phosphorus, nitrate nitrogen, nitrite nitrogen, total Kjeldahl nitrogen, and ammonia nitrogen.

   In addition, the following water quality parameters were assessed during each field visit at each sampling location, as applicable: Secchi disk transparency, temperature, dissolved oxygen, specific conductance, pH, color, and turbidity. The measurement technique for each of these parameters adhered to the QAPP guidelines developed specifically for Hopedale Pond (Appendix A).

3. **Tributary and outlet water quality:** Three Hopedale Pond tributary sites (Sites 5, 6, and 7) and one stormwater outfall (Site 4) were sampled using grab techniques to evaluate water quality on a monthly basis during dry weather periods. Photographs of these sites are presented in Appendix C. Wet weather water quality was also assessed at these sites during two storm events, on August 6 and November 13, 2008. Four additional stormwater outfall sites were also assessed during wet weather conditions, including sites SS2, SS3, SS8, and SS11. Sites 4, 5, 6 and SS11 were sampled during both storm events but Sites SS2, SS3, SS8 and 7 were only sampled on August 6, due to the limited duration of the targeted storm event on November 13.

   Water samples collected from all tributaries and the outlet were tested for *E. coli*, TSS, total phosphorus, dissolved phosphorus, nitrate nitrogen, nitrite nitrogen, total Kjeldahl nitrogen, and ammonia nitrogen. Field assessed parameters included: flow rate, temperature, dissolved oxygen, specific conductance, pH, color, and turbidity, as applicable in accordance with the QAPP (Appendix A).

Location: G:/GIS-Projects/H153-Hopedale Pond/00.mxd/FinalFigs/Watershed_11x17.mxd



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Scientists
Consultants

HOPEDALE POND
Hopedale, Massachusetts

Scale: 1" = 2,500'

Source: 1) MassGIS, USGS DRG, 1982-1985
2) MassGIS, Sub-basins, 2005; 3) ESS, Stations, 2008

0 0.5 1
Miles

Hopedale Pond Sub-basins and Sampling Stations

Figure 1

Collection of water quality samples from Site 4 outfall – "Dutcher Street" storm drain.

4. **Groundwater Quality:** The quantity and quality of groundwater entering Hopedale Pond was evaluated to assess non-point groundwater sources of nutrients that might have been entering the pond from along its immediate shoreline. Groundwater monitoring was conducted on two dates, July 30 and September 18, 2008, in order to characterize seasonal variability and to confirm sampling results.

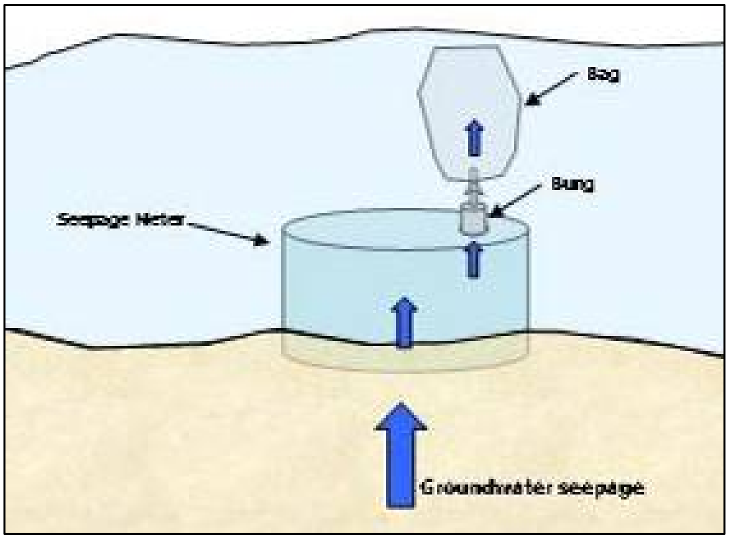
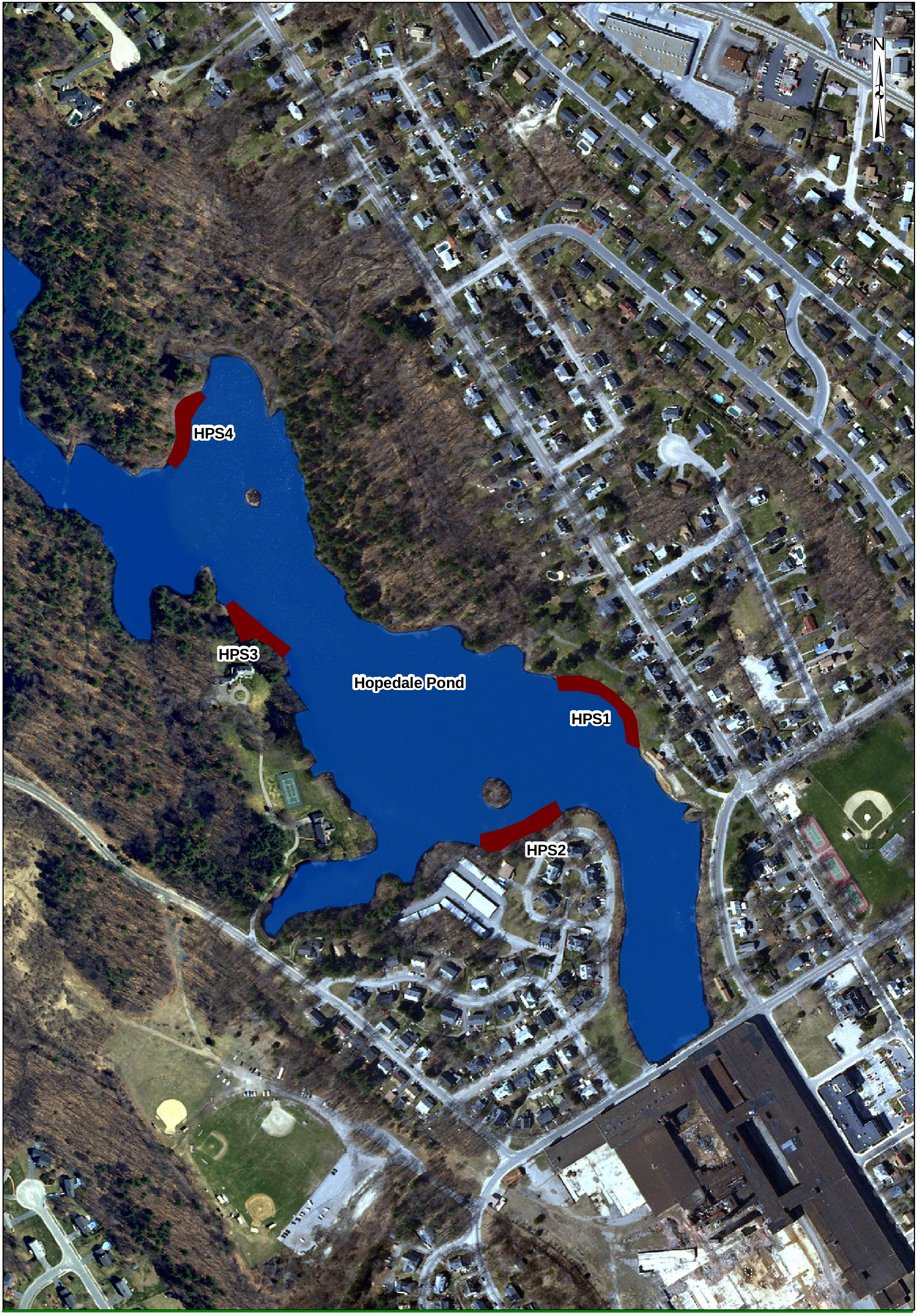


Diagram of an installed seepage meter.

The hydrologic connection between the pond and groundwater was evaluated using seepage meter surveys at four shoreline segments in the lower basin of the pond (Figure 2). A seepage meter is a device that allows investigators to quantify the flux of groundwater seepage into a pond along the shoreline. The seepage meter segments were selected based on surrounding topography, housing density and bottom substrate characteristics. Two of the four segments (Segments HPS1 and HPS2) were selected to characterize the high-density residential areas of the lower pond basin. Segment HPS3 was selected to characterize the influence of lower-density residential areas. Lastly, segment HPS4 was sited within an undeveloped portion of the pond as a control site. A total of eight seepage meters were temporarily installed within the pre-defined segments along the Hopedale Pond shoreline. Of the two meters deployed within each study segment, one was placed in relatively shallow water and the other was placed in somewhat deeper water. This was done to get a sense of groundwater seepage at differing depths. The exact placement of the seepage meters was determined by bottom substrate characteristics, since debris-free soft/small grained substrates such as silt or sand are required to ensure a tight seal around the base of the seepage meter.

Each seepage meter was left for in place for at least 2.0 hours, which is usually sufficient to capture the subtle changes in seepage over time. At the end of the deployment period, the amount of water in each attached bag was measured by emptying it out into a graduated cylinder. The change in volume measured within each bag over a given period of time is then multiplied by the area of pond bottom sampled. This calculation represents the in-seepage or out-seepage at the location of the seepage meter.

Location: G:/GIS-Projects/H153-Hopedale-Pond/00-mxd/Seepage.mxd



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HOPEDALE POND DIAGNOSTIC/FEASIBILITY STUDY
Hopedale, Massachusetts

Scale: 1" = 300'

Source: 1) MassGIS, Orthophotos, 2005

● Seepage Survey Shoreline Segments

Seepage Survey Shoreline Segments at Hopedale Pond, 2008

Figure 2

Collection of groundwater samples with a LIP sampler.

Littoral Interstitial Porewater (LIP) samplers, essentially mini-wells, were used to extract (by pumping) the groundwater from below the pond bottom at multiple locations near the deployed seepage meters within each of the pre-defined shoreline segments. The extracted groundwater was then combined for each segment and analyzed for water quality parameters including: *E. coli* bacteria, nitrate nitrogen, ammonia nitrogen, dissolved iron, dissolved phosphorus, specific conductance, temperature, and pH. The water extracted by the LIP sampler is representative of water entering the pond in the vicinity of the seepage meters within each shoreline segment.

2.3 Assessment of *E. coli* Bacteria Sources

Water quality samples documenting *E. coli* bacteria levels within the pond and its watershed were made as part of the sampling program described under Section 3.2. In addition to field observations, stormwater and watershed land use maps were consulted to infer potential sources for locations that were found to have elevated levels of *E. coli*.

2.4 Pond Rights

ESS searched public documents and assessor's maps to delineate property boundaries along the pond. Pond property rights were researched in order to identify the potential for interference with recommended physical management techniques, such as drawdown or dredging.

2.5 Morphometry, Bathymetry and Isopach Mapping

Water depth measurements at Hopedale Pond were conducted on July 23 and July 25, 2008. Multiple points were measured along each transect to accurately characterize depth contours across the pond. Individual point depths were also measured where it was determined that additional depth characterization was needed to fully characterize the bathymetry. The location of each point measurement was taken using a GPS unit. Subsequently, these data were used to develop water depth contours for the pond in GIS.

Collection of bathymetric data in Hopedale Pond.

Sediment depths were also measured at each point using an extendible carbon steel tile probe, in order to estimate the volume of soft sediments in the pond. Western portions of the northern basin were essentially inaccessible due to heavy weed cover and very shallow water. Ice cover allowed two additional partial transects to be surveyed in this area on January 19, 2009. Sediment depth data were compiled from each of the three survey dates to develop an isopach map of the pond in GIS.

2.6 Sediment Quality

Sediment quality is often used as an indicator of long-term nutrient or contaminant contributions from the watershed to a waterbody. Sediment samples were collected at Hopedale Pond in order to assess the availability of nutrients that may impact internal recycling or be available for rooted plant uptake. In addition, sediment samples were collected to document physical characteristics and identify levels of potential contaminants that could pose challenges for dredging of the pond. The characterization of sediments is part of a screening process designed to reveal the severity of sediment contamination, if present, and to aid in the development of future management strategies.

Sediment was sampled from Hopedale Pond on January 19, 2009. Sample cores were recovered from the pond bottom using an extendible Russian peat corer. Sediment nutrient samples were collected from seven different locations including three within the northern basin, one in the middle portion, and three within the southern basin of the pond (Figure 3). Each set of cores was composited into a single sample (N1 and N3) for laboratory analysis of total phosphorous and total nitrogen. Sediment coring was only completed at one location in the middle portion of the pond (N2).

Bulk physical and chemical analysis was conducted on two composite samples, including one from the southern basin (SC1) and one from the northern basin (SC2 [Figure 3]). Three cores from the southern basin were composited to form the sample for SC1 while three cores from the northern basin of the pond were composited to form the sample for SC2. Compositing was accomplished by homogenizing each set of cores with a stainless steel spoon in a stainless steel bowl. Volatile organic compounds (VOCs) were sampled from individual cores prior to compositing, in order to avoid sample loss through volatilization.

Sediment samples were analyzed for the following parameters: arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc, polychlorinated biphenyls (PCBs), VOCs, polynuclear aromatic hydrocarbons (PAHs), total petroleum hydrocarbons (TPH), percent ash, percent water, total organic carbon, Atterberg limits, and ASTM grain size analysis.

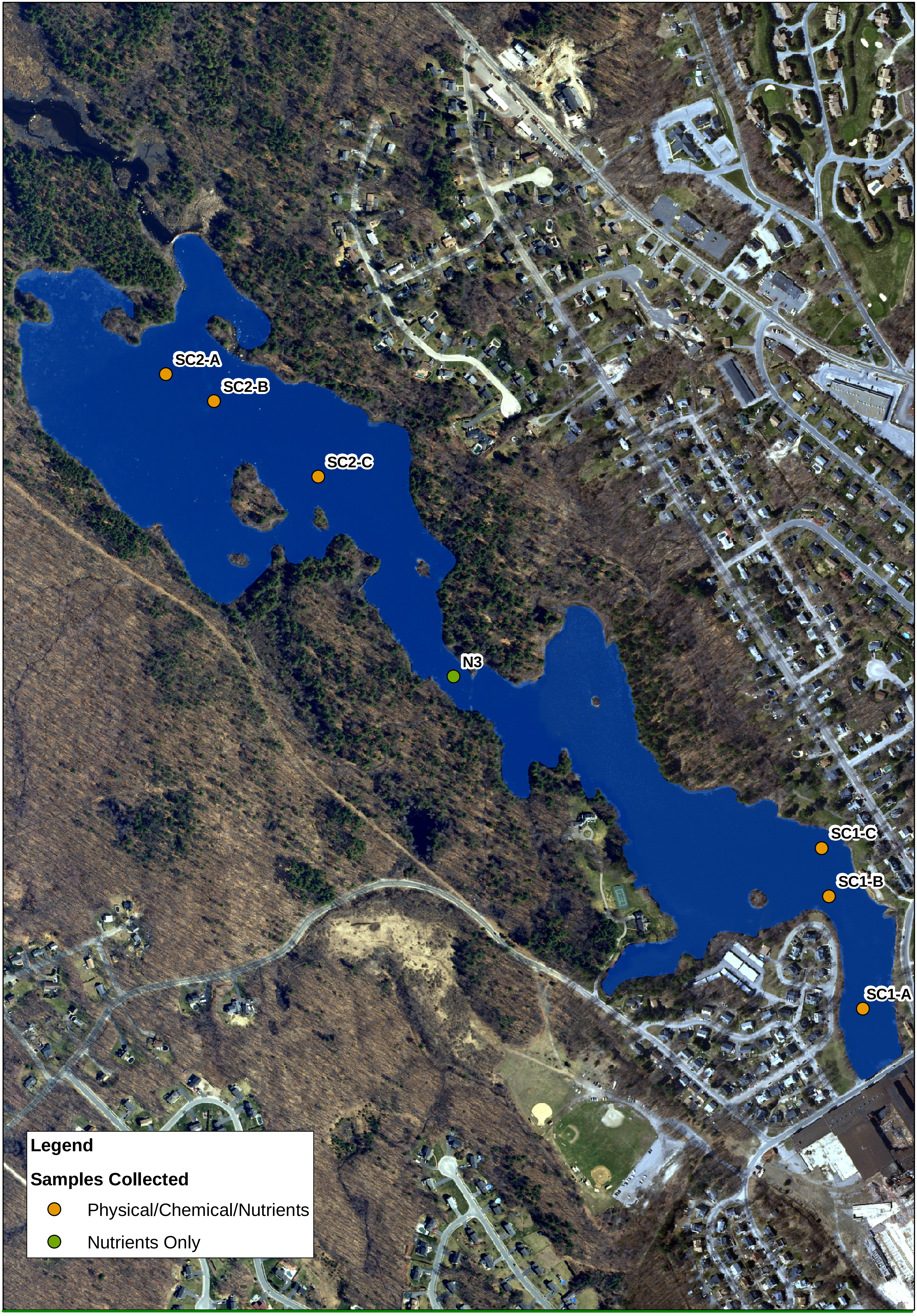
2.7 Hydrology and Nutrient Budgets

It is possible to estimate the amount (load) of phosphorus and nitrogen being contributed to Hopedale Pond by its watershed when an estimate of water flowing into the pond and the concentration of each nutrient in this water is known. Water flowing into Hopedale Pond comes from three primary sources: surface water, groundwater, and direct precipitation.

Surface water flows can be estimated from actual flow data or from known relationships for water yield from similar watersheds. One inflowing tributary to the pond exists (Mill River); however, surface water also enters the pond directly during rain events via stormwater outfalls and as overland runoff. The average annual flow rate to the pond was calculated to include both sources of flow and was based on the area of the watershed and local precipitation data. An estimate of the rate of groundwater movement into the pond was based on averages obtained for New England ponds of similar morphometry as well as from in-pond measurements taken with seepage meters. Inputs from direct precipitation were determined from long-term climatological data for the region and the known surface area of the pond.

The nutrient (phosphorus and nitrogen) budgets for Hopedale Pond were modeled from long-term climatological data, system hydrology, and from field data collected during this study (Appendix D). Nutrient budgets were determined using a variety of limnological modeling techniques based on pond morphometry, watershed features, and field data specific to the pond. Nutrient loading to the lake was further categorized by itemizing various inputs to the pond from the land use data and tributary data collected as part of this study.

Location:G:/GIS-Projects/H153-Hopedale-Pond/00-mxd/FinalFigs/Sediment_cores_final.mxd



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HOPEDALE POND
Project Location: Hopedale, Massachusetts

Scale: 1" = 450'

Source: 1) MassGIS, Orthophotos, 2005
2) ESS Group, Inc., Sediment Data, 2008

0 200 400 800 1,200 1,600
Feet

Hopedale Pond Sediment Sampling Locations
January 2008

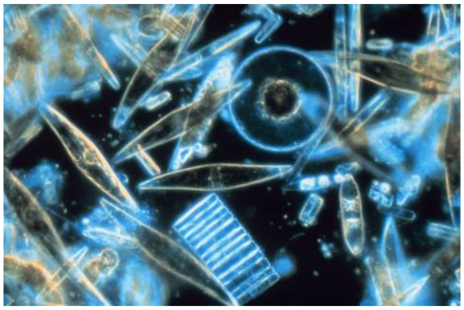
Figure
3

2.8 Biological Assessments

2.8.1 In-Pond Biology

Plankton

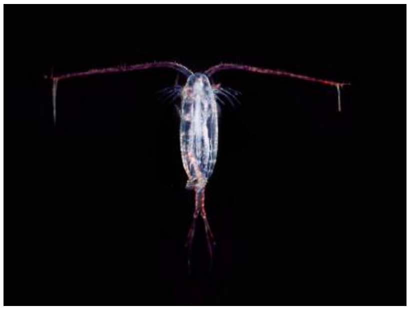
The phytoplankton (microscopic suspended algae) and zooplankton (microscopic suspended animals) communities of Hopedale Pond were assessed five and six times, respectively, throughout the study period. Phytoplankton and zooplankton were collected on a monthly basis between July 2008 and November 2008. One additional sample of each kind was collected in January. Phytoplankton grab samples were collected just below the pond surface at Site 1 and preserved in opaque plastic screw top jars with Lugol's solution. Samples were analyzed by Jim Sweet of Aquatic Analysts, Inc.



Phytoplankton are the base of the food chain in most pond ecosystems.

The zooplankton community was sampled using a plankton tow net, which was a 5.0-inch diameter conical net with a mesh size of 80 µm and an attached collecting bottle at the cod end of the net. Net tows totaling 20 meters (equivalent to ~1,000 liters of sampled lake water) were performed at the in-pond Site 1 for zooplankton sample collection. Tows were taken obliquely beneath the water surface so that samples were depth integrated from within the euphotic zone. Due to complete ice cover during the January sampling event, zooplankton were collected at an augered hole in the ice using repeated vertical tows through the water column. Due to these constraints, sample volume for this event was reduced to 500 liters. Zooplankton samples were preserved with ethanol in 250 mL plastic screw top jars and returned to ESS's laboratory for processing.

Zooplankton samples were transferred into Imhoff settling cones and allowed to stand for 24 hours. After 24 hours, liquid was carefully siphoned off the top of each cone and returned to the sample bottle in order to concentrate samples to a total volume of 75 mL. At this point, the total wet volume of zooplankton in the bottom of the cone was noted. Each concentrated sample was then emptied into a clean 250 mL container and briskly stirred to suspend zooplankton throughout the liquid column. Using a pipette with a wide (1 mm) tip, an approximately 3 mL sample aliquot was removed from the middle of the agitated liquid column and transferred to a Bogorov counting chamber for identification and enumeration.



Microscopic zooplankton are typically the most abundant animals in pond ecosystems.

Aquatic Plants (Macrophytes)

Aquatic plants (including emergent, floating leaved, and submergent species) in Hopedale Pond were mapped on July 23 and July 25, 2008, following an approach comparable to that outlined in the project QAPP for the creation of an aquatic plant map (Appendix A). The goal of the plant mapping effort was to describe species composition and estimate plant biovolume and cover during the period of peak development. A number of transects were established in order to thoroughly characterize plant beds throughout the pond. Each transect was surveyed by direct observation from a boat, in clear shallow areas and by grappling plants from the bottom, in deeper waters. Additionally, unique habitat areas that were not located along these transects, were surveyed so that the less abundant plant species could also be documented. Total macrophyte cover (defined as the portion of the bottom sediments of the examined area covered with plants), and total macrophyte biovolume (defined as the portion of the water column of the same area filled with plant material) were mapped throughout the pond. Macrophyte cover and plant biovolume were expressed as a percentage value within four pre-defined quartile ranges from 1 (1-25 percent cover or biovolume) to 4 (76-100 percent cover or biovolume). The absence of plants was recorded as zero.

Canada Goose and Other Biological Observations

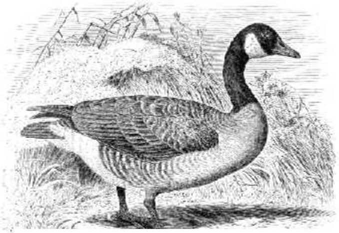
ESS recorded Canada goose observations in and around Hopedale Pond on every outing, noting abundance of adults and goslings, time, location, and behavior (Appendix D). Additionally, the approximate percent cover of goose feces in the vicinity of the pond bath house and beach was noted. Observations of other wildlife and fish occurring in the pond or within its watershed were also documented throughout the course of the study.

2.9 Review of Past Aquatic Plant Treatments and Biological Treatment Options

As described in Section 2.1, ESS investigated the history of past pond treatments in Hopedale Pond. ESS also conducted a literature review of the current body of knowledge regarding biological treatment options for aquatic plant management. Biological treatments involving bacteria, enzymes, fish and other organisms were reviewed and analyzed for feasibility. The results of these reviews were used to supplement the analysis of management options for the pond in Section 4.0.

2.10 Identification of Major Storm Drains

ESS surveyed the developed perimeter of Hopedale Pond during dry weather on May 15, 2008 to locate storm water structures, such as manholes and catch basins. The storm water networks associated with these features were traced to their associated outfalls. The location of each outfall was recorded using a Trimble Global Positioning System (GPS) unit with sub-meter accuracy and the presence of any flow was noted. Outfalls were assigned a unique sequential numeric code beginning with the prefix "SS" (to denote storm sewer). The results of the storm drain identification field survey were



Resident populations of Canada goose (*Branta canadensis maxima*) have ballooned in many parts of the country.

used to identify potential wet weather sampling locations for water quality surveys conducted in the watershed, as described in Section 2.2. Additionally, ESS generated a GIS map and associated geodatabase (Appendix E) from this survey.

2.11 Lake Watershed Survey to Identify and Document Nonpoint Sediment and Nutrient Sources to the Pond

Watershed land use and surface hydrology maps were used to identify key sampling locations for the water quality surveys conducted in the watershed, as described in Section 2.2. The results of these surveys were used to identify likely nonpoint pollution sources to Hopedale Pond and incorporated into the nutrient modeling described in Section 2.5.

3.0 STUDY RESULTS

3.1 Hopedale Pond Historical Background and Current Conditions

3.1.1 Summary of Previous Studies, Management Actions and Current Problems

The Hopedale Parks Department, Hopedale Board of Health and Massachusetts Department of Environmental Protection (MassDEP) were consulted to gather information and data from any previous studies conducted on Hopedale Pond. A summary of the results of research into previous water quality and baseline environmental assessments at Hopedale Pond are presented in this section.

A history of Hopedale Pond and its use as a recreational area reveals that the pond has a long history of weed control issues (Hopedale Park Commission 2005) (Appendix F). Weeds were first reported as a problem in 1948 and the pond was drained and dredged by the Draper Corporation in 1949 to remove weeds. The pond was again treated for weeds in 1953 using a chemical spray from a helicopter. A more intensive weed control program was implemented by the Allied Biological Control Corporation several years later which was in place from 1959 until 1961. Weeds remained a problem in the pond and in 1972 the Hopedale Park Commission reported that pond attendance was down due to excessive weed growth. According to Charles Espanet, Recreation Director at the time, “By July the entire pond looked like a field with only the channel clear of weeds-snaking its way up from the ‘shop’ to the Rustic Bridge…the swim area was a real mess after the weeds were treated.”

The weed issue in Hopedale Pond continued throughout the 1990s with reports of heavy plant cover in the pond and implementation of various treatment programs to address the problem. The most recent treatments were conducted by Aquatic Control Technology in May 1999 with follow-up spot treatments in the southern basin of the pond in 2001 and 2002. Additional weed control treatment planned for 2003 was not implemented due to Town budget delays. In response to excessive deposition of nutrient-rich sediments from storm water inputs, Aquatic Control Technology conducted a hydroraking operation in the vicinity of the town beach in September 2005.

It was during this time period in the 1990s that Canada goose and their droppings were first reported as a nuisance at Hopedale Pond. The release and feeding of domesticated ducks on the pond was cited as a factor that encouraged wild Canada goose to frequent the area and rapidly increase in number. Goose droppings began to impact water quality in the pond and the Town of Hopedale took steps to address the issue by posting 'No-feeding' signs and passing a bylaw prohibiting the feeding of waterfowl. In 1996, plastic mesh fencing was installed to keep Canada goose off the town beach. It is unclear how successful this management effort was at the time but the goose fencing is not currently present. The Canada goose and weed issues remain a problem in Hopedale Pond to this day.

According to the Hopedale Park Department, there have not been any in-depth water quality studies conducted at the pond for in the past 14 years (Espanet, 2008). The Board of Health was contacted to gather data on any previous water quality studies conducted at Hopedale Pond. The beach area at Hopedale Pond has been tested by the Board of Health for *E. coli* bacteria in the past. In 2008, the pond was tested twice, with results meeting primary contact recreational standards in both cases (Izzo, 2008).

Hopedale Pond is included on the Massachusetts 303(d) list of impaired waterbodies in the Blackstone River Basin for noxious aquatic plants, based on the most recent MassDEP Water Quality Assessment Report (MassDEP 2001). The MassDEP report, which classified Hopedale Pond as eutrophic, assessed whether Hopedale Pond meets its designated uses under the Massachusetts Surface Water Quality Standards (MSWQS). These uses include aquatic life, primary contact recreation, secondary contact recreation and aesthetics. The aquatic life use is supported when suitable habitat and water quality is available for sustaining a native, naturally diverse, community of aquatic flora and fauna. Primary contact recreation is supported when water quality is suitable for prolonged water contact in activities such as swimming, wading and waterskiing, while secondary contact recreation is supported when water quality is suitable for limited water contact such as boating and fishing. Aesthetics are supported when surface waters are pollutant-free and lack objectionable deposits, floating debris, scum or other matter which produce objectionable odor, color, taste or turbidity. The entire pond is non-supporting for aquatic life and only a quarter of the total pond acreage partially supports primary contact recreation, secondary contact recreation and aesthetics (MassDEP 2001). The remaining pond acreage is non-supporting for these designated uses. The presence of extensive beds of aquatic invasive species in the pond, primarily variable-leaf milfoil (*Myriophyllum heterophyllum*), are the principal cause of Hopedale Pond failing to meet its designated uses under the MSWQS.

Based on ESS' review of available information on Hopedale Pond it is clear that a new study and a well-defined management plan are needed to address ongoing issues. In general, management techniques have been gradually adapted over the years to address short term issues in Hopedale Pond. Problems with aquatic weeds, resident waterfowl, and sedimentation have been dealt with as they arise, only to return after a short time. This Diagnostic and Feasibility Study serves as a significant first step in solving systemic issues in Hopedale Pond.

3.1.2 Current and Historical Watershed Features

A USGS topographic map was used to delineate the watershed of Hopedale Pond (Figure 1). The watershed, including Hopedale Pond, was calculated to be approximately 6,284 acres. Spanning the towns of Hopedale, Milford, Upton and Hopkinton, the watershed is currently dominated by forest and residential land use (Table 1, Figure 4). Forested lands make up 57% of the watershed area. Altogether, low impact land uses, including forests, wetlands, open land and water bodies comprise approximately 65% of the watershed area. Most of the remainder (27%) consists of residential land use.

In the late 19th and early part of the 20th century, land use within the towns of Hopkinton, Upton, Milford, and Hopedale was split mostly between forest and agriculture, including pasture, hay production, and tilled land. Residential land use typically covered less than 10% of town lands and it appears that most of this development was focused outside of the watershed in the town centers of Hopkinton, Upton, Hopedale, and Milford. By 1946, development within the Hopedale Pond watershed had increased significantly, especially along the periphery of North Pond (Lake Maspenock) and along Dutcher Street near the southeastern portion of Hopedale Pond.

Comparison of recent historical (1971) and contemporary land use maps indicates that land use within the Hopedale Pond watershed has changed a good deal in recent decades (Table 1). The most notable trends include the conversion of forest lands and open space to residential and industrial land uses (Figure 5), especially in the upper half of the watershed. These types of land use changes are typically associated with increased stormwater volume and are likely to increase nutrient and sediment loading to Hopedale Pond from nonpoint sources. Among residential land use, low density residential land has seen the largest increase in acreage since 1971 and now accounts for more than half the total residential acreage in the watershed.

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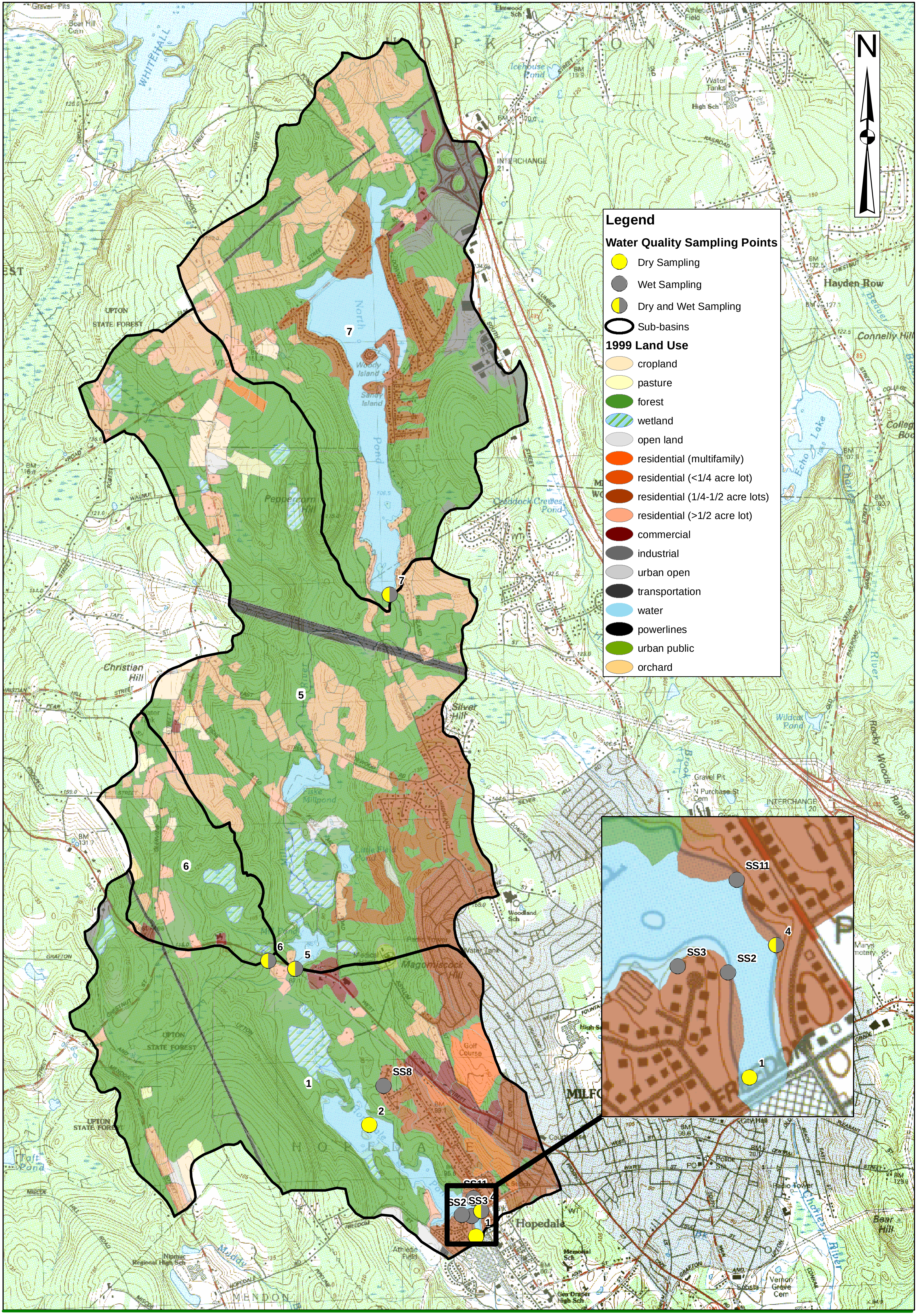


ESS Group, Inc.
Engineers
Scientists
Consultants

HOPEDALE POND
Hopedale, Massachusetts

Scale: 1" = 2,500'

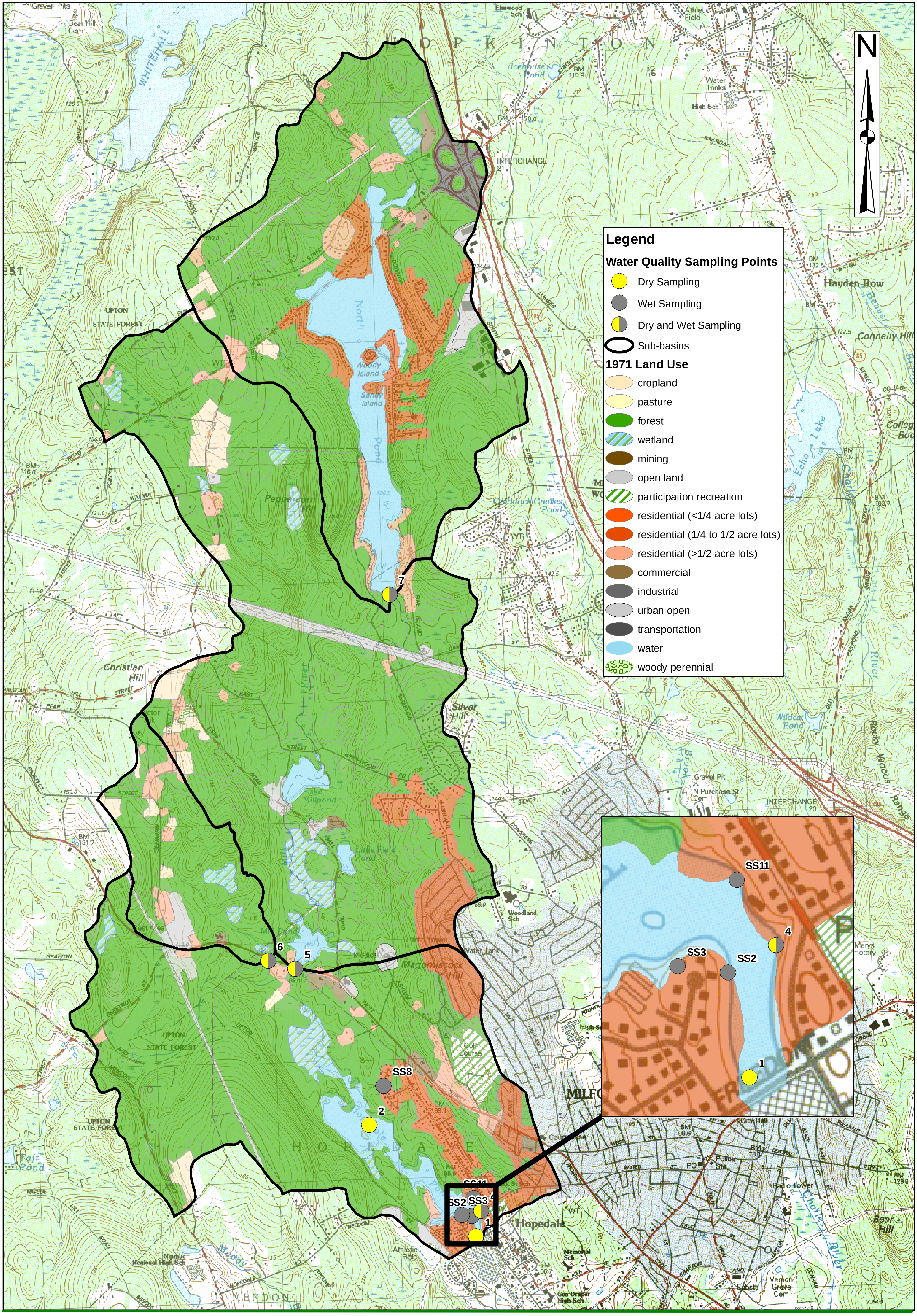
Source: 1) MassGIS, USGS DRG, 1982-1985
2) MassGIS, Land Use, 2002; 3) ESS, 2008

0 0.5 1 Miles

Current Land Use in the Hopedale Pond Watershed

Figure
4

Location: G:/GIS-Projects/H153-Hopedale Pond/00.mxd/FinalFigs/LandUse1971_11x17.mxd



HOPEDALE POND
Hopedale, Massachusetts

Scale: 1" = 2,500'

Source: 1) MassGIS, USGS DRG, 1982-1985
2) MassGIS, Land Use data, 2002; 3) ESS, 2008

0 0.5 1 Miles

Engineers
Scientists
Consultants

Hopedale Pond Watershed Land Use in 1971

Figure
5

3.2 Water Quality

Results from the water quality monitoring program are summarized in the following sections.

3.2.1 In-Pond Dissolved Oxygen Assessment

Dissolved oxygen (DO) is the amount of molecular oxygen (O_2) dissolved in water. Dissolved oxygen concentrations below 5.0 mg/L, as well as temperatures above 28.3^{o}C, are generally considered unsuitable for support of aquatic life in Class B warm water fisheries. Additionally, release of phosphorus (which, in turn, may promote algal and plant growth) from bottom sediments can often be enhanced under anoxic (no oxygen) or hypoxic (very low oxygen) conditions. Temperature and dissolved oxygen are typically measured within the water column to evaluate the extent of pond stratification.

Dissolved oxygen and temperature profiles documented at Site 1 in Hopedale Pond are presented in Table 2 and Figures 6 and 7. Temperature and DO profile data for Hopedale Pond indicate that stratification of the pond was strongest in June and July 2008 and again in January 2009.

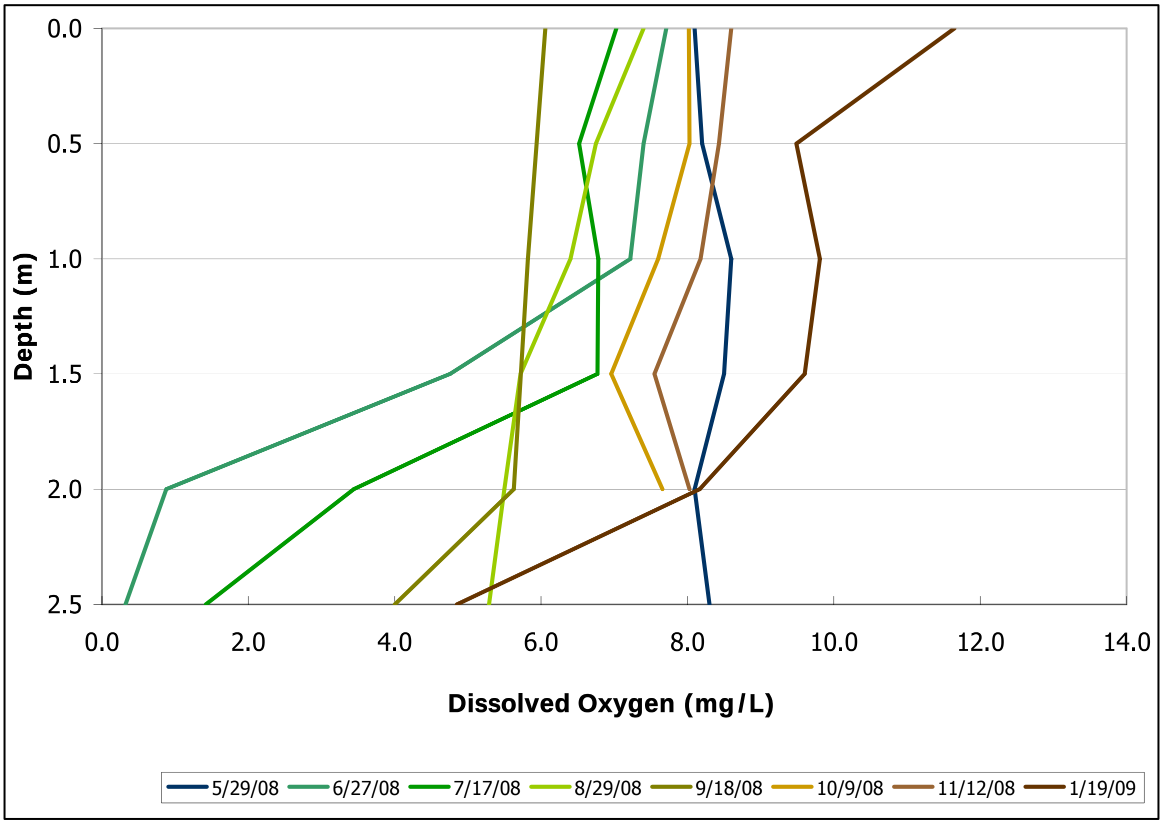


Figure 6. Dissolved Oxygen Profiles for Hopedale Pond, May 2008 to January 2009

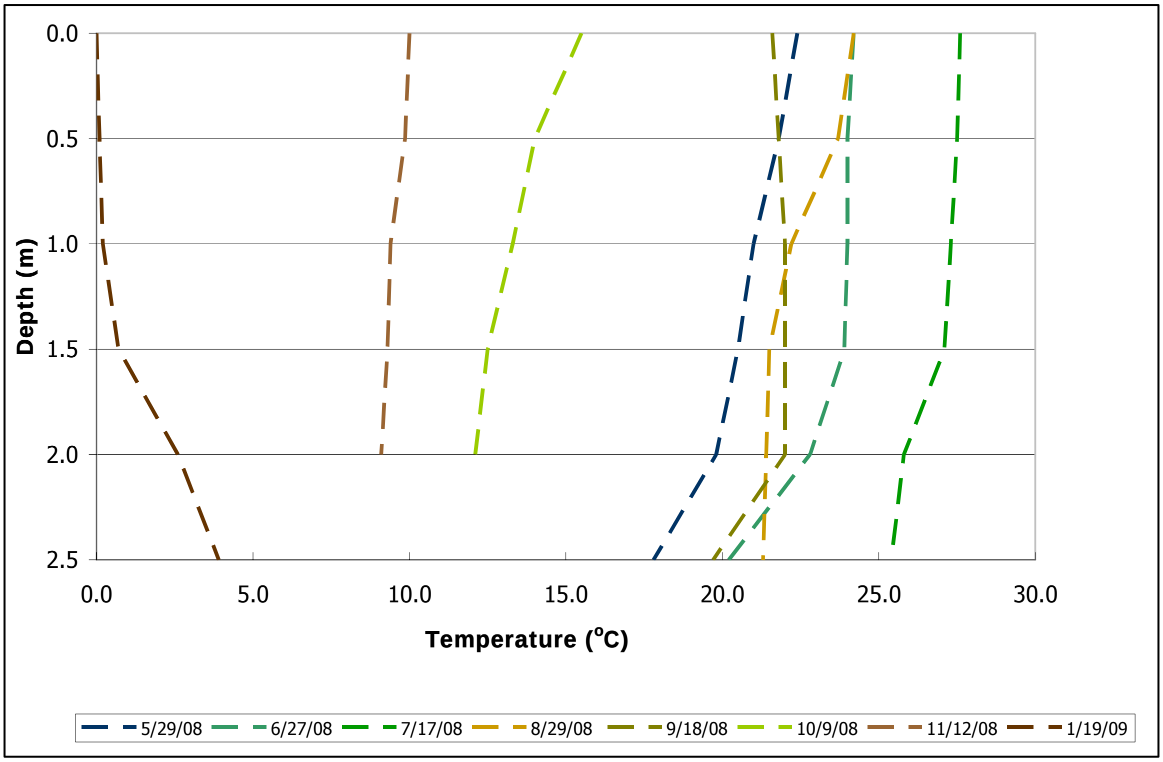


Figure 7. Temperature Profiles for Hopedale Pond, May 2008 to January 2009

Bottom waters were nearly depleted of oxygen in June (as low as 0.3 mg/L). However, conditions improved in July and DO remained above 4.0 mg/L during each of the subsequent sampling dates. Hopedale Pond appeared to be fairly well mixed in May and from August to November 2008.

Measured water temperature in Hopedale Pond did not exceed the Massachusetts standard for Class B warm water fisheries of 28.3°C during the study period (Table 2). On a thermal basis, Hopedale Pond appears to be suitable habitat for most aquatic life, including warm water fish, according to state standards. With the exception of June, thermal stratification was weak during the summer months, likely due to the shallow nature of the pond. Larger waterbodies of the Northeast typically exhibit a strong thermocline (the point of maximum temperature change within the metalimnion) that is observed to occur deeper within the water column as the warm season progresses and the surface waters warm. Temperature data suggest the lack of this typical thermocline behavior for Hopedale Pond. However, when the pond was stratified, maximum temperature drops typically occurred between 1.5 and 2.5 meters deep.

Dissolved oxygen profiles at Site 1 were also not strongly characteristic DO stratification, although the months of June and July 2008, along with January 2009, did exhibit a maximum decrease in DO between 1.5 and 2.5 meters in depth. The dissolved oxygen levels were typically greater than 5.0 mg/L in the epilimnion (i.e., waters above the thermocline) and therefore reflect a moderately well to well oxygenated environment, suitable for aquatic life such as warm water fish. DO data obtained during the months of June and July 2008 depict some DO stratification, where the pond bottom becomes poorly oxygenated. Data from September depict a relatively even and somewhat low concentration of DO throughout the water column (maximum DO of 6.1 mg/L). As water temperatures cooled through the autumn months, DO levels rebounded throughout most of the water column. DO levels remained mainly high in January, although the heavy ice cover permitted a strong vertical gradient to develop, with DO concentrations sagging below 5.0 mg/L at the pond bottom.

Specific conductance (conductivity at 25°C) was also evaluated within the water column, as this is used to assess stability of stratification. Measurements of conductivity also provide a general indication of water quality and fertility. Conductivity data did not indicate a strong chemocline (layer of increased salinity) within Hopedale Pond (Table 3 and Figure 8), and conductivity levels in Hopedale Pond remained relatively consistent at the top and bottom of the water column over time. High conductivity values are characteristic of eutrophic lakes (nutrient rich). With the exception of the January 2009 measurements, specific conductance levels were above 250 µSiemens/cm, suggesting that the pond is at least moderately nutrient enriched.

3.2.2 In-pond Water Quality

Hopedale Pond was sampled from two locations within its two basins to determine water quality characteristics. These two locations were designated as Site 1(south basin) and Site 2 (north basin) respectively (Figure 1). Tributary, storm water, and outlet water quality characteristics are

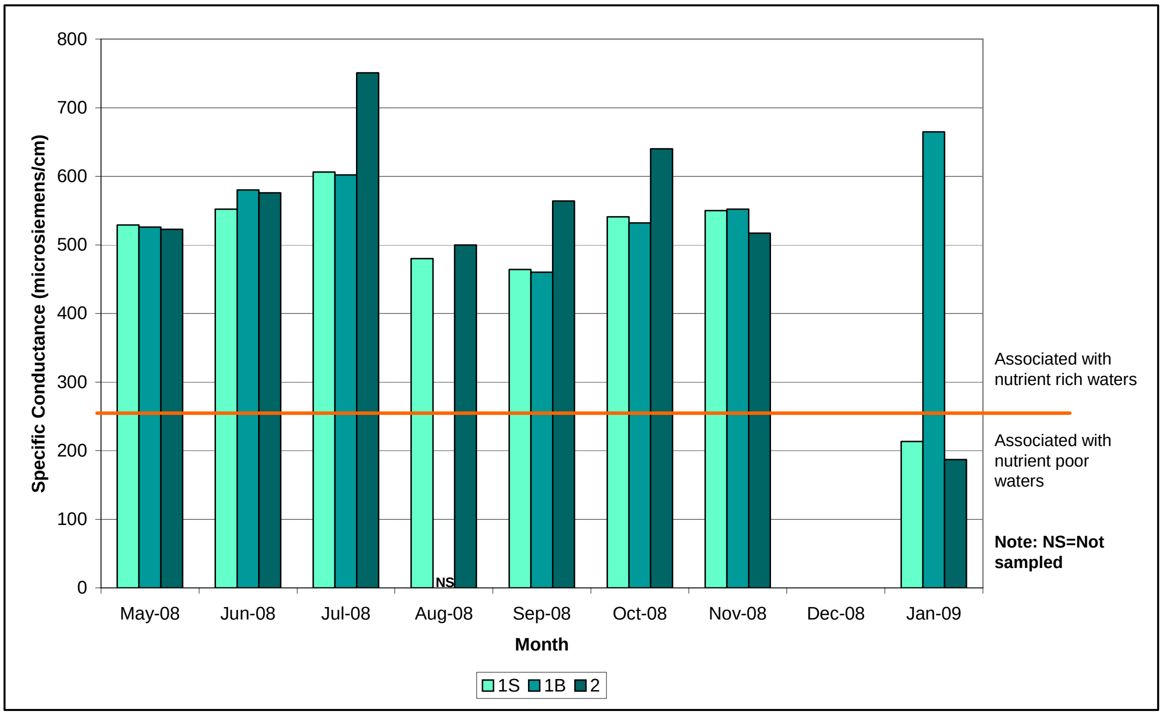


Figure 8. In-pond Specific Conductance at Hopedale Pond, May 2008 to January 2009

discussed in Section 3.2.3. Laboratory reports for each sampling event are compiled in Appendix G. All values that were below the reporting limit are reported as half the value of the detection limit.

3.2.2.1 Turbidity

Turbidity is an indirect measure of the quantity and size of particles (sediment, algae cells, debris, etc.) in a water sample, but water color also can affect turbidity. Turbidity values less than 10 NTU (nephelometric turbidity units) are generally assumed to have minimal impact on habitat and biota. Typical "clean" New England lakes exhibit turbidity values ranging from 1 to 5 NTU. Throughout the monitoring period, turbidity values exhibited at the surface of Sites 1 and 2 ranged from 0.05 to 3.65 NTU. The average turbidity values indicate the presence of a relatively insignificant amount of particulate matter in the water column at the surface of the pond. A summary of the turbidity data collected at the in-pond stations is presented in Table 3 and Figure 9.

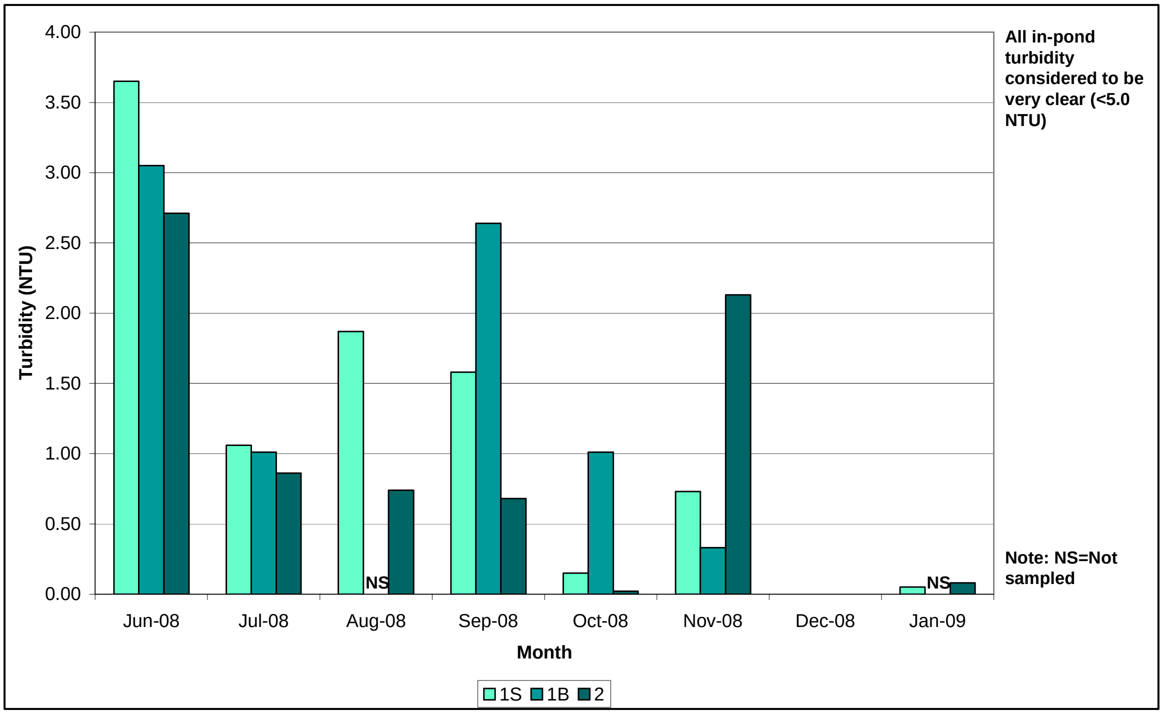


Figure 9. In-pond Turbidity at Hopedale Pond, May 2008 to January 2009

3.2.2.2 pH

The pH value is a measure of how acidic (values below 7.0) or basic (values above 7.0) the water is in a lake, pond, or stream. In general, pH values for most lakes and streams in Massachusetts range from 6.0 to 7.5 SU (standard units), although the State standard for Class B waters ranges from 6.5-8.3 SU Average pH values exhibited from the surface water at Site 1 ranged from 6.5 to 7.5 SU, while pH values at Site 2 ranged from 6.3 to 7.6. The highest pH measured at both sites during this study was recorded in January 2009. The range of pH values exhibited during this study are typical for a Massachusetts water body and do not appear to indicate significant acidification of Hopedale Pond. A summary of the pH data collected at Sites 1 and 2 is presented in Table 3 and Figure 10.

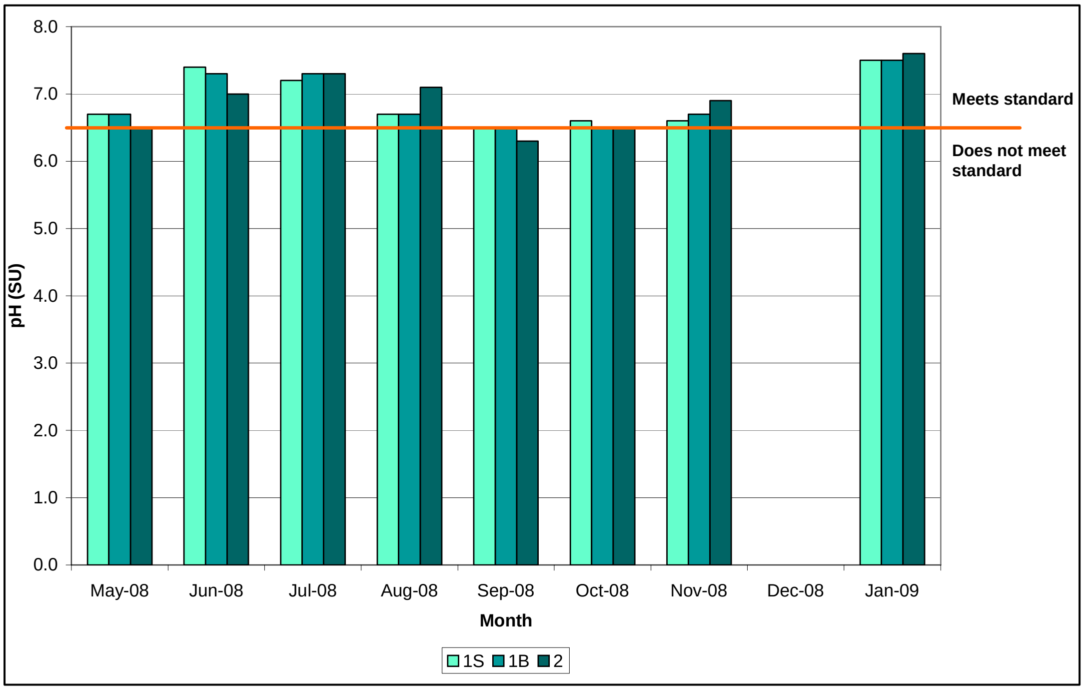


Figure 10. In-pond pH at Hopedale Pond, May 2008 to January 2009

3.2.2.3 Water Transparency

Water transparency (or clarity) in Hopedale Pond was measured in-field with a Secchi disk at the south basin (Site 1). Factors such as plankton concentration, water color, and suspended particles within the water column directly impact Secchi depth measurements. Secchi depth values varied throughout the study, ranging from between 1.25 and 2.75 meters, but always met the Massachusetts standard for contact use of 1.22 meters. Data collected at Site 1 is presented in Table 3 and Figure 11.

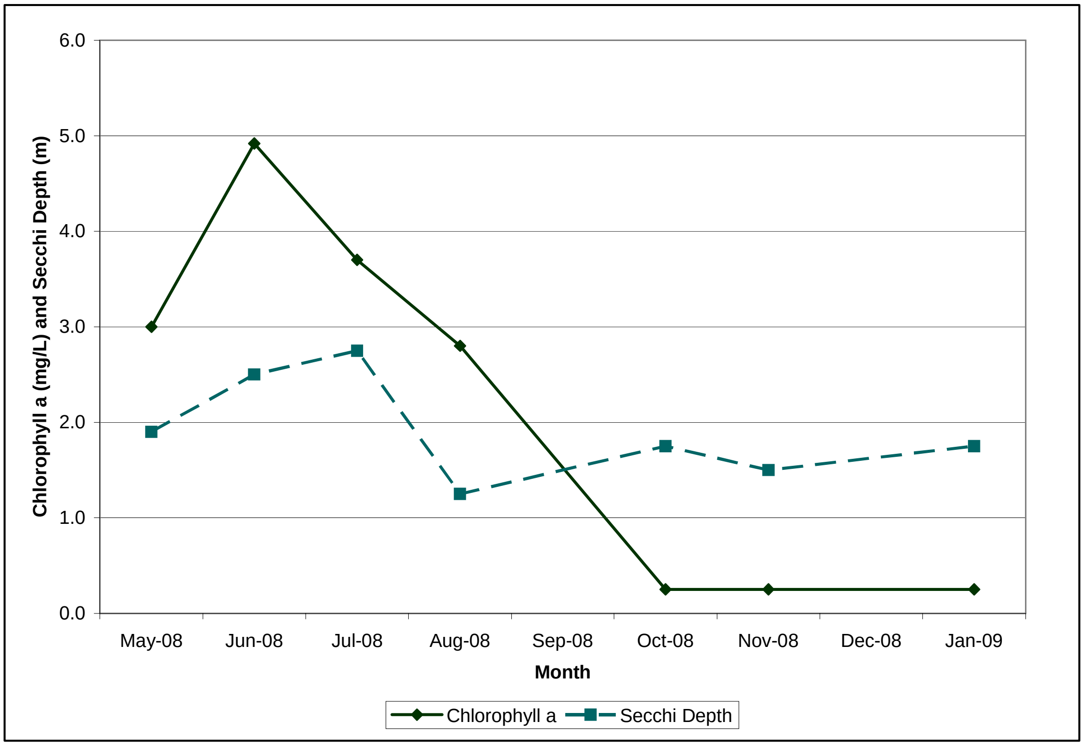


Figure 11. In-pond Secchi Depth and Chlorophyll *a* at Hopedale Pond, May 2008 to January 2009

Typically, Secchi depths of 2 to 3 meters are indicative of late-mesotrophic (moderate fertility) waterbodies, whereas depths of 1 to 2 meters are indicative of eutrophic (very fertile) waterbodies (Canavan and Siver, 1995). In general, Secchi depths of 2 to 3 meters are considered good for a Massachusetts lake or pond.

3.2.2.4 Chlorophyll *a*

Chlorophyll *a* is associated with the biomass of phytoplankton (planktonic algae) in a water body. Higher levels of chlorophyll *a* usually indicate greater biomass of phytoplankton and are suggestive of more eutrophic conditions. Concentrations of chlorophyll *a* near the surface of Hopedale Pond ranged from 0.3 to 4.9 mg/m^3, peaking in June and bottoming out from October 2008 through January 2009 (Table 3 and Figure 11). These levels of chlorophyll *a* are typical of oligotrophic to mesotrophic Massachusetts lakes and ponds in the absence of macrophyte growth. However, chlorophyll *a* levels may be depressed in Hopedale Pond due to extensive macrophyte cover, especially in mid- to late summer.

3.2.2.5 Color

Apparent color is a measure of the reflected wavelengths in water not filtered for particulates. Therefore, it represents the color of both dissolved and colloidal materials in the water. Higher color values generally indicate the increasing presence of materials in the water column and may limit or impact growth rates and composition of primary producers. At Hopedale Pond, color values at the in-pond surface stations ranged from approximately 0 to 10 platinum-cobalt units (PCU), but were generally below 7 PCU, indicating relatively low levels of dissolved and colloidal material in the water column (Table 3).

3.2.2.6 *E. coli* Bacteria

E. coli bacteria is widely distributed in nature and found as a free-living organism. Populations typically mobilize rapidly during storm events, eventually flowing into rivers, streams, lakes, or groundwater strata. Although these bacteria are usually not harmful themselves, their presence is often associated with many other enteric pathogens (bacteria, viral, and parasitic), which are also associated with feces. The abundance of *E. coli* in the water column reflects the degree of pollution present and thus the sanitary quality of a waterbody (Feachem et al., 1983).

The Massachusetts *E. coli* single sample standard for waters designated as bathing beaches is 235 colonies per 100 mL. Likewise, the respective geometric mean of the most recent five *E. coli* samples should not exceed the state standard of 126 colonies per 100 mL. In-pond *E. coli* concentrations during dry weather conditions ranged from 5 to 100 colonies per 100 mL, with no measured concentration values exceeding the state single sample or geometric mean standards (Figure 12). The maximum value of 100 col/100 mL occurred in September, while all other sampling dates resulted in values of 56 col/100 mL and below.

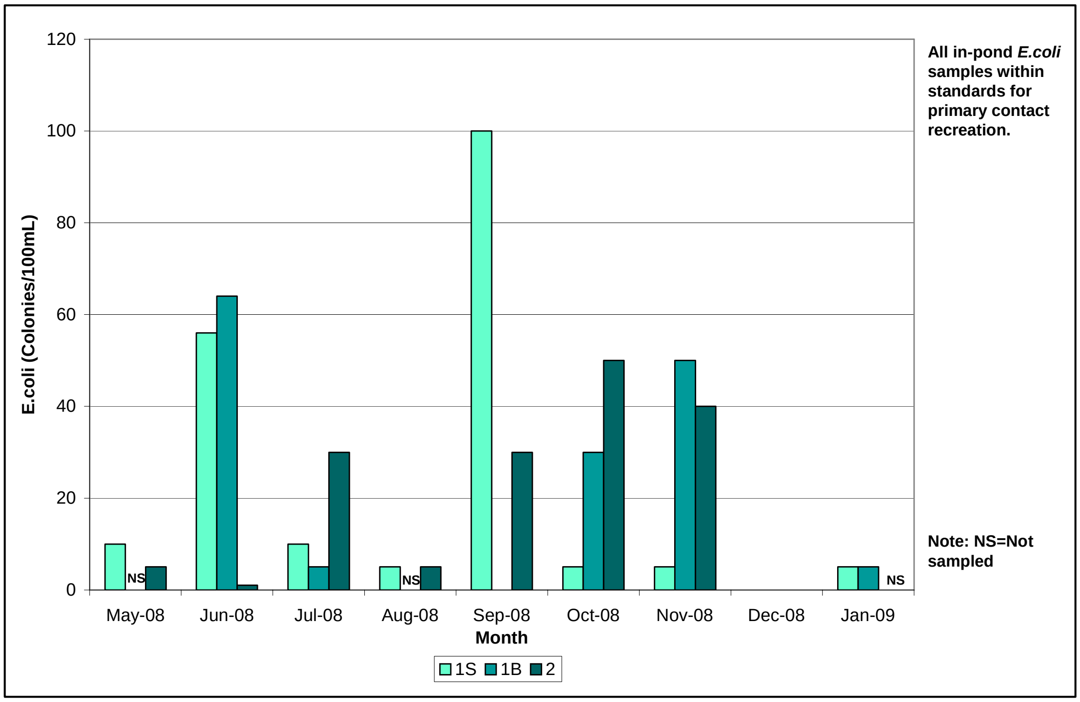


Figure 12. In-pond *E.coli* Concentrations at Hopedale Pond, May 2008 to January 2009

3.2.2.7 Hypolimnetic Total Iron

Levels of total iron in the hypolimnetic (bottom) waters are often of interest when developing a lake management plan due to the ability of iron molecules to sequester available phosphorus and render it unavailable for further biotic uptake. Specifically, if elevated levels of iron are present in the water column, they promote the formation of iron phosphates, which are highly insoluble in oxygenated water and precipitate to the sediment. Elevated levels of phosphorus in the water column may be exhibited when iron concentrations are less than five times the phosphorus level.

Total iron was measured throughout the course of the study from the bottom waters at Site 1. Values ranged from 0.21 to 1.13 mg/L with an average of 0.57 mg/L (Table 3), yielding an iron:phosphorus ratio of roughly 50:1. This is significantly greater than the 5:1 ratio, indicating that sufficient levels of iron are usually available to sequester elevated levels of phosphorus and render them biologically inert.

3.2.2.8 Phosphorus and Nitrogen

Phosphorus and nitrogen are essential plant nutrients. Excessive concentrations of these nutrients often fuel undesirable growths of algae in the water column (phytoplankton) and accumulations of attached algae (periphyton) on the shallower bottom sediments (within the euphotic zone). In addition, excessive quantities of these nutrients can also promote rooted plant growth. Although debate is still ongoing with regard to establishing state or federal standards for nutrients, total phosphorus values below 0.02 mg/L are usually desirable for maintaining low algal biomass and high water clarity, while concentrations above 0.05 mg/L are considered excessive (Canavan and Siver, 1995). Similar thresholds for nitrogen in freshwater systems have not been established since phosphorus is typically the limiting nutrient in most freshwater systems.

Phosphorus

Total phosphorous measures the total concentration of all biologically available and unavailable phosphorous in the water column. Average total phosphorus values exhibited at the in-pond stations were somewhat low with 0.012 mg/L at the surface and 0.016 mg/L at the bottom of Site 1 and 0.017 mg/L at Site 2 (Table 3). However, the range of values sometimes exceeded 0.02 mg/L (Figure 13). These data suggest low to moderate availability of phosphorus within the water column. The lack of a well-developed thermocline in Hopedale Pond is not likely to mitigate the effect of the slightly elevated phosphorus values observed at the bottom of the pond during the late summer.

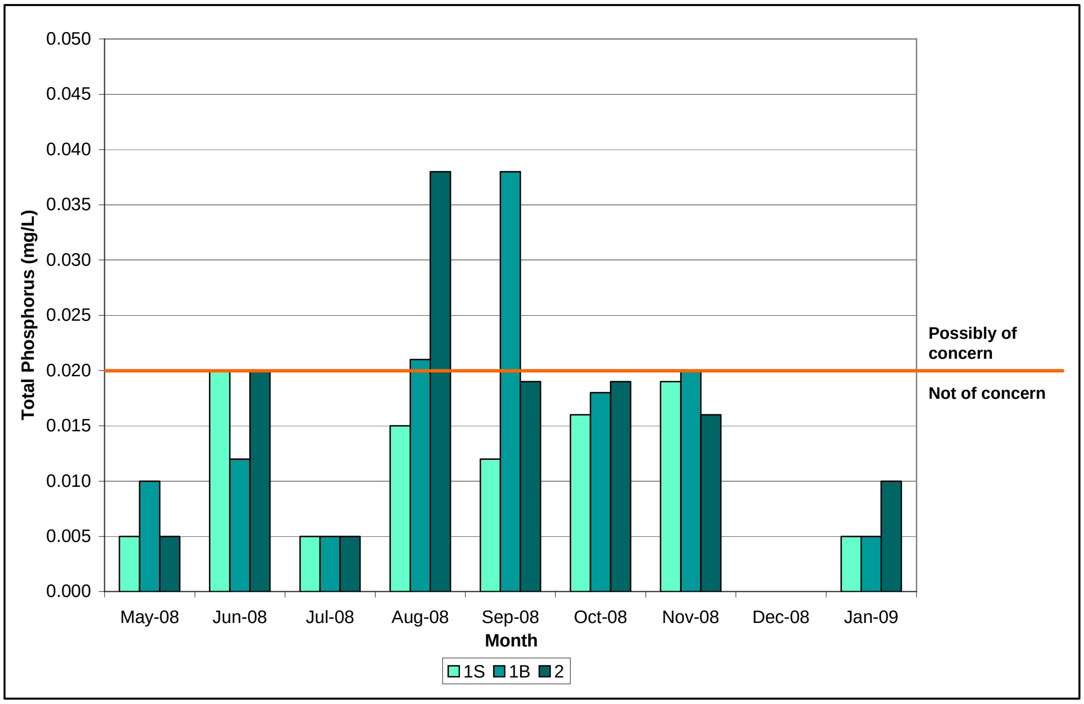


Figure 13. In-pond Total Phosphorus Concentrations at Hopedale Pond, May 2008 to January 2009

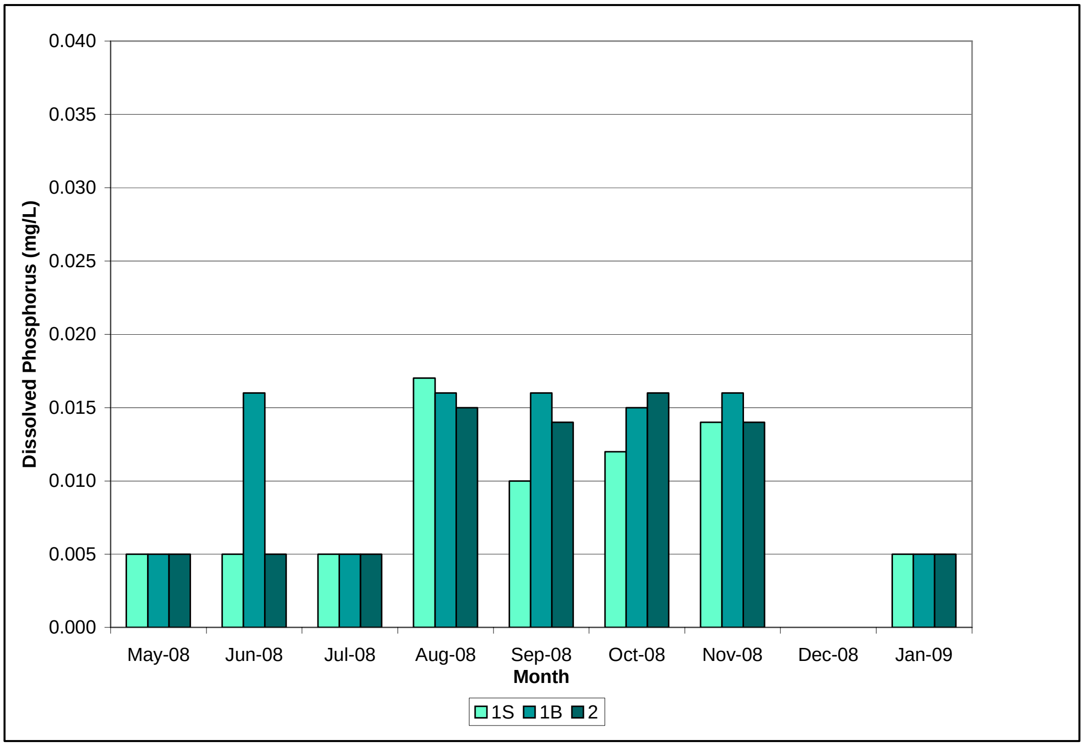


Figure 14. In-pond Dissolved Phosphorus Concentrations at Hopedale Pond, May 2008 to January 2009

Dissolved phosphorus refers to the soluble portion of total phosphorus. It is generally more readily available for uptake by aquatic organisms than particulate phosphorus. Dissolved phosphorus values exhibited at Sites 1 and 2 were also relatively low at Hopedale Pond, averaging 0.009 mg/L at the surface and 0.012 mg/L at the bottom of Site 1 and 0.010 mg/L at Site 2 (Table 3). However, individual sample concentrations ranged from 0.005 to 0.017 mg/L (Figure 14). These data suggest low to moderate levels of phosphorous available in the water column to fuel algae and macrophyte growth.

Nitrogen

Nitrate-nitrogen, one of the several major forms of nitrogen, within Hopedale Pond was low on average. Nitrate-nitrogen values at Hopedale Pond ranged between approximately 0.015 and 0.582 mg/L (Table 3). A second form of nitrogen, nitrite-nitrogen, is generally present only in trace quantities in water exposed to oxygen, where it is quickly transformed to nitrate. In anoxic waters it is usually converted to ammonia (Goldman and Horne 1983). Concentration levels of nitrite-nitrogen within Hopedale Pond ranged from 0.004 to 0.046 mg/L (Table 3). Nitrate-nitrogen and nitrite-nitrogen were analyzed by a different method (SM 4500-NO3- F) for samples collected on June 27, 2008 and results from this date are reported as one sum value.

Ammonia-nitrogen concentrations were also found to be low at Sites 1 and 2 in Hopedale Pond. Detectable values ranged from 0.138 to 0.247 mg/L at the surface (Table 3). All non-detectable ammonia values are reported at half the detection limit. The presence of ammonia-nitrogen in the bottom waters is consistent with the lower dissolved oxygen levels observed there.

The fourth form of nitrogen assessed as part of this study was total Kjeldahl nitrogen or TKN. TKN is a measure of the amount of ammonia and organic nitrogen in a sample. The average TKN value for Hopedale Pond at the surface of Sites 1 and 2 ranged from 0.48 to 0.54 mg/L and 0.39 mg/L at the bottom of the pond at Site 1 (Table 3).

Together, TKN, nitrate-nitrogen and nitrite-nitrogen comprise total nitrogen within the water column. Typically, total nitrogen values no greater than 0.2 mg/L are desirable for maintaining high water quality, while concentrations above 1.0 mg/L are considered excessive and indicative of a hyper-eutrophic system in most southern New England lakes and ponds (Canavan and Siver, 1995). In Hopedale Pond, total nitrogen was found to be more than 1.0 mg/L just once (at Site 1B) during the study period (Figure 15).

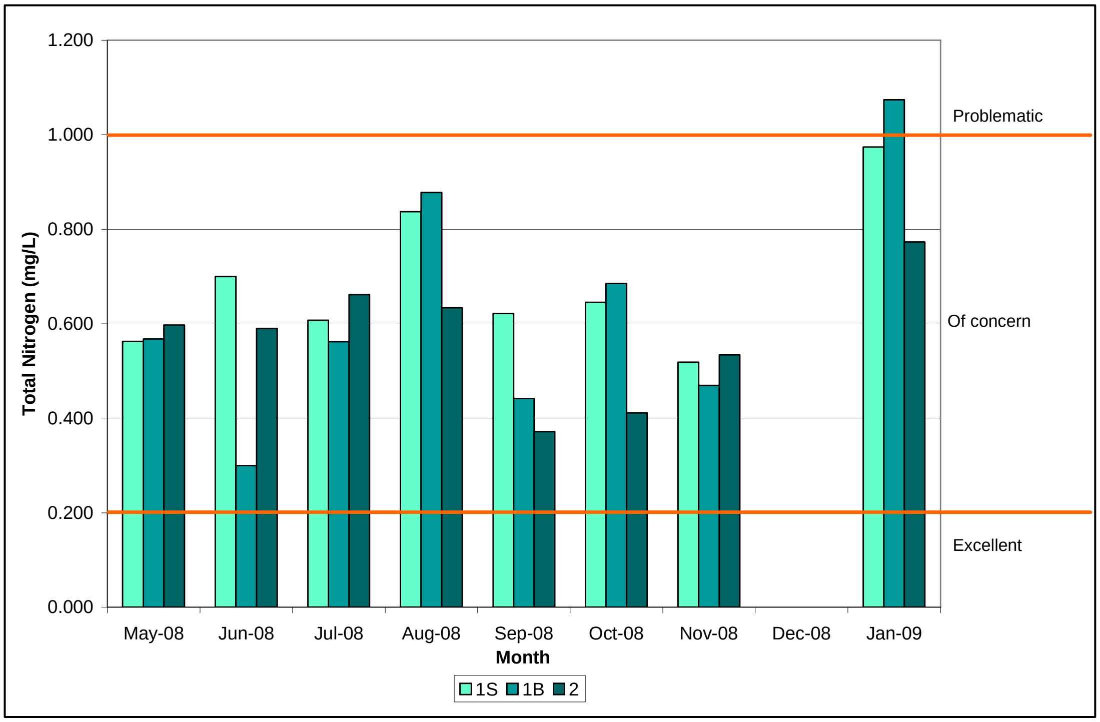


Figure 15. In-pond Total Nitrogen Concentrations at Hopedale Pond, May 2008 to January 2009.

3.2.3 Tributary and Outfall Water Quality

Hopedale Pond is an impoundment on the Mill River, which is the sole perennial tributary to the pond. For the purposes of this study, the Mill River and its tributaries above Hopedale Pond were sampled during dry and wet weather at three locations, corresponding to Sites 5, 6, and 7.

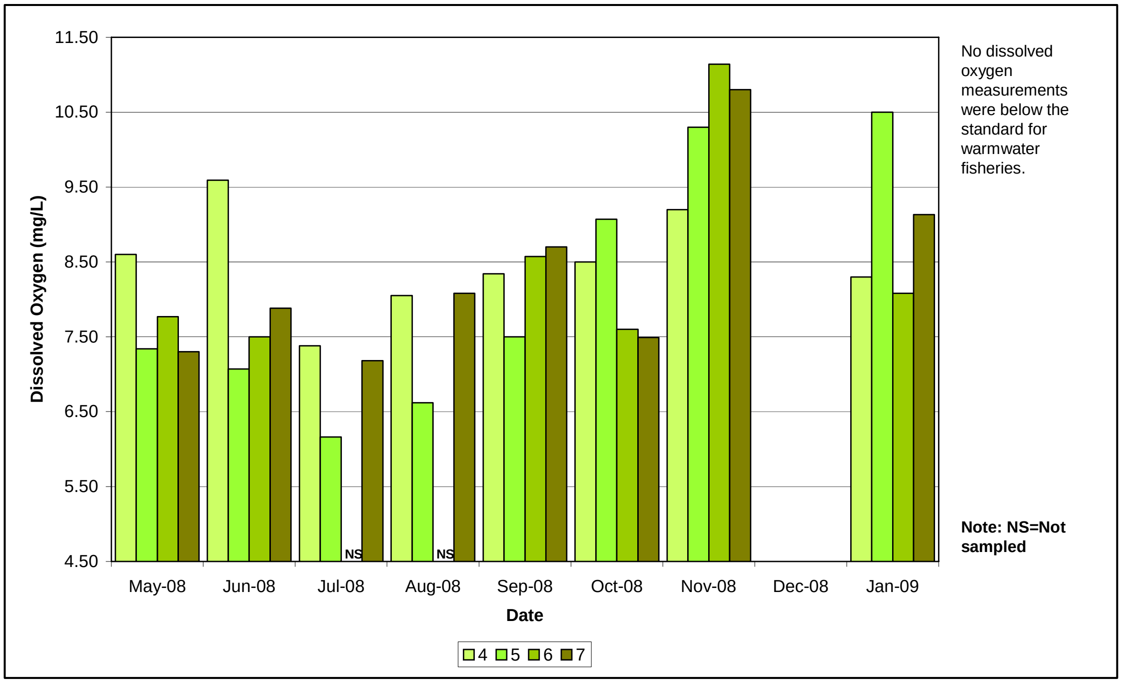
The Site 4 outfall discharges directly into the southern basin of Hopedale Pond. This location was sampled during both wet and dry weather, in order to capture potential contamination from both septic cross connections during dry weather flows and stormwater during wet weather flows.

Four additional outfalls into Hopedale Pond were sampled during wet weather flow only, including SS2, SS3, SS8 and SS11.

Results of the tributary and outfall water quality sampling efforts are presented in the following sections. Laboratory reports for each sampling event are compiled in Appendix G.

3.2.3.1 Dissolved Oxygen

Dissolved oxygen levels at Sites 4 to 7 ranged from 6.16 to 11.14 mg/L during dry weather surveys (Table 4, Figure 16), satisfying the 5.0 mg/L standard for Class B warm water fisheries. This indicates that surface water tributaries were sufficiently oxygenated for maintaining fish and other aquatic organisms at the time of sampling. Dissolved oxygen never dipped below 7.00 mg/L at Site 4 despite the high levels of *E.coli* and nutrients collected on several occasions (see sections 3.2.3.6 and 3.2.3.7). This is most likely due to the shallow, turbulent flow in the storm drain during dry weather that allows for ample diffusion of air into the water.



No dissolved oxygen measurements were below the standard for warmwater fisheries.

Note: NS=Not sampled

Figure 16. Dry Weather Dissolved Oxygen at Tributary Sites in the Hopedale Pond Watershed, May 2008 to January 2009

Dissolved oxygen levels in the tributaries and outfalls were not significantly impaired by precipitation events. Dissolved oxygen concentrations remained above 5.0 mg/L during wet weather sampling at Sites 4 to 7 as well as the stormwater Sites SS2, SS3, SS8 and SS11 (Table 5). However, dissolved oxygen levels were marginally low (5.6 mg/L and 62.2% saturation) at Site 6 on August 6, 2008. Despite the wet weather conditions, flow was not noted at Site 6 on this date. This stagnation was at least partly responsible for the marginal concentration of dissolved oxygen observed at Site 6 during the August wet weather sampling event.

3.2.3.2 Conductivity

A wide range in specific conductance levels was observed during dry weather sampling at Sites 4 through 7 over the course of the study (Table 4 and Figure 17). Measured specific conductance ranged from 210 µS/cm at Site 6 to 1142 µS/cm at Site 4. Site 6 consistently had the lowest readings while Site 4 was typically highest. However, specific conductance at Sites 5 and 7 also frequently exceeded 500 µS/cm, which is very high for waters in eastern Massachusetts (USGS, 2004). Specific conductance readings that are higher than expected given the natural characteristics of the drainage basin are usually indicative of dissolved pollutants and may be associated with nutrient rich waters.

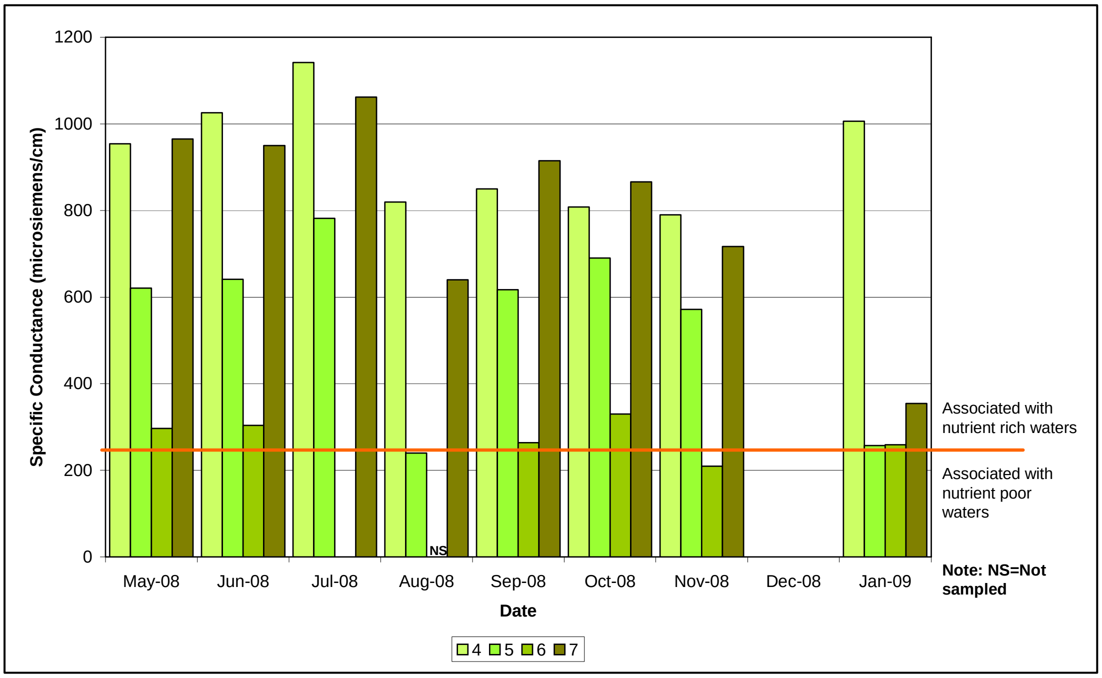


Figure 17. Dry Weather Specific Conductance at Tributary Sites in the Hopedale Pond Watershed, May 2008 to January 2009

Specific conductance sampled during wet weather was generally within the range of dry weather readings (Table 5). The highest readings (in excess of 500 µS/cm) were measured at Sites 4 and 5. Specific conductance at the outfall stations was generally low except at Site SS8, where levels reached 500 µS/cm during the August wet weather sampling event. However, it is likely that specific conductance was higher than measured at SS2, SS3, and SS11. The low values at these locations were likely influenced by low sample volume, which can impact the accuracy of the measurement. Relatively high levels of other field measured parameters and analytes at these sites support this assessment, as discussed in subsequent sections.

3.2.3.3 Turbidity

Dry weather turbidity ranged from 0.0 to 7.2 NTU at tributary sites (including Site 4) in the Hopedale Pond watershed (Table 4, Figure 18). Turbidity was highest in June, ranging from 4.3 NTU at Site 5 to 7.2 NTU at Site 7, but did not exceed 2.0 NTU at any other time during dry weather sampling.

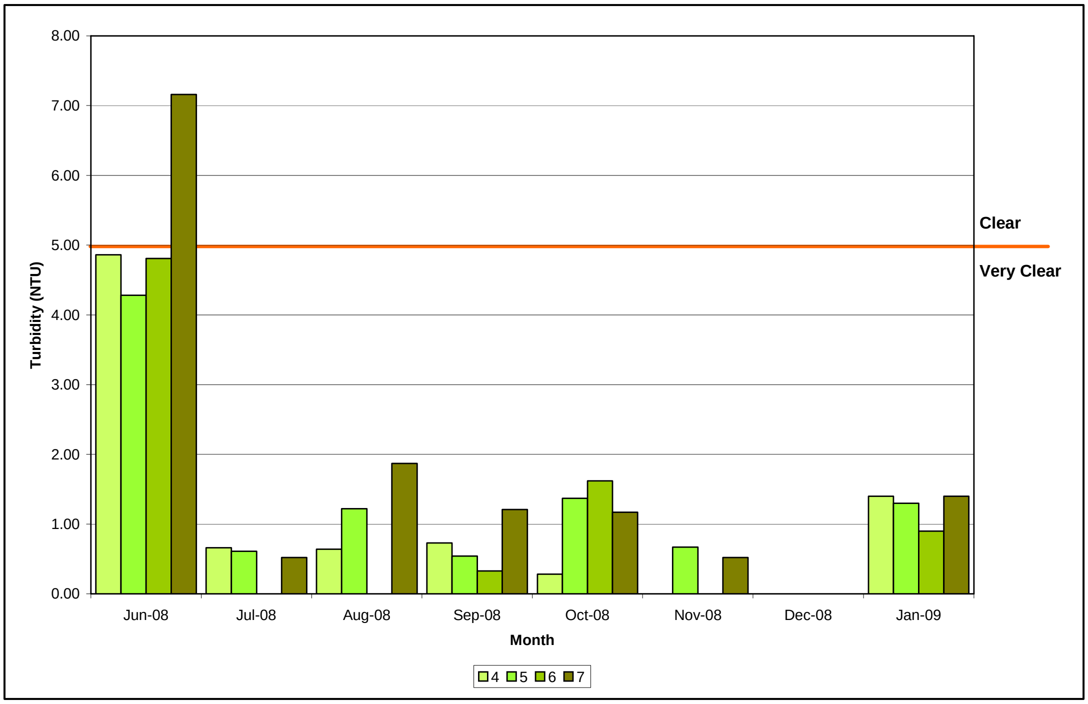


Figure 18. Dry Weather Tributary Turbidity in the Hopedale Pond Watershed, May 2008 to January 2009

Turbidity ranged from 0.0 to 21.1 NTU during wet weather sampling (Table 5). The lowest values were recorded at Sites 5, 6, and 7 and the outfall station SS8. Wet weather turbidity exceeded 10.0 NTU at Site 4 during both sampling events. Turbidity also exceeded 10.0 NTU at outfall stations SS2 and SS3 during the August sampling event and SS11 during the November sampling event.

The high turbidity levels measured at the sampled outfalls (including Site 4) during wet weather sampling suggests that accumulated particulate matter from area residences, roads, or inadequately maintained catch basins becomes mobilized and is discharged into Hopedale Pond during precipitation events.

3.2.3.4 Total Suspended Solids

Total suspended solids (TSS) within a water column can greatly affect water clarity. Sources of TSS are typically surface runoff and re-suspended bottom sediments; however, pollen, algal production, and other natural processes can also contribute to high TSS values. TSS values less than 10 mg/L are deemed acceptable for aquatic life according to the State Water Quality Criteria (MADEP 1996).

Dry weather TSS values were within state standards (less than 10 mg/L) at all sites during each sampling event (Table 4). TSS was only detectable by the laboratory for the September sample collected at Site 6.

Wet weather TSS values varied from 2 mg/L to 15 mg/L with values above state standards at Sites 4, 7, SS3, and SS11 on one occasion (Table 5). TSS levels would be expected to rise during storm events, especially at Site 4, which receives a high percentage of runoff from impervious surfaces. Higher average TSS values during wet weather sampling at Site 4 support this (Figure 19).

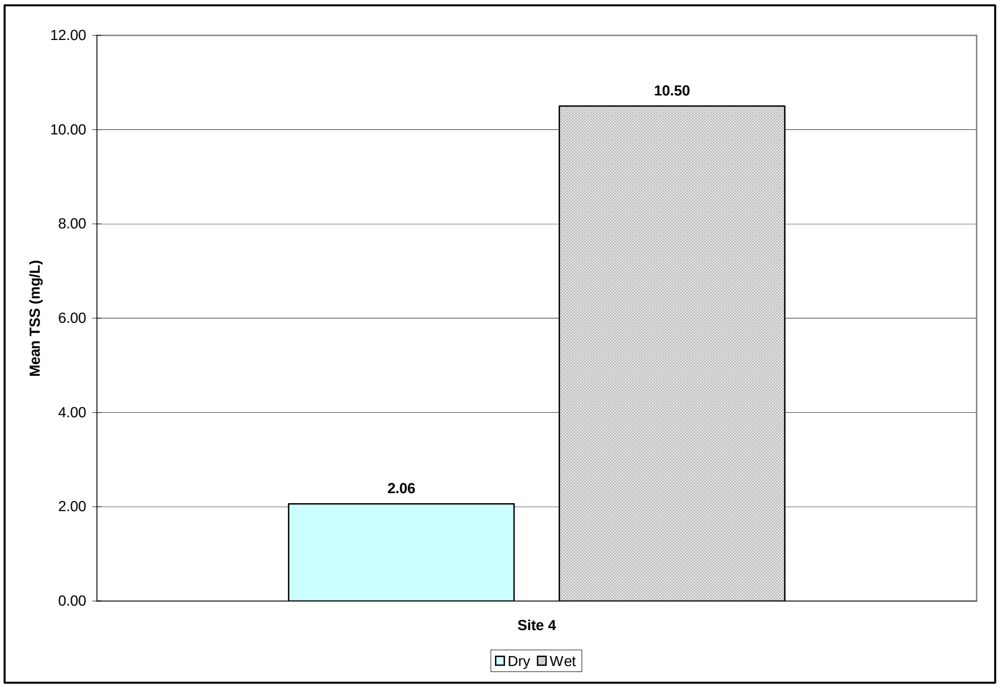


Figure 19. Mean TSS Levels during Wet and Dry Weather Sampling at the Site 4 Outfall, May 2008 to January 2009

3.2.3.5 pH

Dry weather tributary pH levels were generally within the range typical for Massachusetts waters (6.0 to 7.5 SU) with few exceptions (Table 4, Figure 20). One exceptionally low pH of 5.2 SU (well below the state standard of 6.5 SU) was observed at Site 4 during July dry weather sampling. Otherwise, most pH values were circumneutral to slightly acidic. Several pH values were above 7.5 SU in January but still well within the state standard.

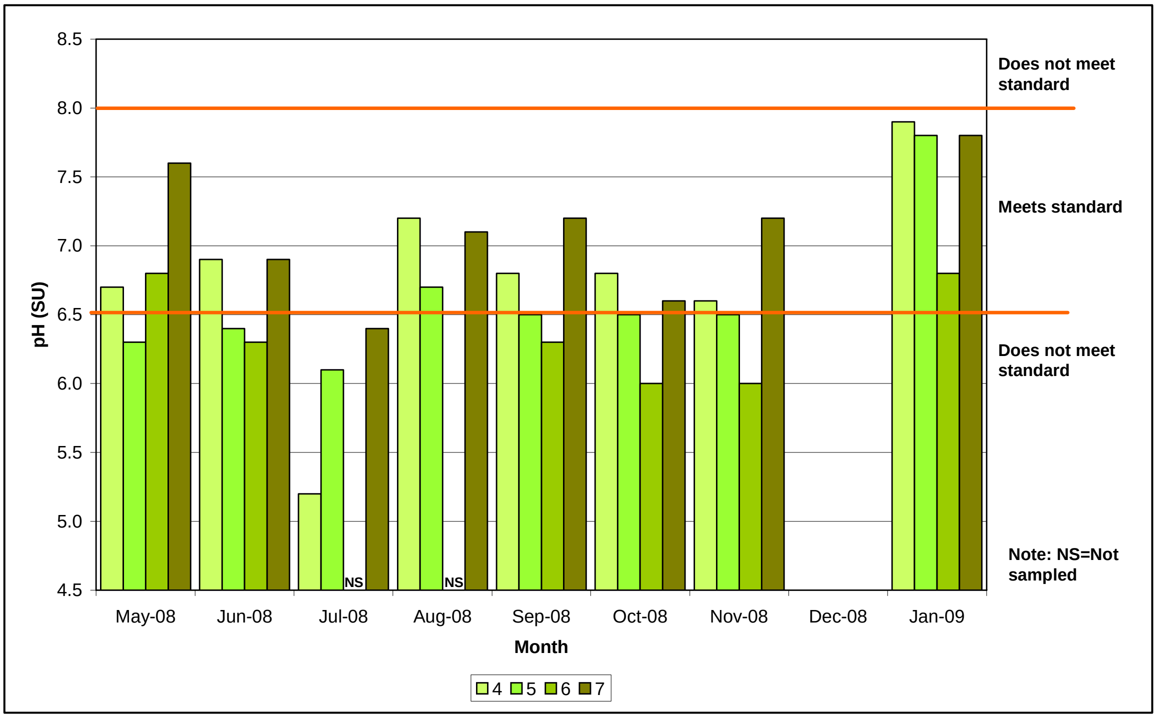


Figure 20. Dry Weather Tributary pH in the Hopedale Pond Watershed, May 2008 to January 2009

Wet weather sampling yielded pH values ranging from 5.8 to 7.5 SU among the sampled tributaries and outfalls, with the lowe st values at Site 6 and the highest at Site 4 (Table 5). The outfall stations SS2, SS3, SS8, and SS11 were all between 6.0 and 6.9 SU.

3.2.3.6 *E. coli*

E. coli bacteria sampled during dry weather at the tributaries (including the outfall at Site 4) varied greatly from site to site and often from one sampling date to the next (Table 4, Figure 21). However, Site 4 had the highest *E.coli* numbers by far (as high as >20,000 colonies/100mL) and exceeded the state standards for single sample on four occasions as well as for geometric mean during sampling from September 2008 to January 2009. Site 6 also exceeded the single sample *E. coli* standards during the June dry weather sampling event with a count of 420 colonies/100mL. All other sites were within the primary contact state standards for *E.coli*.

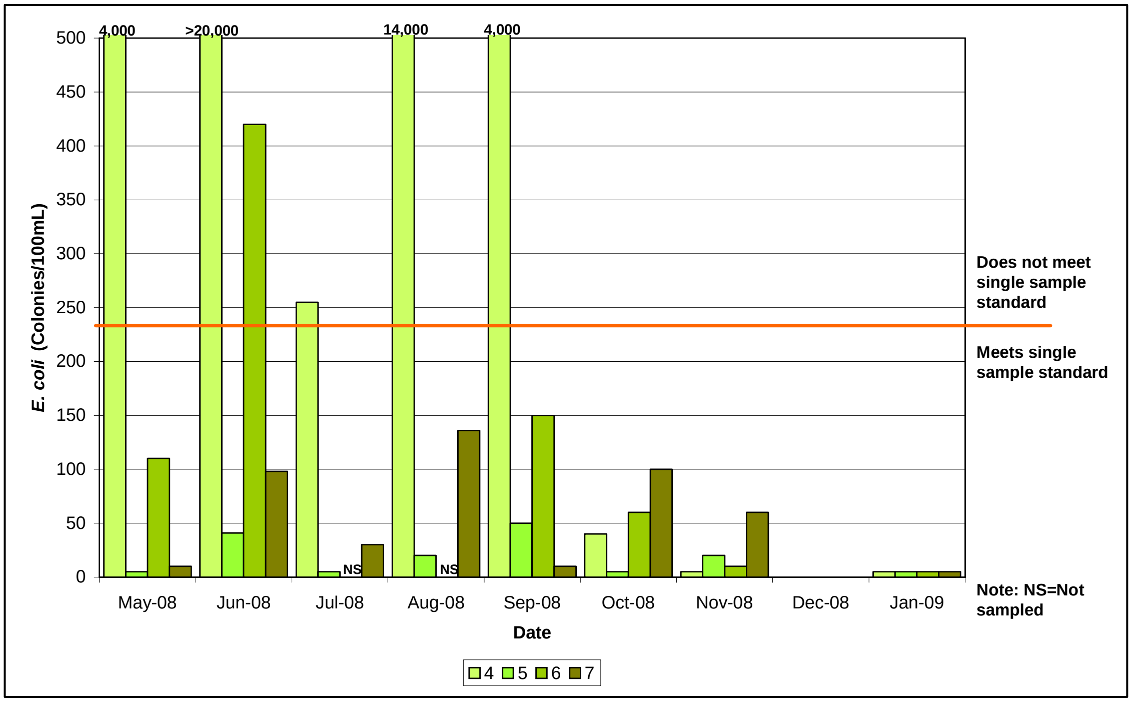


Figure 21. E.coli Concentrations at Tributary Sites in the Hopedale Pond Watershed, May 2008 to January 2009

Wet weather sampling revealed similar numbers of *E.coli* at sites also sampled during dry weather conditions (Table 5). However, the geometric mean of *E. coli* levels from the wet weather samples (379 colonies/100mL) at Site 4 was less than the levels found during dry weather (429 colonies/100mL), suggesting that contaminated dry weather flows are the main source of *E.coli* contamination at this outfall. *E. coli* numbers were also high among each of the outfall stations that were only sampled during wet weather, with single samples in August ranging from 820 to 3,000 colonies/100mL. All other sites were within the primary contact state standards for *E. coli*.

A further investigation of potential sources of *E. coli* pollution to the Site 4 storm drain is currently being pursued to trace the origin of the elevated bacteria levels.

3.2.3.7 Phosphorus and Nitrogen

Phosphorus

Phosphorous is often the limiting nutrient in freshwater ecosystems in the eastern United States, where nitrogen is usually available in ample supply. Although explicit phosphorus standards have not been implemented at the state level, the estimated reference condition for total phosphorous in regional rivers and streams is approximately 0.02 mg/L (USEPA, 2000). Values much above this are likely to be indicative of excessive human inputs.

Total phosphorus in the tributaries to Hopedale Pond (including Site 4) ranged from 0.005 (very low) to 0.277 mg/L (very high) for water samples collected during dry weather (Table 4, Figure 22). As with *E. coli*, values of total phosphorous were consistently high at Site 4 through most of the sampling period. On the contrary, dry weather total phosphorous did not appear to be problematic at the remaining tributary sites (5 through 7), where the maximum concentration measured was 0.026 mg/L at Site 6 in September 2008.

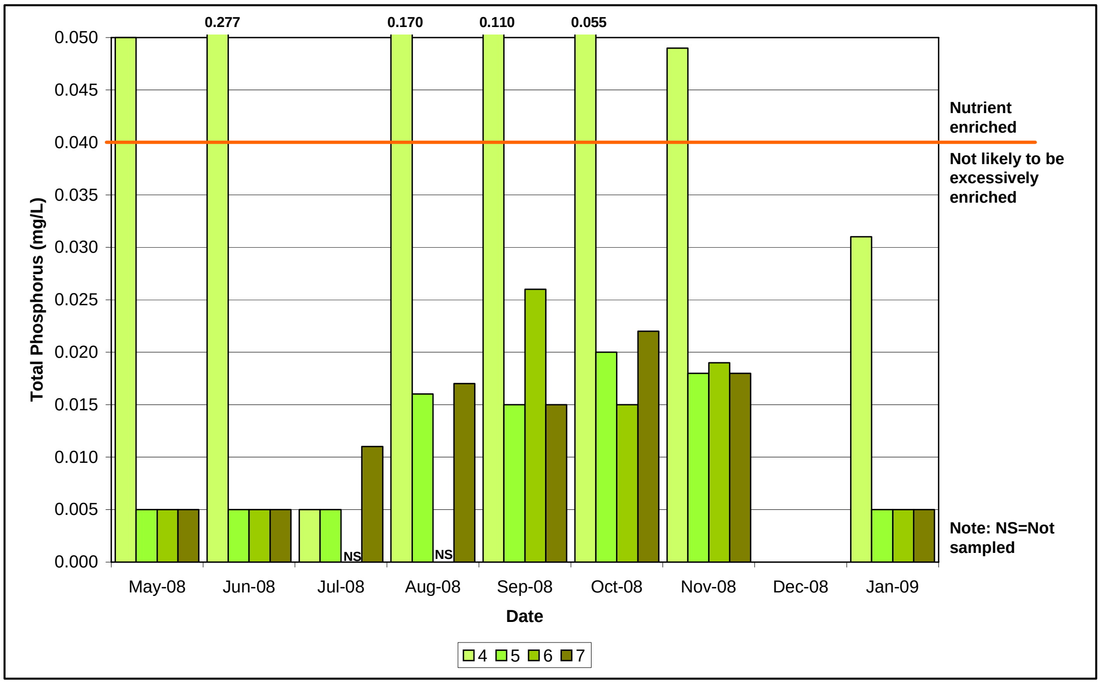


Figure 22. Total Phosphorus Concentrations at Tributary Sites in the Hopedale Pond Watershed, May 2008 to January 2009

Dissolved phosphorus concentrations were also excessive at Site 4, reaching as high as 0.244 mg/L during dry weather (Table 4, Figure 23). As with total phosphorus, dissolved phosphorus was typically much lower at the remaining tributary sites. Dissolved phosphorus concentrations in these locations were usually less than 0.015 mg/L, although between August and November 2008 borderline high values up to 0.018 mg/L were sometimes found at each of these sites.

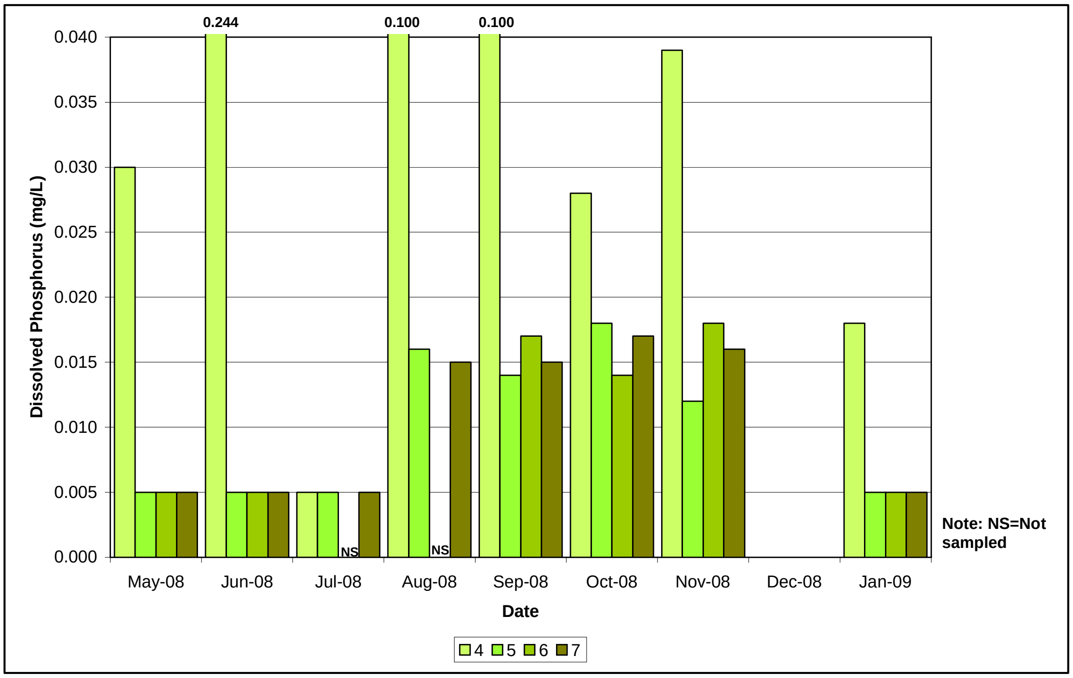


Figure 23. Dissolved Phosphorus Concentrations at Tributary Sites in the Hopedale Pond Watershed, May 2008 to January 2009

On average, wet weather samples contained much higher levels of total phosphorous than dry weather samples at Sites 4 through 7 (Table 5 and Figure 24). Furthermore, storm drains emptying to Hopedale Pond were found to have total phosphorus concentrations as high as 2.30 mg/L. Given the large differences in the magnitude of dry and wet weather phosphorous concentrations within Hopedale Pond tributaries, stormwater is likely to be a major source of phosphorous loading to the pond.

Nitrogen

A combination of many factors in the watershed controls the flux of nitrogen. The sources and sinks of nitrogen in the watershed are dominated by levels of nitrate and ammonia in rainfall, biological nitrogen fixation and denitrification, as well as freezing and thawing of the soils, natural fires and erosion, and the amount of nitrogen recycled by vegetation or held in

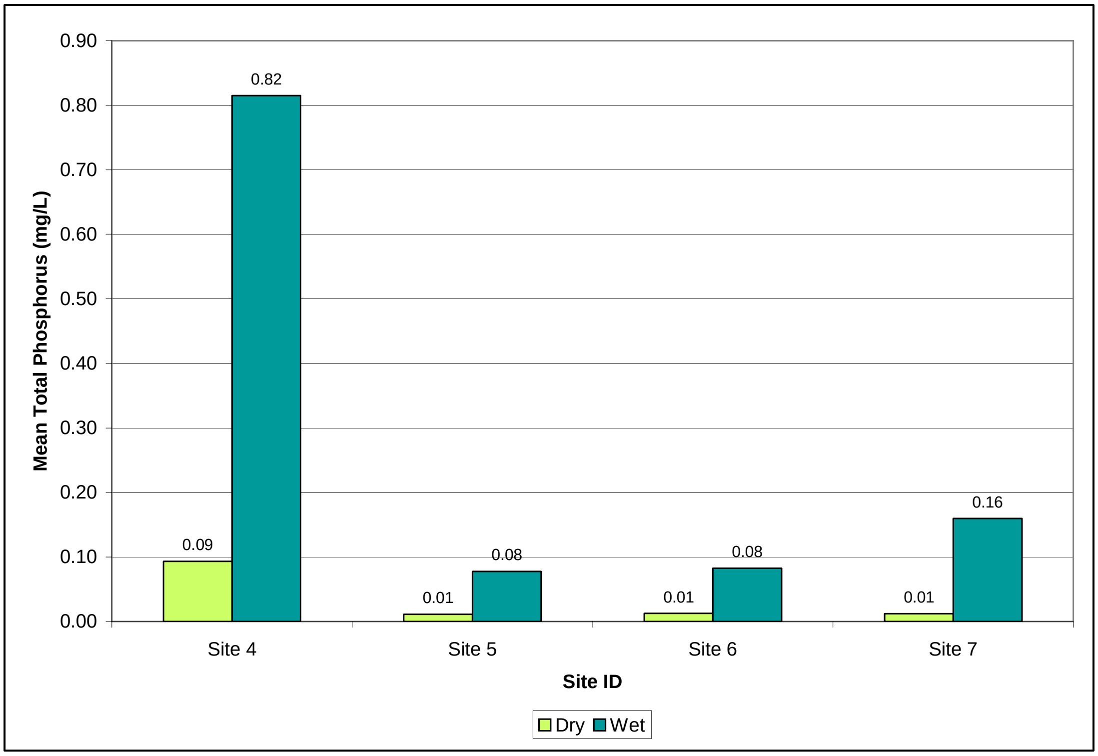


Figure 24. Mean Total Phosphorus in the Hopedale Pond Watershed during Dry and Wet Weather Sampling , May 2008 to January 2009

the humus layer (Goldman and Horne 1983). Anthropogenic sources are often attributable to septic system discharges or excessive fertilizer use.

Total nitrogen is the sum of nitrogen found as nitrate, nitrite, or TKN (which includes ammonia). The estimated reference condition for total nitrogen in the region is 0.61 mg/L (USEPA, 2000) and total nitrogen values over 1.0 mg/L are unusual without direct urban or agricultural influence.

In general, total nitrogen sampled during dry weather was less than 1.0 mg/L for tributary sites 5, 6, and 7, although it was as high as 1.75 mg/L at Site 6 during June 2008 (Table 4 and Figure 25). Excluding this outlier value, total nitrogen ranged from 0.35 mg/L to 0.89 mg/L at Sites 5, 6, and 7 during dry weather. However, total nitrogen was much higher at Site 4, ranging from 2.52 mg/L to 5.30 mg/L during dry weather, indicating clear contamination of flows at this site.

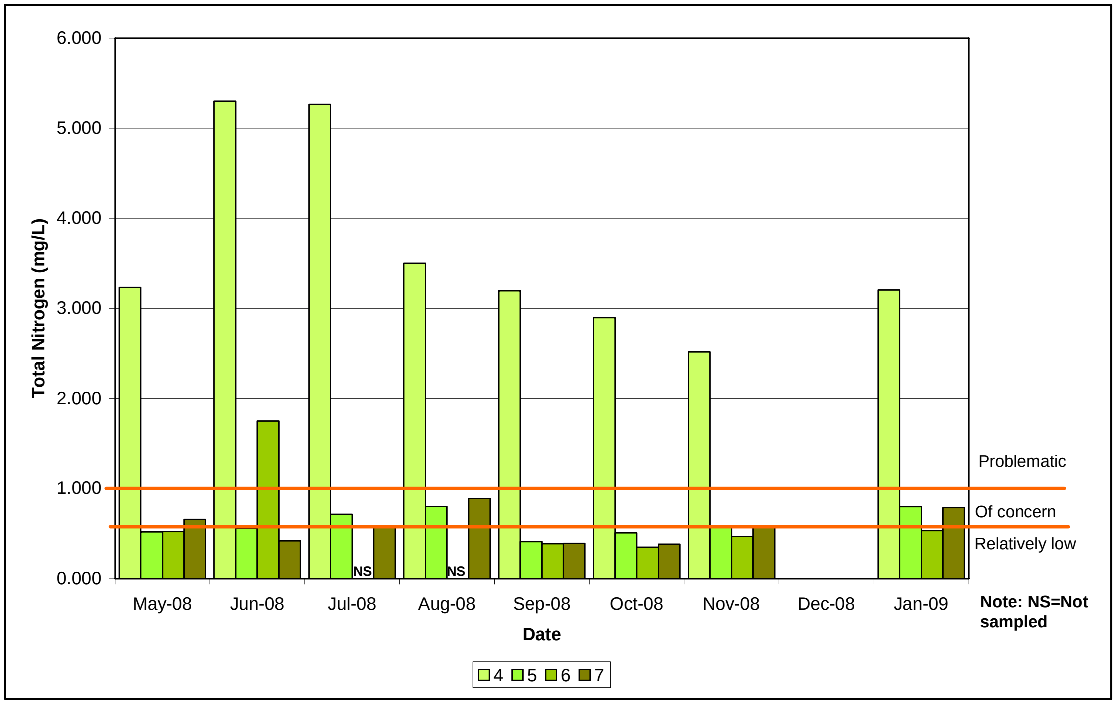


Figure 25. Total Nitrogen Concentrations at Tributary Sites in the Hopedale Pond Watershed, May 2008 to January 2009

Wet weather total nitrogen values were similar to those found during dry weather sampling at the tributary sites and Site 4 (Table 5). Additionally, total nitrogen was above 1.0 mg/L for each of the outfall sampling stations. These values are indicative of direct human influence on water quality in the Hopedale Pond watershed.

Dry weather nitrate-nitrogen levels in the tributaries (including Site 4) were consistently very high at Site 4, where values averaged 2.58 mg/L and were as high as 2.97 mg/L (Table 4). Nitrate-nitrogen concentrations varied from 0.015 to 0.462 mg/L at the remainder of the tributary sites.

Wet weather nitrate-nitrogen concentrations varied from 0.125 to 2.72 mg/L (Table 5) and at tributary Sites 5, 6, and 7 tended to be high compared to concentrations measured during dry weather. However, wet weather nitrate-nitrogen values at Site 4 were similar to those collected during dry weather.

Dry weather concentrations of nitrite-nitrogen at the tributary sites were generally at or close to 0.01 mg/L, although levels were as high as 0.07 mg/L at the Site 4 outfall (Table 4). Nitrate-nitrogen and nitrite-nitrogen were analyzed by a different analytical method (SM 4500-NO3- F) for samples collected on June 27, 2008 and are reported as one sum value for this date in Table 4.

Dry weather ammonia-nitrogen concentrations ranged from 0.065 mg/L to 1.890 mg/L at the tributary sites, including Site 4 (Table 4). As with other nutrient measures, the highest concentrations, on average, were found at Site 4.

Wet weather sampling results (Table 5) indicate that ammonia-nitrogen concentrations did not appear to be consistently influenced by precipitation events at any of the tributaries.

3.2.4 Groundwater Quality

In general, springtime precipitation will typically raise the pond level faster than the groundwater elevation, resulting in net outflow in portions of the pond with coarse sediments. During dry periods, the pond elevation will decline in response to surface water outflow and evaporation, while the groundwater elevation will decline more slowly. This generally allows groundwater seepage rates into the pond to increase or decrease in response to local weather patterns. Groundwater flow may change direction throughout the summer, as precipitation changes the pond level more rapidly than the groundwater level, and greater evaporation and surface outflow draw the lake down again. Inseepage of groundwater may dominate the pond during the annual winter drawdown period, as pond elevation drops below the local ground water elevation.

Spatial variation in groundwater seepage rates may also develop within the pond. Generally coarser substrates in the southern basin allow groundwater to enter or exit the pond more easily than the thick deposits of fine sediments and clays that dominate the northern basin. However, spatial variation in sediment thickness and grain size is high throughout both basins, implying that large local differences in groundwater seepage rates are possible. Where the pond has developed a peat seal (due to years of accumulation of organic sediments) groundwater exchange may be negligible.

In Hopedale Pond, seepage rates varied by date, with an increase observed between July and September (Table 6). Average seepage rates for the study area were 0.42 liters per square meter per day ($L/m^2/D$) of net outflow (outseepage) in July and 1.18 $L/m^2/D$ of net inflow (inseepage) in September. Measured rates of seepage at Hopedale Pond also varied by location, with some of the study shoreline segments showing inseepage and others showing outseepage (Table 6 and Figure 2). The highest rates of inseepage were measured on the western shoreline of the pond. In July, inseepage was only recorded in Segment HPS3, where rates averaged 1.46 $L/m^2/D$. By contrast, in September, inseepage was observed at Segments HPS1, HPS2, and HPS3, with the highest rate of 3.49 $L/m^2/D$ at HPS2. Outseepage was observed during both July and September at Segment HPS4 with rates of outflow ranging from 0.65 $L/m^2/D$ in September to 2.10 $L/m^2/D$ in July.

Groundwater quality also varied by date and location (Table 7). Porewater pH ranged from 5.9 to 7.2 in July and 5.7 to 6.2 in September. The lowest pH levels during both months were observed at Segment HPS2. Porewater specific conductance ranged from 384 to 1,186 µS/cm in July and from 230 to 1,931 µS/cm in September. The highest levels during both months were observed at Segment HPS2. Higher levels of specific conductance (>400 µS/cm) are often indicative of human influences, typically faulty or poorly maintained septic systems.

Dissolved phosphorus is the concentration of all forms of dissolved phosphorus. "Dissolved" in this case is defined as passing through a 0.45 µm filter. In groundwater, dissolved phosphorus values in excess of 0.05 mg/L are of concern in terms of eutrophication, and values in excess of 0.10 mg/L can cause serious deterioration of conditions if the phosphorus is biologically available. However, high porewater concentrations do not necessarily translate into in-pond water column values of the same magnitude. High iron levels may promote complexing of iron phosphates, which are highly insoluble in oxygenated water. For phosphorus to become available in the water column at a significant level, it must be simultaneously paired with low iron levels (i.e., less than five times the phosphorus level).

Dissolved phosphorus in Hopedale Pond porewater was measured only at segments with observed inseepage. Observed levels were 0.005 mg/L in July and ranged from 0.05 to 0.45 mg/L in September, with highest levels observed near the Town beach at Segment HPS1 (Table 7). Total dissolved iron levels ranged from 8.92 to 12.5 mg/L in July and 0.03 to 15.8 mg/L in September. At segments HPS2 and HPS3, high levels of iron were associated with very low levels of phosphorous in July. Likewise, low levels of iron in these segments were associated with higher levels of phosphorous in September. Samples collected from segment HPS1 in September yielded high level of both phosphorous and iron. These results indicate that there may not be enough naturally occurring iron in the soils to counteract the groundwater phosphorus load throughout the entire season.

Nitrate nitrogen values in Hopedale Pond porewater ranged from 0.02 to 2.54 mg/L (Table 7). The highest nitrate levels were found in shoreline segment HPS2 on both survey dates and were well out of range of what would be considered "pristine" conditions (0.01-0.5 mg/L).

Ammonia nitrogen ranged from 0.050 mg/L to 12.7 mg/L in Hopedale Pond porewater (Table 7). Ammonia was lowest in segment HPS2 on both survey dates. The highest ammonia levels were found at HPS3 (1.01 mg/L) on July 30, 2008 and HPS1 (12.7 mg/L) on September 18, 2008.

The sum of nitrate and ammonium nitrogen, or soluble inorganic nitrogen (SIN), could be expected to reach up to approximately 1.0 mg/L under natural conditions. Values much over this concentration raise suspicions of septic leachate contamination. SIN values exceeded this value in each of the sampled study segments (HPS1, HPS2, and HPS3), indicating that septic leachate contamination may occurring in along both the eastern and western shorelines of the southern basin of Hopedale Pond (Table 7).

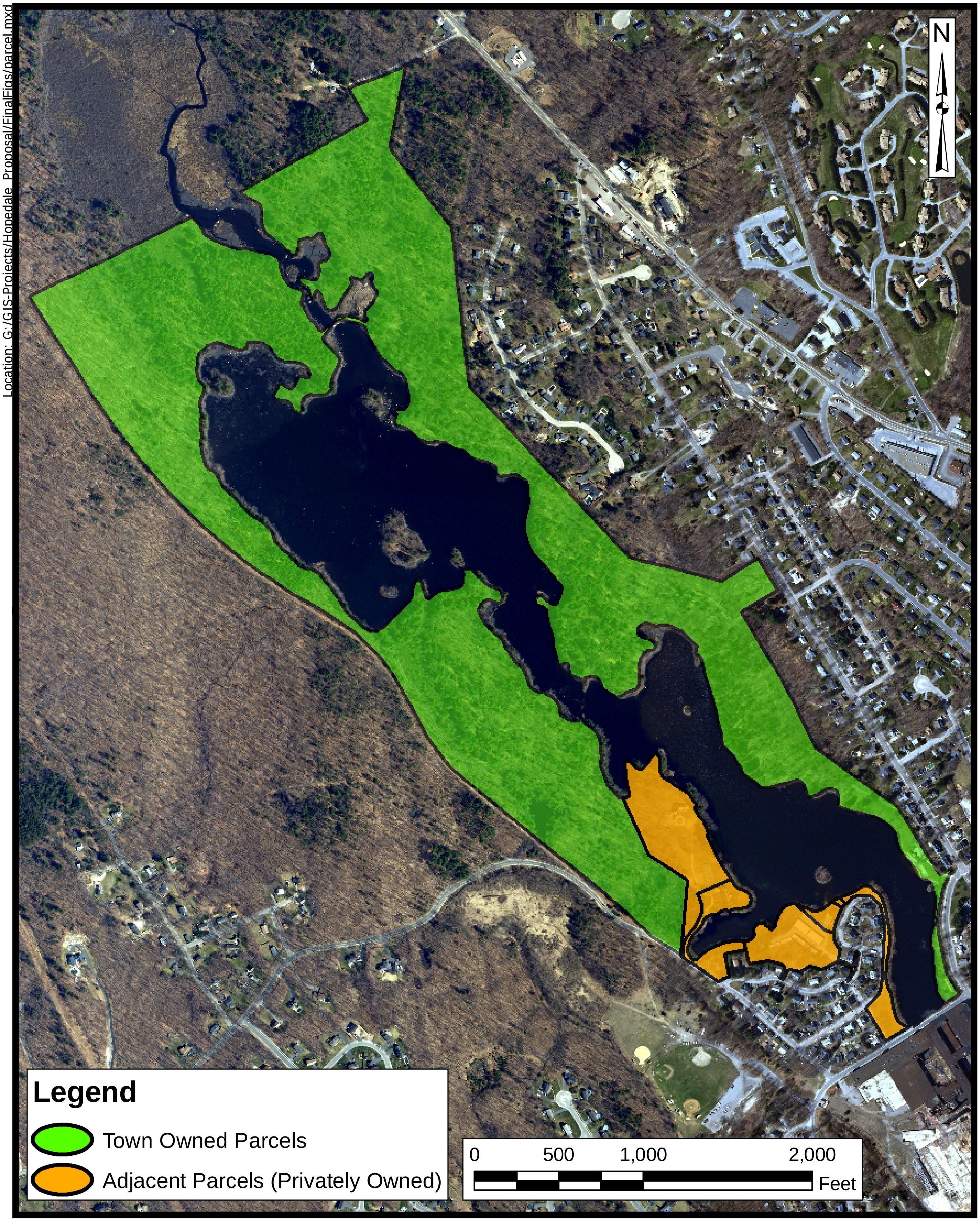
3.3 Site 4 (Dutcher Street) Outfall Source Tracking

STUDY IN PROGRESS

3.4 Pond Rights

Using town assessor maps and deeds, ESS determined that rights to land under the pond reside with the Town. Additionally, the Town owns much of the land surrounding Hopedale Pond, including the Town Parklands (Figure 26). Therefore, pond rights do not represent significant obstruction to implementation of a dredging project, should the Town select this as a management option for Hopedale Pond. However, Mr. Phil Shwachman maintains ownership of the water rights within the pond and the Mill River, including the dam at Hopedale Pond. Consequently, the Town may need to consult with Mr. Shwachman prior to the implementation of dredging, drawdown, herbicide applications, or other direct weed control as management options.

Location: G:/GIS-Projects/Hopedale_Proposal/FinalFigs/parcel.mxd



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HOPEDALE POND
Hopedale, Massachusetts

Source: 1) MassGIS, Assessors' Parcels, 2007
2) Town of Hopedale, 2007
3) MassGIS Orthos, 2005

Hopedale Pond Parcels

Figure 26

Hopedale Dam impounds the waters of the Mill River to form Hopedale Pond. The dam allowed the Draper Corporation loom factory to harness power for manufacturing. The exact age of the original dam is not clear. However, it is depicted on an 1854 map of the Town and likely dates back to the early years of the Town (1840s) or even earlier. The U.S. Army Corps of Engineers (1979) describes Hopedale Dam as "an earth embankment 265 ft. long and 19 ft. high with a concrete and stone masonry spillway with flashboards near the right end of the dam." The dam was considered to be in fair condition at the time but with a high hazard potential.

3.4 Bathymetry and Isopach Mapping

Results of water depth surveys were used to create a bathymetric map for the pond (Figure 27). Hopedale Pond was found to be shallow, only exceeding 10 feet in depth at the southern end of the pond. The total volume of water in the pond is estimated to be just over 11,500,000 cubic feet (or about 86 million gallons) with a mean water depth of 3.4 feet (Table 8).

The thickness of soft pond sediments was measured along transects throughout both the northern and southern basins of Hopedale Pond in order to generate a sediment isopach map (Figure 28). The thickest sediments were found in the northwestern corner of the pond where sediment thicknesses in excess of 12 feet were measured. Sediment thickness averaged approximately 3.0 feet over the area of the pond. Although soft sediments in the southern basin of Hopedale Pond were generally thin (less than 1.5 feet), areas of thicker sediments (up to 8 feet thick) were also documented. Sediment thickness was generally thinnest near the dam and in the immediate vicinity of the beach. The total volume of soft sediments in Hopedale Pond was estimated to be just over 376,000 cubic yards (Table 9) which is a volume that is slightly less than that of the overlying water volume.

3.5 Sediment Quality

An assessment of overall sediment quality in Hopedale Pond was conducted on January 19, 2009. The purpose of the analysis was to assess the feasibility of incorporating dredging as a management option for the pond. Results of the analysis provide insight into regulatory issues related to dredge spoils, should dredging be pursued as a management action. This study included analysis of bulk physical properties, a quantitative assessment of sediment contaminants, and an assessment of nutrient levels in pond sediments.

A summary table of sediment chemistry results is provided (Table 10). Only constituents with measurable concentrations from at least one composite sample are reported in this table. However, a complete list of analytes is provided in the laboratory results (Appendix G).

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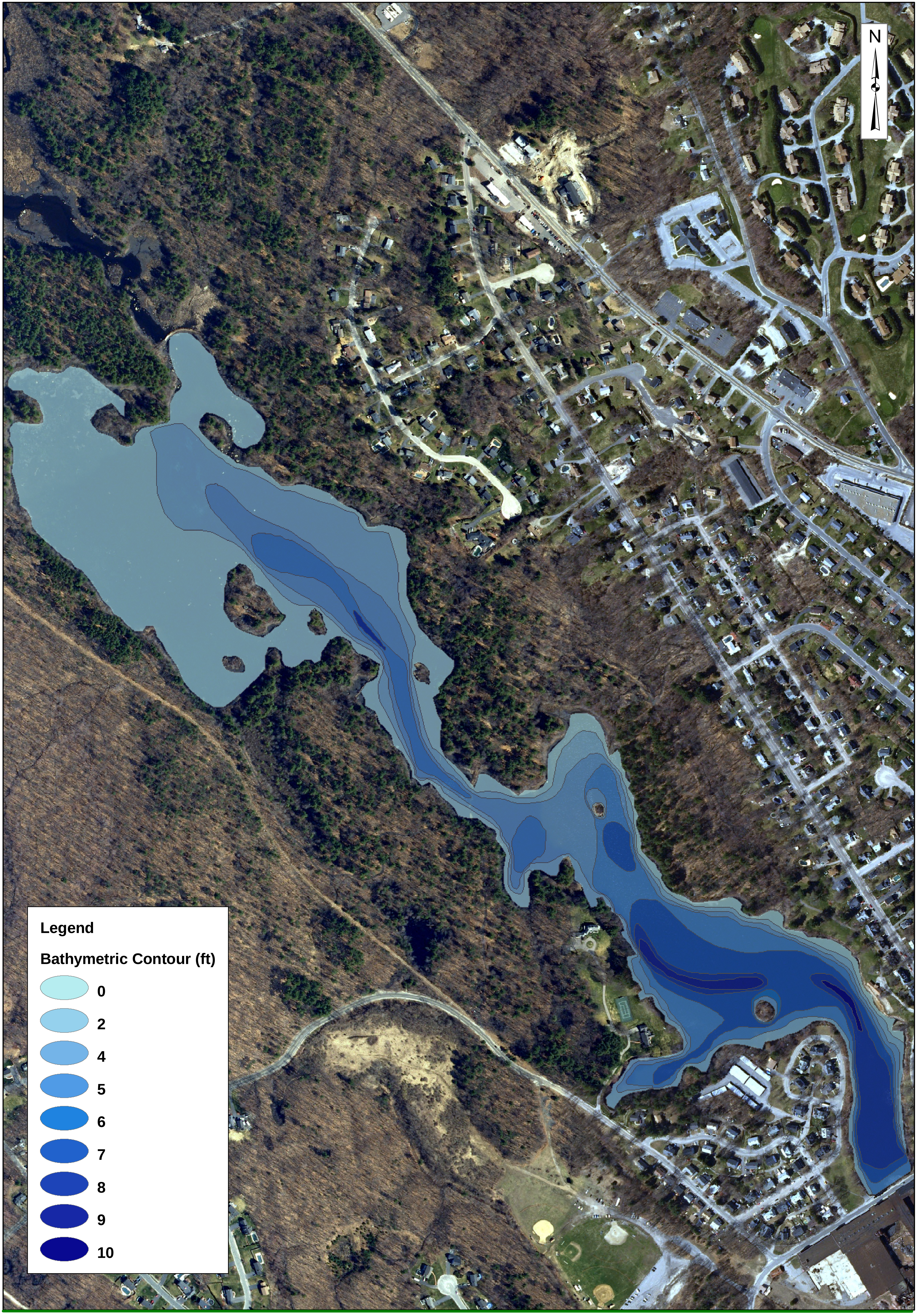

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Hopedale, Massachusetts

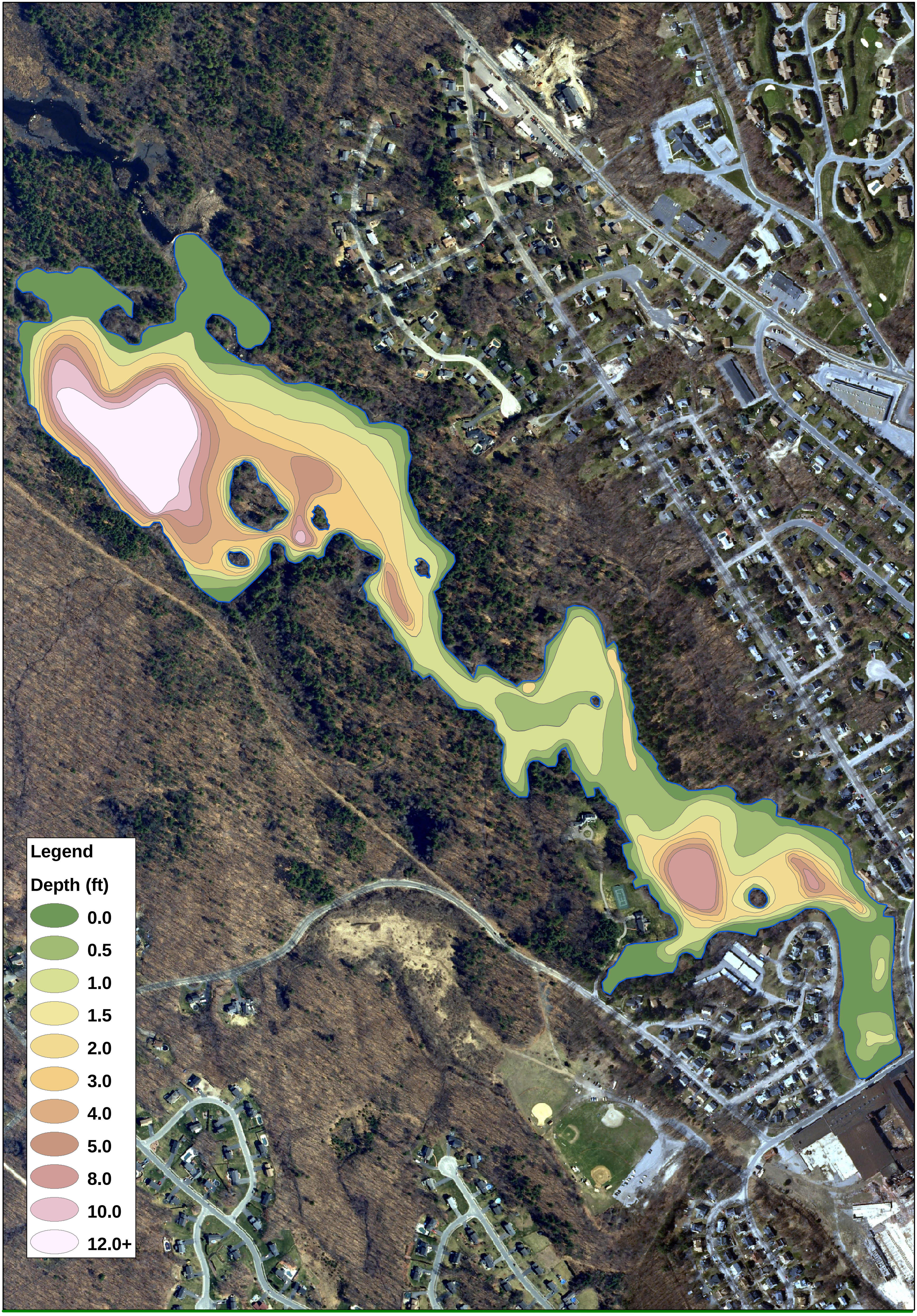
Scale: 1" = 440'

Source: 1) MassGIS, Orthophotos, 2005
2) ESS Bathymetry Data, 2009

Hopedale Pond Bathymetric Map
July 2008

Figure
27

Location:G:/GIS-Projects/H153-Hopedale-Pond/00-mxd/FinalFigs/Sediment_depth_final.mxd



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HOPEDALE POND
Project Location: Hopedale, Massachusetts

Scale: 1" = 450'

Source: 1) MassGIS, Orthophotos, 2005
2) ESS Group, Inc., Sediment Data, 2008

0 200 400 800 1,200 1,600
Feet

Isopach Map for Hopedale Pond
January 2009

Figure
28

Sediment chemistry data was compared to the Massachusetts Contingency Plan (MCP) Method 1 Soil Standards (Table 10). These standards consider the potential risk of harm resulting from direct exposure to the hazardous constituent of the soil and the potential impact to groundwater. The MCP defines three different soil types (S-1, S-2, & S-3), generally based on the potential for exposure to that soil. For simplicity, the lowest concentration level was used to evaluate the Hopedale 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. The MCP Method 1 standards will apply to dredge spoil material.

In the northern basin of Hopedale Pond (composite sample SC-2), each of the tested analytes was below MCP Method 1 Soil Standards. This suggests that sediments in the northern basin tend to be relatively free of contaminants of concern. It should be noted that this result does not necessarily indicate that all sediments in the northern basin are uncontaminated. A more detailed field study would need to be conducted under a MassDEP-approved sediment sampling plan to confirm that dredged sediments would meet the relevant standards for the intended use of spoils.

Sediments from the southern basin of Hopedale Pond (composite sample SC-1) exceeded the MCP Method 1 Soil Standards for arsenic and benzo(a)pyrene. Although additional field studies would need to be completed to identify areas of contamination, it is likely that dredged sediments from the southern basin would be subject to limitations on use and/or disposal.

Physical testing indicated that sediments can be classified as MH (high plasticity silt) or OH (high plasticity organic soil). Although the sediments in both the SC-1 and SC-2 composite samples were described as moist brown or gray silt with organics during the Atterberg Limit testing, the results of the grain size analysis are reflective of a coarser material. Photographic documentation of the collected sediment cores indicates that the descriptions of the material from Atterberg Limit testing better reflect the true nature of the material (i.e., silt with organics). Therefore, it is recommended that these data be used to guide future considerations regarding bulk physical analysis of sediments.

Total phosphorus concentrations in the sediment ranged from 54 mg/kg (dry) in northern basin (N-3) to 229 mg/kg in southern basin (N-1; Table 11. Total phosphorus in sediments of the middle section (N-2) of Hopedale Pond was similar to those of the northern basin (66 mg/kg).

Total nitrogen concentrations showed a different pattern, with the highest concentration (6,300 mg/kg) at N-3 and the lowest (3,500 mg/kg) at N-2 (Table 11).

3.6 Hydrology and Nutrient Budget

Precipitation data utilized for modeling was reported as the average annual precipitation for Milford, Massachusetts (47.7 inches), which is adjacent to Hopedale.

Estimated average water input to Hopedale Pond from surface water, groundwater, and direct precipitation is 21.09, 0.01, and 0.28 cfs, respectively, for a total average annual flow of 21.38 cfs (Table 12). This flow will vary appreciably among seasons and weather conditions. Surface water flow contributes significantly (99%) to the total pond inflow, while groundwater inflow (<1%) and direct precipitation (1%) make up the remainder. The surface water flow can be further divided into dry weather flows (31%) and wet weather flows (68%).

Based on total pond volume and the calculated flow through the pond, average detention time was calculated to be 8.1 days (0.02 years). Detention time represents the duration of time necessary to exchange the volume of water in the pond one time. Flushing rate is the inverse of detention time, and represents the number of times per year the pond volume is replaced; for Hopedale Pond the flushing rate is about 45 times per year. This is a relatively fast flushing rate, but would be anticipated for a long, shallow pond with a comparatively large sized watershed.

When detention time is known, a calculation can be made to determine response time (time needed for a pond to fully realize nutrient inputs), which for Hopedale Pond ranges between 7.9 days and 8.0 days. Since Hopedale Pond's detention time (8.1 days) is more than its response time, the effect of nutrients entering the pond may be expressed as they pass through the system (i.e., the conditions within the pond may be reflective of the water quality it receives).

The trophic state of Hopedale Pond, determined as Carlson's (1977) trophic state index (TSI) from Secchi depth, surface total phosphorus values, and chlorophyll *a* values was representative of mesotrophic (moderate nutrient levels) to eutrophic conditions (high nutrient levels) during the collection period assessed in this study. This assessment is also supported by the phytoplankton density and biovolume results (Section 4.7) which found the phytoplankton community to be typical for a eutrophic waterbody.

The nutrient water quality data can be placed into further perspective once the values are interpreted as a measurement of the nutrient load to Hopedale Pond. A calculation of minimum nutrient load was made by multiplying the volume of the pond by its flushing rate and the average concentration of the nutrient observed during this study. The minimum phosphorus and nitrogen loads delivered to Hopedale Pond were determined to be 0.93 g/m2/yr (288 kg/yr) and 47.14 g/m2/yr (14,632 kg/yr), respectively, based on the in-pond concentration data collected during this study (see Appendix H for details on phosphorus modeling). The actual load of phosphorus or nitrogen will exceed the estimated minimum load as a consequence of loss processes that reduce the in-pond concentration over time. Since phosphorus is viewed as the nutrient that controls productivity in this freshwater pond, emphasis is placed on a more detailed modeling analysis of its loading to Hopedale Pond.

A more detailed and realistic estimate of nutrient loading can be obtained by using a combination of actual field data and in-pond modeling theory. Nutrient loads are calculated based on nutrient values measured within the pond and hydraulic features of the pond. The predicted phosphorus load necessary to achieve the values found in Hopedale Pond ranges between 0.94 g/m2/yr (291 kg/yr) and 1.29 g/m2/yr (400 kg/yr) (Vollenweider 1975, Reckhow 1977) based on this approach. The average predicted phosphorus load for all models was 1.09 g/m2/yr (338 kg/yr). The nitrogen load necessary to achieve the observed in-pond concentrations was estimated to be 53.11 g/m2/yr (16,484 kg/yr) (Bachmann 1980) in this manner.

Vollenweider (1968) established criteria for calculating the phosphorus load below which no productivity problems were expected (permissible load) and above which productivity problems were almost certain to persist (critical load). These loading limits are also based on the hydraulic properties of the pond and depend upon average depth and detention time. The average of phosphorus loads estimated for the pond through in-pond modeling (338 kg/yr) is greater than the permissible level of 244 kg/yr, but considerably lower than the critical level of 488 kg/yr. This indicates that phosphorus in Hopedale Pond is approaching levels which are likely to result in degraded water quality conditions in the future if not corrected. This knowledge is useful for determining the value of the various management alternatives, and can be particularly helpful when prioritizing their order of implementation under fiscal constraints.

Similar loading limits for nitrogen have not been established, owing to the less predictable relationship between nitrogen, pond hydrology, and primary productivity. Although nitrogen data are very useful in understanding pond conditions and processes, phosphorus is the logical target of management actions aimed at controlling plant growth.

An itemized phosphorus load can be developed when nutrient data from each of the various sources has been determined. Annual phosphorus loading itemized by sources to Hopedale Pond suggests that the actual load of phosphorus could be higher than the load indicated by the in-pond models or concentration. The wet weather surface flow inputs stand out as the dominant influence at just over 292.8 kg/yr, and representing more than 76.2% of the total estimated phosphorus load (Table 13). In contrast, the phosphorus load being contributed via direct precipitation and groundwater were estimated to be approximately 1.4% and 0.3%, respectively.

Site 5 contributed approximately 50% of the total phosphorus load to Hopedale Pond through wet weather flows alone. A lower percentage of the total phosphorus load was contributed by wet weather flows at Site 4 (23%). However, while Site 5 drains over half the area of the watershed, the Site 4 sub-basin represents only a very small fraction of the total watershed area. Therefore, the Site 4 sub-basin contributes a much higher load of phosphorus, given its drainage area, than the sub-basins represented by the other study sites. This implies that reducing the phosphorus load from Site 4 would be the most logical and cost-effective first step in managing nutrients within the Hopedale Pond watershed.

These estimates are based on a limited number of samples collected over one field season and could be greatly influenced by the conditions prior to the commencement of the sampling or by the size of the particular storm events sampled. More detailed calculations for the hydrologic and nutrient budgets are presented in Appendix H.

3.7 Biological Community

Data on the biological community associated with Hopedale Pond was collected as part of this study. Particular emphasis was placed on aquatic plants, phytoplankton, zooplankton, and Canada geese. However, observations of other wildlife were noted as well.

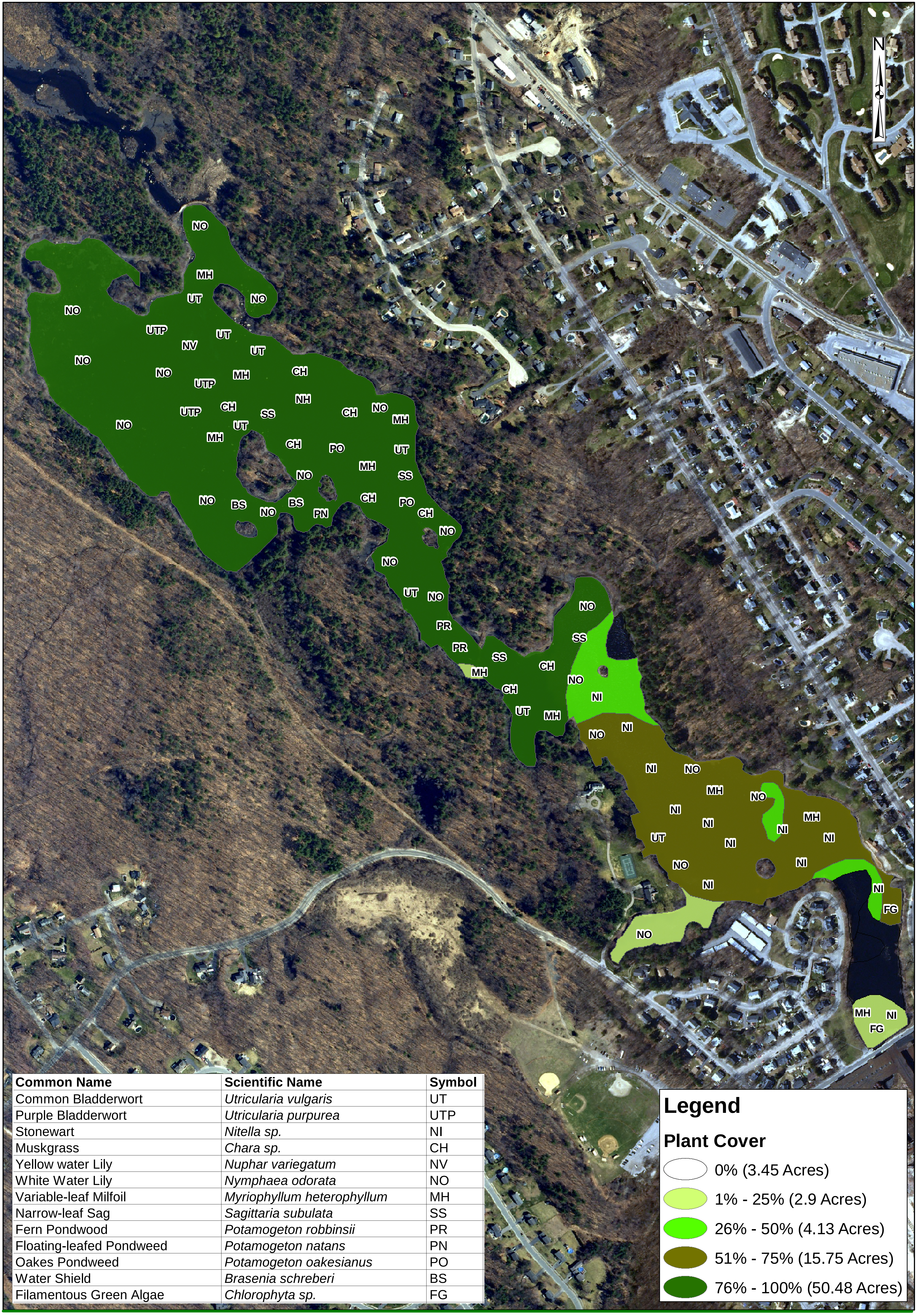
3.7.1 Aquatic Plants (Macrophytes)

Results of the plant survey conducted in July 2008 found an aquatic plant community consisting of a mix of exotic invasive and native species. Aquatic plant growth was observed around the perimeter of the pond to a depth of up to 11 feet. The invasive exotic species variable-leaf milfoil (*Myriophyllum heterophyllum*) was common in Hopedale Pond and the exotic and highly invasive species fanwort (*Cabomba caroliniana*) has been reported historically but has been recently managed and was fortunately not documented during this study.

Overall plant cover was highest in the northern basin of the pond and lowest in the southern basin (Figure 29). There was also heavy plant cover in the narrow central portion of the pond. Plant cover was generally absent in the southernmost portion of the pond near the beach on the eastern shoreline. Deeper water depths in the southern basin limit plant growth and past plant management techniques also likely contribute to the reduced plant cover observed in this area of the pond. Moving north from the beach area, plant cover increased in the southern basin to 50%-75% cover. Almost the entire pond within the narrow middle section and throughout the entire northern basin had dense plant cover ranging from 75%-100%.

The biovolume within the pond showed a similar pattern to plant cover, with the highest levels in the northern basin and lower levels in the southern basin (Figure 30). In the southern basin, biovolume was low (1%-25%) because the dominant species in the area was stonewort (*Nitella* sp.) an alga which forms dense mats on lake and pond bottoms. Moderate biovolume levels of 26%-50% with some smaller areas of even greater biovolume (50%-100%) were observed in the middle, narrow portion of the pond. Excessive biovolume levels were observed in the northern basin with almost all plants growing to the water's surface. Biovolume was so high that it was difficult to travel by motorboat due to propeller entanglement with weeds. The shallower depths in the northern basin and deep organic substrate likely allow for greater plant growth. In addition, the invasive species variable-leaf milfoil was dominant in the northern basin and has formed dense beds throughout (Figure 29).

Location: G:/GIS-Projects/H153-Hopedale-Pond/00-mxd/Final Figs/PlantCover.mxd



Common Name	Scientific Name	Symbol
Common Bladderwort	*Utricularia vulgaris*	UT
Purple Bladderwort	*Utricularia purpurea*	UTP
Stonewart	*Nitella sp.*	NI
Muskgrass	*Chara sp.*	CH
Yellow water Lily	*Nuphar variegatum*	NV
White Water Lily	*Nymphaea odorata*	NO
Variable-leaf Milfoil	*Myriophyllum heterophyllum*	MH
Narrow-leaf Sag	*Sagittaria subulata*	SS
Fern Pondwood	*Potamogeton robbinsii*	PR
Floating-leafed Pondweed	*Potamogeton natans*	PN
Oakes Pondweed	*Potamogeton oakesianus*	PO
Water Shield	*Brasenia schreberi*	BS
Filamentous Green Algae	*Chlorophyta sp.*	FG

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HOPEDALE POND DIAGNOSTIC/FEASIBILITY STUDY
Hopedale, Massachusetts

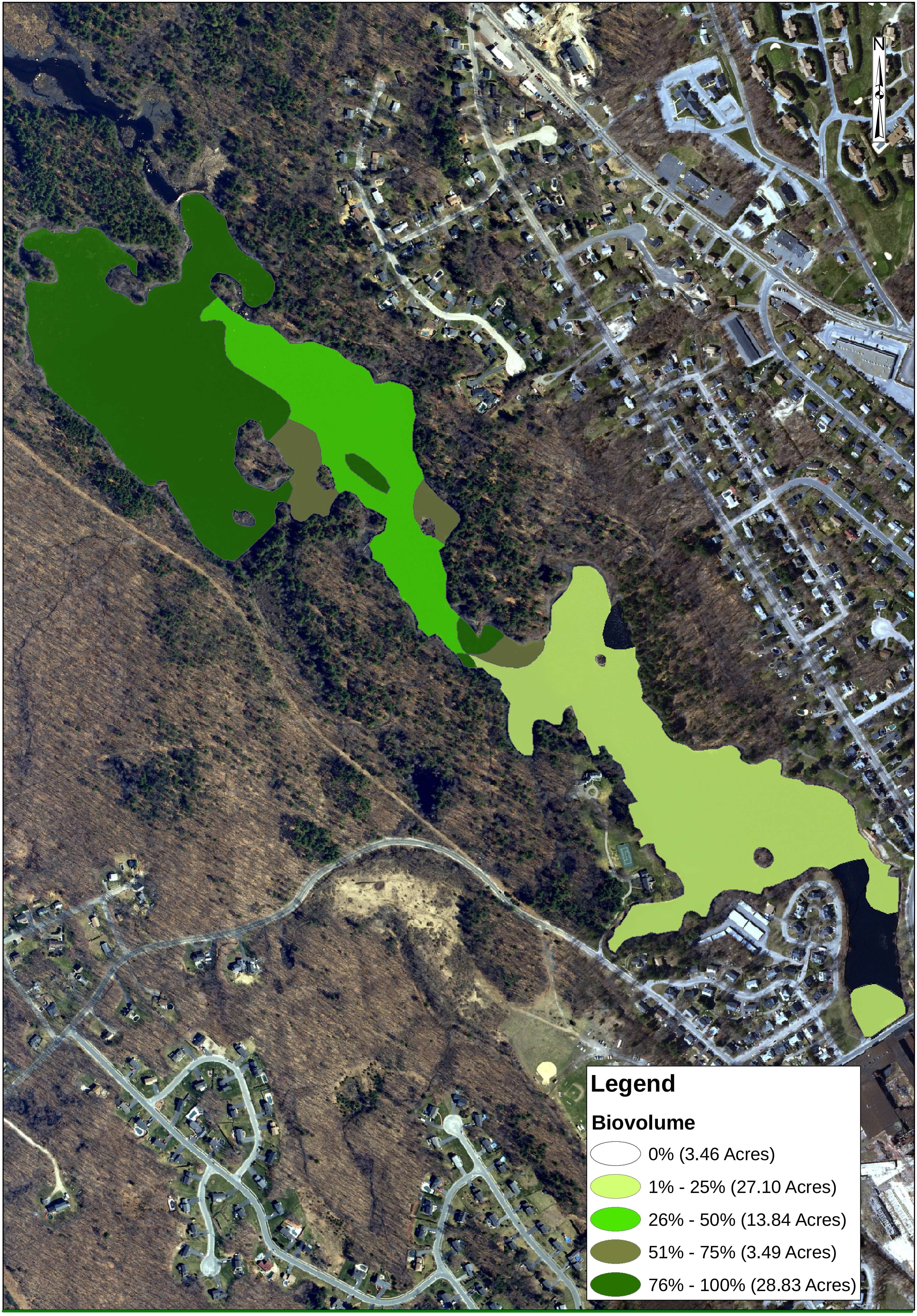
Scale: 1" = 450'

Source: 1) MassGIS, Orthophotos, 2005
2) ESS, Plant Species Data, 2008

Hopedale Pond
Plant Cover

Figure
29

Location: G:/GIS-Projects/H153-Hopedale-Pond/00-mxd/FinalFigs/PlantCover.mxd



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Hopedale, Massachusetts

Scale: 1" = 450'

Source: 1) MassGIS, Orthophotos, 2005
2) ESS, Plant Cover Data, 2008

Hopedale Pond
Plant Biovolume Classes

Figure
30

There were a total of thirteen vascular and non-vascular aquatic plant species documented in Hopedale Pond during the survey (Table 14). Native species observed included water lilies, a variety of pondweeds (*Potamogeton* sp.), bladderworts (*Utricularia* sp.) and mat forming algae (*Nitella* sp. and *Chara* sp.) which grow along the pond bottom. The invasive variable-leaf milfoil was the only aquatic exotic species observed but it has colonized large areas of the northern basin and was observed in lower densities in the southern basin. Variable-leaf milfoil has choked out some of the habitat available for native species. However, despite the presence of variable-leaf milfoil, overall plant diversity was greatest in the northern basin. Both common and purple bladderworts were observed in dense beds in the northern basin, while mats of muskgrass (*Chara* sp.) occurred at deeper depths. Fern pondweed (*Potamogeton robbinsii*), floating-leaf pondweed (*Potamogeton natans*), Oakes pondweed (*Potamogeton oakesianus*) and narrow-leaf sag (*Sagittaria subulata*) were observed in lower densities scattered throughout the middle and upper portions of the pond. The dense growth of variable-leaf milfoil and native plants in the northern basin suggest that nutrient inputs are contributing to excessive plant growth. Diversity was lower in the southern basin with white water lily (*Nymphaea odorata*) growing along the shoreline and stonewort found along the pond bottom.

3.7.2 Phytoplankton

Results of the phytoplankton sampling conducted between July 2008 and December 2009 are presented in Table 15 and Appendix I.

[PENDING RESULTS FROM ALGAE LAB]

3.7.3 Zooplankton

Zooplankton are microscopic animals that freely float in open water, eat bacteria, algae, detritus and sometimes other zooplankton and are in turn eaten by planktivorous fish.

The zooplankton sampling conducted between July 2008 and January 2009 revealed a fairly diverse community of large and small bodied cladocerans, copepods, and rotifers (Table 16). Zooplankton densities were highest from July through September, peaking in August at nearly 30,000 individuals/m^3. In October, densities fell significantly to just over 4,000 individuals/m^3 and continued to decline to a low of less than 40 individuals/m^3 in January 2009.

Zooplankton biovolumes were also high from July through September. However, the peak biovolume of 1.7 mL/m^3 was found in September, one month after zooplankton density reached its peak. Maximum taxonomic richness also coincided with this peak in September. Zooplankton biovolumes rapidly fell to 0.1 mL/m^3 in October and stayed low for the remainder of the year and into January 2009.

Cladocerans (water fleas) were the most abundant taxa in July and August but were outnumbered by copepods in September, when biovolume peaked. Rotifers were only noted in October.

The low to moderate overall presence of zooplankton may be related to availability of food as well as predation by fish and other predators. The phytoplankton community constitutes the principal food source for most zooplankton species and the availability of preferred food is important in determining the composition and size of the zooplankton community. However, zooplankton are also affected by predation, sometimes by other zooplankton but also by fish, macroinvertebrates, and even certain carnivorous plants (*Utricularia* spp.). Bluegill, which were readily observed in Hopedale Pond, are voracious open water zooplankton predators. Additionally, zooplankton densities can vary greatly according to season and even time of day. Seasonal trends in the overall abundance and makeup of the zooplankton community, such as those observed in Hopedale Pond, are typical in temperate lakes and ponds where water temperature and chemistry may vary significantly from one season to another.

3.7.4 Other Wildlife

Hopedale Pond provides habitat for several warmwater fish species including American eel, golden shiner, chain pickerel, yellow bullhead, brown bullhead, white catfish, yellow perch, bluegill, pumpkinseed, largemouth bass, and black crappie. Although the scope for this study did not include fish surveys, ESS did observe numerous guarded bluegill and pumpkinseed nests along the sandy shoreline just north of the bath house during the summer months.

Few waterfowl species were observed at the pond during sampling events. Canada goose was observed on most visits to Hopedale Pond (observations are described in more detail in Section 4.2.4). However, other than Canada goose, mallard, black duck, wood duck and mute swan were occasionally present in small numbers. Wading birds were not observed at Hopedale Pond on the study dates, although sufficient habitat does appear to exist for foraging. However, a wide variety of songbirds were observed to use the surrounding forested habitat during the breeding season. Observed species of particular note include pileated woodpecker, wood thrush, and ovenbird.

3.8 Quality Assurance/Quality Control

Quality control specifications in the QAPP were met with the following exceptions:

- The grain size analysis conducted by GeoLabs on January 19, 2009 sediment samples from Hopedale Pond did not appear to correspond with visual observations made by ESS in the field and GeoTesting Express during the Atterberg Limit testing. ESS twice requested and received reanalysis of grain size for both composite samples from GeoLabs. The revised results (issued February 23, 2009) were considered to be more representative of the material than the original results. However, it is recommended that the grain size analysis results be used only in the context of the qualitative observations made by GeoTesting Express to guide any future bulk physical testing of sediments in Hopedale Pond.

- Total phosphorus results from August 29, 2008 were altered from lab-reported values for display in report tables and for use in phosphorus modeling. This assumption was made due to the consistently high results obtained in waters throughout the watershed on these dates. It is unlikely that all sampled waters in the Hopedale Pond watershed would simultaneously show greater than an order of magnitude change in phosphorus concentration from one month to the next during dry weather flow. Correspondence with GeoLabs indicated that there were no internal quality control problems with either the total or dissolved phosphorus analyses on these dates. It is also unlikely that the sample bottles used on these dates were contaminated because the batches of bottles received from GeoLabs for phosphorus samples were regularly split for use between different sampling dates (due to a surplus supply of bottles). Therefore, it is assumed that an error did occur during the laboratory analysis on these dates because this is the most parsimonious explanation. Due to the relatively limited number of total phosphorus samples collected at each site over the period of the study, it was deemed preferable to apply a correction factor to the existing results rather than exclude them from data analysis and modeling. Therefore, total phosphorus results from August 29 were divided by 100 at each dry weather sampling site to account for this probable error.

- Total and dissolved phosphorus results from October 9, 2008 were taken from samples that exceeded the method holding time. Although these analyses were originally performed within the holding time, they were not conducted in accordance with ESS' specifications. Therefore, ESS requested that GeoLabs reanalyze all phosphorus samples outside of the holding time.

- The total number of samples collected for several analytes differed from the number anticipated in the QAPP. This was due to a number of factors, including intermittency of flow at Site 6, the unexpected cessation of precipitation during the November 13, 2008 wet weather sampling event, the lack of inseepage at certain shoreline segments during seepage surveys, and other similar limitations largely outside the control of the field program.

4.0 MANAGEMENT FEASIBILITY ASSESSMENT AND RECOMMENDATIONS

4.1 Management Objectives

Future management of Hopedale Pond will be dependent upon its intended uses as determined by the Town, local residents, the dam owner, and other stakeholders in the watershed. Hopedale Pond is well-suited to serving a variety of human purposes, including swimming, winter skating, fishing (including ice fishing), nature observation, small-craft boating, and passive aesthetic enjoyment. The present-day Hopedale Pond is not ideally suited for swimming due to a variety of human health issues identified during this study, the primary one being the discharge of high levels of *E. coli* bacteria and other pathogens associated with the Dutcher Street storm drain and runoff from areas surrounding the pond that are ideally suited to the establishment of a resident goose population with their associated fecal droppings.

Historically, Hopedale Pond was a popular swimming spot and the Town beach was regularly enjoyed by local residents during the summer months. However, the summer swimming program was discontinued in 2002, reportedly due in part to issues associated with funding of life guards at the beach as well as regular exceedance of the state's bacterial water quality standard.

Although the Town has periodically funded herbicide treatments to aid in managing the rooted aquatic plant problems at the pond, recreational boating is currently limited by the thick growth of nuisance aquatic vegetation extending from the Rustic Bridge to the Jetty and along much of the shoreline south to the Town beach. Herbicide treatment has been successful at controlling fanwort at the pond, however, other invasive species such as milfoil have continued to proliferate.

Although there is significant waterfront development along the southern shoreline of Hopedale Pond, the Town Parklands have successfully preserved the natural state of much of the shoreline. Therefore, additional shoreline development or conversion of vacation homes to year-round residences is not likely to be an issue confronting Hopedale Pond as is the case with many other lakes in central and western Massachusetts.

Hopedale Pond is not a used as a potable water source, so recreational enjoyment of the pond is one of the highest use priorities for this pond. However, improving water quality and controlling aquatic invasive weeds in Hopedale Pond will help to remove the pond from the state's list of impaired waters. Additionally, the location of the pond within the Blackstone River watershed means that maintaining or improving the health of Hopedale Pond will also help the Blackstone River reach its fishable/swimmable goal by 2015. These points of consideration should help the Town secure state and federal funding support for future management actions if desired.

The selection of management actions for Hopedale Pond should be guided by the long-term management objectives. Management for recreation is believed to be appropriate for Hopedale Pond at this time, as this water body is a community asset that could be significantly enhanced if given the appropriate level of attention.

Management goals for Hopedale Pond should include the following:

1. Ensuring a safe, clean and aesthetically pleasing beach area for swimming, wading, and passive use;
2. Improving water quality in the pond and addressing the impairment caused by nuisance and exotic plant growth;
3. Expanding the opportunity for recreation in non-motorized watercraft; and
4. Maintaining habitat for *migratory* waterfowl, wading birds, fish, reptiles and amphibians.

More specifically, physical features of the lake are to be managed to maintain appropriate fish habitat, maximize safety and enjoyment for human users, minimize shoreline erosion, and prevent excessive plant growths or other abnormal biological nuisances. Short-term management effort is needed with regard to controlling nutrient inputs and weed growth in the pond while long-term management should be directed toward planning for future growth and development within the watershed. At the present time, it is recommended that management action be taken to control nuisance aquatic plant growth.

4.2 Management Options and Recommendations

Given the number of issues currently impacting Hopedale Pond, including excessive aquatic weed growth as well as nutrient and bacteria loading (both anthropogenic and Canada goose related), the range of options for managing the pond is large. With each of the specific management objectives outlined above in mind, management methodologies can be examined to determine the applicability and feasibility of options for meeting that objective. A review of these management options for each suggested management objective is presented below.

4.2.1 Watershed Level

4.2.1.1 Agricultural Best Management Practices – Not Recommended

Agricultural land use makes up approximately 2% of the total watershed area for Hopedale Pond. Therefore, agricultural best management practices (BMPs) are unlikely to result in significant water quality improvements to Hopedale Pond.

4.2.1.2 Bank and Slope Stabilization – Not Recommended

Bank and slope erosion appear to be contributing little to sedimentation in Hopedale Pond. Most of the sediments mobilized in the upper watershed are intercepted by one of the several impoundments upstream from Hopedale Pond. Bank stabilization efforts in the vicinity of the Route 140 road crossings of the Mill River (at Station 5) and an unnamed tributary (Station 6) would reduce subsequent erosion and deposition of sediments in the northern portion of Hopedale Pond. However, a better option for controlling sedimentation would be implementation of stormwater BMPs at the Route 140 road crossings and at high runoff locations around the southern portion of the pond, such as the Freedom Street and Dutcher Street areas. This option is discussed in more detail in section 5.2.1.4.

4.2.1.3 Behavioral Modifications - Recommended

Behavioral modifications include alteration of individual or group practices that lead to increased runoff and pollutant loading. Actions relating to lawn and garden care, yard waste disposal, automotive cleaning and maintenance, and pavement deicing or sanding would be likely targets for this approach. Modifications are usually attained by a combination of education and regulation, but there are practical limits in residential settings. Most behavioral controls are best implemented on a voluntary basis, but are unlikely to provide more than a 5% to 10% reduction in pollutant loads. Mandatory controls are better suited to situations of clear non-compliance, as with illegal hook-ups or dumping to the storm drainage system.

Successful management of Canada goose populations at Hopedale Pond will likely include behavioral modifications. These are discussed in more detail in Section 5.2.3.

There are typically no permits or significant costs associated with any of the above-described behavioral modifications, but compliance is difficult to measure and major changes in water quality are rarely observed as a result. It would be beneficial, however, to encourage appropriate residential property management through a brochure aimed at informing watershed residents of their link to water quality and role in protecting it. Such a brochure could be professionally produced and distributed for a cost of around $5,000.

4.2.1.4 Detention or Infiltration Basin Use and Maintenance - Recommended

Detention basins aim to delay the time it takes for stormwater runoff to reach streams and ponds but may not significantly reduce the total volume of runoff. Depending on the design, they may also remove stormwater pollutants. There are two main kinds of detention basins – dry and wet. Dry detention basins are designed to dry out between storm events and tend to retain only a minimal portion of the stormwater pollutants. Wet detention basins retain a permanent pool of water, which allows a longer period of time for the removal of pollutants. Both types of detention basin must be maintained in order to function properly. Maintenance may include repair of discharge structures, mowing, and cleaning out accumulated sediments.

Infiltration basins are designed to reduce runoff volumes by infiltrating stormwater into the ground. Under most circumstances, they also provide improved removal of pollutants over detention basins and may contribute to groundwater recharge. Maintenance usually consists of cleaning out accumulated sediments to prevent clogging of the basin.

Although detention and infiltration basins may take up a significant amount of space when used to control runoff from large developments, compact structural designs may be used to treat stormwater in areas that are already densely developed. A catch basin sump and leaching dry well system combines principals of detention (sump) with infiltration (leaching dry well) in a relatively compact area. Outflow or overflow pipes from these systems can be tied into existing storm drains. These types of designs could provide much improved treatment of stormwater at road crossings where runoff is currently diverted down paved or unvegetated embankments and directly into tributaries or Hopedale Pond itself. Notable examples of locations that might benefit from a catch basin sump and leaching dry well system include the Route 140 crossing of the Mill River and Freedom Street at the Hopedale Pond dam. Typical capital costs for BMP systems range from deep sump catch basins and grass swales ($5,000) to leaching systems ($15,000) to larger detention systems and created wetlands ($20,000 to $40,000). Maintenance costs would also need to be incorporated into the Town’s annual storm water infrastructure maintenance program.

It may also be beneficial to consider other decentralized approaches to reducing runoff and infiltrating stormwater at its source, such as encouraging the use of the new advance porous pavements, green roofs and rain gardens among Town residents and new developments. By reducing the volume of runoff from individual properties, these types of stormwater BMPs reduce peak stormwater flows and can also prevent many contaminants from leaving the site and entering the storm drainage system. Rain gardens are often very efficient at removing suspended solids and heavy metals (90% is not uncommon for copper, zinc, and lead) but removal rates for nutrients, and nitrate in particular, are less consistent. Most structures can be retrofitted with green roofs and although the initial investment cost is high, green roofs easily extend the life of a traditional roof by 20 or more years. Rain gardens typically require much less capital investment and can be constructed in all but the smallest yards. In order to be noticeably effective, porous pavement, green roofs and rain gardens would need to be implemented over a significant portion of the currently developed area. However, updated regulatory by-laws in town could be developed to encourage or require these techniques.

4.2.1.5 Increased Street Sweeping and Catch Basin Cleaning - Recommended

By increasing the frequency of street sweeping and catch basin cleaning, the Town could remove some potential runoff pollutants, particularly sediments and associated phosphorus. Catch basins should be cleaned at least twice per year to prevent the release of accumulated sediments, nutrients, and other contaminants. Street sweeping should be conducted several times per year to remove accumulated sediments from roads after significant storm events and winter road treatments. The efficiency of street sweeping equipment is also an important consideration, as vacuum technology is far more effective than conventional brushes, which may simply push around (rather than pick up) a significant portion of the total street debris.

A monthly street sweeping program targeting all streets in the Town that occupy the immediate watershed of Hopedale Pond, combined with a semiannual cleaning of all catch basins would carry a capital cost of over $200,000 and an operational cost of approximately $35,000/year. While roadway pollutants are believed to be an important source of contamination, a street-sweeping program would not address other potentially important nutrient sources in the watershed, including lawns. This program would address only those pollutants on roadways or trapped by catch basins. Since much of the watershed is not currently equipped with storm drainage structures, the potential benefits are somewhat limited. However, the results of this study demonstrate the high concentrations of nutrients that are flushed from the Town stormwater system and into Hopedale Pond. Therefore, this approach may have merit for Hopedale Pond, especially if new stormwater detention or infiltration systems are installed, as recommended in the previous section.

4.2.1.6 Maintenance and Upgrade of On-site Disposal Systems – Not a Priority

Individual sewage disposal systems (ISDS) provide on-site treatment of sewage for homes and businesses that are not connected to a sanitary sewer. Since Hopedale has a municipal sewer system and treatment plant, ISDS use is limited to a few isolated households, including two on Hazel Street and possibly those along Route 140 at the northern extreme of the Town. Although not specifically examined, it is likely that ISDS use is more widespread outside the Hopedale town boundaries, especially in areas of low-density residential development in the upper watershed. Septic system repairs and improvements could help reduce the nutrient load (primarily nitrogen) associated with failing systems or improperly designed or sized systems in the upper watershed. However, within the Town of Hopedale a much greater reduction could be achieved by connecting these residences to the sanitary sewer instead. This is due to the fact that the Hopedale municipal treatment plant discharges effluent outside of the watershed boundary.

Since the area immediately surrounding the pond is sewered and the pond received over 99% of its water as overland flow, a program focusing on maintenance or upgrades would not be likely to provide measurable improvements to in-pond water quality.

4.2.1.7 Provision of Sanitary Sewers – Not Recommended

The Town of Hopedale currently provides sanitary sewer service to most of its residences and businesses. However, there are at least two residences within the town that continue to use ISDS for treatment of household wastewater. Extending the sanitary sewer system to these residences could be costly but would eliminate essentially all nutrient discharges associated with sanitary waste in these areas. Costs for extending the sanitary sewer to communities in the upper watershed would likely be even greater and would be the responsibility of other municipalities. Encouraging the upgrade or repair of on-site disposal systems, as described in the previous section, is likely to be a less costly and reasonably effective option. Therefore, extension of the sanitary sewer solely for the purpose of managing Hopedale Pond is not currently recommended.

4.2.1.8 Stormwater or Wastewater Diversion – Not Recommended

The diversion of stormwater or wastewater involves diverting these sources to discharge outside of the Hopedale Pond watershed, essentially bypassing the pond. This option does not provide significant treatment of stormwater or wastewater. Rather, it would simply shift the problems associated with contaminated stormwater or wastewater to areas outside the Hopedale Pond watershed. Therefore, this option is not recommended.

4.2.1.9 Zoning and Land Use Planning – Not Recommended

The perimeter of most of Hopedale Pond is protected as Town Parklands. Within the town of Hopedale some additional watershed protection is currently afforded by the Chapter 61 lands (preserved forest lands) that occupy most of the land north of Hopedale Pond. However, much of the watershed outside of these areas is largely unprotected and is either currently developed or could be developed in the future. Within the town of Hopedale, this includes portions of an industrially zoned area that overlaps the Chapter 61 lands. Outside of the town of Hopedale, land use has changed substantially within the watershed over the last four decades and this trend is likely to continue.

It is recommended that efforts be made to preserve natural areas not subject to protection, especially in areas adjacent to stream corridors and wetlands, and encourage best management practices for construction. Costs for such actions are highly variable and unpredictable, but could be minimal with thoughtful use of existing regulations and programs. Although, land use planning would have no immediate effect on the water quality or nuisance aquatic plant growth in Hopedale Pond, advanced planning for future development can be a critical step toward preventing future problems in the pond.

Conducting a watershed build-out analysis for the Hopedale Pond watershed would be beneficial toward determining how water quality might change if all available sites within the watershed were developed. However, given that much of the watershed is already developed or has been protected through designation as Town Parklands, a build-out analysis for the Hopedale Pond watershed is not being recommended as a high priority.

4.2.1.10 Treatment of Runoff or Stream Flows – Not Recommended

Runoff may be chemically treated in order to remove or inactivate target pollutants. Chemical treatment of nutrients typically targets dissolved phosphorous (the form most readily available to plants and algae) and involves the proportional injection of alum (aluminum sulfate) or similar compounds into stormwater sources so that phosphorous is inactivated prior to entering the pond. This approach to nutrient management can be costly and does not address the actual sources of nutrients to the pond. Therefore, given the other options available with regard to providing long-term permanent improvements to the storm water infrastructure phosphorus inactivation is not being recommended.

4.2.2 In-pond Level

4.2.2.1 Aeration and/or Destratification – Not Recommended

Aeration and/or destratification (or circulation) is used to treat problems with algal growth and low oxygen concentrations that may occur in smaller ponds. Air diffusers, aerating fountains, and water pumps are typical types of equipment that may be installed to increase circulation in a pond. The cost of purchasing, installing, and maintaining pond circulation equipment becomes substantial as pond size increases. Likewise, the effectiveness of the equipment tends to decline with pond size as it is difficult to achieve sufficient circulation in large ponds.

This approach is not currently recommended for Hopedale Pond, primarily because nuisance aquatic plant growth (rather than algal growth) is the targeted impairment at the pond.

4.2.2.2 Biocidal Chemical Treatment (Herbicides) - Recommended

Herbicides remain a controversial aquatic weed control measure in many communities because of their association with pesticides, which is generally perceived to be negative. However, as we learn more about the suite of side effects that comes with alternative physical and biological management options, chemical control measures continue to be used as part of most balanced pond management plans.

Although no herbicide is completely safe or harmless, a premise of federal pesticide regulation is that the potential benefits derived from use outweigh the risks when registered herbicides are applied according to label recommendations and restrictions. Current herbicide registration procedures are far more rigorous than in the past and the ability of applicators to target applications of herbicides further improves the relative safety of using these chemicals for nuisance aquatic plant control.

Chemical treatment is the most cost effective and appropriate means by which to achieve the goal of reducing aquatic weed biomass in Hopedale Pond over the short term. It should be noted that herbicide treatment alone would not provide for long term, sustainable control of nuisance aquatic plant growth. However, when integrated with other management strategies at the watershed and in-pond level, herbicides can play a valuable role in controlling this growth.

For Hopedale Pond the most appropriate approach would be control with the contact herbicide known as diquat (trade name Reward). Costs for this form of treatment in Hopedale Pond would be approximately $5,000 to $8,000 per treatment (including permitting) to clear all major beds of variable-leaf milfoil. Since diquat is a contact herbicide, it does not typically kill rooted portions of aquatic vegetation and follow-up applications may be needed to control growth each year.

Costs in the permitting process could escalate if there is any significant opposition to the treatment. Permits could be denied, appealed, or rigorously conditioned, the last of which could add cost both through constraints on the treatment process and monitoring expenses. However, given the fact that herbicides have been used in the recent past at Hopedale Pond, successful permitting is not anticipated to be a problem.

4.2.2.3 Bottom Sealing - Recommended

Benthic barriers are negatively buoyant materials, usually in sheet form, which can be applied on top of plants to limit light, physically disrupt growth, and allow unfavorable chemical reactions to interfere with further development of plants. They have such positive side effects as creating more edge habitat within dense plant assemblages and minimizing turbidity generation from fine bottom sediments. Barrier materials have been commercially available for decade and a variety of solid and porous are available. However, deployment and maintenance of benthic barriers continues to be difficult and this limits their utility over the full range of weed bed sizes.

Plants under the barrier will usually die completely after about a month, with solid barriers more effective than porous ones in killing the whole plant. Barriers of sufficient tensile strength can then be moved to a new location, although continued presence of at least solid barriers restricts recolonization. Benthic barriers are best used for providing control of milfoil and other nuisance growth on a localized basis. They are likely to be of most use in heavily used areas near shore and in the vicinity of docks or other shoreline structures.

The ability of vegetative fragments to recolonize porous benthic barriers such as fiberglass screening has made them less useful for combating infestations by milfoil on any but the smallest scale, as sheets must be removed and cleaned at least yearly. Solid barriers have been more useful, although the gas released during decomposition in the sediments below can cause the barrier to billow, necessitating the use of anchors or vents that can reduce the lifespan of the barrier.

Problems associated with benthic barriers include long-term integrity of the barrier, billowing caused by trapped gases, accumulation of sediment on top of barriers, and growth of plants on porous barriers. Benthic barriers are also non-selective, which means all plants in the treatment area are killed, including desirable native plants. By smothering bottom sediments, barriers can also impact the benthic macroinvertebrate community within the treatment area, which may locally reduce food sources for some fish. Another drawback of benthic barriers is that recolonization from adjacent plant beds can occur quickly, once the barrier has been removed. Additional effort, such as hand harvesting, might be necessary for two growing seasons or more.

One final problem is the tendency of products to come and go without much stability in the market. Few of the barrier materials on the market at any time continue to be available for more than 5-10 years; most need to be made in bulk to keep costs down, yet costs remain high enough to hinder demand and reduce bulk use.

Cost and labor are the main factors limiting the use of benthic barriers in most lakes, and would be prime deterrents in Hopedale Pond. The cost per installed square foot is on the order of $2.00, leading to an expense of nearly $90,000 per acre. Bulk purchase and use of volunteer labor can greatly decrease costs, but use over large areas of nuisance vegetation is highly unlikely. Benthic barriers could be useful for addressing nuisance plant growth near the town beach, where deployment and any subsequent maintenance would be relatively simple. The use of benthic barriers by individual property owners could also be a good approach to local weed control, as necessary.

4.2.2.4 Dilution and/or Flushing – Not Recommended

Dilution and flushing involve increasing the flow rate so as to dilute or remove concentrations of nutrients or other pollutants in the pond. This approach is unlikely to be effective in Hopedale Pond because the volume of the pond is large compared to the magnitude of any relatively "clean" diluting flows that could be diverted into the pond. Additionally, pond sediments appear to hold a large amount of nutrients that would allow aquatic plant growth to continue even if significant dilution or flushing could be achieved. Therefore, dilution and flushing are not recommended.

4.2.2.5 Dredging – Recommended as Long-Term Option for Partial Pond

Dredging works 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. Since light limitation through increased depth is unlikely to be achieved in Hopedale Pond, control will depend on excavation to a hard bottom (coarse sand or gravel in this case). This means that any dredging to control rooted plants must remove all soft sediment in the target area. It may not be necessary to dredge the entire lake to achieve a satisfactory level of plant control, but it would be necessary to do a thorough job in any area where control is to be achieved.

Dredging in Hopedale Pond could be an effective long-term control technique for nuisance aquatic plants, but would be extremely expensive. With an estimated soft sediment volume of approximately 375,000 cubic yards in Hopedale Pond, the dredging cost would likely run between $4,500,000 and $8,000,000 for removal of soft sediments to a depth that would prevent re-growth of variable milfoil and other nuisance species. If the area of dredging was reduced to cover only the southern basin (i.e., the area south of the Jetty), dredging costs could be reduced by more than half to between $2,500,000 and $4,000,000. Dredging could also be targeted at particular problem areas. However, given the high fixed costs to initiate a dredging project, only a modest additional reduction in price could be expected for smaller dredging projects.

The challenges of a project of this type and magnitude are likely to be significant. Research on the proposed upland containment area would be essential to a complete evaluation. However, to dredge most or all of the pond, a relatively large containment area would be necessary for dewatering of the dredged sediments. Access is another consideration and any conventional dredging proposed in the northern basin would be difficult to accomplish, due to the lack of road access in this area. Water level could also present difficulties for conventional dredging as it is uncertain how much of a drawdown is feasible under existing dam controls. In general, a more significant drawdown would be preferred, in order to prevent the high turbidity levels and other complications that may arise with "wet" dredging.

If conventional dredging is not determined to be feasible for part or all of Hopedale Pond, hydraulic dredging would be necessary. Hydraulic dredging is generally more expensive than conventional dredging but the differences for a project of larger scale is relatively small. Hydraulic dredging would require a larger and more sophisticated containment area or the use of advanced dewatering techniques such as the use of Geotubes (geotextile fabric for dewatering) or a belt-filter press machine that can extract water from the sediments while using a relatively confined work area.

The amount of material to be removed and the type of disposal or reuse will also have a significant impact on the cost of dredging. Environmental permitting for dredging projects is complex and will require at least one year before the project could receive all required approvals. Federal (USACE 404), state (MEPA Certificate and 401 Water Quality Certificate) and local permits (Notice of Intent filed for Order of Conditions from conservation commission) are all required, and would necessitate considerable advance information and review time.

Chemical content of the material to be dredged is an important consideration in determining the feasibility of reuse or disposal. The assessment conducted as part of this study indicates that sediment, primarily in the southern basin, may need to be landfilled or amended prior to stockpiling or beneficial use. This could incur significant additional costs.

If dredging is considered to be a viable option, the next steps would be:

1. Assessment of specific scope and extent of dredge program including possible funding options;
2. Thorough chemical and physical analysis of the sediments in areas targeted for dredging under a state-approved sampling plan;
3. Development of a conceptual engineering design; and
4. Initiation of the permitting process (ENF filing for MEPA review).

These initial activities might be expected to cost $50,000 to $60,000 for Hopedale Pond, but are essential if dredging is to be pursued as a management option.

4.2.2.6 Dye Addition – Not Recommended

Dyes are used to limit light penetration and therefore restrict the depth at which rooted plants can grow. In essence, they mimic the effect of light inhibition that might be expected during periods of high turbidity or prolonged ice and snow cover. Natural periods of low light are an important variable in determining plant composition and abundance, and use of dyes can produce similar effects. They are only selective in the sense that they favor species tolerant of low light or with sufficient food reserves to support an extended growth period (during which time the plant could reach the euphotic zone). Dyes tend to reduce the maximum depth of plant growth, but are relatively ineffective in shallow water (less than 6 ft or 1.8 m deep). Dyes are unlikely to make a significant difference in plant growth within shallow bodies of water like Hopedale Pond. Therefore, their use is not recommended for macrophyte control in Hopedale Pond.

4.2.2.7 Macrophyte Harvesting – Not Recommended

Macrophyte harvesting covers a wide range of techniques, including mechanical harvesting, hand pulling, and suction harvesting. Mechanical harvesting, which involves cutting and pulling aquatic plants from a specially-equipped watercraft, is most effective in the short term. As mechanical harvesting simply sets plants back for the season and may allow plant fragments to break free and colonize new locations, its use should be reserved for scenarios where there is an immediate but temporary need for widespread reduction of nuisance plant cover.

Certain other harvesting techniques can be effective for long-term control of plants that reproduce by seed. However, since seeds may remain viable for more than one year, several seasons of intensive effort are usually necessary to achieve control of target species. Intense harvesting of plants that reproduce by vegetative means may help inhibit successful overwintering but this effect varies by species and location.

The simplest form of harvesting is hand pulling of selected plants. Depending on the depth of the water at the targeted site, hand pulling may involve wading, snorkeling, or SCUBA diving. Hand pulling involves collection of pulled plants and fragments in a mesh bag. In deeper water, frequent trips to the surface are necessary to dispose of full bags. Depending on the experience and ability of the diver, fragments of the removed plants may occasionally escape collection and could result in colonization of new areas of the pond. The intensive nature of this work limits its application to small areas, typically less than one acre in size.

Diver assisted suction harvesting (DASH) technology has been around for decades but has been refined in recent years to make it more efficient and accessible. An advantage of DASH over mechanical harvesting methods is that divers can directly confirm removal of entire individual plants. Additionally, because DASH uses suction to bring harvested plants to the surface, it is faster and may result in less fragmentation of nuisance plants than hand harvesting.

Mechanical harvesting is not a recommended management option for Hopedale Pond because it is relatively expensive, typically results in only single season control, and may encourage the spread of invasive variable leaf milfoil to other areas of the pond and even downstream. Additionally, due to the large extent of nuisance plant growth in Hopedale Pond, hand pulling and DASH are not feasible control options at this time.

4.2.2.8 Hydroraking and Rotovation - Not Recommended

Hydroraking uses a backhoe-like machine mounted on a barge to remove plants directly from pond sediments. Depending on the attachment used, plants are scooped, scraped, or raked from the bottom and deposited on shore for disposal. Hydroraking could be somewhat useful for control of milfoil in small areas of Hopedale Pond, although it has the potential to spread milfoil through fragmentation. Hydroraking may be more useful for local control of water lilies, as it can physically remove their large rhizomes (roots). Costs associated with hydroraking in Hopedale Pond would depend upon the area to be raked. Hydroraking generally costs approximately $160/hour and may take between 12 to 24 hours of time per acre. Hydroraking all of the 66 acres with greater than 50% plant cover would range between approximately $130,000 and $255,000. In addition, trucking costs for removal of this amount of plant material will range from $40,000 to $70,000 if a contracted company is hired. Due to the large size of the project, a discount of about 10% off standard rates could probably be negotiated with the selected vendor. However, given other possible alternatives, hydroraking is not a cost-effective option for overall control of aquatic vegetation within Hopedale Pond. If used in combination with herbicides to control nuisance aquatic vegetation in problem spots, hydroraking could be a useful and less complex management technique than dredging.

Rotovation is essentially underwater rototilling of pond sediments. Rotating blades cut through roots, shoots, and tubers, dislodging and expelling them from their growing locations. Some operations are also outfitted to collect some or most of the rotovated plant materials. However, complete collection of these materials is often not possible. Although rotovation typically results in longer control of nuisance plant beds than mechanical harvesting, the risk of dispersing plant fragments remains relatively high. In this way, rotovation may actually be counterproductive in the long term, resulting in new areas of aquatic weed growth. Rotovation is not a recommended management option for Hopedale Pond because it is relatively expensive and may hasten the spread of invasive variable leaf milfoil.

4.2.2.9 Hypolimnetic Withdrawal – Not Recommended

Hypolimnetic withdrawal involves the removal of oxygen-depeleted waters from the pond bottom, typically by siphoning or pumping these waters through a specially constructed pipe. The selective withdrawal of these waters may help prevent phosphorous in the sediments from becoming available to phytoplankton (suspended algae) in the pond.

Although dissolved oxygen levels sometimes drop to very low levels within Hopedale Pond, the thickness of this oxygen-depleted layer is limited by the shallowness of the pond and at most times it would be impractical to selectively remove this layer. Hypolimnetic withdrawal may also require treatment of the removed water before it is returned to the Mill River, in order to prevent causing water quality problems downstream. Additionally, this management option tends to be less effective on the nuisance growth of aquatic plants, which are the main problem at Hopedale Pond. Therefore, hypolimnetic withdrawal is not recommended.

4.2.2.10 Nutrient Inactivation – Not Recommended

Nutrient inactivation typically targets dissolved phosphorous (the form most readily available to plants and algae) and involves the addition of alum (aluminum sulfate) or similar compounds to sequester this phosphorous in pond sediments. In its simplest form, nutrient inactivation is conducted by applying alum directly to the pond as a single dose. More sophisticated nutrient inactivation programs involve proportional injection of alum into stormwater sources so that phosphorous is inactivated before it even enters the pond.

Nutrient inactivation is typically used to control algae blooms and improve water clarity. These are not considered to be target issues for the shallow waters of Hopedale Pond, where nuisance growth of aquatic plants is the primary problem. Therefore, nutrient inactivation is not recommended.

4.2.2.11 Water Level Control (Drawdown) – Not Recommended

Drawdown involves lowering the water level of a pond to expose shallow bottom sediments and associated plants to drying and/or freezing. It is most effective against species that reproduce mainly by vegetative means, including variable-leaf milfoil. Although drawdown can be conducted at any time, the interaction of drying and freezing that occurs with winter drawdown is usually most effective.

In order to effectively drawdown a pond, there must be an adjustable discharge structure that allows the water level to be safely controlled. The water level must be drawn down to a sufficient depth (typically at least 6 feet [1.8 m]) and for a long enough period of time to allow bottom sediments to at least partially de-water. Aside from the practical feasibility of performing a drawdown, the potential impacts on winter recreation (primarily ice fishing, skating, and hockey) should also be considered.

Any manipulation of the water level in Hopedale Pond would need to be approved by and coordinated with the owner of the water rights at the pond and in the Mill River. According to deed records, Mr. Phil Shwachman of First American Realty, Inc. currently holds these rights.

Recent water level management in Hopedale Pond has resulted in much smaller drawdowns during the late fall to winter (perhaps one to two feet). These drawdowns have not specifically targeted aquatic plant control and do not appear to be contributing to the control of nuisance aquatic species in the pond.

If drawdown is pursued as a management strategy, a drawdown feasibility study would first be needed in order to file a Notice of Intent with the Hopedale Conservation Commission. Given the data already collected under the current study, a supplemental study to examine the feasibility of drawdown could be accomplished for around $5,000 (focusing on hydraulics, flooding, and impacts to downstream resources) with an additional cost of approximately $7,000 for project permitting. If drawdown were determined to be feasible and successfully permitted, the Town would likely need to monitor impacts to aquatic resources in the pond annually as a permit condition, which could cost $5,000/year.

Although it is technically possible to lower the water level in Hopedale pond since it does have a functioning outlet structure that could lower water levels by 6 feet, it is highly unlikely that such action would be allowed by the permitting authorities under the state's wetland protection act due to the significant wetland impacts that could occur, particularly in the upper half of the pond which is relatively shallow and would be mostly dewatered by a drawdown of more than 3 feet. ESS would not recommend a drawdown of anything more than 2 feet, which if implemented, would be only marginally effective for management of plant growth in the pond.

4.2.3 Biological Controls

Biological control involves the introduction of any parasite, predator, pathogen or other organism by humans to a lake as a method of managing invasive aquatic plants. Several different biological control techniques including food web manipulation, herbivorous fish stocking, insect stocking, pathogen release, barley straw deposition and plant competition enhancement have been used to control target invasive plants with varying degrees of success. Biological control functions as a suppression technology that in most cases reduces population growth and stresses target plants rather than eliminating the species (Grodowitz 1998). Unlike physical and chemical control which have well defined outcomes, the results of biological controls are often less predictable with outcomes that have greater uncertainty (Mattson et al. 2004). Biological controls are more effective as a long-term approach to plant management because their use alone often takes several years before effective results are observed in a lake (Aquatic Ecosystem Restoration

Foundation 2005). Therefore, biological controls are most useful as part of an integrated approach to invasive plant management which includes the use of other techniques as well.

Several broad biological treatment approaches are currently recognized (Aquatic Ecosystem Restoration Foundation 2005). These include a classical approach, inundative approach, use of general feeders and native species augmentation.

Using a classical approach, a host-specific organism from the target plant's native home range is introduced into the non-native environment the target plant has invaded. In essence, another exotic species is introduced to control an exotic species which has already invaded a new environment (Washington State Department of Ecology 2008). Extensive research is usually conducted ahead of time to ensure the newly introduced species does not become a nuisance in itself.

A mass release of either a native or exotic species which targets a nuisance invasive species is the basis of an inundative biological control approach. This method is used when the natural reproduction of the controlling species is not high enough to limit the spread of the target species.

A general feeder approach involves the introduction of an agent which is not species-specific and will target both native as well as the exotic target species of interest. The introduction of exotic grass carp (*Ctenopharyngodon idella*) which feed on a wide variety of plant species represents a general feeder approach to biological control (Washington State Department of Ecology 2008).

Last, native species augmentation seeks to improve the natural capacity of a native controlling agent to target an invasive species. The use of native milfoil weevils (*Euhrychiopsis lecontei*) to control Eurasian milfoil provides an example of native species augmentation. Weevils are reared and then stocked in select lakes to supplement the existing in-lake weevil population.

A variety of biocontrol methods which use these different general approaches was researched for potential use in Hopedale Pond. These methods and their applicability for use in Hopedale Pond are discussed in the sections below.

Food Web Manipulation – Not recommended

Food web manipulation is a method of native species augmentation that works to alter the fish community structure by favoring larger, piscivorous fish over smaller planktivorous fish. By introducing or augmenting piscivorous fish such as largemouth bass, the population of planktivorous fish in the lake is reduced, thereby increasing the population of algae-eating zooplankton (Mattson et al. 2004). In theory, the increased zooplankton population will graze on algae and improve water clarity and quality. An alternate method of reducing the planktivorous fish population without having to stock larger fish is to remove planktivorous fish through electroshocking, netting and recreational fishing.

The advantage of food web manipulation is it is relatively inexpensive, does not involve the release of any exotic species and may require only limited follow-up work once fish are introduced and natural processes are set in motion. The major disadvantages are variability and lack of predictability in results.

Food web manipulation would most likely require an Order of Conditions from the Hopedale Conservation Commission, and possible permits from the Massachusetts Division of Fisheries and Wildlife for fish stocking. Estimates of costs are variable and range from $500 to $1,500/acre for piscivorous fish stocking and $1,000 to $5,000/acre for planktivorous fish removal (Wagner 2004). Food web manipulation is not recommended for Hopedale Pond as the primary nuisance aquatic species are rooted macrophytes rather than algae blooms. It is unlikely that food web manipulation would have any significant impact on reducing invasive macrophytes.

Herbivorous Fish Stocking – Not permitted

The introduction of herbivorous fish employs a generalist approach to aquatic invasive species management. The most commonly used species are grass carp which have been introduced into lakes in other states and have successfully controlled exotic plant growth as well native growth. Although there other fish species which consume macrophytes, grass carp appear to be the only actively used species which can survive the cold waters of the northeast during the winter. Grass carp are not currently permitted to be introduced into Massachusetts waters so they are not an option for Hopedale Pond. However, the following discussion is included to cover this commonly used technique which has been used in neighboring states.

The grass carp is an exotic species which typically grows up to 15 to 20 pounds in North American and tolerates a wide range of water conditions (Wagner 2004). They display a wide range in dietary preference and feed vociferously, with the ability to consume more than their own body weight in fresh vegetation in a single day (Whetstone and Watson 2004). Because of concern of the spread of this exotic species, biologists artificially created a sterile, triploid grass carp for use as a plant control agent. When introduced, grass carp will selectively feed on preferred species before targeting other less preferred species (Whetstone and Watson 2004). When stocked at the appropriate density, it is possible to get up to five years of plant control with the grass carp (Wagner 2004). One source reviewed noted that most submerged aquatic weeds can be controlled with a stocking rate of 20-25 grass carp per acre (Whetstone and Watson 2004). However, appropriate stocking rates appear to vary, with other sources citing ranges from 80 to 100 fish/acre, 12 fish/acre in Virginia and New York and 9 to 25 fish/acre in Washington (Wagner 2004; Helfrich et al. 2004; Washington State Department of Ecology 2008). Costs of grass carp range from $4 to $13 per fish depending on the source. At a stocking rate of 7 to 15 fish per acre, this would lead to a cost of $28 to $195 per acre with treatment effectiveness lasting for approximately five years (Wagner 2004).

There are many challenges and concerns regarding the use of grass carp which explain why their use is not permitted in Massachusetts (Wagner 2004). In addition to controlling exotic plants, grass carp can have serious impacts on native aquatic vegetation as well. Their introduction often leads to decreases in water quality and they are known to carry fish diseases which can be transmitted to local fish. Once released, grass carp are extremely difficult to catch. Finally, they are highly migratory and can easily escape over spillways and dams. Although they can be effective in controlling invasive plants, any use of grass carp in Hopedale Pond would need to be done with a great deal of caution even if their release were to be permitted in Massachusetts in the future.

Insect Stocking (Weevils) – Not recommended

The milfoil weevil (*Euhrychiopsis lecontei*) is a native invertebrate which typically feeds on northern watermilfoil (*Myriophyllum sibericum*) a native milfoil species which has been replaced by the spread of the invasive Eurasian milfoil (Wagner 2004). The weevil does not feed on non-milfoil species. Adults feed on the milfoil and the larvae burrow into the stems of the plant, consuming the plant tissue within the stem, which ultimately results in the collapse of the plant to the pond bottom. As a control technique, the weevil larvae are introduced to a lake by placing infested water milfoil strands within the targeted water milfoil beds of the lake. The best results are usually achieved in controlling water milfoil in lakes with dense, monotypic stands of water milfoil with several years required to measure a positive effect. As outlined by Grodowitz (1998), it may also be possible to improve results of weevil and other insect introductions by taking an active approach which includes yearly follow-up studies to evaluate populations, supplementing the insect population if necessary and integrating with other plant control techniques.

The weevils were first associated with the decline of Eurasian milfoil in nine lakes in Vermont and there have been signs of success of weevil introductions at two test lakes in Massachusetts. The weevils are now marketed commercially with a recommended stocking of 3,000 weevils per acre (Wagner 2004). Costs of the weevils are generally $1 per insect though the insects can generally be raised by interested parties on their own at a reduced price (Washington State Department of Ecology 2008). An Order of Conditions under the Wetlands Protection Act would most likely be required in order to introduce the weevils to a body of water.

The primary invasive plant observed in Hopedale Pond is Variable-leaf milfoil (*Myriophyllum hetereophyllum*), which is not targeted by the weevil. Since Hopedale Pond is not over-run by Eurasian water milfoil, introduction of the water milfoil weevil would not be expected to be effective. If Eurasian milfoil ever became a problem in Hopedale Pond, use of the weevils might be reconsidered.

Pathogen Introduction – Not recommended

The release of pathogens (disease causing organisms) into a lake to suppress target invasive aquatic species remains largely experimental though considerable research has been done on the subject (Mattson 2004). Pathogens hold promise for invasive species control for several reasons: they have a high abundance and diversity, are often host-specific, are usually harmless to non-target organisms, are easily disseminated, are self-maintaining and have to the ability to limit the host population without elimination (Mattson 2004).

The most commonly used plant pathogens have been fungi with results of their use evaluated extensively. Specific pathogen examples include the fungi species *Mycoleptodiscus terrestris* which has been under research for use against Eurasian milfoil and hydrilla (Aquatic Ecosystem Restoration Foundation 2005). Existing research has yielded inconsistent results and problems isolating specific pathogens. In addition, many host plants have shown resistance to pathogens.

Viral bacterial and fungal pathogens have also been explored to control algae populations as well (Mattson 2004). Lakes could potentially be inoculated with a pathogen to suppress the growth of a variety of algae populations. Experimental results using pathogens to target algae have shown that this method has not been effective.

The introduction of any pathogen to Hopedale Pond would likely require an Order of Conditions from the Hopedale Conservation Commission. Costs of existing pathogens are not well known; however, bacterial additives are relatively inexpensive for the small scale at which they have been used (Wagner 2004). Because the use of pathogens is still largely experimental with unpredictable results, it is not recommended for use in Hopedale Pond.

Barley Straw – Not recommended

The use of barley straw as a method to control algae blooms in lakes began in England in the early 1990s. As the barley straw rots, a chemical is believed to be released which acts as an algaecide. The chemical which is actually responsible for the algae control has not yet been identified and it is not clear whether it is exuded from the barley straw itself or whether it is a metabolic byproduct produced by decomposers (Lembi 2002).

Existing research suggests that barley straw acts to prevent new algae growth rather than kill existing algae, and is not effective against all types of algae (Lembi 2002). In addition, results of use of barley straw in both the laboratory and in the field have varied widely from success to failure. Overall, the use of barley straw appears to have very unreliable results (Wagner 2004).

When it is used, the suggested application rate is 255 pounds of barley straw per surface acre of lake (Lembi 2002). When applied, the bales of barley straw first need to be broken apart, then packed into some form of loose netting before being placed in the lake using floats. The barley straw needs to remain in the upper three to four feet of the lake in order to remain effective. Costs of barley straw and labor to install are largely unknown (Wagner 2004).

Barley straw would most likely require an Order of Conditions from the Hopedale Conservation Commission before being applied. The use of barley straw also raises an issue in regards to permitting. Because of its algaecidal properties, barley straw is currently regarded as an unregistered herbicide by the United States Department of Environmental Protection. As such, it cannot be covered by a License to Apply Chemicals from DEP, and licensed herbicide applicators cannot apply it to a lake (Wagner 2004).

Because of its unreliability, the large size of Hopedale Pond which would require over 20,000 pounds of barley straw and the associated permitting issues, barley straw is not recommended for use in Hopedale Pond.

Plant Competition – Not recommended

The presence of a healthy, native plant community can often suppress the spread of invasive aquatic species. A plant competition biocontrol technique seeks to supplement native species through seeding and planting disturbed or bare areas before they can be colonized by invasives.

The overall goal of the technique is to maximize spatial resource use by desirable species to keep out undesirable invasive species (Wagner 2004).

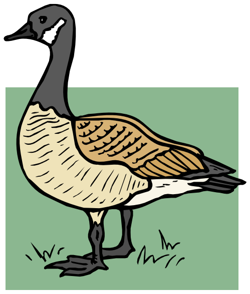
The advantages of this approach are that it uses natural processes to control aquatic invasives, may be self-perpetuating after an initial establishment period of several years and can be easily integrated with other approaches (Wagner 2004). It is likely to be most effective after elimination of an invasive plant community through an initial herbicide treatment or mechanical removal followed by native species plantings.

There are several challenges associated with the plant competition approach which makes its long-term effectiveness uncertain (Wagner 2004). Periodic natural disturbances within a plant community provide continual opportunities for recolonization by invasives, which would require ongoing effort with supplemental native plantings. The use of seeding or planting native vegetation is also still experimental and these native species may not become established quickly enough to prevent invasion by exotics.

An Order of Conditions would most likely be needed from the Hopedale Conservation Commission in order to implement a plant competition approach in Hopedale Pond. Costs of this approach will vary depending on the species and area being planted and are largely unknown. Though it might be useful as a trial approach to exotic plant management on a small scale, plant competition is not recommended for use in Hopedale Pond because it is still largely experimental and would most likely involve years of ongoing labor to supplement native plants.

4.2.4 Canada Goose Management

Canada goose populations in Massachusetts can be broken into two broad groups: migratory and resident. Migratory Canada goose populations are generally not considered to be a problem in Massachusetts, since they do not nest locally and experience significant hunting pressure across much of their migratory routes. However, resident Canada goose populations in the region have increased greatly over the last 50 years. Limited hunting pressure and available habitat allowed the resident goose flocks to grow to an estimated 38,000 geese statewide in 1997. Resident flocks of Canada goose have grown especially large in eastern Massachusetts, where local hunting-related ordinances and feeding by the public reduce pressures on goose populations.



Reports of the number of resident Canada goose at Hopedale Pond vary from year to year. However, ESS observed flocks as large as 44 birds using the pond and adjacent lawns during the summer and early fall of 2008. High densities of resident Canada goose may contribute to excess nutrient and bacteria loading at Hopedale Pond. Increased nutrient loading may trigger excessive aquatic plant growth or algae blooms while bacterial loading poses a direct public health issue for waders and swimmers. Additionally, geese may become aggressive toward children and even adults that approach too closely. In order to minimize these threats, management of the resident Canada goose population at Hopedale Pond is recommended.

4.2.4.1 Canada Goose Management Options

Management of the Canada goose population at Hopedale Pond is most likely to be successful if multiple active and passive options are simultaneously employed over the long term. Recommended actions include changing lawn care practices, maintaining fences or vegetated buffers around the pond shoreline, egg addling, limited hunting and expanded public education. Each of these actions is discussed in the following sections. Other actions, including chemical repellents, harassment and decoys are also evaluated.

Modify Lawn Care Practices - Recommended

By raising the height of the blade on lawnmowers, grazing by Canada goose populations can be reduced. Taller grass is less palatable to the geese and therefore less likely to attract grazing flocks. The adjustment of mowing practices could save homeowners and the Hopedale Parks Department both time and money by reducing the amount of fertilizer and water needed to maintain their lawns. Taller lawns also require less frequent mowing than shorter lawns.

The main obstacles to implementation of this option are the perceived reduction in aesthetic appeal of taller grass by some individuals and the reduced recreational value for sports or lawn games. However, in areas with Canada goose grazing activity and subsequent fecal contamination, these concerns probably represent an acceptable tradeoff.

Install Fencing or Other Barriers - Recommended

ESS has observed flocks of up to 35 Canada geese walking between grassy areas near the town boat ramp and Hopedale Pond. The installation of fencing or other landscaping barriers along the open shoreline will prevent Canada geese from walking onto lawns directly from the water. This measure is most effective during the summer molting period but should deter most geese from open lawn throughout the growing season. Fencing may be as simple as metal stakes strung with durable wire or nylon mesh. More aesthetically pleasing wooden post and rail fences would also work, as long as they extend the entire perimeter of the lawn/shoreline transition and the rails are low enough to prevent goose passage. These fences may also be strung with mesh on a seasonal basis, as necessary. In all cases, fencing should be at least 30 inches tall. Increasing the height of the fence up to 50 inches may incrementally improve deterrence. Recent projects by the Massachusetts Department of Conservation and Recreation also indicate that barrier benches (essentially a row of multiple benches) constitute both an effective goose deterrent and a public asset.

Shrubby vegetation is another very effective goose deterrent along shorelines. Canada geese tend to avoid walking through hedgerows because they are vulnerable to predator ambush when they do not have a clear view of the land around them. Even relatively low-growing (three feet in height) shrubs are likely to be effective. To maximize the effectiveness of this measure, shrubs should be spaced close enough that, when full grown, foliage overlaps and covers the ends of adjacent fences. The planting of native or non-invasive exotic shrubs along the shoreline will help deter Canada geese from walking onto adjacent lawns.

According to the Town of Hopedale Parks Commission, additional vegetation has been allowed to grow along the shoreline in recent years. However, several segments of shoreline are still easily accessible to Canada geese, including substantial portions of the Town Beach. Fencing and vegetation can be used in tandem to create an effective, non-obtrusive and even aesthetically pleasing barrier to Canada geese along targeted portions of the Hopedale Pond shoreline. Specific areas that correspond to the proposed management actions are depicted in Figure 31.

The potential shortcomings of this option are related to aesthetic and economic concerns. Shrubs and fencing may partially block or otherwise interfere with desirable views of the pond from residences and public land. Additionally, low to moderate costs can be expected for the installation and maintenance of goose barriers.

Expand Egg Addling - Recommended

Egg addling is an active management measure that involves the shaking of Canada goose eggs to prevent them from hatching successfully. Other egg destruction methods include puncture or coating with 100% corn oil. Effective egg addling reduces Canada goose populations not only through the direct destruction of eggs but also by preventing geese from nesting again during the same season. This is because adults will often continue to incubate eggs after addling. An additional benefit is that adults without young are more easily repelled by other management actions. If pursued as a long-term strategy, egg addling can be very effective in reducing local Canada goose populations.

Canada geese are reproducing at Hopedale Pond. According to the Hopedale Parks Commission, a volunteer group addled eggs in at least six nests during the 2007 nesting season. However, this activity was not continued during the 2008 nesting season. ESS observed up to 30 goslings at one time in May 2008. It is recommended that egg addling continue to be pursued at known nesting sites in future years, as necessary.

Egg addling requires a permit from the Massachusetts Division of Fisheries and Wildlife (MassWildlife). However, the costs associated with a volunteer-run egg addling program are minimal.

Continue Controlled and Limited Hunting - Recommended

Hunting is an active management method that can be directly effective in controlling the growth of resident Canada goose populations. Hunting controls resident Canada goose populations mainly by removing individuals from the flock.

Hunting of resident Canada geese at Hopedale Pond is currently allowed during State-approved special seasons, which vary in length but may be open on certain days between the month of September and late winter. Hunters must obtain all required federal and state permits and licenses, as well as a town permit, to be eligible for hunting at Hopedale Pond. Additionally, goose hunting on town parklands is limited to the area around the northern basin of the pond (north of the jetty).

The Town of Hopedale monitors the hunting take of Canada goose. According to the Hopedale Parks Commission, approximately 20 geese were harvested by registered members of the hunting group at Hopedale Pond in 2006. However, no individuals were harvested in 2007.

The drawbacks of hunting are mainly associated with public safety. However, good signage and carefully controlled hunting in the undeveloped portions of Hopedale Pond (i.e. the northern basin) minimize the risk to public safety. Given these considerations, the continuation of controlled and limited hunting is recommended.

Expand Public Education Programs - Recommended

Education of the public remains a viable option for reducing the impacts of Canada goose populations on Hopedale Pond. In addition to reducing the problems associated with hand feeding Canada goose, public education will increase awareness of resident goose populations as a problem. This is an important step in solidifying public support of Canada goose management actions.

The Town of Hopedale has already placed signage at the Town Beach to inform visitors that feeding waterfowl is discouraged. Further public education programs should involve maintenance, replacement or addition of signage at the Town Beach. In addition, expansion of active community outreach should be undertaken via creation and distribution of informative brochures as well as partnership with local schools and community organizations.

Application of Chemical Repellents – Not Recommended

Chemical repellents have a taste that Canada geese find disagreeable and may be spread on lawns to discourage geese from grazing. A commercially available and safe repellent, known by the trade name RiJeXiT®, is made from grapes and has been used with some success.

The main drawbacks of commercially available chemical repellents are that they are expensive ($125 per acre) and require frequent reapplication in order to remain effective. Additionally, chemical repellents must be spread evenly over the area of concern. Otherwise, Canada geese may find an under treated patch of grass that is palatable and continue grazing in that area. Except for very small patches of grass, the cost and effort of applying chemical repellents is not considered to be worthwhile. Therefore, this option is not recommended.

Harassment of Geese – Not Recommended

Canada goose harassment is an active control option that involves scaring geese away from an area. In most cases, harassment involves loud noises, explosions or flashing lights. In and around residential shorelines (where the Hopedale Pond Canada goose problem is most apparent) these disturbances are, at best, undesirable and, at worst, dangerous. Furthermore, these options, which may require additional permits or specialized training, are typically either high-cost or labor intensive and must be pursued consistently over a long period of time to be effective.

In contrast to other active control measures, such as hunting or egg addling, goose harassment does not actually remove individual geese from the population. Rather, it simply prevents geese from using available habitat. Passive management options at Hopedale Pond would be able to achieve the same results, usually at a fraction of the cost or effort and without raising personal risk to local residents and users of the pond. Therefore, Canada goose harassment is not recommended as a viable management option at Hopedale Pond.

Deploy Animal Decoys – Not Recommended

Decoys are used to frighten Canada geese and may take the form of Mylar helium balloons or flagging, scarecrows, plastic coyotes, or a number of other objects (generally they are either highly reflective or designed to mimic a predator). These are sometimes installed in grassy areas to deter geese from feeding nearby.

Although certain types of decoys appear to be more effective than others, almost all of them will have to be moved frequently to prevent resident geese from becoming acclimated to them. Additionally, all have a limited range and multiple decoys may be necessary to protect even small parcels of land. Given the moderate to high level of maintenance and the wide range in effectiveness, decoys are not recommended for Canada goose control at Hopedale Pond.

4.2.4.2 Canada Goose Pilot Study

In recognition of the need to monitor and evaluate nuisance species control programs, ESS has designed the following pilot study for implementation during the first year of the program.

According to ESS' observations during 2008, flocks of up to 44 Canada geese are most likely to graze and loaf at or near the town beach, especially during the breeding and molting seasons (May to July). This is the shoreline area where open lawn is most accessible to

Canada geese from the water. Additionally, this is the area most likely to accumulate goose feces. In 2008, the coverage of droppings approached 30 percent in June and July.

Consequently, it is recommended that target management areas (Figure 31) be surveyed for individuals as well as sign (i.e., fecal matter). If egg addling is chosen as a management strategy, it will be necessary to locate Canada goose nests. This may be accomplished by careful visual observation of geese during the nesting season. Female geese take occasional recesses from incubation of their clutch and may be briefly joined by males prior to returning to the nest. This behavior should permit the location of most nests and access to the eggs for addling. Additional canvassing of the shoreline (including islands) may be necessary to ensure complete coverage of existing nests. Assuming an average clutch size between five and six eggs, there are likely to be at least five nesting sites on the periphery of Hopedale Pond. When encountered, nest locations should be marked on a map and/or located with a GPS and the clutch size should be noted. Canada goose often returns to previously used nest sites and this behavior may prove useful for quickly locating nests in subsequent years.

During the breeding season (April to June), surveys should be conducted at all transects on a monthly or semi-monthly basis. Survey transects may be surveyed quarterly outside of the breeding season. One survey transect is proposed for the target management areas (and adjacent areas) along the southern shoreline of the pond. A second transect could be surveyed in the vicinity of the Rustic Bridge or on the western periphery of the north end of the pond, in order to account for geese using other portions of the pond. Effort for each survey should be similar (1.0 hour for each transect, for example). Data collected should include total number of geese, with adults and goslings recorded separately. Location data is also important to record. Of particular significance is whether the observed geese are inside the management area (e.g., within the goose barriers) or outside (e.g., on the boat ramp, in the water). A map of the pond and adjacent areas may be included in order to facilitate notation of these observations. Goose behavioral observations should also be recorded and the presence of any nests should be noted and addressed through the egg addling program. Additionally, notes should be kept on the presence of other waterfowl, including mute swans, which were observed on the pond in low numbers (two to three at a time) in 2008. Mute swans can be very aggressive toward other waterfowl and even humans and should be monitored to prevent the establishment of nuisance populations.

Canada geese frequently feed in the lawn area behind the bath house and both north and south of the parking lot. These areas are subject to moderate to high levels of fecal contamination and present a potential health risk for people coming into direct contact with fecal matter. However, goose fecal matter accumulations in these areas are unlikely to contribute to significant water quality degradation in the pond. Water quality degradation due to goose defecation is more of an issue at the shoreline and in the unvegetated areas near the boat ramp, where nutrients and pathogens can more directly enter the pond. Therefore, a stratified random sampling approach is recommended for this area.

Five randomly selected 0.25 m^2 quadrats within each of two strata would be monitored for goose feces during each survey. One stratum would consist of the managed areas, which would include the grassy lawns on either side of the boat ramp and, if cooperation can be obtained from the owner, the grassy parcel abutting the western end of the dam. The second stratum would consist of the unmanaged or open access areas, including the immediate shoreline, boat ramp and parking area near the bath house. Data collected would include estimated number of droppings as well as percent cover of droppings per unit area.

Quantitative data from the transect surveys and fecal matter quadrats can be explicitly used to evaluate success of the reduced mowing and goose barrier management options. Egg addling and hunting records can be used to help interpret these data. Additionally, qualitative observations can be used to identify any problems that may arise and address these through changes to the management plan.

Location: G:/GIS-Projects/H153-Hopedale-Pond/00-mxd/FinalFigs/Goose Exclusion.mxd

ESS Group, Inc.
Engineers
Scientists
Consultants

HOPEDALE POND DIAGNOSTIC/FEASIBILTY STUDY
Hopedale, Massachusetts

Scale: 1" = 200'

Source: 1) MassGIS, Orthophotos, 2005
2) ESS Group, Inc., 2009

🟦 Hopedale Pond

🟩 Proposed Goose Management Area

0 200 400 Feet

Proposed Goose Management Areas at Hopedale Pond

Figure 31

5.0 SUMMARY OF MANAGEMENT RECOMMENDATIONS

The most critical management action identified through this study is the need to address water quality issues, particularly the extremely high levels of *E. coli* bacteria observed at the Dutcher Street storm drain outfall. To adequately address this there remains a need to perform additional study, but actions can and should be initiated immediately as this does pose a risk to human health due to the proximity of the outfall to the public beach which, despite the town's current policy of keeping the beach closed, still remains a reasonably well visited recreational site for some local residents.

To address the water quality at the Dutcher Street outfall, ESS recommends:

1. Sampling the drain during dry weather flows to determine whether the system is being impacted by human sewage or by wildlife sources of bacteria. Dry weather flows were where the highest bacteria were recorded during the study. By sampling the dry weather flows using techniques such as DNA Ribotyping or performing analyses on the water for caffeine, testosterone or optical brighteners a better understanding of the source/s of contamination can be made which will then lead to methods for further evaluation or determining the correct method for addressing the situation. Additional sampling has been approved by the town and ESS is already working to assess this outfall for caffeine and optical brighteners at a cost of about $4,000.

2. If either caffeine or optical brighteners are found, then a human source of contamination is likely to be present. If neither of these is found, it is likely that wildlife such as bats or other mammals have contaminated the drain by taking residence in the system's infrastructure. If human sources are suspected, the system should be investigated using a remote camera to detect illicit hook-ups to the storm drain system at an estimated cost of $10,000. If wildlife are suspected, the solutions could vary from simply closing off the storm drain system by placing a grate on the outlet to more extensive techniques such as wildlife trapping and relocation depending on the type or types of animals present. It is possible that the wildlife may never be completely excluded from the system.

3. Given the possibility that the sources of contamination will take time to locate and may not be easily resolved; ESS is recommending that the town seek to address the issue by mitigating the source of contamination through the creation of a wetland treatment system. Such a system would direct the Dutcher outfall flows to the south through a narrow wetland channel created along the pond shoreline. This approach would reduce the potential for contaminated water to circulate in the vicinity of the town beach and would also expose the flows from the outfall to ultraviolet light, which breaks down bacteria and the associated pathogens, before the discharge can flow into the pond. The town has already asked ESS to produce a conceptual design of this wetland system and may seek to fund the project through a Section 319 Non-Point Source Pollution grant from MassDEP in 2009 or 2010. The cost for designing, permitting, and constructing such a system is likely to be on the order of $60,000 to $75,000, however, it may be possible to save substantial cost if work can be performed by the town's DPW.

To address other water quality issues in the watershed ESS recommends:

1. Implement an education program focused on teaching watershed residents, particularly those living close to Hopedale Pond and the other ponds in its watershed, about the benefits of proper yard care (fertilization being a key focus), pet waste management, and other small behavioral changes they can adopt to make improvements in the pond's water quality. A typical program focusing on the development of a watershed specific brochure can be performed for less than $5,000. Education materials can be used in the public school if presented properly with appropriate age-based messages. Some towns we have worked with have opted to distribute brochures with town water or sewer bills for very little additional cost.

2. More direct improvements in water quality can be achieved through improvements made to the watershed's storm water infrastructure. Improved detention and infiltration facilities would greatly reduce the phosphorus reaching the pond and would also be able to significantly reduce bacterial contamination as well. Many systems in the watershed were designed to remove water from roadways; however, the infrastructure could be upgraded by incorporating infiltrating chambers to the outflows or other features such as grassed swales, rain gardens, detention ponds, etc. The cost for each of these varies (ranging from simple grass swales for less than $5,000 to larger detention basins and created wetland systems on the order of $40,000), but a comprehensive watershed wide program can be implemented over time thereby allowing for maximum use of state grant programs such as the 319 NPS Pollution grant program run by MassDEP that is specifically designed for implementing such programs.

3. Goose management will also be essential toward removing bacteria and nutrients from Hopedale Pond. Education will be a primary means for accomplishing the goal of reducing the resident goose population. Educational efforts can be combined with item 1 above to maximize its effect. Goose management may also include implementation of a basin-wide addling program, continued controlled hunting, and construction of physical barriers to geese such as barrier fences or vegetative barriers along key sections of the pond's perimeter. Educational costs can vary widely depending upon the level of implementation, but a budget of $5,000 to $10,000 should be anticipated. Addling and hunting program costs can also vary widely, but if performed by local volunteers the costs could be minimal, yet effective. Finally, the cost of designing, permitting, and constructing vegetative or barrier fencing is likely to be on the order of $3.00 per linear foot (all inclusive), but could be as much as $10.00 per foot depending upon the type of barrier to be developed. If homeowner education is successful, the direct costs to the town could be zero for private shorelines; however, since much of the pond's shoreline is town owned, the town does have an obligation of their own. Once again, the MassDEP 319 NPS Pollution grant program could be used to fund a portion of the costs for a comprehensive project to create barrier fences and/or vegetative barriers.

In addition to making improvements in the pond's water quality, the pond will also require management action to address the rooted plant problem in order to truly restore Hopedale Pond. Based on our findings in this study and on the previously reported management efforts in this regard, ESS is recommending the following actions be taken:

1. Herbicides are likely to be the most effective option available for managing the nuisance weeds at Hopedale Pond. Presently, the milfoil only occupies about 10 acres of the pond bottom. Treatment

should focus on the larger milfoil beds using the contact herbicide diquat (trade name Reward). An NOI will need to be filed with the conservation commission (estimated cost between $2,000 and $3,500) once every three years with this report should serving as the basis for that filing. Treatment with diquat is likely to be on the order of up to $8,000 per year, although treatment costs could be reduced to nearly half this value if performed annually. If treatments with diquat are neglected or go unfunded for more than 2 years, treatment with other herbicides such as fluidone (trade name Sonar) will be necessary at a cost of about $25,000 to $30,000 per treatment. Herbicide treatment is only a method of controlling the weed problem as is does not solve the cause of the issue entirely.

2. Benthic barriers can be used on a localized basis if herbicide use is not welcome or in critical areas that must remain weed free. Barrier material could be placed at the town beach for an estimated cost of between $10,000 and $20,000 depending upon the area to be managed. Although permits would be required, very little long-term environmental impact can be expected from such a management approach. This approach also does not address the weed issue on a basin wide basis nor does it address the cause of the weed problem.

3. Dredging does address the primary cause of the rooted weed problem by removing the accumulated sediment, particularly if the dredging can be performed to restore the depth of the pond to a level that would prevent penetration of light from the surface to the bottom, thereby excluding the possibility of future plant growth. Costs for dredging can be unmanageable for some towns, although there are several options available regarding how a project is carried out that can spread costs over a period of years. Total dredging of the lower basin of the pond would be most desirable and could be performed with the least environmental impact. This approach would cost on the order of between $2,500,000 and $4,000,000. The next step in this effort is recommended, which is advanced efforts to find a source of funding or a project alternative that can be funded depending upon the funds that can reasonably be made available. Additional sediment analysis would be required to be performed under the guidance of a state-approved sediment sampling plan, and then a project conceptual design could be developed and submitted with an ENF for MEPA review. Total cost to advance a dredging project to the point of MEPA review would be between $50,000 and $60,000, at which point the project could be considered "shovel ready" but would still require final engineering design and permitting by the USACE (404 permit), the state (401 Water Quality Certificate), and conservation commission (NOI filing).

In order to restore Hopedale Pond in a manner that is comprehensive and will be long-lasting the cost will be significant. However, with proper planning and by being ready to take advantage of funding opportunities as they arise, it can be done in a reasonable amount of time. Initial actions to rectify high priority issues such as the Dutcher Street outfall can and should be implemented immediately. While funding for a dredging project is being sought, the town should continue to be diligent with regard to water quality and plant management efforts annually while also trying to advance the dredge project concept by moving forward with conceptual design and initial permitting efforts.

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7.0 GLOSSARY

Abiotic: A term that refers to the nonliving components of an ecosystem (e.g., sunlight, physical and chemical characteristics).

Algae: Typically microscopic plants that may occur as single-celled organisms, colonies or filaments.

Anoxic: Greatly deficient in oxygen.

Aquifer: A water-bearing layer of rock (including gravel and sand) that will yield water in usable quantity to a well or spring.

Aquatic plants: A term used to describe a broad group of plants typically found growing in water bodies. The term may generally refer to both algae and macrophytes, but is commonly used synonymously with the term macrophyte.

Bacteria: Typically single celled microorganisms that have no chlorophyll, multiply by simple division, and occur in various forms. Some bacteria may cause disease, but many do not and are necessary for fermentation, nitrogen fixation, and decomposition of organic matter.

Bathymetric Map: A map illustrating the bottom contours (topography) and depth of a lake or pond.

Best Management Practices (BMPs): Any of a number of practices or treatment devices that reduce pollution in runoff via runoff treatment or source control.

Biomass: A term that refers to the weight of biological matter. Standing crop is the amount of biomass (e.g., fish or algae) in a body of water at a given time. Biomass is often measured in grams per square meter of surface.

Biota: All living organisms in a given area.

Cultural Eutrophication: The acceleration of the natural eutrophication process caused by human activities, occurring over decades as opposed to thousands of years.

***E. coli* Bacteria:** Found naturally in the intestinal tracts of warm blooded animals, high levels of this bacteria in water or sludge is an indicator of pollution and possible contamination by pathogens.

Ecosystem: An interactive community of living organisms, together with the physical and chemical environment they inhabit.

Endangered/Threatened Species: An animal or plant species that is in danger of extinction that is recognized and protected by state or federal agencies.

Erosion: A process of breakdown and movement of land surface that is often intensified by human disturbances.

Eutrophic: A trophic state (degree of eutrophication) in which a lake or pond is nutrient rich and sustains high levels of biological productivity. Dense macrophyte growth, fast sediment accumulation, frequent algae blooms, poor water transparency and periodic oxygen depletion in the hypolimnion are common characteristics of eutrophic lakes and ponds.

Eutrophication: The process, or set of processes, driven by nutrient, organic matter, and sediment addition to a pond that leads to increased biological production and decreased volume. The process occurs naturally in all lakes and ponds over thousands of years.

Exotic Species: Species of plants or animals that occur outside of their normal, indigenous ranges and environments. Populations of exotic species may expand rapidly and displace native populations if natural predators are absent or if conditions are more favorable for the exotics growth than for native species.

Filamentous: A term used to refer to a type of algae that forms long filaments composed of individual cells.

Groundwater: Water found beneath the soil surface and saturating the layer at which it is located.

Habitat: The natural dwelling place of an animal or plant; the type of environment where a particular species is likely to be found.

Herbicide: Any of a class of compounds that produce mortality in plants when applied in sufficient concentrations.

Infiltration Structures: Any of a number of structures used to treat runoff quality or control runoff quantity by infiltrating runoff into the ground. Includes infiltration trenches, dry wells, infiltration basins, and leaching catch basins.

Invasive: Spreading aggressively from the original site of planting.

Isopach Map: A map illustrating the depth of sediments within a lake or pond.

Limnology: The study of lakes.

Littoral Zone: The shallow, highly productive area along the shoreline of a lake or pond where rooted aquatic plants grow.

Macroinvertebrates: Aquatic insects, worms, clams, snails and other animals visible without aid of a microscope that may be associated with or live on substrates such as sediments and macrophytes. They supply a major portion of fish diets and consume detritus and algae.

Macrophytes: Macroscopic vascular plants present in the littoral zone of lakes and ponds.

Morphometry: A term that refers to the depth contours and dimensions (topographic features) of a lake or pond.

Nonpoint Source: A source of pollutants to the environment that does not come from a confined, definable source such as a pipe. Common examples of non-point source pollution include urban runoff, septic system leachate, and runoff from agricultural fields.

Nutrient Limitation: The limitation of growth imposed by the depletion of an essential nutrient.

Nutrients: Elements or chemicals required to sustain life, including carbon, oxygen, nitrogen and phosphorus.

pH: An index derived from the inverse log of the hydrogen ion concentration that ranges from zero to 14 indicating the relative acidity or alkalinity of a liquid.

Photosynthesis: The process by which plants use chlorophyll to convert carbon dioxide, water and sunlight to oxygen and cellular products (carbohydrates).

Phytoplankton: Algae that float or are freely suspended in the water.

Pollutants: Elements and compounds occurring naturally or man-made introduced into the environment at levels in excess of the concentration of chemicals naturally occurring.

Secchi disk: A black and white or all white 20 cm disk attached to a cord used to measure water transparency. The disk is lowered into the water until it is no longer visible (Secchi depth). Secchi depth is generally proportional to the depth of light penetration sufficient to sustain algae growth.

Seepage meter: A device used to measure the groundwater volume entering a lake, pond or stream over time.

Sediment: Topsoil, sand, and minerals washed from the land into water, usually after rain or snowmelt.

Septic system: An individual wastewater treatment system that includes a septic tank for removing solids, and a leachfield for discharging the clarified wastewater to the ground.

Septic System Leachate: The clarified wastewater discharged into the ground from a septic system.

Siltation: The process in which inorganic silt settles and accumulates at the bottom of a lake or pond.

Stormwater Runoff: Runoff generated as a result of precipitation or snowmelt.

Temperature Profile: A series of temperature measurements collected at incremental water depths from surface to bottom at a given location.

Thermal Stratification: The process by which a lake or pond forms several distinct thermal layers. The layers include a warmer well-mixed upper layer (epilimnion), a cooler, poorly mixed layer at the bottom (hypolimnion), and a middle layer (metalimnion) that separates the two.

Thermocline: A term that refers to the plane of greatest temperature change within the metalimnion. Often used interchangeably with metalimnion.

TKN: Total Kjeldahl nitrogen, essentially the sum of ammonia nitrogen and organic forms of nitrogen.

TSS: Total suspended solids, a direct measure of all suspended solid materials in the water.

Turbidity: A measure of the light scattering properties of water; often used more generally to describe water clarity or the relative presence or absence of suspended materials in the water.

Vegetated Buffer: An undisturbed vegetated land area that separates an area of human activity from the adjacent water body; can be effective in reducing runoff velocities and volumes and the removal of sediment and pollutant from runoff.

Water Column: Water in a lake or pond between the interface with the atmosphere at the surface and the interface with the sediment at the bottom.

Water Quality: A term used to reference the general chemical and physical properties of water relative to the requirements of living organisms that depend upon that water.

Watershed: The surrounding land area that drains into a water body via surface runoff or groundwater recharge and discharge.

Zooplankton: Microscopic animals that float or are freely suspended in the water.

Tables

Table 1. Current and Recent Historical Land Use in the Hopedale Pond Watershed

Land Use	**Area in 1971** (Acres)	**Area in 1999** (Acres)	**Net Change 1971 to 1999** (Acres)	**Area in 1971** (%of Total Watershed Area)	**Area in 1999** (%of Total Watershed Area)	**Net Change 1971 to 1999** (As % of 1971 Area)
Cropland	121.3	107.6	*-13.7*	1.9	1.7	*-11.3*
Pasture	4.1	10.8	*6.8*	0.1	0.2	*165.8*
Forest	4568.3	3584.0	*-984.3*	72.7	57.0	*-21.5*
Wetland	133.2	133.2	*0.0*	2.1	2.1	*0.0*
Mining	3.7		*-3.7*	0.1	0.0	*-100.0*
Open Land	129.5	28.5	*-101.0*	2.1	0.5	*-78.0*
Participation Recreation	46.8	5.3	*-41.5*	0.7	0.1	*-88.6*
Residential (Multi-family)	0.0	52.3	*52.3*	0.0	0.8	*NA*
Residential (High Density)	2.9	41.4	*38.4*	0.0	0.7	*1303.5*
Residential (Medium Density)	537.9	723.0	*185.1*	8.6	11.5	*34.4*
Residential (Low Density)	238.2	901.3	*663.1*	3.8	14.3	*278.4*
Commercial	36.7	86.2	*49.5*	0.6	1.4	*134.7*
Industrial	0.4	98.1	*97.7*	0.0	1.6	*25624.5*
Urban Open	37.5	4.5	*-33.0*	0.6	0.1	*-88.1*
Transportation	45.5	45.5	*0.0*	0.7	0.7	*0.0*
Water	374.8	374.8	*0.0*	6.0	6.0	*0.0*
Woody Perennial	3.5	72.0	*68.5*	0.1	1.1	*1980.2*
Urban public (part of Urban Open)		8.4	*8.4*	NA	0.1	*NA*
Orchard (part of Woody Perennial)		7.4	*7.4*	NA	0.1	*NA*
Total Area (Acres)	**6284.1**					

Table 2. Dissolved Oxygen Profile at Site 1, Hopedale Pond, May 2008 to January 2009

Date	**Depth** (meters)	**Dissolved Oxygen** (mg/L)	**Dissolved Oxygen** (% saturation)	**Temperature** (°C)
5/29/08	0.0	8.1	92.1	22.4
	0.5	8.2	93.6	21.8
	1.0	8.6	96.0	21.0
	1.5	8.5	94.5	20.5
	2.0	8.1	89.3	19.8
	2.5	8.3	88.0	17.8
6/27/08	0.0	7.7	92.0	24.2
	0.5	7.4	88.2	24.0
	1.0	7.2	85.8	24.0
	1.5	4.8	55.7	23.9
	2.0	0.9	8.8	22.8
	2.5	0.3	3.6	20.2
7/17/08	0.0	7.0	88.7	27.6
	0.5	6.5	84.4	27.5
	1.0	6.8	85.2	27.3
	1.5	6.8	85.3	27.1
	2.0	3.4	41.7	25.8
	2.5	1.4	14.1	25.4
8/29/08	0.0	7.4	84	24.2
	0.5	6.8	79.6	23.7
	1.0	6.4	74.0	22.2
	1.5	5.7	64.8	21.5
	2.0	5.5	61.0	21.4
	2.5	5.3	59.8	21.3
9/18/08	0.0	6.06	67.2	21.6
	1.0	5.8	64.6	22.0
	2.0	5.6	62.7	22.0
	2.5	4.0	42.6	19.7
10/9/08	0.0	8.02	80	15.5
	0.5	8.0	78.7	14.0
	1.0	7.6	73.0	13.3
	1.5	7.0	64.9	12.5
	2.0	7.7	69.8	12.1
11/12/08	0.0	8.6	76.0	10.0
	0.5	8.4	74.0	9.9
	1.0	8.2	71.6	9.4
	1.5	7.6	65.5	9.3
	2.0	8.0	69.8	9.1
1/19/09	0.0	11.65	79.0	0.0
	0.5	9.49	65.5	0.1
	1.0	9.81	69.7	0.2
	1.5	9.60	68.0	0.7
	2.0	8.17	62.1	2.6
	2.5	4.85	38.0	3.9

Table 3. In-pond Dry Weather Water Quality Data for Hopedale Pond, May 2008 to January 2009

Sample Location	Station ID	Date	Time	Color (PCU)	Turbidity (NTU)	pH SU)	Conductivity (µS/cm)	Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% Saturation)	Total Suspended Solids (mg/L)	Nitrate-N (mg/L)	Nitrite-N (mg/L)	Nitrite+Nitrate-N (mg/L)	Total Kjeldahl Nitrogen (mg/L)
Southern Basin - Surface	Site 1S	5/29/2008	NC	2	NC	6.7	529	22.4	8.10	82.0	2.00	0.0536	0.011	NS	0.498
	Site 1S	6/27/2008	8:38	6	3.7	7.4	552	24.2	7.71	92.0	2.50	NS	NS	0.05	0.650
	Site 1S	7/17/2008	10:30	10	1.1	7.2	606	27.6	7.03	88.7	2.00	0.0374	0.011	NS	0.559
	Site 1S	8/29/2008	NC	NC	1.9	6.7	480	24.2	7.40	84.0	NC	0.3370	0.011	NS	0.489
	Site 1S	9/18/2008	12:03	0	1.6	6.5	464	21.6	6.06	67.2	2.00	0.2200	0.004	NS	0.398
	Site 1S	10/9/2008	11:12	0	0.2	6.6	541	15.5	8.02	80.0	2.00	0.1000	0.011	NS	0.534
	Site 1S	11/12/2008	11:45	2	0.7	6.6	550	10.0	8.60	76.0	2.00	0.0400	0.004	NS	0.475
	Site 1S	1/19/2009	8:30	NC	0.1	7.5	213	0.0	11.65	79.0	2.00	0.3080	0.011	NS	0.655
		Mean*		**3**	**1.3**	**6.9**	**492**	**18.2**	**8.07**	**81.1**	**2.07**	**0.1566**	**0.009**	**0.05**	**0.532**
Southern Basin - Bottom	Site 1B	5/29/2008	NC	NC	NC	6.7	526	17.8	8.30	88.0	NS	0.0520	0.029	NS	0.487
	Site 1B	6/27/2008	9:01	NC	3.1	7.3	580	20.2	0.32	3.6	2.50	NS	NS	0.05	0.250
	Site 1B	7/17/2008	10:45	5	1.0	7.3	602	25.4	1.42	14.1	2.00	0.0323	0.011	NS	0.519
	Site 1B	8/29/2008	NC	NC	NC	6.7	NC	21.3	5.29	59.8	NC	0.2800	0.011	NS	0.587
	Site 1B	9/18/2008	12:30	NC	2.6	6.5	460	22.1	4.00	42.6	2.00	0.0400	0.004	NS	0.398
	Site 1B	10/9/2008	11:43	1	1.0	6.5	532	12.1	7.66	69.8	2.00	0.1510	0.011	NS	0.523
	Site 1B	11/12/2008	12:10	0	0.3	6.7	552	9.8	7.92	75.1	2.00	0.0150	0.004	NS	0.451
	Site 1B	1/19/2009	9:00	NC	NC	7.5	665	1.3	4.85	38.0	2.00	0.5820	0.011	NS	0.481
		Mean*		**2**	**1.6**	**6.9**	**560**	**16.3**	**4.97**	**48.9**	**2.08**	**0.1646**	**0.011**	**0.05**	**0.462**
Northern Basin - Surface	Site 2	5/29/2008	NC	0	NC	6.5	523	20.8	8.30	93.0	7.00	0.0552	0.011	NS	0.531
	Site 2	6/27/2008	9:53	5	2.7	7.0	576	23.6	6.34	73.1	2.50	NS	NS	0.05	0.540
	Site 2	7/17/2008	11:20	7	0.9	7.3	751	28.9	8.75	114.3	2.00	0.0447	0.011	NS	0.606
	Site 2	8/29/2008	NC	NC	0.7	7.1	500	21.3	5.39	59.9	NC	0.1590	0.046	NS	0.429
	Site 2	9/18/2008	11:18	10	0.7	6.3	564	19.3	5.68	62.1	2.00	0.0150	0.004	NS	0.353
	Site 2	10/9/2008	12:17	1	0.0	6.5	640	15.6	3.68	86.7	2.00	0.0383	0.011	NS	0.362
	Site 2	11/12/2008	11:13	0	2.1	6.9	517	7.0	9.86	81.6	2.00	0.0150	0.004	NS	0.516
	Site 2	1/19/2009	3:00	NC	0.1	7.6	187	0.2	10.86	74.8	2.00	0.3030	0.011	NS	0.459
		Mean*		**4**	**1.0**	**6.9**	**532**	**17.1**	**7.36**	**80.7**	**2.79**	**0.0900**	**0.014**	**0.05**	**0.475**

🟦 Analyte was not detectable: value represents half of the reported detection limit

NS=Analyte was not sampled

NC=Data not collected

* Arithmetic mean calculated for each parameter with the exception of *E. coli*, where the geometric mean was calculated.

Table 3. In-pond Dry Weather Water Quality Da

Sample Location	Station ID	Date	Time	Ammonia-N (mg/L)	Total Nitrogen (mg/L)	Total Phosphorus (mg/L)	Dissolved Phosphorus (mg/L)	*E. coli* (col/100ml)	Chlorophyll a (mg/m^3)	Secchi Disk (m)	Total Iron (mg/L)
Southern Basin - Surface	Site 1S	5/29/2008	NC	0.065	0.563	0.005	0.005	10	3.0	1.9	NS
	Site 1S	6/27/2008	8:38	0.200	0.700	0.020	0.005	56	4.9	2.5	NS
	Site 1S	7/17/2008	10:30	0.065	0.607	0.005	0.005	10	3.7	2.75	NS
	Site 1S	8/29/2008	NC	0.065	0.837	0.015	0.017	5	2.8	1.25	NS
	Site 1S	9/18/2008	12:03	0.065	0.622	0.012	0.010	100	NC	NC	NS
	Site 1S	10/9/2008	11:12	0.065	0.645	0.016	0.012	5	0.3	1.75	NS
	Site 1S	11/12/2008	11:45	0.065	0.519	0.019	0.014	5	0.3	1.50	NS
	Site 1S	1/19/2009	8:30	0.208	0.974	0.005	0.005	5	0.3	1.75	NS
		Mean*		**0.100**	**0.683**	**0.012**	**0.009**	**12**	**2.2**	**1.91**	**NA**
Southern Basin - Bottom	Site 1B	5/29/2008	NC	0.065	0.568	0.010	0.005	NS	NS	NC	0.21
	Site 1B	6/27/2008	9:01	0.200	0.300	0.012	0.016	64	NS	NC	0.64
	Site 1B	7/17/2008	10:45	0.156	0.562	0.005	0.005	5	NS	NC	1.13
	Site 1B	8/29/2008	NC	0.065	0.878	0.021	0.016	NS	NS	NC	0.51
	Site 1B	9/18/2008	12:30	0.065	0.442	0.038	0.016	NS	NS	NC	0.63
	Site 1B	10/9/2008	11:43	0.065	0.685	0.018	0.015	30	NS	NC	0.39
	Site 1B	11/12/2008	12:10	0.065	0.470	0.020	0.016	50	NS	NC	0.40
	Site 1B	1/19/2009	9:00	0.225	1.074	0.005	0.005	5	NS	NC	0.78
		Mean*		**0.113**	**0.622**	**0.016**	**0.012**	**19**	**NA**	**NA**	**0.58**
Northern Basin - Surface	Site 2	5/29/2008	NC	0.065	0.597	0.005	0.005	5	2.9	NC	NS
	Site 2	6/27/2008	9:53	0.200	0.590	0.020	0.005	1	NS	NC	NS
	Site 2	7/17/2008	11:20	0.065	0.662	0.005	0.005	30	NS	NC	NS
	Site 2	8/29/2008	NC	0.065	0.634	0.038	0.015	5	NS	NC	NS
	Site 2	9/18/2008	11:18	0.143	0.372	0.019	0.014	30	NS	NC	NS
	Site 2	10/9/2008	12:17	0.065	0.411	0.019	0.016	50	NS	NC	NS
	Site 2	11/12/2008	11:13	0.065	0.535	0.016	0.014	40	NS	NC	NS
	Site 2	1/19/2009	3:00	0.247	0.773	0.010	0.005	NS	NS	NC	NS
		Mean*		**0.114**	**0.572**	**0.017**	**0.010**	**12**	**2.9**	**NA**	**NA**

🟦 Analyte was not detectable: valu

NS=Analyte was not sampled

NC=Data not collected

* Arithmetic mean calculated for each parameter with t

Table 4. Tributary Dry Weather Water Quality Data for Hopedale Pond, May 2008 to January 2009

Sample Location	Station ID	Date	Time	Color (PCU)	Turbidity (NTU)	pH (SU)	Conductivity (µS/cm)	Temperature (°C)	Dissolved Oxygen (mg/L)	Dissolved Oxygen (% Saturation)	Total Suspended Solids (mg/L)	Nitrate-N (mg/L)	Nitrite-N (mg/L)	Nitrite+Nitrate-N (mg/L)	Total Kjeldahl Nitrogen (mg/L)	Ammonia-N (mg/L)	Total Nitrogen (mg/L)	Total Phosphorus (mg/L)	Dissolved Phosphorus (mg/L)	*E. coli* (col/100mL)	Total Discharge (cfs)
Outfall South of Town Beach	Site 4	5/29/2008	NC	2	NC	6.7	954	14.5	8.60	84.1	2.00	2.7400	0.011	NS	0.482	0.065	3.233	0.050	0.030	4000	0.04
	Site 4	6/27/2008	10:50	NC	4.9	6.9	1026	15.8	9.59	97.9	2.50	NS	NS	3.3	2.000	0.925	5.300	0.277	0.244	>20000	0.15
	Site 4	7/17/2008	12:30	3	0.7	5.2	1142	19.9	7.38	97.5	2.00	2.4600	0.073	NS	2.730	1.890	5.263	0.005	0.005	255	0.08
	Site 4	8/29/2008	NC	NC	0.6	7.2	820	17.7	8.05	84.5	2.00	2.9700	0.042	NS	0.489	0.296	3.501	0.170	0.100	14000	1.00
	Site 4	9/18/2008	9:54	4	0.7	6.8	850	18.0	8.34	93.5	2.00	2.5000	0.026	NS	0.670	0.317	3.196	0.110	0.100	4000	1.02
	Site 4	10/9/2008	10:38	0	0.3	6.8	808	16.6	8.50	88.5	2.00	2.5300	0.011	NS	0.356	0.065	2.897	0.055	0.028	40	0.95
	Site 4	11/12/2008	10:13	2	NC	6.6	790	12.9	9.20	87.7	2.00	2.1000	0.021	NS	0.398	0.168	2.519	0.049	0.039	5	0.50
	Site 4	1/19/2009	9:15	5	1.4	7.9	1006	7.3	8.30	65.0	2.00	2.7300	0.011	NS	0.465	0.230	3.206	0.031	0.018	5	1.00
		Mean*		**3**	**1.4**	**6.8**	**925**	**15.3**	**8.50**	**87.3**	**2.06**	**2.5757**	**0.028**	**3.3**	**0.949**	**0.495**	**3.639**	**0.093**	**0.071**	**429**	**0.59**
Mill River at Route 140	Site 5	5/29/2008	12:00	3	NC	6.3	621	19.1	7.34	80.4	2.00	0.0421	0.011	NS	0.466	0.065	0.519	0.005	0.005	5	3.43
	Site 5	6/27/2008	11:58	5	4.3	6.4	641	22.8	7.07	81.8	2.50	NS	NS	0.05	0.510	0.200	0.560	0.005	0.005	41	9.60
	Site 5	7/17/2008	13:15	7	0.6	6.1	782	26.5	6.16	75.1	2.00	0.0337	0.011	NS	0.669	0.065	0.714	0.005	0.005	5	6.66
	Site 5	8/29/2008	NC	NC	1.2	6.7	240	19.0	6.62	71.5	2.00	0.2880	0.036	NS	0.478	0.065	0.802	0.016	0.016	20	NC
	Site 5	9/18/2008	8:23	7	0.5	6.5	617	17.5	7.50	78.5	2.00	0.0150	0.004	NS	0.392	0.065	0.411	0.015	0.014	50	56.67
	Site 5	10/9/2008	9:59	0	1.4	6.5	690	13.8	9.07	89.6	2.00	0.0416	0.011	NS	0.456	0.065	0.509	0.020	0.018	5	42.50
	Site 5	11/12/2008	9:20	0	0.7	6.5	572	7.1	10.30	85.0	2.00	0.0500	0.004	NS	0.522	0.065	0.576	0.018	0.012	20	4.58
	Site 5	1/19/2009	11:15	3	1.3	7.8	258	0.5	10.50	69.5	2.00	0.3350	0.011	NS	0.454	0.192	0.800	0.005	0.005	5	22.22
		Mean*		**4**	**1.4**	**6.6**	**553**	**15.8**	**8.07**	**78.9**	**2.06**	**0.1151**	**0.012**	**0.05**	**0.493**	**0.098**	**0.611**	**0.011**	**0.010**	**12**	**20.81**
Unnamed Tributary at Route 140	Site 6	5/29/2008	11:46	3	NC	6.8	297	13.1	7.77	73.8	2.00	0.0566	0.011	NS	0.455	0.065	0.523	0.005	0.005	110	0.23
	Site 6	6/27/2008	11:35	4	4.8	6.3	304	17.0	7.50	76.3	2.50	NS	NS	0.05	1.700	0.200	1.750	0.005	0.005	420	0.04
	Site 6	7/17/2008	13:45	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NS	NF	NF	0.000	NF	NF	NF	0.00
	Site 6	8/29/2008	NC	NF	NF	NF	NF	NF	NF	NF	NF	NF	NF	NS	NF	NF	0.000	NF	NF	NF	0.00
	Site 6	9/18/2008	9:05	1	0.3	6.3	264	14.5	8.57	83.3	7.00	0.0150	0.004	NS	0.370	0.065	0.389	0.026	0.017	150	0.70
	Site 6	10/9/2008	10:15	0	1.6	6.0	330	12.5	7.60	70.4	2.00	0.0374	0.011	NS	0.301	0.065	0.349	0.015	0.014	60	1.77
	Site 6	11/12/2008	9:40	0	ND	6.0	210	5.2	11.14	87.5	2.00	0.0150	0.004	NS	0.451	0.065	0.470	0.019	0.018	10	0.70
	Site 6	1/19/2009	11:45	5	0.9	6.8	259	0.4	8.08	54.0	2.00	0.1050	0.011	NS	0.416	0.208	0.532	0.005	0.005	5	2.50
		Mean*		**2**	**1.9**	**6.4**	**277**	**10.5**	**8.44**	**74.2**	**2.92**	**0.0458**	**0.008**	**0.05**	**0.616**	**0.111**	**0.502**	**0.013**	**0.011**	**52**	**0.74**
Mill River at North Pond Outlet	Site 7	5/29/2008	11:00	4	NC	7.6	965	18.3	7.30	82.0	2.00	0.2310	0.011	NS	0.416	0.065	0.658	0.005	0.005	10	2.75
	Site 7	6/27/2008	12:33	3	7.2	6.9	950	23.7	7.88	93.1	2.50	NS	NS	0.17	0.250	0.200	0.420	0.005	0.005	98	2.64
	Site 7	7/17/2008	14:15	8	0.5	6.4	1062	28.0	7.18	91.2	2.00	0.0729	0.011	NS	0.496	0.065	0.580	0.011	0.005	30	2.00
	Site 7	8/29/2008	NC	NC	1.9	7.1	640	16.5	8.08	82.8	2.00	0.4620	0.011	NS	0.419	0.065	0.892	0.017	0.015	136	1.30
	Site 7	9/18/2008	7:47	10	1.2	7.2	915	21.0	8.70	99.0	2.00	0.0400	0.004	NS	0.347	0.065	0.391	0.015	0.015	10	10.00
	Site 7	10/9/2008	9:26	2	1.2	6.6	866	16.3	7.49	79.2	2.00	0.0709	0.011	NS	0.301	0.065	0.383	0.022	0.017	100	3.13
	Site 7	11/12/2008	8:50	0	0.5	7.2	717	8.3	10.80	91.3	2.00	0.0900	0.004	NS	0.481	0.065	0.575	0.018	0.016	60	9.17
	Site 7	1/19/2009	10:15	10	1.4	7.8	354	1.8	9.13	65.5	2.00	0.3800	0.011	NS	0.399	0.181	0.790	0.005	0.005	5	4.69
		Mean*		**5**	**2.0**	**7.1**	**809**	**16.7**	**8.32**	**85.5**	**2.06**	**0.1924**	**0.009**	**0.17**	**0.389**	**0.096**	**0.586**	**0.012**	**0.010**	**32**	**4.46**

🟦 Analyte was not detectable: value represents half of the reported detection limit

NS=Analyte was not sampled

NC=Data not collected

NF=No flow at time of sampling

* Arithmetic mean calculated for each parameter with the exception of *E. coli*, where the geometric mean was calculated.

Table 5. Storm Water Quality Data for Hopedale Pond, May 2008 to January 2009

Sample Location	**Station ID**	**Date**	**Time**	**Color**	**Turbidity** (NTU)	**pH** (SU)	**Conductivity** (µS)	**Temperature** (°C)	**Dissolved Oxygen** (mg/L)	**Dissolved Oxygen** (% Saturation)	**Total Suspended Solids** (mg/L)	**Nitrate-N** (mg/L)	**Nitrite-N** (mg/L)	**Total Kjeldahl Nitrogen** (mg/L)	**Ammonia-N** (mg/L)	**Total Nitrogen** (mg/L)	**Total Phosphorus** (mg/L)	**Dissolved Phosphorus** (mg/L)	**E-coli** (col/100ml)	**Total Discharge** (cfs)
Outfall South of Town Beach	Site 4	8/6/2008	8:37	12	17.2	7.5	822	11.8	8.80	95.8	6.00	2.720	0.048	0.985	0.424	3.753	0.970	0.130	2400	1.42
	Site 4	11/13/2008	3:10	35	12.8	6.7	560	10.3	11.25	101.4	15.00	2.350	0.026	1.730	0.345	4.106	0.660	0.370	60	0.15
Outfall North of Town Beach	Site SS11	8/6/2008	9:09	8	4.9	6.6	50.4*	12.6	9.50	98.5	15.00	0.569	0.011	0.896	0.219	1.476	1.100	0.140	1980	0.08
	Site SS11	11/13/2008	3:40	5	10.8	6.4	250	10.2	10.84	95.9	2.00	2.110	0.011	1.05	0.065	3.171	0.240	0.082	20	0.02
Outfall - East Side of Lake Street Loop	Site SS2	8/6/2008	9:51	4	21.1	6.9	12.5*	17.6	8.00	87.6	2.00	0.453	0.011	0.709	0.197	1.173	1.200	0.200	1750	0.01
	Site SS2	11/13/2008	NC	NC	NC	NC	NC	NC	NC	NC	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Outfall - West Side of Lake Street Loop	Site SS3	8/6/2008	12:49	4	19.1	6.6	16.7*	18.4	8.00	89.4	15.00	0.314	0.011	0.786	0.325	1.111	2.300	0.190	3000	0.01
	Site SS3	11/13/2008	NC	NC	NC	NC	NC	NC	NC	NC	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Culvert at The Driftway	Site SS8	8/6/2008	10:25	8	1.7	6.0	500	12.0	7.00	73.5	2.00	1.040	0.011	0.256	0.065	1.307	0.160	0.051	820	0.01
	Site SS8	11/13/2008	NC	NC	NC	NC	NC	NC	NC	NC	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Mill River at Route 140	Site 5	8/6/2008	10:59	2	0.6	6.3	729	19.0	6.50	74.7	2.00	0.125	0.011	0.461	0.065	0.597	0.150	0.032	170	1.26
	Site 5	11/13/2008	4:56	30	NC	6.4	586	7.0	10.48	86.7	2.00	0.136	0.011	0.469	0.065	0.616	0.005	0.005	10	33.30
Unnamed Tributary at Route 140	Site 6	8/6/2008	11:29	7	3.6	5.8	160	13.7	5.60	62.2	2.00	0.143	0.011	0.825	0.065	0.979	0.160	0.034	140	0.01
	Site 6	11/13/2008	4:30	5	NC	6.7	217	6.4	9.90	80.6	2.00	0.161	0.011	0.416	0.065	0.588	0.005	0.005	70	2.22
Mill River at North Pond Outlet	Site 7	8/6/2008	12:01	1	0.0	6.5	120	24.6	7.57	92.6	13.00	0.156	0.011	0.378	0.065	0.545	0.160	0.017	60	1.45
	Site 7	11/13/2008	NC	NC	NC	NC	NC	NC	NC	NC	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

🟦 Analyte was not detectable: value represents half of the reported detection limit

NS=Analyte was not sampled

NC=Data not collected

NF=No flow at time of sampling

*Due to insufficent sample volume, measured value may be low

Table 6. Seepage Survey Results for Hopedale Pond, July 30 and September 18, 2008

Station	Depth	Date	Seepage Time (hr)	Seepage (L/m2/D)	Seepage Meter Sample Area (m2)	Station Averaged Seepage (L/m2/D)
1a	**Shallow**	7/30/2008	4:57:00	-0.57	0.26	-0.59
1b	**Deep**	7/30/2008	4:42:00	-0.60	0.26	
2a	**Shallow**	7/30/2008	5:19:00	-0.14	0.26	-0.45
2b	**Deep**	7/30/2008	5:18:00	-0.76	0.26	
3a	**Shallow**	7/30/2008	5:16:00	1.39	0.26	1.46
3b	**Deep**	7/30/2008	5:06:00	1.52	0.17	
4a	**Shallow**	7/30/2008	4:58:00	-1.22	0.26	-2.10
4b	**Deep**	7/30/2008	4:55:00	-2.98	0.17	
Average Shallow			**5:07:30**	**-0.13**		
Average Deep			**5:00:15**	**-0.71**		
Combined Average			**5:03:53**	**-0.42**		

Station	Depth	Date	Seepage Time (hr)	Seepage (L/m2/D)	Seepage Meter Sample Area (m2)	Station Averaged Seepage (L/m2/D)
1a	**Shallow**	9/18/2008	2:55:00	-0.63	0.26	0.98
1b	**Deep**	9/18/2008	2:40:00	2.59	0.17	
2a	**Shallow**	9/18/2008	2:15:00	4.19	0.26	3.49
2b	**Deep**	9/18/2008	2:10:00	2.79	0.26	
3a	**Shallow**	9/18/2008	4:38:00	2.49	0.26	0.87
3b	**Deep**	9/18/2008	4:55:00	-0.75	0.26	
4a	**Shallow**	9/18/2008	5:50:00	-0.47	0.17	-0.65
4b	**Deep**	9/18/2008	5:30:00	-0.82	0.26	
Average Shallow			**3:54:30**	**1.40**		
Average Deep			**3:48:45**	**0.96**		
Combined Average			**3:51:38**	**1.18**		

Table 7. Porewater Quality for Hopedale Pond, July 30 and September 18, 2008

Sample Location	Date	Time	pH (SU)	Conductivity (µS)	Temperature (°C)	Nitrate-N (mg/L)	Ammonia-N (mg/L)	Dissolved Phosphorus (mg/L)	*E. coli* (MPN/100 mL)	Iron (mg/L)
HPS1	7/30/2008	11:00	NS	NS	NS	NS	NS	NS	NS	NS
	9/18/2008	10:50	6.2	1256	19.7	<0.03	12.7	0.45	<10	15.8
HPS2	7/30/2008	11:40	5.9	1156	20.7	2.54	<0.130	<0.010	<10	8.92
	9/18/2008	12:00	5.7	1931	19.5	2.10	<0.100	0.050	<10	<0.06
HPS3	7/30/2008	12:20	6.6	646	21.6	<0.03	1.01	<0.010	20	12.5
	9/18/2008	9:40	6.2	230	20.1	<0.03	2.1	0.260	<10	<0.06
HPS4	7/30/2008	13:20	NS	NS	NS	NS	NS	NS	NS	NS
	9/18/2008	7:50	6.2	383	19.5	NS	NS	NS	NS	NS

NS = No sample collected (due to outseepage at location)

Table 8. Area and Volume Calculations from Bathymetric Contours for Hopedale Pond, July 2008

Depth Contour (feet below water level)	**Incremental Area** (sq. ft.)	**Total Area** (sq. ft.)	**Avg. Area** (sq. ft.)	**Incremental Volume** (cu. ft.)	**Cumulative Volume** (cu. ft.)
11.5	0	0	0	0	0
10	7,520	7,520	3,760	5,640	5,640
9	27,356	34,875	21,198	21,198	26,837
8	153,775	188,651	111,763	111,763	138,600
7	317,259	505,910	347,280	347,280	485,881
6	11,793	517,703	511,807	511,807	997,687
5	442,088	959,791	738,747	738,747	1,736,434
4	399,278	1,359,069	1,159,430	1,159,430	2,895,864
2	598,838	1,957,907	1,658,488	3,316,975	6,212,840
0	1,389,490	3,347,397	2,652,652	5,305,303	11,518,143

Total water volume in ponded area = 11,518,143 cu. ft.
Mean water depth in ponded area = 3.44 ft.

Table 9. Area and Volume Calculations from Isopach Map for Hopedale Pond, July 2008

Sediment Depth	Area (sq. ft.)	Total Area (sq. ft.)	Avg. Area (sq. ft.)	Incremental Volume (cu. ft.)	Cumulative Volume (cu. ft.)
13	0	0	0	0	0
12	241,075	241,075	120,537	120,537	120,537
10	82,222	323,297	282,186	564,371	684,908
8	143,263	466,560	394,928	789,857	1,474,765
5	141,901	608,461	537,510	1,612,531	3,087,296
4	234,021	842,482	725,471	725,471	3,812,767
3	250,691	1,093,172	967,827	967,827	4,780,594
2	394,744	1,487,917	1,290,545	1,290,545	6,071,139
1.5	16,659	1,504,575	1,496,246	748,123	6,819,262
1	656,060	2,160,636	1,832,606	916,303	7,735,565
0.5	521,841	2,682,477	2,421,556	1,210,778	8,946,343
0	664,920	3,347,397	2,425,986	1,212,993	10,159,336

Total sediment volume in ponded area = 10,159,336 cu. ft.
Mean sediment depth in ponded area = 3.03 ft.

Table 10. Sediment Bulk Chemical and Physical Testing Results* for Hopedale Pond Samples, January 19, 2009

Analyte	CAS #	Composite Sample ID		MCP[1]	Lined Landfill[2]
		SC-1	SC-2		
Metals - mg/kg-dry					
Arsenic	7440-38-2	**27.4**	ND	20	40
Chromium (total)	7440-47-3	9.7	ND	30	1000
Copper (analyzed wet)	7440-50-8	40.9	18.8	1000	NR
Lead	7439-92-1	66.2	6.99	300	2000
Mercury	7439-97-6	0.128	ND	20	10
Nickel	7440-02-0	6.26	ND	20	NR
Zinc	7440-66-6	11	ND	2500	NR
EPH Ranges - mg/kg-dry					
Adjusted C11-C22 Aromatics		104	85.8	1000	NR
C19-C36 Aliphatics		136	122	3000	NR
EPH Target Analytes - mg/kg-dry					
Acenaphthylene	208-96-8	0.147	ND	1	NR
Anthracene	120-12-7	ND	0.123	1000	NR
Benzo(a)anthracene	56-55-3	2.75	0.604	7	NR
Benzo(a)pyrene	50-32-8	**2.83**	0.65	2	NR
Benzo(b)fluoranthene	205-99-2	2.14	0.736	NR	NR
Benzo(g,h,i)perylene	191-24-2	0.483	0.37	1000	NR
Benzo(k)fluoranthene	207-08-9	2.79	0.443	70	NR
Chrysene	218-01-9	3.55	0.918	70	NR
Fluoranthene	206-44-0	7.9	1.7	1000	NR
Indeno(1,2,3-cd)pyrene	193-39-5	0.478	0.111	7	NR
Phenanthrene	85-01-8	3.19	0.724	10	NR
Pyrene	129-00-0	6.41	1.69	1000	NR
Total PAH Target Concentration		32.7	8.06	NR	100
TOC - mg/kg-dry					
Total Organic Carbon	7440-44-0	60300	100000	NR	NR
VOC - µg/kg					
Methyl ethyl ketone	78-93-3	ND	836	4000	NR
PAH - µg/kg					
Acenaphthylene	208-96-8	733	ND	1000	NR
Anthracene	120-12-7	1400	ND	1000000	NR
Benz(a)anthracene	56-55-3	2170	ND	7000	NR
Benzo(a)pyrene	50-32-8	3050	ND	2000	NR
Benzo(b)fluoranthene	205-99-2	4220	ND	NR	NR
Benzo(g,h,i)perylene	191-24-2	2410	ND	1000000	NR
Benzo(k)fluoranthene	207-08-9	2330	ND	70000	NR
Chrysene	218-01-9	4110	ND	70000	NR
Fluoranthene	206-44-0	9410	ND	1000000	NR
Indeno(1,2,3-cd)pyrene	193-39-5	2300	ND	7000	NR
Phenanthrene	85-01-8	4410	ND	10000	NR
Pyrene	129-00-0	6060	17	1000000	NR
Total PAH Target Concentration		42603	17	NR	100000
Bulk Physical Results					
Moisture Content		9	15		
Liquid Limit		115	268		
Plastic Limit		69	139		
Plasticity Index		46	129		
Liquidity Index		-1	-1		

*Samples in exceedence of MCP Method 1 are shown in bold. Results are only depicted for concentrations of constituents ocurring above the detection limit in at least one composite sample.

1: MADEP, 2006. Massachusetts Contingency Plan

2: MADEP, 1997. Reuse and Disposal of Contaminated Soil at Massachusetts Landfills Department of Environmental Protection Policy # COMM-97-001

ND: Not Detected

NR: Not Reported

Table 11. Sediment Nutrient Concentrations in Hopedale Pond, January 19, 2009.

Sample ID	Location	Total Nitrogen (mg/kg)	Total Phosphorus (mg/kg)
N-1	Southern Basin	4600	229
N-2	Middle Section (Jetty area)	3500	66
N-3	Northern Basin	6300	54

Table 12. Estimated Annual Hydrologic Loading for Hopedale Pond

Source	Load		
	(cfs)	(m^3/yr)	(%)
Direct Precipitation w/ Evapotranspiration	0.28	251,676	1.3
Ground Water Inseepage	0.01	6,247	0.03
Surface Water	21.09	18,822,167	98.6
*Dry Weather**	*6.62*	*5,908,143*	*31.0*
*Wet Weather**	*14.47*	*12,914,023*	*67.60*
Total Annual	**21.38**	**19,080,090**	**100.0**

*Subset of surface water total

Table 13. Estimated Annual Phosphorus Loads for Hopedale Pond as Derived from In-field Measurements and Hydrologic Modeling.

Source	Phosphorus Loads	
	(kg/yr)	(%)
Direct Precipitation	5.3	1.4%
Ground Water Inseepage	1.3	0.3%
Surface Water		
Dry Weather	84.8	22.1%
Wet Weather	292.8	76.2%
*Site 4 (Dutcher Outfall)**	*87.5*	*22.8%*
*Site 5**	*193.1*	*50.3%*
*Site 6**	*12.2*	*3.2%*
Internal Release (from pond sediments)	0.0	0.0%
Total Annual	**384.1**	**100.0%**

*Subset of wet weather total

Table 14. Aquatic Plant Species Observed in Hopedale Pond during Survey Conducted July 23 and 25, 2008.

Common Name	Scientific Name	Symbol
Common Bladderwort	*Utricularia vulgaris*	UT
Purple Bladderwort	*Utricularia purpurea*	UTP
Stonewart	*Nitella sp.*	NI
Muskgrass	*Chara sp.*	CH
Yellow water Lily	*Nuphar variegatum*	NV
White Water Lily	*Nymphaea odorata*	NO
Variable-leaf Milfoil	*Myriophyllum heterophyllum*	MH
Narrow-leaf Sag	*Sagittaria subulata*	SS
Fern Pondwood	*Potamogeton robbinsii*	PR
Floating-leafed Pondweed	*Potamogeton natans*	PN
Oakes Pondweed	*Potamogeton oakesianus*	PO
Water Shield	*Brasenia schreberi*	BS
Filamentous Green Algae	Chlorophyta	FG

Table 16. Zooplankton Density and Community Composition in Hopedale Pond, July 2008 to January 2009

Date	17-Jul-08	29-Aug-08	18-Sep-08	9-Oct-08	25-Nov-08	19-Jan-09
Species	Density (Individuals/m^3)	Density (Individuals/m^3)	Density (Individuals/m^3)	Density (Individuals/m^3)	Density (Individuals/m^3)	Density (Individuals/m^3)
Alonella sp.	0	0	175	50	100	0
Bosmina longirostris	15000	18000	8400	2600	150	12.5
Daphnia galeata	3200	875	0	0	0	0
Daphnia parvula	2125	500	50	0	0	0
Daphnia sp.	0	1375	0	25	0	0
Diaphanosoma brachyurum	100	0	100	0	0	0
Eubosmina tubicen	5000	8500	3600	0	0	0
Sida crystallina	0	0	100	0	0	0
Total cladocerans	**25425**	**29250**	**12425**	**2675**	**250**	**12.5**
Calanoid copepodite	250	175	8750	275	0	25
Cyclopoid copepodite	0	0	3650	0	0	0
Epischura nordenskiøldi	100	0	2175	0	0	0
Epischurid copepodites	0	0	0	0	0	0
Leptodiaptomus nudus	0	0	0	25	0	0
Copepod nauplii	100	250	25	0	0	0
Total copepods	**450**	**425**	**14600**	**300**	**0**	**25**
Conochilus hippocrepis	0	0	0	1125	0	0
Other Rotifera	0	0	0	200	0	0
Total rotifers	**0**	**0**	**0**	**1325**	**0**	**0**
Total Density (#/m3)	**25875**	**29675**	**27025**	**4300**	**250**	**37.5**
Total Count	**1035**	**1187**	**1081**	**172**	**10**	**3**
Total Biovolume (mL/m3)	**0.8**	**1.0**	**1.7**	**0.1**	**0.1**	**0.1**

*Significant ice cover at time of sampling.

Appendix A

Quality Assurance Project Plan

Quality Assurance Project Plan

FOR DIAGNOSTIC/FEASIBILITY STUDY OF HOPEDALE POND HOPEDALE, MASSACHUSETTS

PREPARED FOR	Office of the Town Coordinator Town of Hopedale 78 Hopedale Street Hopedale, Massachusetts 01747
PREPARED BY	ESS Group, Inc. 888 Worcester Street, Suite 240 Wellesley, Massachusetts 02482

Project No. H153-000

May 23, 2008

QUALITY ASSURANCE PROJECT PLAN (QAPP)

For the

Hopedale Pond Diagnostic/Feasibility Study
H153-000
ESS Group, Inc.

May 23, 2008

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1.0 PROJECT ORGANIZATION

Work for the Hopedale Pond Diagnostic Feasibility Study will be conducted by ESS Group Inc. (ESS) for the Town of Hopedale, Massachusetts ("the Town") under the supervision of Eugene Phillips, the Hopedale Town Coordinator. Carl Nielsen will be the ESS Project Manager and also serve as the project internal Quality Assurance (QA) Officer. The Project Manager will be responsible for coordinating all field and laboratory efforts as well as serving as a direct contact for all parties involved with the project. Responsibilities of the QA Officer will be primarily associated with ensuring that personnel serving the project are properly trained in all appropriate procedures relating to sample collection and data generation. The QA Officer will regularly verify that the items described in this Quality Assurance Project Plan (QAPP) are being followed. Additionally, the QA Officer will verify conformance with project reporting deadlines and data quality objectives, and ensure that project deliverables satisfy contract provisions.

This QAPP will direct field and laboratory activities for the Hopedale Pond Diagnostic Feasibility Study. ESS will conduct all field sample collection activities and provide aquatic macrophyte, phytoplankton and zooplankton analyses including taxonomic identification and enumeration, as appropriate. GeoLabs, Inc. (GeoLabs), a Massachusetts certified laboratory, will provide analytical services for all sediment and water quality parameters (except those analyzed in the field by ESS personnel).

2.0 PROJECT DESCRIPTION

Hopedale Pond is a shallow waterbody formed by damming the Mill River. Based on the history of the Parklands, 1949 was the first mention of a weed problem in Hopedale Pond. The Draper Corporation dredged the pond in 1949 and in 1953 the weeds were chemically treated through aerial spraying. By 1959, weeds were a problem once again and management of the pond has included chemical treatment ever since. Aquatic Control Technologies has most recently been chemically treating Hopedale Pond. Hopedale Pond is currently on the Massachusetts list of impaired waters for having exotic species (Massachusetts Year 2006 Integrated List of Waters, August 2007). The northern portion of the pond is infested with fanwort (*Cabomba caroliniana*), which makes passage to the Rustic Bridge almost impossible by mid-summer.

Nuisance and exotic weed growth currently threaten Hopedale Pond. The nuisance vegetation partly results from the shallowness of the pond, which allows light penetration to the pond bottom so that aquatic vegetation grows well. The northern section of the pond is extremely shallow and stumps are prevalent where forest used to stand. The perimeter of Hopedale Pond is not heavily developed; however, the southern shorelines have managed lawns and limited vegetative buffers. This can result in additional nutrient input to the pond from fertilization practices and by attracting resident goose populations. Nuisance and exotic vegetation is also a problem upstream at Lake Maspenock (North Pond). Exotic and nuisance plants can travel downstream and foul Hopedale Pond. The resident Canada goose population likely has a significant impact to water quality and fouls the shoreline and grassy areas of the Parklands so that they are unusable. Hopedale Pond is not an isolated waterbody—there are many environmental and human-induced sources causing excessive vegetation growth in the pond.

ESS will gather substantial data covering every key physical, chemical, and biological aspect of Hopedale Pond and its watershed. The data will be used to document the pond's present condition and establish a baseline dataset for monitoring and evaluation. The data will form the basis of the Diagnostic/Feasibility study that focuses on methods to reduce nuisance aquatic macrophyte growth and meet state Class B Surface Water Quality Standards.

Work will be conducted under the guidance of this QAPP, which is compatible with the Environmental Protection Agency (EPA) and Massachusetts Department of Environmental Protection (MassDEP) guidelines and developed specifically for this Hopedale Pond project. All laboratory water quality analysis will be performed by a Massachusetts certified laboratory.

This project is designed to establish a set of baseline data, covering key physical, chemical and biological aspects of Hopedale Pond and its watershed. This data will be used to develop a pond and watershed management plan to ensure the future protection of Hopedale Pond. To this end, ESS will conduct the following:

1. **Water Quality Sampling** – In-pond sampling as well as sampling of all major sources of water to the pond including groundwater, tributaries and pond outlet, and storm water runoff. Sampling will be conducted during the period from May to December 2008, with an emphasis on identifying potential sources of pollution within the pond's watershed.

2. **Sediment Analysis** – Determine the quantity and quality of the pond sediments that can affect ecological health as well as nutrient cycling within the system.

3. **Pond Morphometry and Bathymetry –** Determine the pond's maximum depth and water depth contours, measure soft sediment distribution, and then evaluate the feasibility of dredging as one option for restoring the pond.

4. **Aquatic Macrophyte Mapping** – Inventory and map the aquatic plant community associated with the pond and its shoreline during peak growing season to provide a well-documented baseline or reference condition of plant cover and water column density.

5. **Phytoplankton and Zooplankton Analysis** – Establish baseline conditions for these critical biological components that directly influence water clarity and quality.

6. **Final Report -** ESS will prepare a Diagnostic/Feasibility report presenting data gathered, existing pond conditions, and management options for reducing pollutant and nutrient loading, controlling aquatic vegetation, and improving water quality. The report will focus on goals described by the Town and the local community, and identify techniques that apply to the pond itself as well as the entire watershed.

3.0 TECHNICAL DESIGN FOR FIELD SAMPLING

3.1 Water Quality

(a) **In-Pond Water Quality:** ESS will sample the pond at one location in the southern end and at one location in the northern end to determine water quality characteristics. The two in-pond stations will be sampled monthly between May and December, inclusive. This proposed sampling program results in a total of 7 collection dates with 14 water quality samples. This is more than adequate to characterize water quality and will provide an excellent data set for calculating the nutrient budget and assessing the health of the pond.

The following parameters will be measured in the field: dissolved oxygen, water temperature, pH, turbidity, true color, and Secchi transparency. ESS personnel will follow the Standard Operating Guidelines (SOGs) outlined in Appendix A to analyze these parameters in the field. Water samples will be field collected and analyzed in the lab for nutrients (total phosphorus and dissolved (ortho) phosphorus, nitrate and nitrite nitrogen, ammonia, and total Kjeldahl nitrogen (TKN)), and total suspended sediments (TSS). Chlorophyll *a* and *E. coli* bacteria will be collected from all pond surface samples while total iron will be collected from pond bottom samples. Sampling will include quality control field blanks, duplicates, and lab spike samples. As a quality assurance/quality control (QA/QC) measure of field sampling activities, duplicate samples will be incorporated into the sampling program at random to represent at least 5% of the total number of samples.

(b) **Tributary and Outlet Water Quality:** Water quality sampling will also occur following the above-described schedule (monthly sampling May through December) at the pond's outlet at Freedom Street and at three upstream tributary locations. The three upstream tributary locations will be selected based on watershed land use (Figure 1) and ease of access; these are likely to occur along the Mill River near Route 140 and at major tributaries and/or pond outlets in the watershed upstream of the pond (Figure 2). This sampling effort yields an additional 28 samples (four locations multiplied by 7 dates). In addition to the surface water parameters listed above for the pond sampling, flow rate will be calculated at the outlet and tributary sampling locations. However, Secchi disk transparency, chlorophyll *a* and total iron will not be measured at the outlet and tributary sampling locations. This information will be used to locate potential non-point sources of pollution within the watershed. For the sampling of surface water from the tributaries and outlet of Hopedale Pond, ESS personnel will follow a streamlined approach comparable to that outlined in the SOGs for the acquisition of surface water samples (Appendix A). As a QA/QC measure of field sampling activities, duplicate samples will be incorporated into the sampling program at random to represent at least 5% of the total number of samples.

(c) **Storm Water Quality:** In addition to the monthly sampling, ESS will collect samples during three storm events at the three upstream tributary locations (Mill River) and at the Dutcher Street storm water outfall (a total of 12 samples). The Dutcher Street storm water outfall will also be sampled during dry weather (if flowing) to establish baseline conditions.

ESS will investigate the pond shore to determine location of any other storm drain outlets, piped discharges, or other point sources that may be contributing significant pollutant load and record their locations using a Global Positioning System (GPS) unit with sub-meter accuracy. These sources will be investigated during dry weather for the purpose of locating potential sources, and then sampled during dry weather (if flowing) and twice during storm flow conditions to quantify flow rates and the quality of these discharges.

ESS will measure the following parameters at storm water quality locations: flow rate, dissolved oxygen, pH, temperature, turbidity, true color, conductivity and salinity. Water samples will be field collected and analyzed in the lab for nutrients (ortho and total phosphorus, nitrate+nitrite, ammonia and TKN), TSS, and *E. coli*. Wet weather sampling will be conducted such that the more heavily polluted "first-flush" samples are collected. Storm flow and base flow data from these collections will be incorporated into hydrologic and nutrient budget models. As a QA/QC measure of field sampling activities, duplicate samples will be incorporated into the sampling program at random to represent at least 5% of the total number of samples.

(d) **Groundwater Station Monitoring:** In order to determine the hydrologic connections between the pond and the surrounding groundwater and assess whether the existing sewer along the eastern shoreline is faulty, ESS will conduct two seepage meter surveys of Hopedale Pond. Surveys will be conducted in July and September. A total of four pairs of seepage meters will be temporarily installed in pre-defined segments along the pond's shoreline. The exact placement of the seepage meters will be determined based on surrounding topography, housing density and bottom substrate characteristics. A seepage meter is a device that allows investigators to collect and quantify groundwater seeping into the pond from sources along a pond's shoreline. ESS will measure the change in water volume associated with a bag attached to each seepage meter over a given amount of time. The change in volume measured within this bag multiplied by the area of pond bottom sampled will be used to calculate the average in-seepage or out-seepage within the defined shoreline segment.

Once the seepage meters have been installed along the shore, ESS staff will extract groundwater for water quality testing by pumping it up from below the lake bottom. A littoral interstitial porewater sampler will be used to extract shallow groundwater samples from each segment. This water's quality is representative of water entering the pond near the paired seepage meters within each shoreline segment. This data will give an accurate assessment of the nutrient load entering the lake from each shoreline segment via groundwater. The extracted samples from each segment will be composited and tested in the laboratory for the following parameters: nitrate nitrogen, ammonia nitrogen, *E. coli* bacteria, dissolved iron, and dissolved phosphorus. Temperature, specific conductance, turbidity, and pH will be measured in the field. These parameters are of significant concern in groundwater and can have a major effect on overall water quality. The groundwater quality information will be incorporated into calculations of the hydrologic and nutrient budgets for the pond and will be discussed with respect to the overall management of Hopedale Pond.

Samples will be delivered on-ice to the appropriate water quality laboratory along with a completed chain of custody. GeoLabs will conduct analysis for nitrate and nitrite nitrogen, ammonia nitrogen, total Kjeldahl nitrogen, total phosphorus, dissolved phosphorus, total suspended solids, total iron, dissolved iron, *E. coli*, and chlorophyll *a*. GeoLabs is a Massachusetts certified lab and will follow an internal quality assurance plan for all analyses (Appendix B). ESS personnel will follow the SOGs (Appendix A) for the measurement of: specific conductance, dissolved oxygen, pH, Secchi disc depth, temperature, turbidity with a nephelometric turbidity meter and the measurement of groundwater seepage quality and quantity, to analyze the remaining parameters in the field.

All dry weather sampling will be conducted following a period of at least 72 hours with less than 0.10 inches of precipitation. Wet weather storm water quality sampling efforts will target a rainfall event forecasted to produce at least 0.25 inches, and following at least 72 hours of weather with less than 0.10 inches of precipitation. Weather data, forecasts and precipitation totals will be tracked for the Hopedale Pond watershed through an Internet weather service (www.intellicast.com or equivalent service) and the National Oceanic and Atmospheric Administration database (National Climatic Data Center).

3.2 Morphometry And Bathymetry

Hopedale Pond will be surveyed via sonar, marked rod, or weighted line at points along appropriately spaced transects to determine the lake's maximum depth and define the water depth contours (bathymetry). This information will be incorporated into the assessment of Hopedale Pond's hydrologic and nutrient budgets. Information generated will also be used to produce figures depicting the water depth contours in 2 to 5 foot increments. Additionally, ESS will verify and/or update any previously made calculations on the pond's surface area, mean depth, water volume, maximum length, maximum width, shoreline length and relative development of shoreline. Calculations will be based on Normal Pool Elevation. ESS personnel will follow the SOGs for the creation of a Geographic Information System (GIS) format map bathymetry map (Appendix A), to conduct an assessment of the morphometry and bathymetry of Hopedale Pond.

During the bathymetry survey, ESS staff will also measure soft sediment depth in the pond for the purposes of creating a detailed map of the existing unconsolidated sediment thickness (isopac). As with bathymetery, measurements will be made at points along appropriately spaced transects (data will be recorded using a GPS with sub-meter accuracy). Field notes will provide a description of the underlying sediments (i.e. silt, sand, gravel, hardpan, etc.). These data will be used to calculate the volume, average depth, and maximum depth of organic matter. A GIS format map will be prepared depicting sediment depths throughout the pond.

3.3 Sediment Sampling

ESS will collect two composite sediment samples representative of the organic bottom material. Each of the two composite samples will be comprised of three distinct sediment cores that will be homogenized for analysis. However, volatile organic compound (VOC) samples will be extracted prior to homogenization, in order to avoid volatilization of the samples. The sediment samples collected will reflect bottom characteristics in the pond and be analyzed as described below.

Cores obtained by ESS will be logged, photographed, and sampled by ESS in the field in order to obtain and track representative samples for delivery to the appropriate laboratory. ESS will deliver the sediment samples to GeoLabs, where it will be analyzed for bulk physical and chemical characteristics, as required for 401 Water Quality Certification.

- ***Bulk Physical Analysis***: Bulk physical analysis will be performed by GeoLabs on recovered sediment. The analyses will include: ASTM classification, Gradation Analysis, Moisture Content, Ash Content, Organic Content and Atterberg Limits (Liquid Limit, Plastic Limit, and Plasticity Index).

- ***Bulk Chemical Analysis***: Bulk chemical analysis will be performed by GeoLabs on recovered sediment. Two composite samples will be analyzed from the six cores collected at the pond. Samples will be obtained for VOCs before homogenizing. Then each remaining sample will be mixed thoroughly to create a composite sample representative of the three cores. These will be analyzed for metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel and zinc), polychlorinated biphenyls (PCBs) with congeners, and extractable petroleum hydrocarbons (EPHs) with target polynuclear aromatic hydrocarbons (PAHs). This list of analytes is preliminary and will be finalized through communication with MassDEP prior to sampling. The list may be modified based on the history of land use within the watershed and the potential for additional contaminants.

Detection limits for this testing will be set at a level appropriate for material removal, storage, and disposal as specified under "Regulations for Water Quality Certification for Dredging, Dredged Materials Disposal, and Filling in the Waters of the Commonwealth" and sufficient to complete an application for an Army Corps of Engineer 404 Permit.

The purpose of this assessment is to assess: (a) the availability of certain nutrients within the sediment of Hopedale Pond, which can contribute to excessive plant growth and (b) the overall ecological health of the pond. VOC samples will be preserved in methanol. Other samples will be delivered on-ice to the appropriate sediment quality laboratory along with a completed chain of custody. GeoLabs will conduct analysis for all sediment quality parameters. For the sampling of sediment from Hopedale Pond, ESS personnel will follow the SOGs for the sampling of sediment (Appendix A).

3.4 BIOLOGICAL ASSESSMENTS

(a) **Phytoplankton and Zooplankton:** Phytoplankton and zooplankton will be sampled and analyzed five times (May, June, July, August and September) at one site, in association with the in-pond water quality sampling events. Phytoplankton will be collected in the form of a grab sample just below the water surface. A fine mesh (153 micron [µm]) plankton tow net will be used to collect depth-integrated zooplankton samples. Samples will be concentrated (if needed), labeled and preserved in the field. This information will be used to describe Hopedale Pond's phytoplankton and zooplankton communities and their significance with respect to the pond's overall trophic condition and future management implications. ESS will conduct phytoplankton and zooplankton taxa identification and enumeration using a high-powered (40x) stereo dissecting microscope or a phase contrast compound microscope with magnification up to 1600x, as needed.

(b) **Macrophytes:** An inventory of the aquatic plant community will be conducted for the purpose of describing species composition and abundance throughout the growing season and particularly during the period of peak development (usually August). The survey will be conducted over two consecutive days between late June and September. All plant species encountered will be identified by an ESS botanist using the most current taxonomic keys. Taxonomic keys used to identify plants include: *A Guide to Aquatic Plants in Massachusetts* (New England Aquarium, 1999), *Aquatic and Wetland Plants of Northeastern North America* (Crow and Hellquist, 2000) and a series produced by the New Hampshire Agricultural Experiment Station (Crow and Hellquist, 1982).

Transects will be established such that plant cover and bio-volume (water column density) can be mapped throughout the pond. Additionally, unique habitat areas that are not located along these transects will be surveyed so that less abundant plant species may also be documented. If conditions warrant, it is likely that ESS will also employ the use of an underwater camera to aid in underwater plant mapping. This approach achieves results similar to the results that may be obtained by a diver. The data collected from this study will be of the quality necessary to establish baseline conditions and evaluate the potential costs of various plant management techniques for Hopedale Pond. In the completion of this macrophyte survey, ESS personnel will follow a streamlined approach comparable to that outlined in the SOGs for the creation of an aquatic plant map (Appendix A).

Maps depicting the distribution of the major plant beds (by species), plant cover (by percentage), and plant bio-volume (by percentage) will be created in GIS format as data layers. Using GIS, the acreage of Hopedale Pond covered by aquatic plants will be determined. The maps created by ESS will be compared with any previous mapping done on Hopedale Pond.

4.0 PROJECT SCHEDULE

The following table outlines the proposed project schedule for data collection and completion of the project. Since some of the water quality sampling will depend upon the size, duration, and timing of the storm events, this schedule may be altered during the study.

The following is a summary of the proposed schedule:

- Work associated with the water quality sampling effort will begin by May 2008.
- A Draft Project Report will be submitted to the Town detailing the methodology of the study and findings of all the analyses and assessments outlined in Section 2.0. Following receipt of comments, a Final Report will be prepared and submitted to the Town.

5.0 ANALYTICAL PROCEDURES

Water quality samples (in-pond, tributary/outlet, storm water and groundwater), sediment quality samples and phyto/zooplankton samples will be collected in the field by ESS personnel using the appropriate containers and preserved on ice. All field sampling will follow a streamlined approach comparable to that outlined in the SOGs for the acquisition of surface water samples, pond bathymetry, the sampling of sediment and the measurement of groundwater seepage quality and quantity (Appendix A). In addition, ESS personnel will deliver samples for bacteriological testing to GeoLabs in sufficient time to meet the critical holding times for these samples.

Water quality parameters to be tested by ESS personnel in the field will include: flow rate, pH, specific conductance, turbidity, dissolved oxygen, temperature. Water quality will be assessed in the field using instrumentation in accordance with the SOGs provided in Appendix A. All field meters will be calibrated in accordance with their respective operator's manual prior to fieldwork and as needed while in the field. In order to avoid cross contamination, field equipment will be rinsed prior to each measurement using de-ionized water or surface water from the next station. A flow probe will be the preferred flow rate-measuring device for this study; however, time of travel flow measurements may be conducted if equipment malfunctions in the field or if flow is too slow or the stream is too shallow to be accurately characterized by the flow probe. Both of these methods are described in detail in Appendix A.

Water quality parameters to be tested (by GeoLabs) will include: nitrate and nitrite nitrogen, ammonium nitrogen, total Kjeldahl nitrogen, total phosphorus, dissolved phosphorus, total suspended solids, total iron, dissolved iron, *E. coli*, and chlorophyll *a*.

Sediment quality parameters to be tested (by GeoLabs) will include: arsenic, cadmium, chromium, copper, lead, mercury, nickel, zinc, PCBs, PAHs, EPH, VOCs, percent water, ASTM classification, gradation analysis, ash content, organic content and Atterberg Limits (liquid limit, plastic limit, and plasticity index).

The laboratory testing programs for sediment quality and water quality are summarized in Table 1 below.

Table 1: Water and Sediment Quality Sampling/Laboratory Parameters (for all samples)

PARAMETER	Sample Matrix	Number of Samples*	Minimum Volume Needed	Sample Container	Sample Preservation	Maximum Hold Time (Hours)	EPA #
E. coli	Water	62	100ml	Plastic	Ice	6	9213D
TSS	Water	54	300ml	Plastic	Ice	7 days	160.2
Total Phosphorus	Water	54	500ml	Plastic	Ice	48	365.2
Dissolved phosphorus	Water	62	500ml	Plastic	Ice	48	365.2
TKN	Water	54	100ml	Plastic	Ice	48	351.3
Nitrate nitrogen	Water	62	50ml	Plastic	Ice	48	353.3
Nitrite nitrogen	Water	62	50ml	Plastic	Ice	48	354.1
Ammonium nitrogen	Water	62	100ml	Plastic	Ice	28 days	350.1
Dissolved iron	Water	8	100ml	Plastic	Ice	6	200.7
Total iron	Water	14	100ml	Plastic	Ice (then nitric acid)	180 days	200.7
Chlorophyll *a*	Water	14	3L	Plastic	Ice	Immediate	SM 10200-H
Phytoplankton	Water	5	500ml	Plastic	0.5% Glutaraldehyde.	Indefinite	None
Zooplankton	Water	5	N/A	Plastic	75% Ethanol	Indefinite	None
Arsenic	Sediment	2	100g	Amber Glass	Ice	6 months	200.7
Cadmium	Sediment	2	100g	Amber Glass	Ice	6 months	200.7
Chromium	Sediment	2	100g	Amber Glass	Ice	6 months	200.7
Copper	Sediment	2	100g	Amber Glass	Ice	6 months	200.7
Lead	Sediment	2	100g	Amber Glass	Ice	6 months	200.7
Mercury	Sediment	2	100g	Amber Glass	Ice	6 months	245.1
Nickel	Sediment	2	100g	Amber Glass	Ice	6 months	200.7
Zinc	Sediment	2	100g	Amber Glass	Ice	6 months	200.7
PCBs	Sediment	2	100g	Amber Glass	Ice	7 days	8082
PAHs	Sediment	2	100g	Amber Glass	Ice	7 days	8270
EPH	Sediment	2	100g	Amber Glass	Ice	28 days	418.1
VOCs	Sediment	2	100g	VOA Vial	Methanol	14 days	8260

Gradation Analysis	Sediment	2	1,000g	Plastic Bag	None required	Indefinite	ASTM D 422-63
% water	Sediment	2	100g	Amber Glass	Ice	14 days	160.3
% organic content	Sediment	2	100g	Amber Glass	Ice	7 days	160.4
% ash content	Sediment	2	100g	Amber Glass	Ice	7 days	160.4
Atterberg limits	Sediment	2	100g	Amber Glass	None required	Indefinite	ASTM D4318-05

*Does not include field duplicates. Duplicates will be collected at a 5% rate for water quality samples only.

The laboratories, as part of their internal QA/QC program, routinely analyze duplicate samples for each analytical batch, and water quality field duplicates will be collected at a 5% rate for this project. Given the large number of samples being collected on any given date, internal checks on the validity of field data will be possible as well and ESS will evaluate data as it is received from the lab. If any data is questionable, ESS will contact the lab immediately to determine whether the problem is due to a transcription error or, if necessary, have the lab re-run the sample test.

Table 2 summarizes the parameters to be measured in the field with respective EPA methods. Conductivity, DO, temperature, pH and flow rate will be measured directly in the water column, where possible. Turbidity and color will be collected in glass or plastic containers and measured immediately in the field. All field parameters will be duplicate tested at a 5% rate for quality control (QC) purposes.

Table 2: Water Quality Sampling / Field Parameters.

PARAMETER	**Flow Rate**	Specific Conductance	**Dissolved Oxygen**	**Turbidity**	**pH**	**Color**	**Temperature**
Sample Matrix	Water	Water	Water	Water	Water	Water	Water
Number of Samples*	40	20	54	62	62	54	62
Sample Container	Instrument	Instrument	Instrument	Instrument	Instrument	Instrument	Instrument
Hold Time	In Field	In Field	In Field	In Field	In Field	In Field	In Field
EPA Number	-	120.1	360.1	180.1	150.1	-	170.1
Expected Range of Field Measurements	0.3 – 25 cfs	0 to 1,000 µS	0 to 20 mg/L 0 to 200 % Sat.	0 to 1100 NTU	4 - 10 SU	0 – 100 units	-2 to 30 °C
Precision	0.1 cfs (Expected)	1% full scale	0.01 mg/L 0.1 % Sat.	0.01 NTU (Expected)	0.1 SU	0.5 units	0.1 °C
Accuracy	± 0.1 cfs (Expected)	± 1 % full scale	± 0.3 mg/L ± 2 % Sat.	± 2 %	± 0.1 SU	± 0.5 units	± 0.2 °C

*Does not include field duplicates.

Phytoplankton and zooplankton samples will be logged on a project log-in sheet and examined for signs of damage upon receipt. Large samples may be randomly subsampled using a Folsom or comparable sample splitter. ESS will conduct all phytoplankton and zooplankton taxa identification and enumeration using a high-powered (40x) stereo dissecting microscope or phase contrast compound microscope with magnification up to 1600x, as needed. Identification will typically be to family level, using freshwater plankton keys such as *How to Know the Freshwater Algae* (Prescott, 1978), *Freshwater Algae of North*

America: Ecology and Classification (Wehr and Sheath, 2002) and *Pennak's Freshwater Invertebrates of the United States: Porifera to Crustacea* (Smith, 2001), as applicable. A taxonomic reference collection for the project will be maintained by ESS. Phytoplankton biovolume will be calculated using shape formulas developed by Hildebrand et al. (1999).

6.0 QUALITY CONTROL REQUIREMENTS

6.1 Water Quality Sampling

By ensuring that the field sampling plan is followed, proper sampling techniques are used, proper analytical procedures are followed, and that sample holding times are not exceeded, ESS will be certain to collect and report water quality data that are representative.

The in-pond water sampling program has been designed to provide data representative of *E. coli,* TSS, TKN, nitrate and nitrite nitrogen, ammonia nitrogen, total and dissolved phosphorus, total iron and chlorophyll *a*. In addition, water quality parameters including temperature, Secchi disk depth, turbidity, pH, true color and dissolved oxygen will be measured in the field.

The storm water sampling program has been designed to provide data representative of *E. coli,* TSS, TKN, nitrate and nitrite nitrogen, ammonia nitrogen, total and dissolved phosphorus, in dry and wet weather stream and storm drain flow. It is expected that bacteria, TSS, TKN, total phosphorus and field parameters measured will fluctuate in response to changes in stream discharge. Consequently, ESS will attempt to collect a minimum of three wet weather samples from each stream sampling location and two wet weather samples from each outfall sampling location to provide data on the mean value and the range of values that are occurring at each site. If dry weather flow is observed at selected outfalls, a dry weather sample will also be collected at these locations.

The groundwater sampling program has been designed to measure nitrate nitrogen, ammonia nitrogen, *E. coli*, dissolved iron, and dissolved phosphorus. Additionally, temperature, conductivity, pH, and turbidity will be measured in the field.

6.2 Sediment Sampling

By ensuring that the field sampling plan is followed, proper sampling techniques are used, proper analytical procedures are followed, and that sample holding times are not exceeded, ESS will be certain to collect and report water quality data that are representative of actual sediment conditions. All sediment cores will be logged and photographed at the time of collection.

6.3 Macrophyte Mapping

Plants that cannot be easily identified within the field due to either condition or development stage will be sampled and transported back to the lab in plastic bags for identification and/or verification using appropriate taxonomic keys, dissecting microscopes, and consultation with other ESS plant experts. This will ensure that identifications made are as accurate as possible.

6.4 Plankton Sampling and Analysis

Phytoplankton and zooplankton samples will be subject to random QC checks by a second ESS taxonomic expert, in order to ensure correct and complete taxonomic identification and check for transcription errors.

6.5 Laboratory Analyses

The accuracy, precision, and sensitivity of laboratory analytical data are critical to achieving the QC acceptance criteria of the analytical protocols. With respect to parameters tested in the laboratory, QC requirements for precision, accuracy, and measurement range will be implemented according to GeoLabs' Quality Assurance Plan.

7.0 DATA VALIDATION AND MANAGEMENT

7.1 Field Data

A permanently bound notebook with waterproof pages will be maintained for field sampling. All entries into the notebook will be made with indelible ink or pencil. Corrections will be made using a single line through the mistake with the initials of the individual who made them. Entries will include sampling location, time, date, weather conditions, personnel, parameters to be measured and associated data, as well as any problems encountered during sampling. Copies of data sheets will be checked regularly by the Project QA Officer and will be made available for review upon request.

7.2 Laboratory Data

Analytical results will be recorded in a permanently bound laboratory notebook, specific for each instrument and method. The automated analytical equipment will have computer generated analytical runs and any problems associated with the analytical runs will be flagged and noted. If any corrective action is taken, it will be noted in narrative in the instrument notebook.

The laboratory will provide ESS with the following deliverables:

- Sample data results for all field samples
- Internal and field duplicate sample results, as applicable
- A case narrative of any deviations from QA/QC criteria and observations about the samples that potentially affect sample or data quality (i.e., missed holding times, broken or leaking bottles, and reference standards or check standards outside criteria, etc.).

The following deliverables will not be required, but will be maintained by the laboratory as applicable and could be made available upon request:

- All raw data
- Duplicate laboratory recoveries and acceptance limits

- Matrix spike/matrix spike duplicate results and acceptance limits
- Method/reagent blank results
- Calibration standards/reference standards/LFB reports
- Copies of instrument logbooks
- Copies of internal chains of custody

All reports will be generated in digital and hard copy form.

8.0 REPORTING

A draft report will be prepared and submitted to the Town for review and comment. In the draft report, ESS will provide a brief narrative of methodologies used and analytical results obtained. Tables and figures will also be provided to summarize the findings of the water quality sampling program. Results will be presented in a comprehensive final report, which will incorporate the comments of the Town. ESS will assess the water quality data, using Massachusetts Department of Environmental Protection standards where applicable, to identify those locations that would require either additional monitoring or implementation of specific Best Management Practices BMPs. The Final Report will be accompanied by a Pond and Watershed Management Plan with recommendations of corrective actions and their respective estimated costs for restoring or protecting water resources found to be associated with major sources of water quality impairment. ESS will prepare and deliver a final presentation of the data and significant findings of this study at the direction of the Town. One electronic copy of the presentation will also be provided in CD-ROM format for future use.

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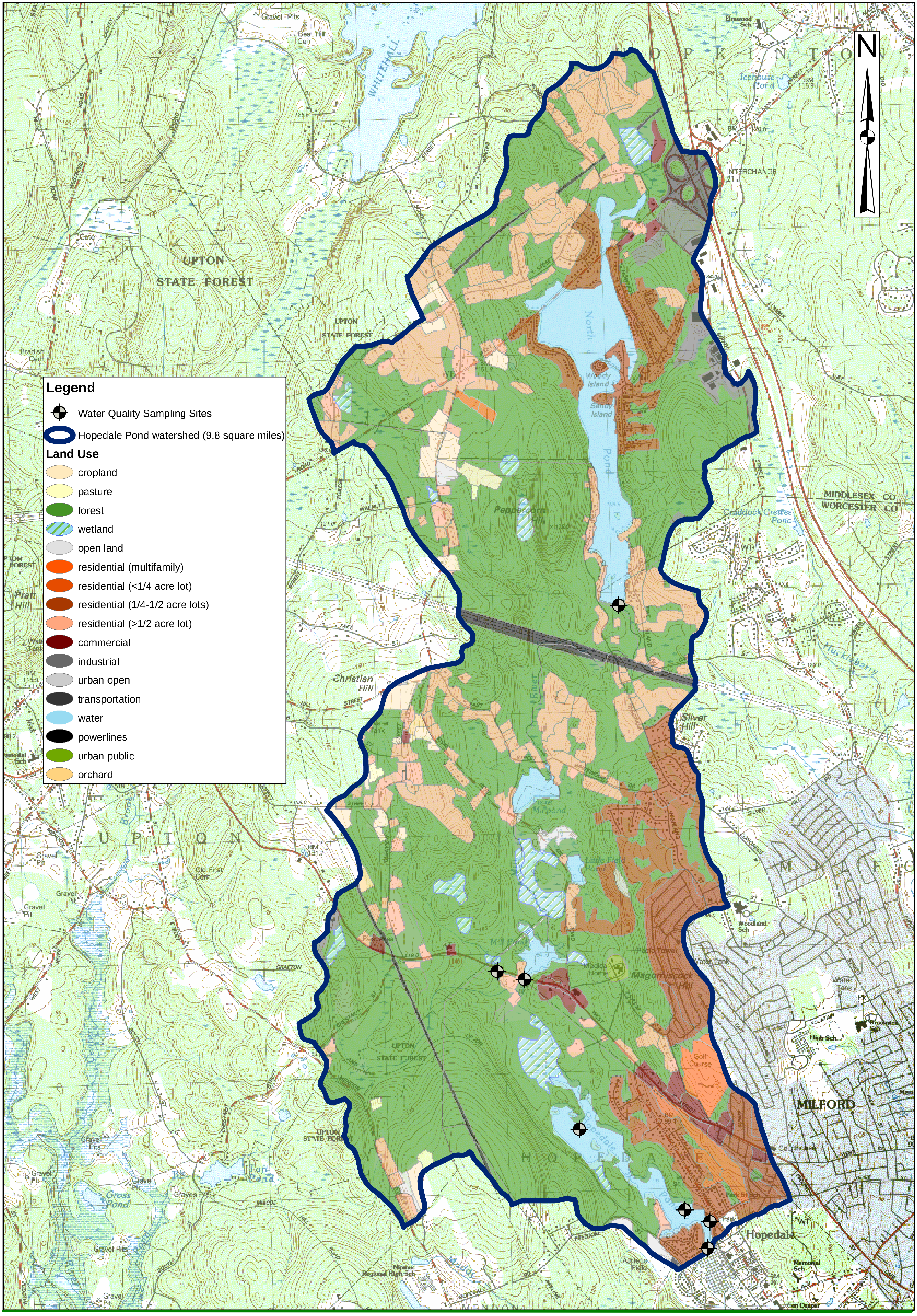
Figures

Location: G:/GIS-Projects/Hopedale_Proposal_Watershed_11x17.mxd



ESS Group, Inc.
Engineers
Scientists
Consultants

HOPEDALE POND
Hopedale, Massachusetts

Scale: 1" = 2,500'

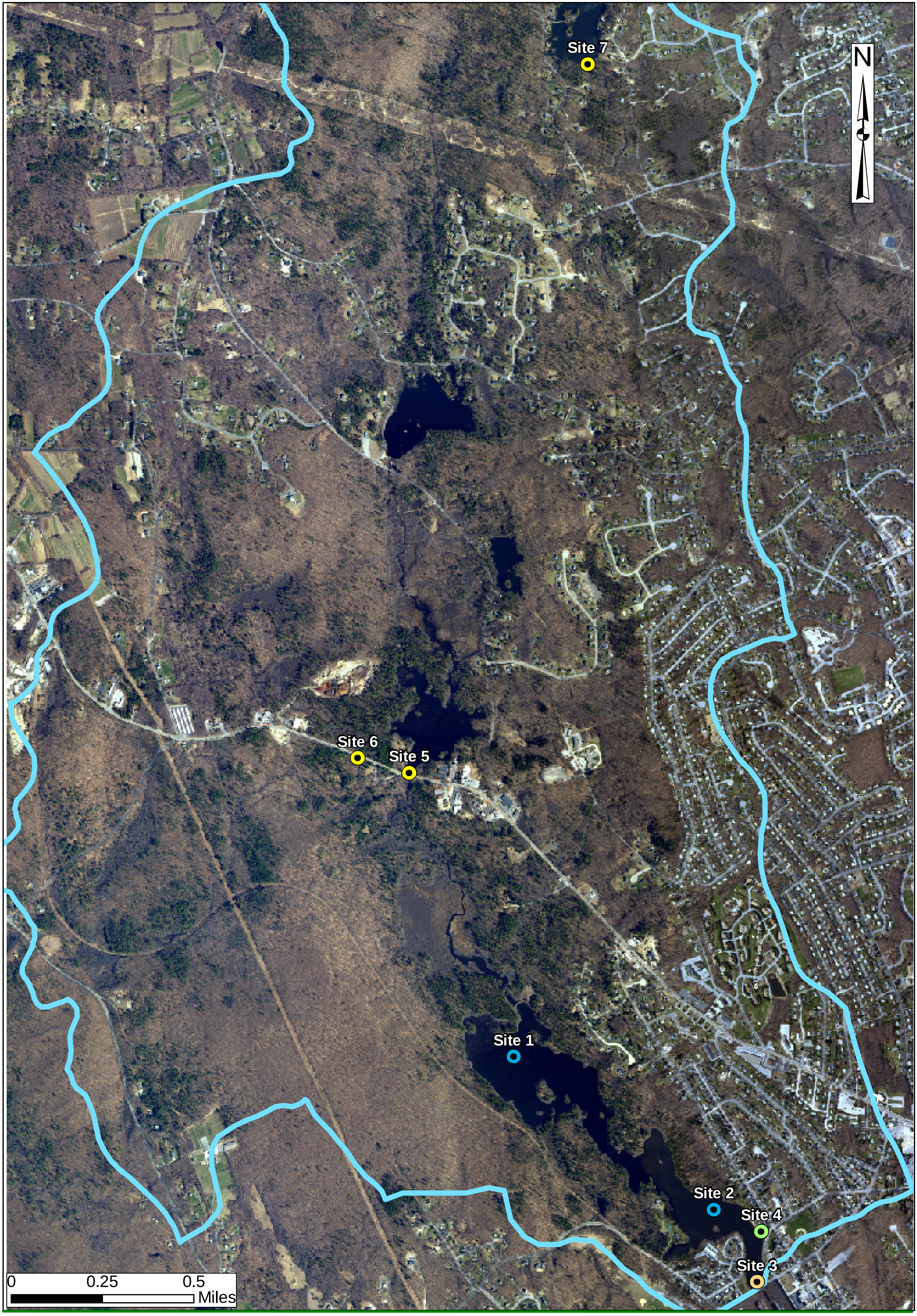
Source: 1) MassGIS, USGS DRG, 1982-1985
2) MassGIS, Sub-basins, 2005; 3) ESS, 2008

0 0.5 1
Miles

Hopedale Pond Watershed

Figure
1

Location: G:/GIS-Projects/Hopedale_Proposal_SamplingPoints11x17.mxd



ESS Group, Inc.
Engineers
Scientists
Consultants

HOPEDALE POND
Hopedale, Massachusetts

Source: 1) MassGIS Orthos 2005;
2) MassGIS, Sub-basins, 2005; 3) ESS, 2008

Legend

Sampling Sites

- ◉ In Lake
- ◉ Outfall
- ◉ Outlet
- ◉ Trib

⬭ Hopedale Pond watershed (9.8 square miles)

Hopedale Pond Water Quality Sampling Locations

Figure 2

Appendix A

Standard Operating Guidelines for Field Measurements

ENVIRONMENTAL SCIENCE SERVICES, INC.
STANDARD OPERATING GUIDELINES FOR THE CREATION OF A BATHYMETRY MAP

1.0 INTRODUCTION

1.1 Purpose and Applicability

This Standard Operating Guideline (SOG) provides basic instructions for the mapping of depth contours within standing waterbodies. The methods outlined below are intended (1) to standardize depth measurement techniques used by Environmental Science Services field personnel; (2) to standardize the recording of depth measurements to ensure the creation of an accurate bathymetry map.

2.0 RESPONSIBILITIES

2.1 Project Manager

The project manager is responsible for ensuring that project-specific requirements are communicated to the project team and for providing the materials, resources, and guidance necessary to perform the measurements in accordance with this SOG and the project plan.

2.2 Field Personnel

The field personnel are responsible for taking accurate depth measurements at documented locations throughout the waterbody. The field personnel are also responsible for recording the number of depth measurements that will best characterize the bathymetric contours of the waterbody, i.e. steep contour areas with coves will be more thoroughly characterized than shallow contour areas with no coves.

3.0 REQUIRED MATERIALS

The following materials are necessary for the creation of a bathymetry map:

- Boat
- Depth Probe
- Measuring Pole 10ft in length. Marked off in 1ft increments
- Enlarged outline of the waterbody on write-in-the-rain paper
- Global Positioning System (GPS) unit (optional)

- Field note book
- Historical bathymetric maps for the waterbody (optional)

4.0 METHOD

4.1 Depth Measurement Procedure

- A number of transects will be drawn on the map of the waterbody to act as a guide in the collection of depth measurements. The number and location of transects selected will depend on the size and shape of the waterbody, with the aim of thoroughly characterizing the bathymetric contours within it. Historical bathymetric maps can be used (if available) to guide in the selection of transect locations so that areas requiring more thorough characterization can be identified.
- The boat will be driven along each transect, at appropriately spaced points along the transect the boat will be stopped and a measure of the depth of the water at that point will be recorded.
- The number of depth measurement points will depend on the rate of change in depth as the boat is moved along each transect, i.e. the steeper the slope of the waterbody bottom, the more depth measurements will be taken in order to illustrate incremental changes in depth (i.e. 1ft, 2ft or 5ft increments).
- Each depth measurement point along the transect will be numbered and marked onto the map in order to later link depth data with location information. Locations may be estimated based on landmarks and shoreline morphometry or more precisely mapped using a Global Positioning Systems (GPS). The depth at each point will also be noted with its associated transect and point number in the field note book.
- At each measurement point when the depth is 10ft or less, a measuring pole will be used to measure the exact depth of the water in feet. At depths greater than 10ft a sonar depth probe will be used. This approach minimizes the possibility of plant growth interfering with sonar measurements.

4.2 Creation of Bathymetry Maps

- In the office, depth measurements recorded from throughout the waterbody will be linked with the transects and measurement point locations drawn onto the outline map.

- The known depths at known locations throughout the water body will then be used as a guide (or base) for the drawing of contour lines onto the outline map, thus illustrating incremental changes in water depth either in 1ft, 2ft or 5ft increments depending on the overall depth of the water body.

5.0 QUALITY CONTROL

At each depth measurement point, no matter which depth equipment is being used, a couple of measurements will be taken in very close proximity to each other to make sure the readings are the same, in case of rocks, plants, or other obstacles on the bottom are affecting the measurement at one specific point. In instances where the the measurements are slightly different, the average depth will be recorded.

6.0 DOCUMENTATION

Depth measurements will be recorded in field note books associated with location information in the form of transect numbers and depth measurements points, by ESS personnel. The locations of transect lines and depth measurement points will be recorded on a write-in-the-rain map outline of the waterbody. Any unanticipated site specific information, which requires ESS field personnel to deviate from the above SOG will be reported in an ESS field notebook. Documentation for recorded data must include a minimum of the following:

- Date of survey
- Weather conditions
- Signature or initials of person performing the survey
- Depth measurement point locations
- Comments/Observations

7.0 TRAINING/QUALIFICATIONS

To properly complete an assessment of depth contours within a waterbody, the analyst must be familiar with the measurement and data collection protocols as stated within this SOG and must have confidence in the use of depth measurement equipment.

ESS GROUP, INC.
STANDARD OPERATING GUIDELINES
FOR MEASUREMENT OF SPECIFIC CONDUCTANCE

1.0 INTRODUCTION

1.1 Purpose and Applicability

These Standard Operating Guidelines (SOG) provide basic instructions for routine calibration and operation of a variety of specific conductance meters. Although this meter measures additional parameters (e.g., temperature, TDS), this SOG addresses specific conductance measurement only (other capabilities are outlined in the appropriate SOG and manufacturer's individual instrument manuals). This SOG is designed specifically for the measurement of specific conductance in accordance with EPA Method 120.1 and Standard Method 2510 B which address specific conductance measurements of drinking, surface, and saline waters, domestic and industrial wastes, and acid rain.

1.2 Quality Assurance Planning Considerations

The end use of the data will determine the quality assurance requirements that are necessary to produce data of acceptable quality. These quality assurance requirements will be defined in the site-specific workplan or Quality Assurance Project Plan (QAPP) (hereafter referred to as the project plan) or laboratory Quality Assurance Manual (OAM) and may include duplicate or replicate measurements or confirmatory analyses.

2.0 RESPONSIBILITIES

2.1

The analyst is responsible for verifying that the specific conductance meter is in proper operating condition prior to use and for implementing the calibration and measurement procedures in accordance with this SOG and the project plan.

2.2

The project manager is responsible for ensuring that project-specific requirements are communicated to the project team and for providing the materials, resources, and guidance necessary to perform the measurements in accordance with this SOG and the project plan.

3.0 REQUIRED MATERIALS

The following materials are necessary for this procedure:

- Specific conductance meter
- Specific conductance meter manufacturer's instruction manual
- Deionized water

- KCl standard at concentration that approximates sample concentrations
- Lint-free tissues
- National Institute of Standards and Technology (NIST)-traceable thermometer
- Calibration sheets or logbook
- Laboratory or field data sheets or logbooks

4.0 METHOD

4.1 Sample Handling, Preservation, and General Measurement Procedures

4.1.1

Specific conductance measurements should be taken soon after sample collection since temperature changes, precipitation reactions, and absorption of carbon from the air can affect the specific conductance. If specific conductance measurements cannot be taken immediately (within 24 hours), samples should be filtered through a 0.45 μm filter, stored at 4°C and analyzed within 28 days.

4.1.2

Report results as specific conductance, μmhos/cm at 25°C.

4.1.3

As temperature can affect the specific conductance measurements obtained, record both the specific conductance and the temperature of the sample. The Cole-Parmer Portable Conductivity Meter has the ability to compensate for temperature.

4.1.4

Secondary standards may be purchased as a solution from commercial vendors. These standards should not be used after their expiration dates as provided by the manufacturer. An expiration date of one year should be used if the manufacturer does not supply an expiration date or if the standards are prepared from various salts (e.g., KCl).

4.2 Calibration and Measurement Procedures

4.2.1

The specific conductance meter must be calibrated daily (or the calibration checked) before any analyses are performed.

4.2.2

Set up the instrument according to the manufacturer's instructions.

4.2.3

Rinse the probe with deionized water and dry with a lint-free tissue.

4.2.4

Dip the probe into the calibration standard. Immerse the probe tip beyond the upper steel band. Stir the probe gently to create a homogenous sample.

4.2.5

Record the stabilized specific conductance reading of the standard and the temperature. Enter the calibration mode (according to manufacturer's instructions) and change the value on the primary display to match the value of the calibration standard. The meter can be adjusted to ± 20% from the default setting. If the measurement differs by more than ± 20%, the probe should be cleaned or replaced as needed. If the meter does not have automatic temperature compensation (ATC), correct all measurements to 25°C by adding 2% of the reading per degree if the temperature is below 25°C or by subtracting 2% of the reading per degree if the temperature is above 25°C.

4.2.6

An additional check may be performed, if required by the project plan, by placing the probe into an additional KCl standard. This standard should be from a different source than the standard used for the initial calibration. This standard should read within 5% of the true value.

4.2.7

Verify the calibration every 15 samples and at the end of the day. Recalibrate or replace the instrument if the check value is not within 15% of the true value.

4.2.8

The probe will be rinsed with deionized water and wiped gently with a lint-free tissue between sample analyses.

4.2.9

The meter must be recalibrated following any maintenance activities and prior to the next use.

4.2.10

Conductivity data may be post calibrated using any of a variety of calibration data including, but not limited to field calibration points, manufacturer calibration data, and analytical results from samples collected during field deployment of the sensors. The decision criteria for post calibration, and the technique used will be specified in the project plan, and will be consistent with the manufacturer's recommendations.

4.3 Troubleshooting Information

If there are any performance problems with any of the specific conductance meters which result in inability to achieve the acceptance criteria presented in Section 5.0, consult the appropriate section of the meter instruction manual for the checkout and self-test procedures. If the problem persists, consult the manufacturer's customer service department immediately for further instructions.

4.4 Maintenance

4.4.1

Instrument maintenance should be performed according to the procedures and frequencies required by the manufacturer.

4.4.2

The probe must be stored and maintained according to the manufacturer's instructions.

4.4.3

If an instrument with ATC is being used, the meter should be checked annually for accuracy with an NIST thermometer.

5.0 QUALITY CONTROL

5.1

The meter must be calibrated daily before sampling and recalibrated every 12 hours, and will not be used for sample determinations of specific conductance unless the initial check standard value is within 5% of the true value.

5.2

Duplicate measurements of a single sample will be performed at the frequency specified in the project plan. In the absence of project-specific criteria, duplicate measurements should agree within 10%.

5.3

The temperature readout of the meter will be checked against an NIST traceable thermometer at least quarterly. If the difference is greater than 0.2°C, the instrument manufacturer will be consulted for instructions. Temperature measurements will be compensated for any difference with the reference thermometer.

5.4

Some agencies may require the analysis of USEPA Water Pollution (WP) performance evaluation samples. These performance evaluation samples will be analyzed as required.

6.0 DOCUMENTATION

6.1

All specific conductance meter calibration, temperature check, and maintenance information will be recorded on the daily calibration sheet (an example is presented as Figure 1). Specific conductivity data may be recorded on the appropriate laboratory or field data sheets or logbooks.

6.2

Calibration documentation must be maintained in a thorough and consistent manner. At a minimum, the following information must be recorded:

- Date and time of calibration
- Signature or initials of person performing the measurement
- Instrument identification number/model
- Expiration dates and batch numbers for all standards
- Reading for standard before and after meter adjustment
- Readings for all continuing calibration checks
- Temperature of standards (corrected for any difference with reference thermometer)
- Comments

6.3

Documentation for recorded data must include a minimum of the following:

- Date and time of analysis
- Signature or initials of person performing the measurement
- Instrument identification number/model
- Sample identification/station location
- Temperature (corrected for any difference with reference thermometer) and conductance of sample (including units and duplicate measurements) Note: show all calculations for converting instrument reading to μmhos/cm if the instrument provides readings in any other units. Useful conversions are: 1 mS/m = 10 μmho/cm or 1 μmho/cm = 0.1 mS/m.

- Comments

7.0 TRAINING/QUALIFICATIONS

To properly perform specific conductance measurements, the analyst must be familiar with the calibration and measurement techniques stated in this SOG. The analyst must also be experienced in the operation of the meter.

Certain state certification programs require that specific conductance measurements be taken in the field by, or in the presence of, personnel that are qualified under the certification program.

8.0 REFERENCES

Standard Methods for the Examination of Water and Wastewater, 17th Edition, 1989.

Methods for the Chemical Analysis of Water and Wastes, EPA 600/4-79-020, Revised 1983.

ESS GROUP, INC.
STANDARD OPERATING GUIDELINES FOR MEASUREMENT OF DISSOLVED OXYGEN

1.0 INTRODUCTION

1.1 Purpose and Applicability

These Standard Operating Guidelines (SOG) provide basic instructions for routine measurement of dissolved oxygen using a polarographic sensor equipped dissolved oxygen meter with a digital read-out such as the YSI Model 55 Handheld Dissolved Oxygen System. Measurements are made in accordance with EPA Standard Methods that addresses dissolved oxygen measurement of drinking, surface, and saline waters, and domestic and industrial wastes.

1.2 Quality Assurance Planning Considerations

The end use of the data will determine the quality assurance requirements that are necessary to produce data of acceptable quality. These quality assurance requirements will be defined in the site-specific workplan or Quality Assurance Project Plan (QAPP) (hereafter referred to as the project plan) or laboratory Quality Assurance Manual (QAM) and may include duplicate or replicate measurements or confirmatory measurements.

2.0 RESPONSIBILITIES

2.1

The analyst is responsible for verifying that the dissolved oxygen measuring device is in proper operating condition prior to use and for implementing the calibration and measurement procedures in accordance with this SOG and the project plan.

2.2

The project manager is responsible for ensuring that project-specific requirements are communicated to the project team and for providing the materials, resources, and guidance necessary to perform the measurements in accordance with this SOG and the project plan.

3.0 REQUIRED MATERIALS

The following materials are necessary for this procedure:

- Dissolved oxygen meter with digital read-out device
- Manufacturer's instruction manual for the instrument
- YSI Model 5775 Standard Membrane Kit with KCl solution and O-rings
- NIST-traceable thermometer

Laboratory or field data sheets or logbooks

4.0 METHOD

4.1 Sample Handling, Preservation, and General Measurement Procedures

To achieve accurate dissolved oxygen measurements, samples should be analyzed *in situ*. Measurements in flowing waters should be made in relatively turbulent free areas. Measurements in standing waters will require probe agitation to create water movement around the probe.

4.2 Calibration and Measurement Procedures

To accurately calibrate the YSI Model 55, you will need to know the approximate altitude of the region in which you are located and the approximate salinity of the water you will be analyzing. Fresh water has a salinity of approximately zero. Seawater has an approximate salinity of 35 parts per thousand (ppt). If uncertain, measure salinity with an appropriate device.

4.2.1

Ensure that the sponge inside the instrument's calibration chamber is wet then insert the probe into the chamber. Turn the instrument on and wait for readings to stabilize (approximately 15 minutes).

4.2.2

To calibrate, enter the calibration menu by pressing and releasing both the up and down arrow keys at the same time. Enter the altitude (in hundreds of feet) at the prompt by using the arrow keys to increase or decrease the altitude (example: 12 = 1,200 feet). Press enter when correct altitude is shown.

4.2.3

The meter should display CAL in the lower left of the display with the calibration value in the lower right of the display and the current D.O. reading (before calibration) should be on the main display. Once the D.O. reading is stable, press ENTER. Enter the salinity at the prompt by using the arrow keys. Press ENTER when finished and the instrument will return to normal operation.

4.2.4

Calibration should be performed at a temperature within ± 10°C of the sample temperature. Verify the calibration every 15 samples and at the end of the day.

4.2.5

If erratic readings occur, replace membrane as per the manufacturer's manual. The average replacement interval is two to four weeks.

4.2.6

Replace the membrane as per the manufacturer's manual if bubbles appear (>1/8 inch diameter), or if the membrane becomes damaged, wrinkled, or fouled.

4.2.7

Avoid contact with any environment which contains substances that may attack the probe materials (e.g. acids, caustics, and strong solvents).

4.2.8

The meter must be re-calibrated following any maintenance activities and prior to the next use.

4.3 Troubleshooting Information

If there are any performance problems with the dissolved oxygen-measuring device, consult the appropriate section of the instruction manual for the checkout and self-test procedures. If the problem persists, consult the manufacturer's customer service department immediately for further instructions.

4.4 Maintenance

Instrument maintenance for meter-type dissolved oxygen measuring devices should be performed according to the procedures and frequencies required by the manufacturer.

5.0 QUALITY CONTROL

5.1

Duplicate measurements of a single sample will be performed at the frequency specified in the project plan. In the absence of project-specific criteria, duplicate measurements should agree within ± 0.2 mg/L.

5.2

The temperature readout of the meter will be checked regularly (at least weekly) against a NIST-traceable thermometer. If the difference is greater than 0.5°C, the instrument manufacturer will be consulted for instructions. Temperature measurements will be compensated for any difference with the reference thermometer.

6.0 DOCUMENTATION

All dissolved oxygen meter calibration, checks, and maintenance information will be recorded on the daily calibration sheet or logbook. Dissolved oxygen data may be recorded on the appropriate laboratory or field data sheets or logbooks.

6.1

Calibration documentation must be maintained in a thorough and consistent manner. At a minimum, the following information must be recorded:

- Date and time of calibration
- Signature or initials of person performing the measurement

- Instrument identification number/model
- Expiration dates and batch numbers for all standard solutions
- Readings for all continuing calibration checks
- Comments

6.2

Documentation for recorded data must include a minimum of the following:

- Date and time of analysis
- Signature or initials of person performing the measurement
- Instrument identification number/model
- Sample identification/station location
- Dissolved oxygen, both in mg/L and percent saturation (corrected for any difference with reference thermometer) and temperature of sample (including units and duplicate measurements)
- Comments

7.0 TRAINING/QUALIFICATIONS

To properly perform dissolved oxygen measurements, the analyst must be familiar with the calibration and measurement techniques stated in this SOG. The analyst must also be experienced in the operation of the meter.

Certain state certification programs require that dissolved oxygen measurements in the field be taken by, or in the presence of, personnel that are qualified under the certification program.

8.0 REFERENCES

Standard Methods for the Examination of Water and Wastewater, 17th Edition, 1989.

Methods for the Chemical Analysis of Water and Wastes, EPA 600/4-79-020, Revised 1983

ENVIRONMENTAL SCIENCE SERVICES, INC.
STANDARD OPERATING GUIDELINES
FOR MEASUREMENT OF FLOW RATE

1.0 INTRODUCTION

1.1 Purpose and Applicability

These Standard Operating Guidelines (SOG) provide basic instructions for routine measurement of flow rate in bodies of running water. The two techniques under consideration are the Time of Travel Method and the Global Flow Probe Procedure.

1.2 Quality Assurance Planning Considerations

The end use of the data will determine the quality assurance requirements that are necessary to produce data of acceptable quality. These quality assurance requirements will be defined in the site-specific workplan or Quality Assurance Project Plan (QAPP) (hereafter referred to as the project plan) or laboratory Quality Assurance Manual (QAM) and may include duplicate or replicate measurements or confirmatory measurements.

2.0 RESPONSIBILITIES

2.1 The analyst is responsible for verifying that the instrumentation is in proper operating condition prior to use and for implementing the calibration and measurement procedures in accordance with this SOG and the project plan.

2.2 The project manager is responsible for ensuring that project-specific requirements are communicated to the project team and for providing the materials, resources, and guidance necessary to perform the measurements in accordance with this SOG and the project plan.

3.0 REQUIRED MATERIALS

3.1 The following materials are necessary for the Global Flow Probe Procedure:

- Global Flow Probe FP101, Global Water, Gold River, CA
- LCD computer display

- Radio Shack 675 HP or equivalent batteries
- Manufacturer's instruction manual for the instrument
- Laboratory or field data sheets or logbooks

3.2 The following materials are necessary for the Time of Travel Method:

- A neutral buoyancy floating object, such as a cracked ping-pong ball
- Twine of other heavy-duty string material
- Water proof yard-stick to measure stream depth
- Stop-watch
- Permanent marker (e.g., sharpie)
- Laboratory or field data sheets or logbooks

4.0 METHOD

4.1 General Measurement Procedures For Global Flow Probe Procedure

To achieve accurate flow measurements samples must be analyzed in the field. Flow measurements may be taken in small and large streams, rivers and within pipes.

4.1.1 The average velocity of stream flow multiplied by the cross-sectional area is equal to the flow rate (Q=VxA). The cross sectional area is determined manually by measuring the depth of the water at several points across the channel. The cross section in square feet times the average velocity in feet per second gives the cubic feet per second (c.f.s.).

4.1.2 When sampling within round pipes, one needs only to measure the water depth and then refer to the tables in the Global Flow Probe Instruction Manual to determine the cross-sectional area.

4.2 Calibration and Measurement Procedures for Global Flow Probe Procedure

The Flow Probe is set up and calibrated at the factory. The calibration sequence is entered automatically when the batteries are changed or by holding down both Right and Left buttons simultaneously for 8 seconds. Calibration should be checked annually.

4.2.1 To change between English and Metric units and to enter the calibration sequence, hold down both Left and Right buttons simultaneously for 8 seconds. The Left button scrolls between English “mi” and Metric “km”.

4.2.2 To check the calibration push the Right button to “CAL”. For “mi” calibration set Probe calibration to 33.31. For “km” calibration set Probe calibration to 1603. The Left button increases the number when the arrow points up and decreases the number when the arrow points down.

4.2.3 The Flow Probe computer has a simple 2 – button operation. The Right button changes between Function and the Left button picks the Option. Pushing both buttons simultaneously for 1 second zeros the displayed value.

4.2.4 By pushing the Right button you may scroll through the following functions. Velocity Function: “V” is instantaneous velocity to the nearest 0.1 feet per second. Push the Left button to scroll between “AV” (average velocity) and “MX” (maximum velocity) which reads out to the nearest 0.01 feet per second. Stop Watch / Clock Function: Push the Left button to start and stop watch.

4.2.5 Make sure the prop turns freely and point the prop directly into the flow with the arrow on the bottom of the probe pointing down-stream.

4.2.6 Press the Right button until the “V” for velocity appears and select the desired velocity parameters to be measured by pushing the Left button. Average velocity readings “AV” must be collected for flow rate measurements (c.f.s.).

4.2.7 Put the probe at your measuring point and press both Right and Left buttons simultaneously and release to re-zero and begin recording. Hold in the flow for several seconds until you have steady average velocity.

4.2.8 When sampling in small streams and within pipes, the probe should be moved slowly and smoothly along a vertical plane throughout the flow to ensure that the probe evenly samples the cross-sectional area of the flow.

4.2.9 When sampling larger streams and rivers divide the stream into subsections (e.g. 2-3 feet in width). At the center of each subsection, insert the probe and sample vertically from the surface to the bottom smoothly to obtain a vertical average velocity profile. The Average Velocity times the Area of the subsection is the Flow for the subsection. Add all the subsection flows to obtain the Total Stream Flow.

4.2.10 Repeat procedure three times in at least three different locations, recording data in field notebook. The flow rate should be calculated as an average of the three measurements taken at different locations within the channel or pipe.

4.2.11 Calculate discharge (Q) from the measured data, as follows:

- Measure and calculate the cross-sectional area of your flow stream in square feet and multiply this by the average velocity in feet / second to obtain discharge in cubic feet per second (c.f.s.).
- Cross-sectional area (ft^2) x AV (ft/sec) = Q (ft^3/sec)

4.3 Calibration and Measurement Procedures for the Time of Travel Method

4.3.1 To measure travel time, the length of time taken for the floating object to travel 3 feet will be measured as follows:

1. Select an appropriate stream cross section with relatively uniform and uninterrupted flow
2. Securely attach 3 feet of string to floating object (i.e., cracked ping-pong ball)
3. Release floating object in the water and activate timer
4. Record time (T) from when the floating object is released to the time when the string goes taut, indicating that the object has traversed 3 feet
5. Repeat procedure three times at three different locations, recording data in a field notebook. The flow rate should be calculated as an average of the three measurements taken at different locations within the stream channel. Flow rate = 3 feet/T (seconds) = X feet / second
6. Measure stream average width and average depth at sampling location

4.3.2 Calculate discharge (Q) from the measured data, as follows:

1. Calculate cross-sectional area (A) of the stream, by multiplying average width and average depth
2. Select a coefficient or correction factor (C): 0.8 for rocky bottom streams, 0.9 for muddy bottom streams. The coefficient allows correction for the fact that water travels faster at the surface than at the stream bottom, due to resistance from bottom materials
3. $Q = \frac{A*C*L}{T}$ Where L= 3 feet and T= time of travel (seconds)

   Units of Q are typically cubic feet per second

4.4 Troubleshooting Information for Global Flow Probe Procedure

If there are any performance problems with the Global Flow Probe, consult the appropriate section of the instruction manual for the checkout and self-test procedures. If the problem persists, consult the manufacturer's customer service department at (916) 638-3429 immediately for further instructions.

4.5 Maintenance for Global Flow Probe Procedure

Instrument maintenance for the Global Flow Probe should be performed according to the procedures and frequencies required by the manufacturer.

5.0 QUALITY CONTROL

5.1 Quality Control for Global Flow Probe Procedure

5.1.1 The Global Flow Probe calibration should be checked annually to ensure that the Flow Probe is operating up to factory specifications.

5.2 Quality Control for the Time of Travel Method

5.2.1 To ensure a quality measurement, a minimum of three times of travel measurements will be obtained and recorded at each sampling point. An average value will be used to measure of flow rate / discharge.

6.0 DOCUMENTATION

6.1 Documentation for Global Flow Probe Procedure

All Global Flow Probe calibration, checks, and maintenance information will be recorded on the daily calibration sheet or logbook. Flow data may be recorded on the appropriate laboratory or field data sheets or logbooks.

6.1.1 Calibration documentation must be maintained in a thorough and consistent manner. At a minimum, the following information must be recorded:

- Date and time of calibration
- Signature or initials of person performing the measurement
- Instrument identification number/model
- Readings for all continuing calibration checks
- Comments

6.1.2 Documentation for recorded data must include a minimum of the following:

- Date and time of analysis
- Signature or initials of person performing the measurement
- Instrument identification number/model
- Sample identification/station location
- Flow Rate in cubic feet per second (c.f.s.), average water velocity and maximum water velocity
- Comments

6.2 Documentation for the Time of Travel Method

6.2.1 All data will be recorded in a field logbook. Documentation for recorded data must include a minimum of the following:

- Date, time and location of measurement
- Time of travel and distance traveled
- Comments, if any

7.0 TRAINING/QUALIFICATIONS

7.1 To properly perform Global Flow Probe measurements, the analyst must be familiar with the calibration and measurement techniques stated in this SOG. The analyst must also be experienced in the operation of the meter.

Certain state certification programs require that flow measurements in the field be taken by, or in the presence of, personnel that are qualified under the certification program.

7.2 No special training is required to implement the Time of Travel Method; however, the analyst must be familiar with the calibration and measurement techniques stated in this SOG.

8.0 REFERENCES

Volunteer Stream Monitoring: A Methods Manual. EPA 841-B-97-003, November 1997.

Global Flow Probe Instruction Manual.

ENVIRONMENTAL SCIENCE SERVICES, INC.
STANDARD OPERATING GUIDELINES FOR MEASUREMENT OF GROUNDWATER SEEPAGE QUANTITY AND QUALITY

1.0 INTRODUCTION

1.1 Purpose and Applicability

These Standard Operating Guidelines (SOG) provide basic instructions for the routine measurement of groundwater seepage quality and quantity as outlined in Mitchell et al. (1988 and 1989). These standard methods describe the proper installation of seepage meters and the operation of Littoral Interstitial Porewater (LIP) samplers.

1.2 Quality Assurance Planning Considerations

The end use of the data will determine the quality assurance requirements that are necessary to produce data of acceptable quality. These quality assurance requirements will be defined in the site-specific workplan or Quality Assurance Project Plan (QAPP) (hereafter referred to as the project plan) or laboratory Quality Assurance Manual (QAM) and may include duplicate or replicate measurements or confirmatory analyses.

2.0 RESPONSIBILITIES

2.1 Project Manager

The project manager is responsible for ensuring that project-specific requirements are communicated to the project team and for providing the materials, resources, and guidance necessary to perform the measurements in accordance with this SOG and the project plan.

2.2 Field Personnel

The analyst is responsible for verifying that the seepage meters, seepage bags, hand pump and Littoral Interstitial Porewater (LIP) sampler is in proper operating condition prior to use and shall adhere to the measurement procedures as detailed in this SOG.

3.0 REQUIRED MATERIALS

The following materials are necessary for the seepage meter installation procedure:

- Seepage meters (plastic drums cut in half with a single hole in the end for attachment of seepage bag)
- Plastic tubing with one hole stopper
- Seepage bags with one hole stoppers and plastic clamps

- 250 mL graduated cylinder
- Calibration sheets or logbook
- Laboratory or field data sheets or logbooks

The following materials are necessary for the collection of groundwater samples for analysis:

- Hydrochloric acid
- Distilled water
- Hand pump
- 1 L filter flask with stoppers and tubing
- Littoral Interstitial Porewater (LIP) sampler
- Sample bottles with labels

4.0 METHOD

4.1 Sample Handling, Preservation, and General Measurement Procedures

4.1.1 Seepage Meter Installation

- Initially, representative segments of the shoreline, where seepage meters will be positioned, are selected based on topography and housing density. Such segments may also be assigned to shoreline locations based on specific project objectives.

- Seepage surveys shall be conducted according to the field methods outlined in Mitchell et al. 1988 and 1989. ESS personnel shall estimate seepage quantity by installing two seepage meters per defined shoreline segment and measuring the change in volume in the attached seepage bag. Change in volume multiplied by a conversion factor relating the allotted seepage time (i.e., fraction of the day for which the seepage meter was running) and another conversion factor relating the seepage meter area to a square meter, yields the liters of inseepage (positive value) or outseepage (negative value) per square meter per day.

- Seepage meters shall be firmly embedded in the substrate to depth of greater than 4 inches. Inserting seepage meters to this preferred depth will ensure that volumetric changes observed in the attached seepage bags are truly representative of groundwater flows and will increase the likelihood that seepage meters will not be disrupted by strong currents or wave action.

- At each designated shoreline location (segments pre-determined by project plan), one seepage meter should be placed at a relatively shallow depth and one at a deeper depth in order to capture ground water flows that may be occurring in different strata.

- Seepage meters must be allowed to equilibrate for a minimum of 5 minutes before the system is “closed” by the attachment of the seepage bags.

- The seepage bag should be filled with an appropriate pre-measured volume of water. In most instances 250 mL will be appropriate. The pre determined volume of water is necessary since this volume is compared to the volume obtained after sufficient time has elapsed to quantify the change in volume (either positive or negative).

- Seepage bags are to be secured in place with as little disturbance of the seepage meter as possible. The best approach is to slowly twist the seepage bag’s rubber stopper into the hole of the seepage meter.

- Prior to use, seepage bags must be air dried in order to ensure that all residual water is removed from bags and therefore will not confound the change in volume measurements. Additionally, each bag and associated stopper must be visually inspected and air pressure tested prior to each use to ensure that no leakage can occur.

4.1.2 Groundwater Sampling Using Littoral Interstitial Porewater Sampler

- Groundwater seepage quality can be collected through sampling with a Littoral Interstitial Porewater (LIP) sampler. A hand pump, attached to a 250 ml plastic flask, creates a vacuum causing water to flow from the Littoral Interstitial Porewater (LIP) sampler into the attached plastic flask. Porewater extracted from a minimum of three locations in each segment.

- Samples collected may be tested in the field for parameters such as, temperature, conductivity and pH, and/or transferred into labeled bottles and sent to a laboratory for the other analyses.

- To reduce the likelihood of contamination, all sampling equipment must be cleansed thoroughly with 0.1N HCL and rinsed with distilled water immediately prior to the collection of each sample.

4.2 Troubleshooting Information

In the instance that the Littoral Interstitial Porewater (LIP) sampler fails to collect a sample, visually inspect the fine mesh tip of the sampler and remove any accumulated debris that may be present by rubbing the screen with a gloved hand or rinsing with distilled water.

5.0 QUALITY CONTROL

- Field duplicate measurements of a single sample will be performed at the frequency specified in the project plan.
- The quality of the LIP samples can be verified by field personnel if the field measured parameters (conductivity, temperature and pH) observed in the sample are compared to those of the receiving waterbody. Typically, during warm weather sampling seasons, the surface waters will exhibit warmer temperatures than the groundwater collected through LIP sampling. Additionally, groundwater samples may also exhibit different conductivity or pH than the receiving surface waters, although the direction of change is not predictable.

6.0 DOCUMENTATION

Seepage data will be recorded on the standard form attached. All seepage meters and Littoral Interstitial Porewater (LIP) sampler repair in the field and maintenance information will be recorded in the field notebook. Documentation for recorded data must include a minimum of the following:

- Date and time of analysis
- Signature or initials of person performing the measurement
- Sample identification/station location
- Comments

7.0 TRAINING/QUALIFICATIONS

To properly perform seepage measurements, the analyst must be familiar with the calibration and measurement techniques stated in this SOG. The analyst must also be experienced in the operation of the seepage meters and Littoral Interstitial Porewater (LIP) sampler.

8.0 REFERENCES

Standard Methods for the Examination of Water and Wastewater, 17th Edition, 1989.

Mitchell, D.F., and K. J. Wagner. 1988. Direct measurement of groundwater flow and quality as a lake management tool. Lake and Reservoir Management. 4(1):169-178.

Mitchell, D. F., K.J. Wagner, W. J. Monagle, and G. A. Beluzo. 1989. A littoral interstitial porewater (LIP) sampler and its use in studying groundwater quality entering a lake. Lake and Reservoir Management. 5(1):121-128.

Methods for the Chemical Analysis of Water and Wastes, EPA 600/4-79-020, Revised 1983.

Lake Name:
Date:
In-Lake Water Temperature:
Weather:
Researchers:

Seepage Meter ID	**Size** *S or L*	**Depth to base** *inches*	**Time In** *hr/min*	**Time Out** *hr/min*	**Volume In** *ml*	**Volume Out** *ml*
S1a						
S1b						
S2a						
S2b						
S3a						
S3b						
S4a						
S4b						
S5a						
S5b						
S6a						
S6b						

ENVIRONMENTAL SCIENCE SERVICES, INC.
STANDARD OPERATING GUIDELINES
FOR MEASUREMENT OF pH

1.0 INTRODUCTION

1.1 Purpose and Applicability

These Standard Operating Guidelines (SOG) provide basic instructions for routine calibration and operation of a variety of pH meters, including the Hydac Multimeter Probe and the pHep pH Testers. Although these meters may measure additional parameters (e.g., temperature, specific conductivity, etc.), this SOG addresses pH measurement only (other capabilities are outlined in the appropriate SOG and manufacturer's individual instrument manuals). This SOG is designed specifically for the measurement of pH in accordance with EPA Method 150.1 and Standard Method 4500-H B which address electrometric pH measurements of drinking, surface, and saline waters, domestic and industrial wastes, and acid rain.

1.2 Quality Assurance Planning Considerations

The end use of the data will determine the quality assurance requirements that are necessary to produce data of acceptable quality. These quality assurance requirements will be defined in the site-specific workplan or Quality Assurance Project Plan (QAPP) (hereafter referred to as the project plan) or laboratory Quality Assurance Manual (QAM) and may include duplicate or replicate measurements or confirmatory analyses.

2.0 RESPONSIBILITIES

2.1 The analyst is responsible for verifying that the pH meter is in proper operating condition prior to use and for implementing the calibration and measurement procedures in accordance with this SOG and the project plan.

2.2 The project manager is responsible for ensuring that project-specific requirements are communicated to the project team and for providing the materials, resources, and guidance necessary to perform the measurements in accordance with this SOG and the project plan.

3.0 REQUIRED MATERIALS

The following materials may be necessary for this procedure:

- pH meter
- pH meter manufacturer's instruction manual
- Deionized water
- 4.0, 7.0, and 10.0 buffer solutions
- Lint-free tissues
- Mild detergent
- 10% hydrochloric acid
- National Institute of Standards and Technology (NIST)-traceable thermometer
- Calibration sheets or logbook
- Laboratory or field data sheets or logbooks

4.0 METHOD

4.1 Sample Handling, Preservation, and General Measurement Procedures

4.1.1 To achieve accurate pH measurements, samples should be analyzed in the field (preferably within 15 minutes), or as soon as possible after collection. Sample should be collected in plastic or glass containers.

4.1.2 After measuring a sample containing oily material or particulate matter, the electrode must be cleaned by carefully wiping with a lint-free cloth, or washing gently in a mild detergent, followed by a deionized water rinse. If this does not suffice, an additional rinse with 10% hydrochloric acid (followed by deionized water) may be needed.

4.1.3 As temperature can affect the pH measurements obtained, both the pH and the temperature of the sample must be recorded. Both the Hydac Multimeter and the pHep Tester that will be used in this study have the ability to compensate for temperature.

4.1.4 Calibration must include a minimum of two points that bracket the expected pH of the samples to be measured. Calibration measurements must be recorded in logbook.

4.1.5 Primary standard buffer salts available from NIST can be purchased and are necessary for situations where extreme accuracy is required. Secondary standard buffers may be purchased as a solution from commercial vendors and are recommended for routine use. Buffers should not be used after their expiration dates as provided by the manufacturer. An expiration date of one year should be used if the manufacturer does not supply an expiration date or if the buffers are prepared from pH powder pillows, etc.

4.1.6 When using the meter in the laboratory, always place the buffer/sample beaker on the magnetic stirrer, and make sure the stirring bar is rotating during measurements. Rinse the stirring bar as well as the beaker between buffers/samples.

EXCEPTION: Do not use the magnetic stirrer for acid rain samples. It is crucial not to induce dissolved gases into the sample to be absorbed or desorbed, as this will alter the pH. Stir the sample gently for a few seconds after introducing the electrode, then allow the electrode to equilibrate prior to recording temperature and pH readings.

4.1.7 When the meter is being used in the field, move the probe in a way that creates sufficient sample movement across the sensor; this insures homogeneity of the sample and suspension of solids. If sufficient movement has occurred, the readings will not drift (<0.l pH units). Rinse the electrode with deionized water between samples and wipe gently with a lint-free tissue.

4.1.8 When measuring the pH of hot liquids, wait for the liquid to cool to 160°F or below.

4.1.9 Fluctuating readings may indicate more frequent instrument calibrations are necessary.

4.2 Calibration and Measurement Procedures

4.2.1 The pH meter must be calibrated daily before any analyses are performed. The meter should be re-calibrated every 12 hours or at the frequency specified in the project plan.

4.2.2 Connect the electrode to the meter. Choose either 7.0 and 10.0 (high range) or 4.0 and 7.0 (low range) buffers, whichever will bracket the expected sample range.

Place the buffer in a clean glass beaker. If the pH is being measured in a laboratory, place the beaker on the magnetic stirrer and place the stirring bar in the beaker. Measure and record the temperatures of the buffers using a calibrated thermometer or automatic temperature compensation (ATC).

4.2.3 Place the electrode into the 10.0 buffer or into the 7.0 buffer.

4.2.4 Adjust the instrument calibration according to the manufacturer's instructions. Discard the buffer and rinse the beaker and stirring bar thoroughly with deionized water.

4.2.5 Refill the beaker with the 7.0 buffer or the 4.0 buffer. Rinse the electrode, gently wipe with a lint-free tissue, and place it in the selected buffer solution. If the pH is being measured in a laboratory, place the beaker on the magnetic stirrer and place the stirring bar in the beaker. Continue adjusting the instrument calibration according to the manufacturer's instructions. Record the electrode slope (if provided by the instrument) on the calibration sheet (an acceptable slope is between 92 and 102 percent). Measure and record the temperature of the buffer using a calibrated thermometer or ATC. Discard the buffer and rinse the beaker and stirring bar thoroughly with deionized water.

4.2.6 An additional check may be performed, if required by the project plan, by placing the electrode into an additional buffer solution. This buffer should be from a different source than the buffers used for the initial calibration. This buffer should read within +0.2 pH units of the buffer's true pH value.

4.2.7 Verify the calibration every 15 samples and at the end of the day. Recalibrate the instrument if the check value varies more than 0.2 pH units from the true value.

4.2.8 The electrode will be rinsed with deionized water and wiped gently with a lint-free tissue between sample analysis.

4.2.9 Recalibrate the instrument if the buffers do not bracket the pH of the samples.

4.2.10 The meter must be re-calibrated following any maintenance activities and prior to the next use.

4.3 Troubleshooting Information

If there are any performance problems with any of the pH meters which result in the inability to achieve the acceptance criteria presented in Section 5.0, consult the appropriate section of the meter instruction manual for the checkout and self-test procedures. If the problem persists, consult the manufacturer's customer service department immediately for further instructions.

4.4 Maintenance

4.4.1 Instrument maintenance should be performed according to the procedures and frequencies required by the manufacturer.

4.4.2 The electrode must be stored and maintained according to the manufacturer's instructions.

4.4.3 If an instrument with ATC is being used, the device should be checked on a quarterly basis for accuracy with an NIST thermometer.

5.0 QUALITY CONTROL

5.1 Duplicate measurements of a single sample will be performed at the frequency specified in the project plan. In the absence of project-specific criteria, duplicate measurements should agree within ±0.l pH units.

5.2 The temperature readout of the meter will be checked annually against an NIST-traceable thermometer. If the difference is greater than 0.2°C, the instrument manufacturer will be consulted for instructions. Temperature measurements will be compensated for any difference with the reference thermometer.

5.3 Some regulatory agencies may require the analysis of USEPA Water Supply (WS) or Water Pollution (WP) performance evaluation samples. These performance evaluation samples will be analyzed as required.

6.0 DOCUMENTATION

6.1 All pH meter calibration, temperature check, and maintenance information will be recorded on the daily calibration sheet (Figure 1). pH data may be recorded on the appropriate laboratory or field data sheets or logbooks.

6.2 Calibration documentation must be maintained in a thorough and consistent manner. At a minimum, the following information must be recorded:

- Date and time of calibration
- Signature or initials of person performing the measurement
- Instrument identification number/model
- Expiration dates and batch numbers for all buffer solutions
- Reading for pH 7.0 buffer before and after meter adjustment
- Reading for pH 4.0 or 10.0 buffer before and after meter adjustment
- Readings for all continuing calibration checks
- Temperature of buffers (corrected for any difference with reference thermometer), including units
- Comments

6.3 Documentation for recorded data must include a minimum of the following:

- Date and time of analysis
- Signature or initials of person performing the measurement
- Instrument identification number/model
- Sample identification/station location
- Temperature (corrected for any difference with reference thermometer) and pH of sample (including units and duplicate measurements)
- Comments

7.0 TRAINING/QUALIFICATIONS

To properly perform pH measurements, the analyst must be familiar with the calibration and measurement techniques stated in this SOG. The analyst must also be experienced in the operation of the meter.

Certain state certification programs require that pH measurements in the field be taken by, or in the presence of, personnel that are qualified under the certification program.

8.0 REFERENCES

Standard Methods for the Examination of Water and Wastewater, 17th Edition, 1989.

Methods for the Chemical Analysis of Water and Wastes, EPA 600/4-79-020, Revised 1983.

ENVIRONMENTAL SCIENCE SERVICES, INC.
STANDARD OPERATING GUIDELINES FOR THE CREATION OF A AQUATIC PLANT MAP

1.0 INTRODUCTION

1.1 Purpose and Applicability

This Standard Operating Guideline (SOG) provides basic instructions for the mapping of aquatic plants present within standing waterbodies. The methods outlined below are intended (1) to standardize plant mapping techniques used by Environmental Science Services field personnel; (2) to standardize recording of field data to assure the creation of an accurate plant map .

2.0 RESPONSIBILITIES

2.1 Project Manager

The project manager is responsible for ensuring that project-specific requirements are communicated to the project team and for providing the materials, resources, and guidance necessary to perform the survey in accordance with this SOG and the project plan.

2.2 Field Personnel

The surveyor is responsible for identifying dominant aquatic plant beds within the waterbody, establishing the locations of the beds, noting the percentage of plant cover and biomass throughout the water body, keeping a species list of all plants identified within the waterbody and collecting clearly marked samples of all those plants unidentifiable in the field.

3.0 REQUIRED MATERIALS

The following materials are necessary for the creation of a plant map:

- Boat
- Grappling rake (Xft in length)
- Aquascope
- Plant keys
- Enlarged outline of the waterbody on write-in-the-rain paper

- Field note book
- Small see through plastic bags
- Indelible marker
- Cooler
- Ice

4.0 METHOD

4.1 Aquatic Plant Survey and Sample Collection

- A number of transects will be drawn on the map of the waterbody to act as a guide for the survey. The number and location of transects selected will depend on the size and shape of the waterbody, with the aim of thoroughly characterizing the plants within it.
- The boat will be driven along each transect, at select points along the transect the boat will be anchored and a detailed survey of the aquatic plants carried out in the immediate area.
- The number of points surveyed along each transect will depend on the bathymetry and plant diversity in the survey area, with the aim of characterizing changes in the composition, cover and biomass of plant beds.
- Each point sampled along the transect will be numbered and marked onto the map in order to later link plant survey data with location information.
- At each survey point a grappling rake will be used to bring up aquatic plants from within the water column and from the bottom for closer identification within the boat.
- Each plant present within each survey area will be identified (using keys if necessary) and added to the species list for the waterbody. The dominant plant at each transect point will be noted with its associated transect and point number in the field note book
- If identification of certain plants is not possible in the field, a generous sample of these plants will be stored with a little water in a plastic bag clearly labeled with its transect and point number in indelible ink. All such sample bags will be stored in a cooler filled with ice to preserve the quality of the samples, and transported back to the lab for further study.

- While in the field, unknown plants will be assigned a code number e.g. Unk A, so if the same plant is found on any other transects this code can be used in the field note book.

4.2 Assessment of Percentage Plant Cover and Percentage Plant Biomass

- At each survey point ESS field personnel will use both an aquascope and general observation to rate the percentage plant cover i.e. the percentage of the bottom covered by plants, which is a factor of plant density. A simple code system will be used whereby percentage "ranges" are assigned a code number, i.e. 0 = 0%, 1 = 1%-25%, 2 = 26%-50%, 3 = 51%-75%, 4 = 76%-100%. At each survey point the plant cover "code" will be noted with its transect and point number in the field note book.
- Also at each survey point ESS field personnel will use both an aquascope and general observation to rate the percentage plant biomass i.e. the percentage of the water column filled with plants, which is a factor of water depth, plant height and plant density. The same code system as noted above will be used to assign code numbers to percentage ranges. At each survey point the plant biomass "code" will be noted with its transect and point number in the field note book.
- Assessment of both plant cover and biomass will continue along each transect with an aquascope and general observation until the water becomes too deep or too turbid to make such assessments. The grappling rake will then be used to scrape the bottom in order to make an estimate of the cover and biomass. Once the water becomes too deep for the bottom to be scraped with the grappling rake i.e. >16ft, the plant cover and biomass will be assumed to be 0%.

4.3 Creation of Plant Maps

- In the office, dominant plant beds identified within the waterbody will be linked with the transects and survey point locations drawn onto the outline map to create a dominant aquatic plant distribution map.
- Percentage plant cover and percentage plant biomass "code numbers" will be linked with the transects and survey point locations drawn onto the outline map to create maps that illustrate the percentage cover and percentage biomass of aquatic plants in every part of the waterbody.

5.0 QUALITY CONTROL

Dominant plants will be sampled and transported back to the lab in plastic bags for identification checks with other plant keys and from other ESS plant experts.

6.0 DOCUMENTATION

Dominant plants identified within the water body plus all other plants observed will be reported in field note books in the form of a species list, by ESS personnel. Dominant plants will be also be recorded associated with location information in the form of transect numbers and survey points. Transect lines and survey points will be recorded on a write-in-the-rain map outline of the waterbody. Any unanticipated site-specific information, which requires ESS field personnel to deviate from the above SOG will be reported in an ESS field notebook. Documentation for recorded data must include a minimum of the following:

- Date of survey
- Weather conditions
- Signature or initials of person performing the survey
- Plant survey point locations
- Comments/observations

7.0 TRAINING/QUALIFICATIONS

To properly complete an assessment of plants within a waterbody, the analyst must be familiar with the sampling protocols as stated in this SOG, must have confidence in the use of plant keys and must have familiarity with the aquatic plants of the area in question.

ESS GROUP, INC.
STANDARD OPERATING GUIDELINES FOR MEASUREMENT OF TURBIDTY WITH A SECCHI DISC

1.0 INTRODUCTION

This Standard Operating Guideline (SOG) provides basic instructions for the routine measurement of water clarity in lakes and ponds with a Secchi disc. Water clarity is a function of the number of particles in the water (algae, sediment, etc) and the color of the water, which both have an impact on the depth of light penetration. The transparency of the water column can be used as an indicator of water body productivity, with certain exceptions (e.g., naturally sediment laden waterbodies). Generally, the more productive a system is the more algae in the water column, and the lower the transparency. Water transparency can also be affected by erosionally suspended particles which are related to water depth and wave action. Thus on any given day the turbidity of a water body may be affected by its productivity, the season, wind speed and level of sunlight. The methods outlined below are intended (1) to standardize the use of a Secchi disc in the measurement of turbidity; (2) to standardize recording of field data to assure proper documentation of weekly, monthly and seasonal patterns in turbidity.

2.0 REQUIRED MATERIALS

The following materials are necessary for the measurement of turbidity with a Secchi disc:

- Weighted Secchi disc with attached length of rope marked off in one tenth of a meter increments with indelible ink.
- Field data sheets

3.0 METHODS

- A location will be selected from which to measure turbidity, this location will stay constant throughout the study.
- The date, weather conditions, and personnel conducting the measurement will be recorded on the field sheet.
- The Secchi disc will be lowered slowly into the water by the rope so that the weight enters the water first and the disc follows, flat side parallel to the water surface.

- The disc will continue to be lowered through the water column until it is no longer visible.
- A note will be made of the depth of the disc at this point in tenths of a meter by reading where the surface of the water touches the rope.
- The disc will then be slowly raised until it is just visible again.
- Once again a note will be made of the depth of the disc at this point.
- An average of these two depths will be calculated to give the “Secchi depth”, i.e. a measure of the turbidity of the water.

4.0 DOCUMENTATION

Secchi depth data will be reported on field data sheets for every day that a measurement is taken. Documentation for recorded data must include a minimum of the following:

- The date
- The time
- Weather conditions
- Signature or initials of person performing the measurement
- Depth measurements and average Secchi depth
- Field comments/observations on anything that may influence the Secchi depth measurement that day.

ESS GROUP, INC.
STANDARD OPERATING GUIDELINES
FOR COLLECTION OF SEDIMENTS FROM FRESHWATER ENVIRONMENTS

1.0 INTRODUCTION

1.1 Purpose and Applicability

These Standard Operating Guidelines (SOGs) provide basic instructions for the collection of bottom sediments from freshwater environments. Collections are to be performed in accordance with methodologies generally accepted by the Massachusetts Department of Environmental Protection (MADEP). Laboratory analysis of sediment samples should be performed by a state certified laboratory with the detection limits for analysis specified on the project's Chain of Custody as per MADEP's Interim Policy # COMM-94-007 and their subsequent Technical Update for freshwater sediment screening (May 2002).

1.2 Quality Assurance Planning Considerations

The end use of the data will determine the quality assurance requirements that are necessary to produce data of acceptable quality. These quality assurance requirements may be defined in a site-specific workplan or Quality Assurance Project Plan (QAPP) (hereafter referred to as the project plan) and may include duplicate or replicate measurements or confirmatory measurements.

2.0 RESPONSIBILITIES

Field personnel are responsible for verifying that all sampling equipment is in proper operating condition prior to use and for implementing the sampling procedures in accordance with this SOG and any specific project plan.

The project manager is responsible for ensuring that project-specific requirements are communicated to the project team and for providing the materials, resources, and guidance necessary to perform the measurements in accordance with this SOG and the project plan.

3.0 REQUIRED MATERIALS

The following materials may be necessary for this procedure:

- Sediment coring or grab sampling device
- Stainless steel mixing bowl
- Stainless steel mixing spoon or tool
- Nitrile gloves
- Alconox
- Pre-cleaned sample jars provided by laboratory
- Pencil and labeling marker or pen
- Field data sheets or logbooks
- GPS receiver and/or map of target waterbody to record sample locations

4.0 METHOD

Field personnel are to collect sediment cores or grabs in accordance with the instructions provided with each specific sampling device deployed. Nitrile gloves should be worn at all times during these procedures. At each sampling location, a pre-cleaned grab sample dredge or corer is to be deployed, typically from a boat. All equipment is to be decontaminated using alconox and fresh water before the collection of each discrete sample. If specified by the project plan, samples may be composited in a pre-cleaned stainless steel mixing bowl and mixed thoroughly with a pre-cleaned stainless steel spoon before being transferred to the glass sampling jars provided by the laboratory. However, volatile organic compound (VOC) samples should be collected from cores prior to compositing.

The sample jar should be labeled with the sample identification, date, and any other project specific requirements. This information should be recorded in a field book at the time of sampling along with other essential information such as water depth, sample coordinates (or the location should be mapped on a figure at the time of sampling), and any other general notes on the nature of the sediment collected.

5.0 QUALITY CONTROL

Duplicate field samples or split samples may be collected if specified by the project plan. Once samples have been retrieved and placed into jars, the samples should be kept on ice or refrigerated until the laboratory can analyze them. Specific sample volumes, holding times, and detection limits for each parameter to be analyzed (Table 1) should be adhered to unless the project plan has outlined project-specific requirements.

TABLE 1. SEDIMENT ANALYSIS

PARAMETER	Volume Needed (ml)	Sample Container	Sample Preservation	Maximum Hold Time (hours)	Detection Limits (mg/Kg)	EPA #
Arsenic	100 g	Amber Glass	Ice	6 months	0.5	200.7
Cadmium	100 g	Amber Glass	Ice	6 months	0.1	200.7
Chromium	100 g	Amber Glass	Ice	6 months	1.0	200.7
Copper	100 g	Amber Glass	Ice	6 months	1.0	200.7
Lead	100 g	Amber Glass	Ice	6 months	1.0	200.7
Mercury	100 g	Amber Glass	Ice	6 months	0.02	245.1
Nickel	100 g	Amber Glass	Ice	6 months	1.0	200.7
Zinc	100 g	Amber Glass	Ice	6 months	1.0	200.7
PCBs	100 g	Amber Glass	Ice	7 days	0.01	8082
PAHs	100 g	Amber Glass	Ice	7 days	0.02	8270
EPH	100 g	Amber Glass	Ice	28 days	25	418.1
VOCs	100 g	Amber Glass	Methanol	7 days	0.1	EPA/ACE 8260
%TOC	50 g	Amber Glass	Ice	28 days	1.0%	415.1
Grain Size Analysis (Sieve and Hydrometer)	1,000g	Plastic Bag/Glass	None Required	Indefinite	0.1%	ASTMD 2216
% Water	100g	Amber Glass	Ice	14 days	1.0%	160.3

6.0 DOCUMENTATION

Documentation for recorded data must include a minimum of the following:

- Date and time of collection and analysis

- Signature or initials of person performing the collection or measurement
- Sample identification/station location
- Pertinent comments

7.0 TRAINING/QUALIFICATIONS

To properly perform sediment collections, the field personnel must be familiar with the techniques stated in this SOG and experienced in the operation of the sampling equipment.

8.0 REFERENCES

MADEP Interim Policy # COMM-94-007

MADEP 2002. Technical Update: Freshwater Sediment Screening Benchmarks for Use under the Massachusetts Contingency Plan. May 2002.

ENVIRONMENTAL SCIENCE SERVICES, INC.
STANDARD OPERATING GUIDELINES FOR THE ACQUISITION OF SURFACE WATER

1.0 INTRODUCTION

1.1 Purpose and Applicability

This Standard Operating Guideline (SOG) provides basic instructions for the routine acquisition of surface water. The methods outlined below are intended (1) to standardize water sample collection methods used by Environmental Science Services field personnel; (2) to ensure that samples delivered to the laboratory represent field conditions as accurately as possible; (3) to standardize recording of field data to assure proper documentation of sample collection; (4) to minimize cross contamination between sampling sites.

1.2 Quality Assurance Planning Considerations

The end use of the data will determine the quality assurance requirements that are necessary to produce data of acceptable quality. These quality assurance requirements will be defined in the site-specific workplan or Quality Assurance Project Plan (QAPP) (hereafter referred to as the project plan) or laboratory Quality Assurance Manual (QAM) and may include duplicate or replicate measurements or confirmatory analyses.

2.0 RESPONSIBILITIES

2.1 Project Manager

The project manager is responsible for ensuring that project-specific requirements are communicated to the project team and for providing the materials, resources, and guidance necessary to perform the measurements in accordance with this SOG and the project plan.

2.2 Field Personnel

The analyst is responsible for verifying that the sampling bottles are appropriately sanitized and contain the appropriate preservative for the desired laboratory analyses. Sample bottle caps should be securely in place to ensure that no contamination has occurred and that preservative has not been released.

3.0 REQUIRED MATERIALS

The following materials are necessary for the acquisition of surface water:

- Rubber gloves
- Labeled sampling container provided from contracted laboratory, which is appropriately sanitized and contain the appropriate preservative for the desired analyses
- Laboratory or field data sheets or logbooks
- List of sites or locations of each site to be sampled

4.0 METHOD

4.1 Sample Handling, Preservation, and General Measurement Procedures

- Unless noted otherwise, surface water samples will be collected via direct grab methods.
- Upon entering a sampling location, ESS field personnel shall minimize disturbance to upstream waters and shall always sample water from the undisturbed upstream region. In addition, when wading in waterbodies, field personnel will try and disturb as little bottom sediment as possible.
- Sample collection shall precede the measurement of physical field parameters (such as turbidity, conductivity, dissolved oxygen, etc.) in order to minimize the risk of sediment disturbance and/or contamination.
- Clean rubber gloves shall be worn at each sampling location. Gloves shall be rinsed with distilled water prior to subsequent sample collection. When sampling multiple sites on the same date, gloves may be rinsed in the immediate downstream reaches of the waterbody to be sampled, before sample collection, in order to minimize the risk of cross-contamination. When warranted by the sensitivity of the laboratory analyses under investigation or at the Clients request, new, sterile rubber gloves shall be worn at each different sampling location.
- In absence of a project specific sampling protocol, grab samples are to be collected from beneath the water surface (at approximately 8 to 12 inches beneath the surface or mid-way between the surface and the bottom if the waterbody is shallow, (EPA 1997)). Samples will be collected at an appropriate distance from the stream bank or lake shoreline and away from submerged obstacles. For small streams (i.e., 10-20 feet wide with a maximum depth of less than 2 feet) the appropriate distance to collect a sample would be the center, while within larger streams the sample would be taken at a location where water depth is 2-3 feet.

- When collecting samples, ESS field personnel shall stand downstream of the desired sampling location, hold the bottle near its base and plunge it below the water surface with the opening (mouth) downward. The opening of sample bottles shall always be directed away from field personnel in an upstream direction.
- Sample containers with preservatives should not be used to collect surface water samples. If using containers with preservatives, a pre-cleaned container of similar type should be used to collect the sample with subsequent transfer to the preserved container.
- ESS personnel shall leave an approximate 1-inch air space (except for dissolved oxygen and BOD samples) in sample bottles, so that bottles may be shaken (if needed) before analyses (EPA, 1997).
- ESS personnel shall place sample bottles and temperature blanks (if required by QAPP or QAM) in a cooler filled with ice (if required by QAPP or QAM).
- The testing or analytical method and sample containers, preservation technique, and sample volumes should be selected in consultation with the laboratory to ensure that the samples obtained will provide the desired results.

5.0 QUALITY CONTROL

5.1 Field Duplicates

Field duplicate measurements of a single sample will be performed at the frequency specified in the project plan. Collection of duplicates will adhere to the surface water acquisition methods described above. Field duplicates will be collected immediately following initial sample collection.

6.0 DOCUMENTATION

Surface water quality field data will be reported in field notebooks by ESS personnel. Surface water quality laboratory data will be reported by contracted laboratories on official laboratory letterhead. Any unanticipated site-specific information, which requires ESS field personnel to deviate from the above SOG will be reported in an ESS field notebook. Documentation for recorded data must include a minimum of the following:

- Date and time of analysis
- Signature or initials of person performing the measurement

- Sample identification/station location
- Comments/obsverations

7.0 TRAINING/QUALIFICATIONS

To properly perform the acquisition of surface water, the analyst must be familiar with the sampling protocols as stated in this SOG.

8.0 REFERENCES

EPA, 1997. Volunteer Stream Monitoring: A Methods Manual. United States Environmental Protection Agency. Office of Water. EPA 841-B-97-003.

ENVIRONMENTAL SCIENCE SERVICES, INC.
STANDARD OPERATING GUIDELINES
FOR MEASUREMENT OF TEMPERATURE

1.0 INTRODUCTION

1.1 Purpose and Applicability

These Standard Operating Guidelines (SOG) provide basic instructions for routine measurement of temperature using any high quality mercury-filled thermometer or thermistor with analog or digital read-out device such as the Hydac Multimeter Probe and YSI Model 55. Multimeter instruments used for temperature measurement may measure additional parameters (e.g., dissolved oxygen, conductivity, pH, etc.). This SOG addresses temperature measurement only (other capabilities are outlined in the appropriate SOG). This SOG is designed specifically for the measurement of temperature in accordance with EPA Method 170.1 and Standard Method 2550 B which address thermometric temperature measurement of drinking, surface, and saline waters, and domestic and industrial wastes.

1.2 Quality Assurance Planning Considerations

The end use of the data will determine the quality assurance requirements that are necessary to produce data of acceptable quality. These quality assurance requirements will be defined in the site-specific workplan or Quality Assurance Project Plan (QAPP) (hereafter referred to as the project plan) or laboratory Quality Assurance Manual (QAM) and may include duplicate or replicate measurements or confirmatory measurements.

2.0 RESPONSIBILITIES

2.1 The analyst is responsible for verifying that the temperature measuring device is in proper operating condition prior to use and for implementing the calibration and measurement procedures in accordance with this SOG and the project plan.

2.2 The project manager is responsible for ensuring that project-specific requirements are communicated to the project team and for providing the materials, resources, and guidance necessary to perform the measurements in accordance with this SOG and the project plan.

3.0 REQUIRED MATERIALS

The following materials are necessary for this procedure:

- Thermometer or thermistor with analog or digital read-out device
- Manufacturer's instruction manual for the instrument
- National Institute of Standards and Technology (NIST)-traceable thermometer
- Laboratory or field data sheets or logbooks

4.0 METHOD

4.1 Sample Handling, Preservation, and General Measurement Procedures

To achieve accurate temperature measurements, samples should be analyzed immediately upon collection (preferably within 15 minutes). Samples should be collected in glass or plastic containers.

4.2 Calibration and Measurement Procedures

4.2.1 ESS-owned temperature measuring devices will, at a minimum, be checked annually as described in Section 5.0. The device will be checked against an NIST-traceable thermometer and the necessary compensation made for the difference in temperature between the two. Rental equipment will be checked by the manufacturer and documentation provided to ESS.

4.2.2 Immerse the thermometer or temperature measuring device into the sample.

4.2.3 Swirl and take a reading when the value stabilizes.

4.2.4 Record the temperature reading to the nearest 0.50 for a thermometer or 0.10 for digital meter-type instruments. Compensate for any difference with the NIST-traceable thermometer.

4.2.5 Temperature data may be post-calibrated using any of a variety of calibration data including, but not limited to, field calibration points, manufacturer calibration data, and analytical results from samples collected during field deployment of the sensors. The decision criteria for post calibration, and the technique used, will be specified in the project plan, and will be consistent with the manufacturer's recommendations.

4.3 Troubleshooting Information

If there are any performance problems with any of the meter-type temperature measuring devices, consult the appropriate section of the meter instruction manual for the checkout and self-test procedures. If the problem persists, consult the manufacturer's customer service department immediately for further instructions. If a performance problem exists with the thermometer, discard the thermometer and replace it.

4.4 Maintenance

Instrument maintenance for meter-type temperature measuring devices should be performed according to the procedures and frequencies required by the manufacturer.

5.0 QUALITY CONTROL

5.1 The temperature measuring devices will, at a minimum, be checked against an NIST-traceable thermometer at the frequency stated in Section 4.2.1. This verification procedure will be performed as follows:

- Immerse the thermometer or temperature sensor and the NIST-traceable thermometer into a sample.
- Allow the readings to stabilize.
- Record the readings and document the difference.
- Label the thermometer or temperature sensor with the correction value/adjustment and the date the accuracy check was performed.
- Compensate for the difference when sample measurements are taken.

5.2 Duplicate measurements of a single sample will be performed at the frequency stated in the project plan. In the absence of project-specific criteria, duplicate measurements should agree within ± 0.50C or approximately ± 1.00F.

6.0 DOCUMENTATION

6.1 Records for checking the accuracy of the thermometer or temperature measuring device (where applicable) will include:

- Date
- Thermometer or meter-type temperature measuring device checked
- Reference thermometer number
- Readings for reference thermometer and thermometer being checked
- Adjustment made for difference in readings
- Initials of analyst

6.2 Documentation for recorded data must include a minimum of the following:

- Date and time of analysis
- Signature or initials of person performing the measurement
- Thermometer ID # or instrument identification number/model
- Sample identification/station location
- Temperature of sample (including units and duplicate measurements) compensated for any difference with the reference thermometer if applicable
- Comments

7.0 TRAINING/QUALIFICATIONS

To properly perform temperature measurements, the analyst must be familiar with the calibration and measurement techniques stated in this SOG. The analyst must also be experienced in the operation of the meter.

Certain state certification programs require that temperature measurements in the field be taken by, or in the presence of, personnel that are qualified under the certification program.

8.0 REFERENCES

Standard Methods for the Examination of Water and Wastewater, 17th Edition, 1989.

Methods for the Chemical Analysis of Water and Wastes, EPA 600/4-79-020, Revised 1983.

ENVIRONMENTAL SCIENCE SERVICES, INC.
STANDARD OPERATING GUIDELINES
FOR MEASUREMENT OF TURBIDITY

1.0 INTRODUCTION

1.1 Purpose and Applicability

These Standard Operating Guidelines (SOG) provide basic instructions for routine measurement of turbidity using a nephelometric turbidity meter with a digital read-out device such as the LaMotte 2020 Turbidimeter. Measurements are made in accordance with EPA Method 180.1 that addresses nephelometeric turbidity measurement of drinking, surface, and saline waters, and domestic and industrial wastes.

1.2 Quality Assurance Planning Considerations

The end use of the data will determine the quality assurance requirements that are necessary to produce data of acceptable quality. These quality assurance requirements will be defined in the site-specific workplan or Quality Assurance Project Plan (QAPP) (hereafter referred to as the project plan) or laboratory Quality Assurance Manual (QAM) and may include duplicate or replicate measurements or confirmatory measurements.

2.0 RESPONSIBILITIES

2.1 The analyst is responsible for verifying that the turbidity measuring device is in proper operating condition prior to use and for implementing the calibration and measurement procedures in accordance with this SOG and the project plan.

2.2 The project manager is responsible for ensuring that project-specific requirements are communicated to the project team and for providing the materials, resources, and guidance necessary to perform the measurements in accordance with this SOG and the project plan.

3.0 REQUIRED MATERIALS

The following materials are necessary for this procedure:

- Turbidity meter with digital read-out device

- Manufacturer's instruction manual for the instrument
- Turbidity tubes
- Mild detergent
- Lint-free cloth
- Distilled water
- Nephelometric Turbidity Unit (NTU) calibration standards (1.00 NTU and 10.0 NTU)
- Laboratory or field data sheets or logbooks

4.0 METHOD

4.1 Sample Handling, Preservation, and General Measurement Procedures

To achieve accurate turbidity measurements, samples should be analyzed immediately upon collection (preferably within 15 minutes). Samples should be collected in glass or plastic containers.

4.2 Calibration and Measurement Procedures

4.2.1 Select a turbidity standard in the range of the samples to be tested (1.00 NTU or 10.0 NTU). Fill a turbidity tube with the standard, cap, and wipe the tube with the clean lint-free cloth.

4.2.2 Place the sample into the turbidity meter such that the indexing arrow on the turbidity tube is aligned with the indexing arrow on the meter face. Close the lid and press the “READ” button. If the displayed value is not the same as the value of the standard (within 2%), continue with the calibration procedure.

4.2.3 Follow the calibration procedures outlined by the manufacturer’s manual.

4.2.4 Verify the calibration every 15 samples and at the end of the day. Recalibrate the instrument if the check value varies more than 2% from the true value.

4.2.5 The turbidity tubes will be rinsed with deionized water and wiped gently with a lint-free tissue between sample analysis.

4.2.6 Recalibrate the instrument with the appropriate NTU standard if the standard is not of the same order of magnitude as the samples being tested.

4.2.7 The meter must be re-calibrated following any maintenance activities and prior to the next use.

4.2.8 Record the turbidity reading to the nearest 0.01 NTU for measurements less than 11 NTU and to the nearest 0.1 for measurements greater than 11 NTU but less than 110 NTU. For values greater than 110 NTU record to the nearest 1 NTU.

4.3 Troubleshooting Information

If there are any performance problems with any of the meter-type turbidity measuring devices, consult the appropriate section of the meter instruction manual for the checkout and self-test procedures. If the problem persists, consult the manufacturer's customer service department immediately for further instructions.

4.4 Maintenance

Instrument maintenance for meter-type turbidity measuring devices should be performed according to the procedures and frequencies required by the manufacturer.

5.0 QUALITY CONTROL

5.1 The turbidity measuring tubes will, at a minimum, be checked against NTU calibration standards at the frequency stated in Section 4.2.1. This verification procedure will be performed as follows:

- Insert the turbidity tube with distilled water into the turbidity meter.
- Press “READ”.
- Record the readings and document the difference.
- Label each turbidity tube with its corresponding turbidity correction value.
- Record the adjustment and the date the accuracy check was performed in a logbook.
- Compensate for the difference when sample measurements are taken.

5.2 Duplicate measurements of a single sample will be performed at the frequency stated in the project plan. In the absence of project-specific criteria, duplicate measurements should agree within ± 2% for readings below 100 NTU and ± 3% for readings above 100 NTU.

6.0 DOCUMENTATION

All turbidity meter calibration, checks, and maintenance information will be recorded on the daily calibration sheet or logbook. Turbidity data may be recorded on the appropriate laboratory or field data sheets or logbooks.

6.1 Calibration documentation must be maintained in a thorough and consistent manner. At a minimum, the following information must be recorded:

- Date and time of calibration
- Signature or initials of person performing the measurement
- Instrument identification number/model
- Expiration dates and batch numbers for all standard solutions
- Reading for 1.00 NTU standard before and after meter adjustment
- Reading for 10.0 NTU standard before and after meter adjustment
- Readings for all continuing calibration checks
- Comments

6.2 Documentation for recorded data must include a minimum of the following:

- Date and time of analysis
- Signature or initials of person performing the measurement
- Instrument identification number/model
- Sample identification/station location
- Turbidity of sample (including units and duplicate measurements)
- Comments

7.0 TRAINING/QUALIFICATIONS

To properly perform turbidity measurements, the analyst must be familiar with the calibration and measurement techniques stated in this SOG. The analyst must also be experienced in the operation of the meter.

Certain state certification programs require that turbidity measurements in the field be taken by, or in the presence of, personnel that are qualified under the certification program.

8.0 REFERENCES

Standard Methods for the Examination of Water and Wastewater, 17th Edition, 1989.

Methods for the Chemical Analysis of Water and Wastes, EPA 600/4-79-020, Revised 1983.

Appendix B

GeoLabs, Inc.
Quality Assurance Plan

5. QUALITY ASSURANCE

GeoLabs recognizes that our achievement of excellence in analytical services depends on the accuracy and precision of the data we provide to our clients. As a result, we have developed a Quality Assurance/Quality Control (QA/QC) program, which ensures that standardized, proper protocols are followed and documented for each sample analyzed. As a NELAP certified laboratory we are committed to compliance with the NELAC standards.

The complex task of producing high-quality data can be grouped into several QA/QC considerations:

- Samples must remain undisturbed and representative of sampled conditions until they are analyzed.
- Care must be taken that samples are properly preserved.
- Proper analytical procedures must be followed.
- Analytical equipment must be in proper working order.
- Procedures to determine acceptability of QC data must be formalized.
- Raw data must be "reduced" to usable, comparable formats.
- Procedures for dealing with unusual results/circumstances must be in place.
- All of the above items must be documented appropriately.

With these considerations in mind, GeoLabs has developed specific, uniform procedures for every step of sample handling, analysis, data management and review. While adapted to our own internal needs, these procedures are consistent with the QA/QC requirements of government agencies.

SOP information is available upon request.

By our definition, those procedures concerned with the accuracy and precision of each sample analyzed fall into the QC category. These are usually single procedures, which are performed in conjunction with analysis that are used to quantify the success of analysis. In the GeoLabs plan these include:

- Instrument calibration criteria
- Reagent and standard preparation
- Replicate/spike/blank protocols
- Determination of detection limits

QC activities associated with the procedures above are individually tailored to each instrument and analytical method and are described in the Standard Operating Procedure for each method.

QA, on the other hand, is the composite of all activities involved with the production of valid information. Documentation, review and procedural updating are key elements of GeoLabs' plan, which includes the following:

- Method selection and updating
- Chain of Custody
- Sample log-in and identification
- Sample storage and integrity
- Analysis scheduling (to minimize sample holding time)
- Documentation of sample preparation and analysis activities
- Documentation of standard and reagent receipt and preparation
- Calculation of results
- Data review
- Preparation of final reports
- QA performance audits and system audits
- Personnel training
- Safety

Periodic reviews of the entire QA plan are performed at least once a year prior to the annual internal audit to ensure that appropriate QA procedures are established and initiated in a timely manner. Each employee has clearly defined QA/QC responsibilities while responsibility for QA plan updating and auditing of the QA system rests with GeoLabs' Quality Assurance Officer.

Analytical instrumentation has become increasingly sensitive and sophisticated in recent years and, with the increasing reliance on microprocessors, promises to become even more so in the coming years. While this development allows greater accuracy and precision, lower detection limits, and greater productivity, it also increases the modes of failure, which can occur, as well as the difficulty of repairs. Thus, a program of instrument maintenance is necessary to avoid lengthy repair downtime and to ensure optimum functioning.

Preventive maintenance such as lubrication, cleaning, etc. is performed according to the procedures delineated in each instrument manual. Analytical balances are serviced once a year by an NIST certified balance technician. Precision and accuracy data are examined for trends and excursions beyond control limits to determine evidence of instrument malfunction. Upon discovery of a malfunction, the analyst implements test and corrective procedures recommended by the manufacturer’s manual. If repair cannot be affected at this stage, the laboratory director is notified and determines the appropriate action. This may involve in-house repair or a service call by a repair technician.

All malfunctions detected, as well as corrective action taken, are noted in a logbook maintained with each instrument. This includes regularly scheduled preventive maintenance. All maintenance logbooks shall contain an equipment information section that shall include, laboratory identification, manufacturer’s name, type identification, serial number (or other identification), date received (if available), date placed in service (if available), current location, condition when received (if available) (e.g. new, used, reconditioned), and the location of manufacturer’s instructions if available.

If analysis holding times will be exceeded before repairs can be affected, then samples are sent to a subcontract laboratory with specific instructions on holding times.

9. CERTIFICATIONS AND APPROVALS

GeoLabs, Inc. is certified by NELAC and by the State of Massachusetts Department of Environmental Protection (Massachusetts ID# MA-015) and also holds certifications in the states of New Jersey, New York, Connecticut, New Hampshire, and Rhode Island. GeoLabs also holds a USDA certificate for importing samples.

The Commonwealth of Massachusetts

Department of Environmental Protection

Division of Environmental Analysis
Senator William X. Wall Experiment Station

certifies

M-MA015 **GEOLABS INC**
45 JOHNSON LN
BRAINTREE, MA 02184-0000

Laboratory Director: **JIAN Chen**

for the analysis of **NON POTABLE WATER (CHEMISTRY)**
POTABLE WATER (CHEMISTRY)

pursuant to 310 CMR 42.00

This certificate supersedes all previous Massachusetts certificates issued to this laboratory. The laboratory is regulated by and shall be responsible for being in compliance with Massachusetts regulations at 310 CMR 42.00.

This certificate is valid only when accompanied by the latest dated Certified Parameter List as issued by the Massachusetts D.E.P. Contact the Division of Environmental Analysis to verify the current certification status of the laboratory.

Certification is no guarantee of the validity of the data. This certification is subject to unannounced laboratory inspections.

Issued: **01 JUL 2006**
Expires: **30 JUN 2007**

Oscar C. Pancorbo

Director, Division of Environmental Analysis

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Certified Parameter List as of: 18 FEB 2007

M-MA015 GEOLABS INC
BRAINTREE MA

NON POTABLE WATER (CHEMISTRY) **Effective Date** **01 JUL 2006** **Expiration Date** **30 JUN 2007**

Analytes and Methods

ALUMINUM	EPA 200.7
ANTIMONY	EPA 200.7
ARSENIC	EPA 200.7
BERYLLIUM	EPA 200.7
CADMIUM	EPA 200.7
CHROMIUM	EPA 200.7
COBALT	EPA 200.7
COPPER	EPA 200.7
IRON	EPA 200.7
LEAD	EPA 200.7
MANGANESE	EPA 200.7
MERCURY	EPA 245.1
MOLYBDENUM	EPA 200.7
NICKEL	EPA 200.7
SELENIUM	EPA 200.7
SILVER	EPA 200.7
THALLIUM	EPA 200.7
TITANIUM	EPA 200.7
VANADIUM	EPA 200.7
ZINC	EPA 200.7
PH	EPA 150.1
SPECIFIC CONDUCTIVITY	EPA 120.1
TOTAL DISSOLVED SOLIDS	EPA 160.1
HARDNESS (CACO3), TOTAL	SM 2340B
CALCIUM	EPA 200.7
MAGNESIUM	EPA 200.7
ALKALINITY, TOTAL	EPA 310.1
CHLORIDE	LACHAT 10-117-07-1-B
SULFATE	EPA 375.4
AMMONIA-N	EPA 350.2
NITRATE-N	LACHAT 10-107-04-1-C
KJELDAHL-N	EPA 351.3
ORTHOPHOSPHATE	EPA 365.2
PHOSPHORUS, TOTAL	LACHAT 10-115-01-1-E
CHEMICAL OXYGEN DEMAND	EPA 410.4
CYANIDE, TOTAL	EPA 335.2
NON-FILTERABLE RESIDUE	EPA 160.2
CHLORINE, TOTAL RESIDUAL	HACH 8167
OIL AND GREASE	EPA 1664
VOLATILE HALOCARBONS	EPA 624
VOLATILE AROMATICS	EPA 624
CHLORDANE	EPA 608
ALDRIN	EPA 608
DIELDRIN	EPA 608
DDD	EPA 608
DDE	EPA 608
DDT	EPA 608
HEPTACHLOR	EPA 608
HEPTACHLOR EPOXIDE	EPA 608
POLYCHLORINATED BIPHENYLS (WATE	EPA 608
POLYCHLORINATED BIPHENYLS (OIL)	EPA 600/4-81-045

*** Provisional Certification**

COMMONWEALTH OF MASSACHUSETTS
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Certified Parameter List as of: 18 FEB 2007

M-MA015 GEOLABS INC
BRAINTREE MA

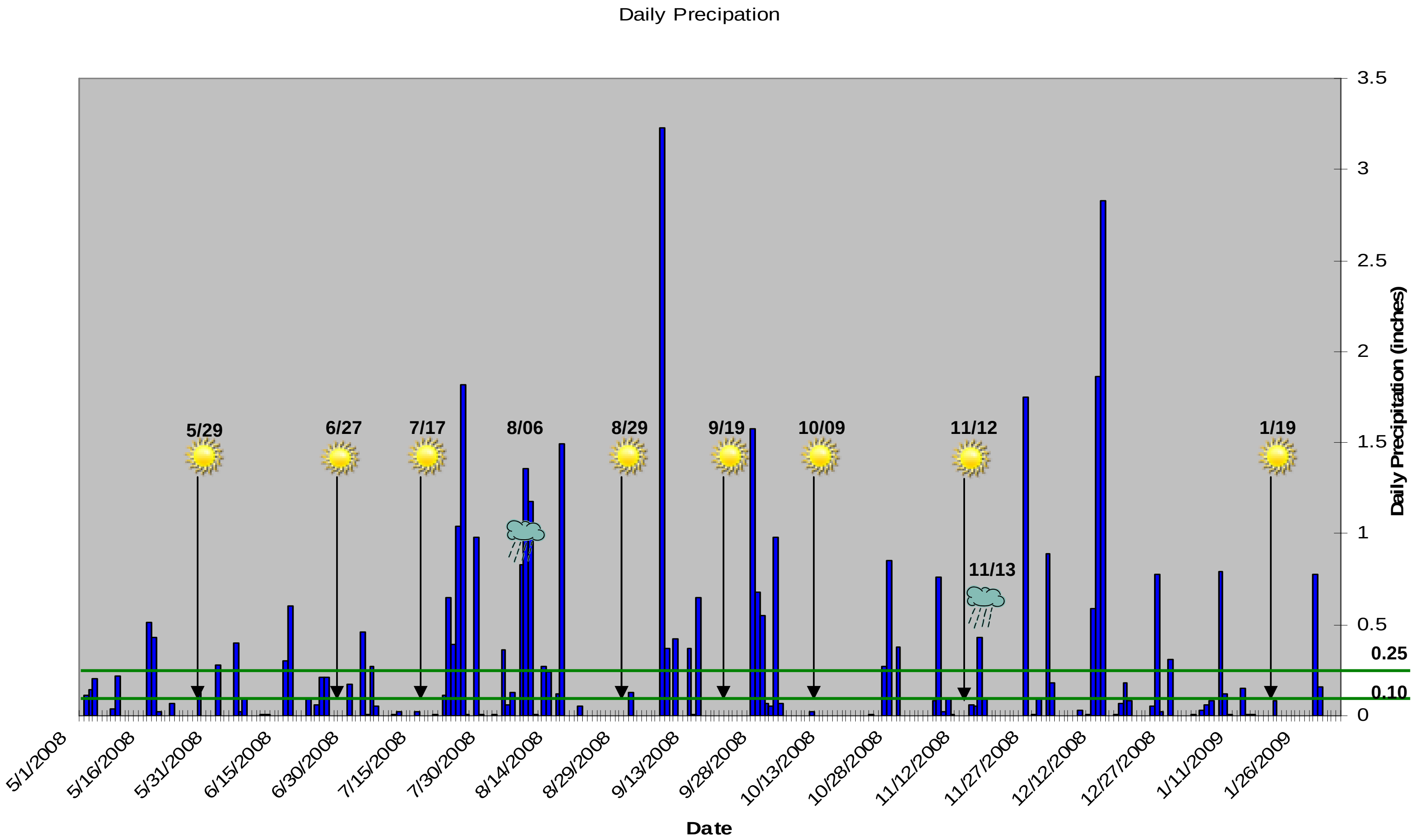
POTABLE WATER (CHEMISTRY) **Effective Date** **18 FEB 2007** **Expiration Date** **30 JUN 2007**

Analytes and Methods

ANTIMONY	EPA 200.8
ANTIMONY	EPA 200.9
ARSENIC	EPA 200.8
ARSENIC	EPA 200.9
BARIUM	EPA 200.7
BARIUM	EPA 200.8
BERYLLIUM	EPA 200.7
BERYLLIUM	EPA 200.8
CADMIUM	EPA 200.7
CADMIUM	EPA 200.8
CHROMIUM	EPA 200.7
CHROMIUM	EPA 200.8
COPPER	EPA 200.7
COPPER	EPA 200.8
LEAD	EPA 200.8
LEAD	EPA 200.9
MERCURY	EPA 245.1
NICKEL	EPA 200.7
NICKEL	EPA 200.8
SELENIUM	EPA 200.8
SELENIUM	EPA 200.9
THALLIUM	EPA 200.8
THALLIUM	EPA 200.9
NITRATE-N	LACHAT 10-107-04-1-C
NITRITE-N	LACHAT 10-107-05-1-A
CALCIUM	EPA 200.7
ALKALINITY, TOTAL	SM 2320B
TOTAL DISSOLVED SOLIDS	SM 2540C
PH	EPA 150.1

Appendix B

Daily Precipitation for the Hopedale Pond Watershed during the Study Period



ESS Group, Inc.
Engineers
Scientists
Consultants

Hopedale Pond
Hopedale, MA

Source: Wunderground.com, 2009

☀ Dry weather water quality sampling event

🌧 Wet weather water quality sampling event

Precipitation in the
Hopedale Pond Watershed
May 1, 2008 to January 31, 2009

Appendix C

Photographic Log

Photograph No. 1:

Site 1 - Looking north from lower basin

Photograph No. 2:

Site 1 - Looking south towards dam and outlet from lower basin

ESS Group, Inc.	**Photographic Log** Hopedale Pond Diagnostic/Feasibility Study	Sheet 1 of 12 PROJECT NO. H153-000

Photograph No. 3:

Site 2 – Looking north from the upper basin

Photograph No. 4:

Site 2 – Looking northwest from the upper basin

Photograph No. 5:

Site 4 – Dutcher Street stormwater outfall

ESS Group, Inc.

Photographic Log

Hopedale Pond Diagnostic/Feasibility Study

PROJECT NO.
H153-000

Photograph No. 6:

Site 5 – Mill pond outlet, looking downstream

Photograph No. 7:

Site 5 – Mill Pond outlet, looking upstream

Photograph No. 8:

Site 6 – Tributary at Route 140, looking west

Photograph No. 9:

Site 7

Photograph No. 10:

Sediment core from SC1-A

Photograph No. 11:

Sediment core from SC1-B

Photograph No. 12:

Upper portion of sediment core from SC1-C

Photograph No. 13:

Lower portion of sediment core from SC1-C

Photograph No. 14:

Upper portion of sediment core SC2-A

Photograph No. 15:

Lower portion of sediment core SC2-A

Photograph No. 16:

Upper portion of sediment core SC2-B

Photograph No. 17:

Lower portion of sediment core SC2-B

Photograph No. 18:

Upper portion of sediment core SC2-C

Photograph No. 19:

Middle portion of sediment core SC2-C

Photograph No. 20:

Lower portion of sediment core SC2-C

Appendix D

Field Notes

Hopedale Pond Goose Log

Date	Time	Location	Number of Adults	Number of Goslings	Behavior (feeding, resting, preening, on water or land)	Status of boat launch/beach/grassy areas
6/12/2008	11:38 AM	Southern basin, west shore, west of beach; location available in GIS	11	0	traveling on water	Beach and grassy area have some scattered goose feces, but it is not completely covered
6/12/2008	3:00 PM	Southern basin, west shore, west of beach; location available in GIS	15	7	traveling on water	Beach and grassy area have some scattered goose feces, but it is not completely covered
6/27/2008	8:30 AM	Grass next to town beach lot	31	4	Grazing/loafing on land	Beach and grassy area have some scattered goose feces, but it is not completely covered
7/17/2008	11:00 AM	Just north of the town beach	35	0	traveling on water	Beach and grassy area have some scattered goose feces, but it is not completely covered
7/23/2008	8:30 AM	Town beach	16	0	loafing on beach	Beach and grassy area have fresh goose feces; 30% scattered feces cover
7/25/2008	8:30 AM	Town beach	4	0	preening at beach at edge of water	Beach and grassy area have fresh goose feces; 30% scattered feces cover
7/30/2008	9:45 AM	Southern basin, eastern shoreline; north of beach near seepage station HPS4	6	0	feeding/traveling on water	Beach has widely scattered goose droppings (<30% cover)
8/6/2008	8:30 AM	Town beach	0	0	NA	It was raining, no geese spotted. <10% scattered feces cover in grassy areas
8/29/2008	NA	Town beach/ramp	28	0	NA	NA
9/18/2008	10:40 AM	Town beach	3	0	leaving the beach area to travel on water	Beach and grassy area have very few goose droppings (<<30% cover) with almost no fresh feces. Dog feces present in a couple of locations.
9/18/2008	10:50 AM	Southern basin	44	0	Descending onto the pond from the south. 3 mute swans also present.	As above
10/16/2008	AM	NA	0	0	No geese observed	None noted
11/12/2008	11:15 AM	Far northern basin	25	0	traveling on water	None noted
1/19/2009	8:30 AM	Southern basin	3	0	Flyover from S to N	> 1' snow cover - no feces noted

Complete ice cover on pond (except at flowing outfalls), typically 7". 5 to 15" of snow cover over the ice.

Hopedale 5/29/08

Sunny – 75°

Site 7.

	DO.%	DO. mg/l	temp	cond.	PH	Color
Site 7	82	7.3	18.3	965 µS	7.6	4
					6.8 color whl	
	flow = 6' X 5.5" X 3'/3sec					
	~~10~~ 11 AM					
Site 6	73.8	7.72	13.1	297 µS	6.8	3
11:46am	Flow 2.3' X 2" X 3'/5sec					
Site 5	80.4	7.34	19.1	621 µS	6.3	3
12:00	0.1' X 8' X 12'/2.8 sec					
Site 4	~~82.5~~ ~~87.5~~	~~8.04~~	~~15.4~~ ~~14.3~~			
	84.1	8.6	14.5	954	6.7	2
	Flow = 2.5' X 0.05' X 1'/3sec					
Site ~~2~~ ①				S	6.7	2
41.79349N				B	6.7	
71.34971W						

		DO%	mg/l	temp	cond
Site 1S	0	92.1	8.1	22.4	529
41.79349N	0.5	93.6	8.2	21.8	
71.34971W	1	96.0	8.6	21.0	
10ft deep	1.5	94.5	8.5	20.5	
	2	84.3	8.1	19.8	
	2.5	88.0	8.3	17.8	526
	~~3~~				
Site 2		93	8.3	20.8	523

42.1382° N

71.55154W

pH = 6.5

depth 4ft

color = 0

Site Secchi 1.9

Site 2 >1.5

Location Hopedale Pond Date 27 June 08

Project / Client H153-000

Personnel: C. LORD / M. LADEWIG

Wx: sunny, no wind, 75 F, humid

Secchi disk: 2.5m

Sample Location	Time	Temp(°C)	pH	Cond (uS)	Turb (NTU)	Diss O2 mg/L	%	Color	Depth(ft)
1 Surface	8:38am	24.2	7.4	552	3.65		92%	6	8ft
N 42.13339						7.71mg/L			
W 71.54493		24.0		553		7.40	88.2		.5m
		24.0		553		7.22	85.8		1m
		23.9		553		4.76	55.7		1.5m
		22.8		554		0.88	8.8		2m
1 Bottom	9:01am	20.2	7.3	580	3.05	0.32	3.6		2.5m
3 Surface (duplicate)	9:18am	24.3	7.1	553	3.54	7.83	94%		
2 west of pointed pier in lake N.42.14178 W 71.55574	9:53am	23.6	7.0	576	2.71	6.34	73.1%	5	5ft
4 slight smells like sewage	10:50am	15.8	6.9	1026	4.86	9.59	97.9%	—	—
6 lots of PIvy	11:35	17.0	6.3	304	4.81	7.50	76.3%	4	—
5	11:58	22.8	6.4	641	4.28	7.07	81.8%	5	—
7 alt	1233	23.7	6.9	950	7.16	7.88	93.1%	3	—

under powerlines off Reservoir Rd

Location Hopedale Pond Date 27 Jun 08

Project / Client H153-000

Personnel: C. LORD / M. LADEWIG

Canada Goose observations

Location	# Adults	# Goslings	Behavior
Grass next to town beach lot	~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~ ~~IIII~~	IIII	Grazing/resting (on land)

Flow

Site 4 0.5ft/sec x 0.1 ft deep x 3ft wide.

Site 6 1.0 ft/4.5sec x 0.1 ft deep x 1.8 ft wide

Site 5 4 in above spillway ~14 ft wide x 0.8 ft deep x 1.0 ft/2sec

Site 7 1.0 ft/3 sec x 0.8 ft deep x 10 ft wide

Location T.F. GREEN AIRPORT, WARWICK, R.I. Date 7/16/08

Project / Client RIDEM - BUCKEYE BROOK

SUNNY, MID-80'S, CLEAR

CN, DH

CONTACT BRENDA POPE TO ARRANGE W/ERNIE TO GET INTO AIRPORT

SITE	TEMP (°C)	DO % sat/(mg/L)	COND µmos/cm	pH	TURBITIY (NTU)
BB00		COLLECTED BY RIDEM			

HABITAT ASSESSMENT - SEE SHEETS

HOPEDALE POND - STREAM FLOW

SITE

4 3' × 0.1' × 1' / 4 sec

5 20' × 2' × 1' / 6 sec

6 NO FLOW

7 10' × 0.4' × 1' / 2 sec

Location HOPEDALE POND Date 7/17/08

Project / Client TOWN OF HOPEDALE

DH, MS, HIGH 80'S SUNNY, PARTLY CLOUDY

SITE	TIME	TEMP °C	pH	COND	DO (mg/L)	DO (% SAT)	COLOR	DEPTH	Secchi (m)
1	10:30 AM	27.6	7.2	606	7.03	88.7	10	0	
		27.5			6.52	84.4		0.5	
		27.3			6.78	86.2		1	
		27.1			6.77	85.3		1.5	
		25.8			3.44	41.7		2	
		25.4			1.42	17.1		2.5	
								3	
1B	10:45 AM		7.3	602			5		2.75
2	11:30	28.9	7.3	751	8.75	114.3	7		
4	12:30	(19.9) 28.6	5.2	1142	7.38	97.5	3		
5	1:15	26.5	6.1	782	6.16	75.1	7		
6	1:45	← NO FLOW →							
7	2:15	28°	6.4	1062	7.18	91.2	8		

36 CANADA GEESE OBSERVED IN SOUTHERN BASIN

Location HOPEDALE POND Date 7/23/08

Project / Client

TRANSECT		WATER DEPTH	TOTAL DEPTH	SPECIES	% COV	BIO
P	1	7.5	8.5 SAND	UT NI	2	1
	2	7.0	16' +	NI	3	1
	3	11.0	16' +	UT NI	3	1
	4	6.0	7.2 SAND	NI	3	1
E	1	~~9.1~~ 8.0	9	NI	3	1
	2	6	11.5	NI	3	1
	3	9.75	10.5	NI	1	1
	4	6.0	6.5	NI	1	1
F	1	8.5	9.0	UT, NI, RR	1	1
	2	6	6	UT, NI, RR	1	1
	3	3	3	NI MH CH UNK A	4	4
G	1			UT MH	4	2
	2			UT MH	4	2

Location HOPEDALE POND Date 7/25/08

Project / Client TOWN OF HOPEDALE

JF, DH (CONT) DAY 2 SUNNY, MID-80'S

TRANSECT		WATER DEPTH	TOTAL DEPTH	SPECIES	% COV	BIO
G	4			UT, MH, CH NO	4	3

7/25/08
8:30 AM 4 ADULT C.G @ BEACH PREENING AT WATERS EDGE

TRANSECT		WATER DEPTH	TOTAL DEPTH	SPECIES	% COV	BIO
H	1	6.2	7.0	NI NO	2	1
	2	6	6.5	NI	3	1
	3	6	~~6.75~~ ~~7.5~~ 6.6	UT NO NI	3	1
	4	7.2	9.4	NI	3	1

9:15 23 GEESE ACROSS WATER FROM TRANSECT H ALL ADULTS

I	1	7.75	16+	UT, NI	3	1
	2	8.5	16+	NO NI	3	1
	3	8.0	16+	NI	3	1
	4	10.1	12.9 SAND	NI	3	1
	5	8	10	NI MH UT	3	1
J	1	5	7.5	MH UT NO	4	2

Location HOPEDALE POND Date 7/25/08

Project / Client TOWN OF HOPEDALE

PN = POTAMOGETON NATANS PO = OAKES PONDWEED POTAMOGETON ~~OA~~

TRANSET	WAT DEP	TOT DEP	SPECIES	% COV	BIO
J 3	4	8.0	MH, UT, NO	4	3
K 1	3.5	12.5	MH, NO, UT PN	4	3
2	3.5	13.2	UT, NO NV, BS	4	3
3	3.0	4.0	NV, UT, NO	4	4

BACK COVE NEARLY IMPENETRABLE
NV, NO, BS, UT, PN, MH ALL PRESENT
MOVING FROM DECAYED TREES

TRANSET	WAT DEP	TOT DEP	SPECIES	% COV	BIO
L 1	5		MH, UT NO	4	2
2	7		UT, MH	4	2
3	4		UT, MH, CH	4	3
4	3,5		CH, UT	4	2
5	3.5		CH, UT	4	2
M 1	5.75		UT, MH	4	1
2	4		CH, MH	4	2
4	4		CH NO	4	2
5	4		CH, UT MH PO	4	2
N 1	4.5	5.5	CH, MH, UT	4	2
2	4.5	5.9	UT, MH, NO UNK A	4	3

Location HOPEDALE POND Date 7/25/06

Project / Client TOWN OF HOPEDALE

		WATER	TOTAL	SPECIES	% COV	BIO
N	3	4	5	NO, UT	4	3
	4	3,3	4	UNK A, NO	4	3
O	1	4,0	5,0	UT, PO	4	2
	2	5.9	7,5	MH, UT PO	4	2
	3	6.0	7.1	UT, NO CH	4	2
	4	6,25	12.0	UT, MH NO	4	2
P	1	4		CH, NO	4	2
	2	5		UNK A CH	2	1
	3	6		—	0	0
	4	5		—	0	0
Q	1	7,25		NI	2	1
	2			NI	3	1
	3			NI	3	1
	4			NI	3	1
R	1			NI	1	1
	2			NI	3	1
	3	7,0		NI	3	1

Location HOPEDALE
Date 7/25/08
Project / Client HOPEDALE POND

TRANSECT		WATER DEPTH	TOTAL DEPTH	SPECIES	% COV	BIOVOLUME
S	1	7.5		NI	3	1
	2	8.5		NI	1	1
	3	7.75		NI	2	1
	4	7.0		NI MH	3	1
T	1	3,75	4.00	NI	2	1
	2	8.00	12.00	NI	~~8~~ 2	1
	3	10.00	11.75		0	0
	4	8.00	8.2		0	0
U	1	8.5	—	~~0~~	0	0
	2	8.0	—	~~UNKA~~ FG	1	0
	3	8.0	—	FG	2	1
	4	6.0	—	FG	3	1
V	1	11.5	12.5	NO PLANTS	0	0
	2	9.5	10,8	FG	1	0
	3	9.5	9.8	FG	1	0
	4	9.0	9.2	FG	1	0
W	1	8.2		FG	0	~~0~~ 0
	2	8.6		UNKA	0	0
	3.			— NO PLANTS	0	0
	4			—	0	0
X	1	8.6		NI, MH	1	1
	2			NH, NI, FG	1	1

Location
Date
Project / Client

e Circled, Dated And Initialed When Recorded.

assifications

ntial spontaneous combustion, or emission of
nable gases when in contact with water)
d Organic Peroxides
fectious substances

gerous goods

reviations (for sampling guidelines):

ston Round
Amber Boston Round
nber Jug
- Clear Wide Mouth
- Amber Wide Mouth
ly - Polyethylene Bottles
OD Bottle

Lake Name: HOPEDALE POND
Date: 7/30/08
In-Lake Water Temperature:
Weather: Sunny, warm (70s to mid 80s over course of the day), calm
Researchers: MDL, MS

Seepage Meter ID	Size *S or L*	Depth to base *inches*	Time In *hr/min*	Time Out *hr/min*	Volume In *ml*	Volume Out *ml*
S1a	L	1.40 ft 0.3 ft below	10:19	15:16	250	214
S1b	L	1.6 ft	10:28	15:10	250	219
S2a	L	1.85 ft 0.4 ft below sed	8:50	14:09	250	242
S2b	L	2.60 ft 0.5 ft below sed	8:55	14:13	250	206
S3a	L	2.70 ft 0.5 ft below sed	9:11	14:29	250	330
S3b	S	2.30 ft 0.35 ft below sed	9:20	14:26	250	306
S4a	L	2.50 ft 0.4 ft below sed	9:42	14:40	250	184
S4b	S	1.35 ft 0.3 ft below sed	9:50	14:45	250	144
S5a						
S5b						
S6a						
S6b						

Location Gilford, CT Date

Project / Client

Station	Width (ft)	Depth (in)	Vel (f/s)
GC 2	7.8 EOW	0	✓0
	10.5	5	✓6.3
			✓4.7
	14	6	0
			5/27
	15.5	7	✓6.5
			✓8.8
	17	11.5	✓6.3
			✓6.1
	18.5	10	0
			0
	20.5 EOW	2.5	0
			0

Location Hopedale Pond Date 7/30/08

Project / Client Town of Hopedale Start 8:30 am

Distance to water from outlet bridge (bottom) 2.50 ft 760 mm

Wx: Sunny, 70s °F calm Personnel: M. LADEWIG/M. SCHAEFER

SITE	TIME	COND µS/cm	pH	Temp °C	NOTES
HPS1	10:43	647	7.2	21.5	Full pen. of
Surface	10:43	535	6.7	26.6	LiP sampler
HPS2	11:40	1156	5.9	20.7	Turbidity ~ 46.74 NTU
Surface	11:40	542	6.6	28.0	~ 2/3 penetration on LiP sampler
HPS3	12:20	64C	6.6	21.6	full pen. of LiP sampler
HPS4	13:15	383.7	6.9	25.6	semi Probes

* 6 Canada geese @ HPS4
grazing & swimming

Hopedale Storm Water Sampling

Date:

Personnel:

		cond.	pen	Dan	white/purple								T
					DO				Flow				
Site	Time	Temp-C	pH	Conductivity	mg/L	% Saturation	Color	Depth	Width	Depth	Length	4sec	
4 (Dutcher St Outfall)	8:37	11.8	7.5	822	5.8	95.8	12	7"	~~75~~	7"	3'	1.5	17.19
SS 11	909	12.6	6.6	50.4	9.5	98.5	8		24	5.5	3	5.5	4.94
SS 2 ~~[illegible]~~	95[illegible]	17.6	6	12.5	8.0	[illegible]	1	~	17n	N		~~[illegible]~~ 19ml	21.11
SS 3	1249		~~[illegible]~~	~~[illegible]~~									19.13
SS 8 (Stream at Driftway)	1025	12.0	6.0	500	7	73.5	8		19	2"	3'	9.0	1.73
5 Noel [illegible] esite	1059	19	6.3	729	[illegible].5	74.7	2		156	7"	3'	3.5	[illegible]
6 Shaw[illegible]	1179	13.7	5.8	15[illegible]	5.6	62.2	7		75	10"	2	[illegible]	3.60
7	[illegible]	2	6.5	[illegible]	7.5	[illegible]2.6	[illegible]		7[illegible]	[illegible]	3	2	[illegible]
					~~[illegible]~~	~~87.6~~							~~[illegible]~~

18.7 [illegible] 16.7

Hopedale - Cloudy - 64
0-5 mph winds

8/29/08

	D.O.%	mg/L	PH	cond	temp
Site 7	82.8	8.08	7.1		16.5
Site 6		Not sampled			
Site 5	71.5	6.62	6.7		19.0
Site 4	84.5	8.05	7.2		17.7
~~Site 3~~					
Site 2	59.9	5.39	7.1		21.3
Site 1s	84.0	7.4	6.7		24.2
~~Site 1b~~					23.7
0.5	79.6	6.75			22.2
1.0	74%	6.4			21.5
1.5	64.8	5.72			21.4
2.0	61	5.5			21.3
2.5	59.8	5.29			
~~3.0~~					
Site 1b - @2.5m			6.7		

Flow

~~3.0 ft~~ 18" X 3½ sec X 1" 10:30
No Flow 10:45
11 AM
1'/2sec X 18" x 3.5" deep 11:15

Secchi - to bottom.

Geese = 28 @ Boatramp

Secchi Disk = 1.25 m
@ site 1

Phyto collected ✓
Zoo collected ✓

Hopedale Water Sampling

Date: ~~10/9/08~~ 9/18/08

Personnel:

Site	Time	Temp-C	pH	Conductivity	Turbidity	DO		Color	Depth	Flow			
						mg/L	% Saturation			Width	Depth	Length	/sec
Site 1- surface	12:03	21.6	6.5	464	—	6.06	67.2	0					
Site 1- bottom	12:30	22.2	6.5	460.3	—	see below							
Site 2	11:18	19.3	6.3	564	—	5.68	62.1	10	NC				
Site 4	9:54	18.0	6.8	850	—	8.34	93.5	4	5"	49"	5"	3'	5
Site 5	8:23	17.5	6.5	617	—	7.5	78.5	7	20"	0	20"	3'	1.5
Site 6	9:05	14.5	6.3	263.7	—	8.51	83.3	1	15"	85"	15"	3'	38
Site 7	7:47am	24	7.2	915	0.84	8.7	99	10	6"	140"	6"	3'	1.75

Do @ depth DO Cond.

1m = 64.6% 5.82 mg/L / 462.4

2M = 62.7% 5.63 mg/L / 463.4

~~3M~~ =

2.5M = 42.6% 4.0 mg/L

Water Body Name: Hopedale Pond
Date: 9/18/08
Surface Water Temperature: 19.2
Weather: Sunny, cool, calm
Researchers: GB/ML

Seepage Meter ID	Size S or L	Depth to base inches	Time In	Time Out	Volume In ml	Volume Out ml
S1a	L	1.7 ft (lip 2.5 in below sed surface)	1130	1425	250	233
S1b	S.	1.3 ft (lip 3.0 in below sed surf)	1140	1420	250	238 + 62 = 300
S2a	L	1.6 ft (3.0" below sed)	1250	1505	250	353
S2b	L	2.2 ft (3.5" below sed)	1300	1510	250	316
S3a	L	1.6 ft (lip 3" below sed surface)	0732	1410	250	376
S3b HPS3a on GPS	L	2.0 ft (lip 3" below sed surface)	0920	1415	250	210
S4a	S	1.35 ft (lip 4" below sed surface)	0800	1350	250 mL	230 mL
S4b	L	1.65 ft (lip 4.5" below sed surface)	0825	1355	250 mL	201 mL
S5a						
S5b						
S6a						
S6b						
S7a						
S7b						
S8a						
S8b						

— stopper was not tight when released

Hopedale Pond

partly cloudy 60°

CL/SK

10/16/08

39

Site	Time	Temp°	pH	Cond	Turb	DO mg/L	%	Color	Depth	Width	Leng	Sec
1s	912	15.5	6.6	~~1430.1~~ 541	.15	8.02	80.0	0	~~8'~~	—	—	—
1b	1143	—	6.5	—	1.01	—	—	1	8'			
2	1217	15.6	6.5	640	.02	8.68	86.7	1	5'			
4	1038	16.6	6.8	808	0.28	8.5	88.5	0	2.5"	55"	3'	3
5	959	13.8	6.5	690	1.37	9.07	89.6	0	20"		3'	2
6	1015	12.5	6.0	~~219.6~~ 330	1.62	7.60	70.4	0	17"	95"	3'	19
7	926	16.3	6.6	866	1.17	7.49	79.2	2	2"	50"	3'	22

Use width from Sept.

	Depth	Temp	Cond	DO mg/L	%
1b	1/2m	14.0	540	8.03	78.7
	1m	13.3	540	7.60	73.0
	1.5m	12.5	541	6.96	64.9
	2m	12.1	532	~~7.66~~ 7.06	69.8
	2.5m	—	—		

781-420-1184 Ken

0

~~gage~~

Seccidisc 1.75m

50° Sunny

Hopedale Pond

CL, JF

11/1/12

						DO							
		Time	Temp	pH	Turb	mg/L	%	Color	Depth	Width	[illegible]	sec	Cond
	1s	1145	10	6.6	.073	8.6	76	Z	7	—	—	—	550
	1b	1210	9.8	6.7	.33	7.92	75.1	0	7	—	—		552
1s	3	—	—	—	—	—	—	—	—	—	—		
	2	11:13	7.9	5.9	2.13	9.86	81.6	0	4"	—	—	—	~~[illegible]~~ 577
	4	1013	12.9	6.6	0	9.2	87.7	Z	4"	55	3'	9	790
	5	9:20	7.1	6.5	0.67	10.3	85	0	12"	22"	3'	12	572
	6	9:40	5.2	6.0	0	11.14	87.5	0	18"	34"	3'	45.	209.8
11X	7	8:50am	8.3	7.2	0.52	10.8	91.3	0	11'	100'	3'	25	~~[illegible]~~ 717

flow @ main

DO

1b	Depth	Temp	Cond	mg/L	%
	1/2m	9.86	553	8.43	74
	1 m	9.4	554	8.18	~~67.8~~ 71.6
	1.5m	9.3	554	7.55	65.5
	2m	9.1	554	8.03	69.8
	2.5m				

Secci disc = 1.5 m

266
4
220

geese: 0 on land
25 in pond

Hopedale Storm Water Sampling

Date: 11/13/08

Personnel:

Site	Details	Time	Temp-C	pH	Conductivity	DO		Color	Depth	Flow				Turbidity
						mg/L	% Saturation			Width	Depth	Length	/sec	
4 (Dutcher St Outfall)	The big outfall at he southern end of the pond where you have to climb in.	1510	10.3	6.7	~~0.5~~ 560	11.25	101.4	35	1"	44"	1"	1'	2	12.81
SS 11	ODOR - Sewage Outfall North of the town beach	1540	~~8.0~~ 10.2	6.4	~~0.73~~ 0.35	~~10.84~~	~~95.[illegible]~~ ~~117.6~~%	5	0.25"	8"	0.25"	2'	1.2	10.76
SS 2	in cul-d-sac, look for collection drains on the other side of the street. Outfall is upland of water's edge.	16:10	NO	FLOW										
SS 3	in cul-d-sac, look for collection drains on the other side of the street. Tricky, it's a pipe that comes out near a tree before you get to the bank.	16:20		NO FLOW										
SS 8 (Stream at Driftway)	N. on Dutcher Street, LFT on Driftway, RT at the "T". There will be a white wooden guardrail on the lft side of the street, the collection site is down there.													
5	Torrent of water that flows under the roadway	1656	7.0	6.4	586	10.48	86.7	30	2.5'	20'	2.5'	2'	3	0
⑥	On the opposite side of th street as 5, where you have to climb down the bank. The low metal guardrail on that side of the street is a good spot to look for.	16:50	6.4	6.7	217.1	9.9	80.6	5	2.5'	8'	2.5'	1'	9/1'	0
7	All the way up North where the entry is down what looks like a personal driveway. Colelct downstream of the spillway.													
SS 11			10.2		250	10.84	95.9							

Location Hopedale Pond Date 9/18/08

Project / Client Town of Hopedale

Other birds observed:

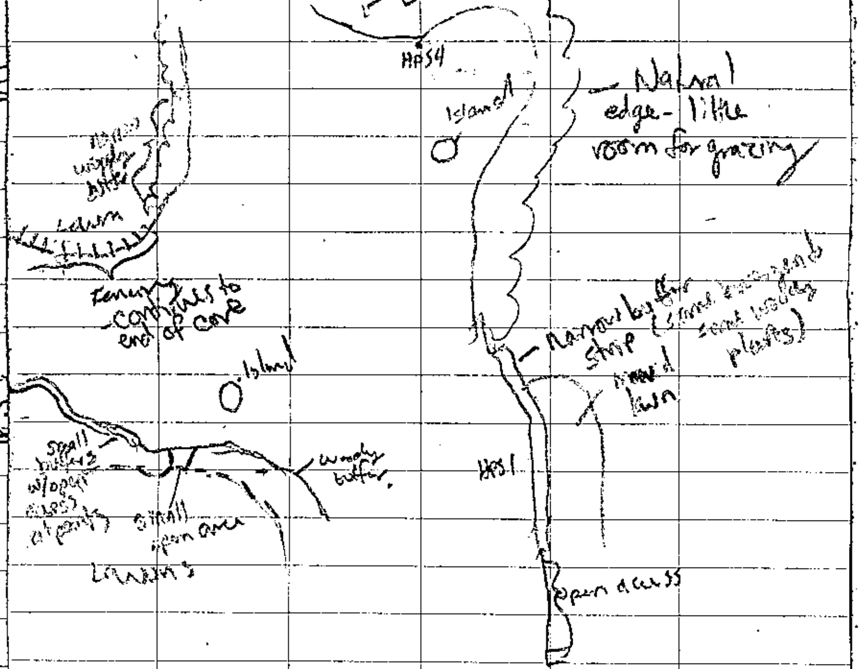
2 mallards - swimming then flying

2 great blue herons - foraging

1 green heron - flying / foraging

- Snail: operculum w/ concentric rings

- More goose notes (shore access)



Location Hopedale Pond Date 1/19/08

Project / Client Town of Hopedale

Personnel: M. LADEWIG / S. LUNDIN / J. FARRELL

wx: Cloudy ~32°F

~12" snow cover over ice (5-8" thickness)

213.3 mm

Site	Time	Temp(°C)	pH	Cond (uS)	Turb (NTU)	DISS O2 mg/L	DISS O2 %	Color	Depth
1S	8:30	[illegible]	7.5	[illegible]	0.05	11.65	79.0		Surface
1B	9:00	1.3	7.5	65 m ~~[illegible]~~	~~0.05~~	4.85	38.0 ~~65.5~~		bottom
		0.1		217.3		9.49	65.5		0.5
		0.2		215.6		9.81	69.7		1.0
		0.7		219.5		9.60 ~~[illegible]~~	68.0		1.5
		2.6		353.9		8.17	62.1		2.0
		3.9		665		4.85	38.0		2.5
2	15:00	0.2	7.6	187.4	0.08	10.86	74.8		Surface

- Flyover 3 Canada geese @ 8:30

- Secchi: 1.75 m (ice-influenced)

Location HOPEDALE POND Date 1/19/09

Project / Client TOWN OF HOPEDALE

Personnel: M. LADEWIG/ S. LUNDIN

SEDIMENT CORES

STATION	DEPTH TO SED (m)	SAMPLE DEPTH (m)	SED TYPE	REFUSAL AT	PHOTO
SC1-A	2.4	2.8	Dk brown silt-clay	Gravel or Bedrock	1
B	2.0	2.4	Dk brown soft organic mud	"	1
Two cores @ C	1.9	2.6			2
Also collected nutrient composites here					
SC2-A	0.6	1.8	Br Peat		2
↳ SC2-A same location as HP97A					
↳ Nutrients also collected					
SC2-B	0.9	1.9	Br Peat		/
SC2-C-3	1.0	2.6	Br Peat		/
C-2		2.7			/

Location HOPEDALE POND Date 1/19/09

Project / Client TOWN OF HOPEDALE

Personnel: M. LADEWIG / S. LUNDIN

SEDIMENT DEPTH

LOCATION	WATER DEPTH	TOTAL DEPTH	SED DEPTH
HP97A	2'	15'	13'
97B	2'	5'	3 → lots of resistence
97C	2'	>15'	> 13'
HP98 ~~A~~ C	1'	>15'	>14'
98 B	2.5'	>15'	> 12.5'
98 A	2'	>15'	> 13'

Hopedale Pond 1/19/09

Water Quality

Site	Time	Temp°C	DO m/L	Oxygen %	pH	Cond. uS/cm	Flow ('') D	W	V	Color
4	9:15	7.3	8.30	65.0	7.9	1006	6	32	45/3'	5
							*Turb. 1.4 NTU			
5	11:15	0.5	10.5	69.5	7.8	257.5	10''	10ft	35/SR	0-5
							*Turb. 1.3			
7	10:15	1.8	9.13	65.5	7.8	354.2	8''in	7ft	45/SEC	10
							*Turb. 1.4			
6	11:45	0.4	8.08	54	6.8	259	6''	5'	1/1	5
							*Turb. 0.90			

"Rite in the Rain"

Appendix E

Storm Drain Identification Survey Map

Location:G:/GIS-Projects/H153-Hopedale-Pond/00-mxd/FinalFigs/StormDrainPoints.mxd

ESS
Group, Inc.

Engineers
Scientists
Consultants

HOPEDALE POND
Project Location: Hopedale, Massachusetts

Scale: 1" = 1,000'

Source: 1) MassGIS Orthophotos, 2005
2) ESS Group, Inc., Sites, 2008

Surveyed Potential
Water Quality Sampling Sites

Site ID	Location
CB1	at dam on Freedom St.
CB2	at dam on Freedom St.
CB3	at dam on Freedom St.
CB4	To outfall #1
SS1	Outfall #1
CB5	To outfall #2
SS2	Outfall #2
CB6	To outfall #3
SS3	Outfall #3
CB7	Outside self storage, conencted to CB8?
CB8	Inside self storage facility
CB9	start of Lake St. loop
SS4	Downstream of Fiske Mill Pond, DS of ftbrdg
SS5	Little Field Pond outlet @ Fiske Mill Rd
SS6	Outlet from Mill Pond, downstream of stairway
SS7	Unnamed trib, downtream of Rt 140
CB10	Driftway at Cutler
SS8	Stream on Driftway
SS9	Main Dutcher outfall at Twn Beach
SS10	stormwater outfall
SS11	outfall N. of Bathhouse, dry flow
SS12	Trailhead N. of beach area, tributary
SS13	Outlet from North Pond

CB = catch basin
SS = storm sewer

Appendix F

Hopedale Park Commission Timeline

YEAR	MILESTONE	NOTES OF INTEREST
1899	**Park Commission Formed (3/6)**	**Startup budget: $12,000 / annual budget: $2,500 - approved by town meeting.**
		The first necessity: "A public play ground of suitable contour for such as baseball, football etc. requiring a large acreage of fairly level land."
	* Town Park land acquired (7/21)	$900 paid to Henry L. Patrick for 11.43 swampy, rocky acres
	* First Parkland parcels acquired	$3,917 paid to various landowners for 176.11 acres. On pond's West shore: land between the water and railroad tracks; and land between the railroad tracks and the top of Darling Hill. East side of pond: land from the intersection of Hopedale and Freedom streets to Hazel St.
	* Stone wall built around Park	All stone taken from excavation/clearing of property.
1900	**Budget: $2,500**	
	* Swamp at Town Park drained	Land graded, drainage system installed
	* Rawson's Bridge constructed	Wooden bridge at North end of pond connects both shorelines
	* Town Park land dispute	H.L. Patrick returns $900 for land, demands more money. Town to let court decide issue.
	* Adin Ballou homestead lot acquired (5/29)	Deed for 1/2 acre lot donated to Park Comm. along with $800 to start a maintenance trust fund. Lot designed by Warren H. Manning
	* Ballou Statue dedicated October 27th	8' high statue of Roman bronze, weight:1600 lbs. Modeled by William Ordway Partridge of New York City and Milton, MA. Casting done in New York City. 8' high pedestal of Cape Ann granite designed by Daniel Woodbury of Boston, MA.
1901	**Budget: $2,500**	
	* Original Town Park plans completed	Patrick land suit over Park grounds remains in litigation
	Trees planted at Town & Ballou Parks	
	* First tennis court built	Dirt surface
	* Temporary bandstand erected	
	Park garage built	
	* Large & small ballfields constructed	
	Rawson's Bridge raised	Mistakenly built too low - boats couldn't pass under.
	* Hazel St. entrance built	Road cut to west side of bridge connecting to railway line.
	Maroney's Grove picnic area built	Picnic area in a majestic pine grove off of Hazel St. entrance
	First Park Field Day Celebration - July 4th	Became a Town tradition for decades
1902	**Budget: $2,500**	
	* First Park Superintendent hired	Fred A. Smith - naturalist & forester. Tree nursery set up.
	* Second tennis court built	Dirt surface

	Drinking faucet added at Park	
	* Additional Parkland acreage acquired	4.75 acres bought from Geo. A. Draper - abutting today's Cutler St.
	Shooting & trapping problems in Parklands	Signs posted with $10 fine for violations
	Stone-crushing operation set up	By Road Commission on lot across from Park - near 68 Dutcher St. Operation halted & lot cleared in 1903.
	* Open brook from Park to Pond enclosed	
1903	**Budget: $2,500**	
	* Additional Parkland acreage acquired	Land across from tracks on both sides of Old Salt Box Rd. donated, small parcel at north end of Parkland grounds donated by heirs of Chester Walker.
	* First income from sale of Parkland timber	$568.20 added to Park coffers
	* Hopedale St. extension built	Road cut along pond connecting Freedom & Northrup Streets
	* Town Park suit with H.L. Patrick settled	Town paid landowner $2,500 plus interest. Suit cost the Town many thousands of dollars to litigate over the past three years
	2nd and 3rd Park Superintendents hired	John Gallagher, Walter F. Durgin
	Hunters elude "No Hunting" in Parklands...	...by hunting from boats. Fines then posted for this activity too!
	Adin Ballou Park addition	Front doorstep from Ballou's "old house" placed at the site
	Electric cars make Parklands stop	Passengers dropped off & picked up at north end of Parklands near Rawson's Bridge.
	The more things change, the more they...	First arrests made by police in Parklands for "drunken carousals."
1904	**Budget: $2,500**	
	* Bath House constructed	Cost: $1,048.09 Built at site of old ice house which burned down during demolition. This prevented the intended re-use of much of the frame and sheathing in the new structure. Locker rentals were $1.50/yr. - .50 deposit given back with key return
	* Town Beach Opens (males only)	Season attendance: 1971 baths taken. Daily high: 79
	Organized sports flourish at Town Park	Baseball, rugby and association football are popular
	Adin Ballou Park addition	Commemorative bronze tablet added to Ballou doorstep.
1905	**Budget: $2,500**	6,322 baths taken. Daily high: 143
	* Town Beach & Bath House expansion	Sand placed on ice melted in to create beach area / Dressing rooms built / float and springboard added. Bath house matron position created. Yound ladies and women granted permission to swim.
	Many skating accidents on the ice	*"The Park Commissioners wish it distinctly understood that they take no responsibility whatsoever for the safety of the ice as any time."*
	Dutcher St. houses built near Bath House	
	* Parkland footpaths built off of Dutcher St.	

1906		**Budget: $2,500**	Pond attendance: 3,633 / Daily high: 154
	*	Permanent bandstand constructed	Cost: $828.40 Also used as a tool shed and dressing room for visiting teams utilizing the Town Park - if "properly behaved."
	*	Third tennis court built	Cost: $345.72, Dirt surface
	*	Additional Parkland acreage acquired	One acre parcel at intersection of Adin St. and West Main St. (today's Rt. 16) donated to the Park Commission by Mssrs. Wm F., Geo A. and Eben S. Draper. A $1,500 trust fund of $1,500 was established to insure the parcel is "properly kept."
1907		**Budget: $2,500**	Pond attendance: 4,768 / Daily high: 167
		Bandstand Electrified	
		Potable water line brought to Bath House	Provided by the Milford Water Co.
	*	Parklands road expansion	Road constructed connecting Rawson's Bridge to Freedom St.
	*	Foot path completed to Darling Hill	Opened up access to vantage point with fine views off of Old Salt Box Rd. Over three miles of paths now exist in the Parklands.
		Tennis court backstop constructed	
		Many bird feeders set out in Parklands	This practice continued for decades. The Commission supplied feed.
1908		**Budget: $2,500**	Pond attendance: 6,370 / Daily high: 181
	*	"Lookout" shelter built on Darling Hill ridge	Cost: $311.448
		Four dressing rooms added at Bath House	
		August 15th Field day attracts 3000	
1909		**Budget: $2,500**	Pond attendance: 5,704 / Daily high: 188
		Parklands pounded by Mother Nature	Gypsy moth devastation and a major ice storm destroy many trees
	*	New layout given to Town Park ballfield	
1910		**Budget: $2,500**	Pond attendance: 7,135 / Daily high: 233
		4000 attend the 10th annual field day	
		"Unfailing" springs discovered in Parklands	On east side by the Maroney's Grove; on the west near a large white oak, and at the base of an enormous red maple.
1911		**Budget: $2,500**	Pond attendance: 6,888 / Daily high: 247
		The Park system is heavily utilized...	
1912		**Budget: $2,500**	Pond attendance: 7,190 / Daily high: 114
	*	Access expanded to Darling Hill	New roads and footpaths constructed. 6 miles of roads and pathways now exist in the Parklands.
1913		**Budget: $2,500**	Pond attendance: 6,868 / Daily high: 135
	*	Comfort Station at Town Park built	Cost: $1471.20 Prep & construction spanned 1911-1913
1914		**Budget: $2,500**	Pond attendance: 6,474 / Daily high: 171
		Grandstand erected at Town Park ballfield	Work done by the "Base Ball association"
	*	New pathways added to Parklands	Connecting Rawson's Bridge - Maroney's Grove - the "big Texas rock"

		district (located at the jetty) - and the "White Oak Spring"
*	1st attempts made to clear ice for skating	A large area was cleared & flooded with some success
1915	**Budget: $2,500**	Pond attendance: 7,103 / Daily high: 372
*	Chestnut Bark Blight hits	Many trees destroyed and cut down
	Seats added on east shore of Pond	*"If the good derived from a public utility can be judged by the number of persons availing themselves of it's opportunities then the play-grounds, Bath House and Park System as a whole are surely doing what is intended. The increase in the town's population during the last few years has had a like effect on the number using our System and consequently the cost of maintaining the various utilities has increased."*
	Population boom: Park St. School built	
1916	**Budget: $2,500**	Pond attendance: 6,842 / Daily high: 225
	Park St. entrance cut through Park wall.	
	Tennis Courts redone	Cost: $700
	Darling Hill roadway construction begins	For easy access to the "Lookout"
*	Additional Parkland acreage acquired	The Commission purchases a tract west of the "Lookout" - the highest point in Hopedale at 525' above sea level. The State Fire Warden suggests it as a prime spot for a fire observation tower
*	Tree replanting begins in earnest	12,000 red & white pines planted to replace blighted Chestnut trees
1917	**Budget: $2,500**	Pond attendance: 6,641 / Daily high: 410
*	Darling Hill Roadway cut in off Freedom St.	1,800' of roadway completed - known today as Overdale Parkway
1918	**Budget: $2,500**	Pond attendance: 4,687 / Daily high: 241
	Draper "Twilight League" formed at Park	Players utilized lockers at Bath House
1919	**Budget: $2,500**	Pond attendance: n/a Daily high: n/a
*	Bath House use limited to residents	Swimmers and athletes using the Bath House as a changing facility caused over-crowded conditions at the Bath House. Commission decides to give usage priority to Hopedale residents when crowded.
1920	**Budget: $7,000**	Pond attendance: 9,876 / Daily high: 344 (5X increase from1904!)
	Park ball field & tennis courts re-graded	
1921	**Budget: $4,500**	Pond attendance: 10,580 / Daily high: 555
	Draper "Twilight" baseball league expands	Season stats & standings kept. Huge attendance
	Flagpole erected at Town Park	Cost: $370.31
1922	**Budget: $4,500**	Pond attendance: 10,407 / Daily high: 457
*	Crowds at Town Beach drain resources	Swimming & facility use restricted to Hopedale residents only
1923	**Budget: $4,500**	Pond attendance: 3,186 / Daily high: 202
*	Fisherman's Island stone shelter built	Cost: $400
*	Maroney's Grove stone shelter built	Cost: $432

*	Lookout shelter on Darling Hill repaired	Cost: $60
	Park ball diamond infield converted to dirt	Cost: $253.20
	Parklands woodlot management continues	Program in place for 20 years. Income from sale of timber: $687.50. 1,500 scotch pine trees planted
1924	**Budget: $4,500**	Pond attendance: 4,536 / Daily high: 235
	Sports at Town Park going strong...	Draper Twilight baseball, soccer, tennis and school games popular
1925	**Budget: $6,000**	Pond attendance: 4,078 / Daily high: 205
	Tennis courts & fencing rebuilt	Cost: $1757.43 - paid for with special $1,500 appropriation
*	10,000 red pines planted in Parklands	
	Tree cutting vandalism becomes a problem	*"Cutting, injuring or removing any trees, shrubs or plants is strictly forbidden by law. A severe penalty is imposed upon violators of the law."* Sections 11 and 12 of Chapter 87 of the Town's General Laws called for punishment of "imprisonment for not more than six months or by *a fine of not more than $500."*
1926	**Budget: $6,000**	Pond attendance: n/a Daily high: n/a
	Tennis courts resurfaced	Cost: 291.75
	Stone wall boundary built in Parklands	Separating Dutcher St. lots from Parkland.
1927	**Budget: $5,000**	Pond attendance: n/a Daily high: n/a
	Park Bleacher & Bandstand repair	
1928	**Budget: $5,000**	Pond attendance: 6,685 / Daily high: 283
*	Rawson's Bridge replaced	Cost: $1,300. Stone structure became known as the Rustic Bridge
1929	**Budget: $5,000**	Pond attendance: 8,441 / Daily high: 332
*	New Lookout Shelter constructed	Cost: $304
	Work begins on new Bath House	
1930	**Budget: $5,000**	Pond attendance: 9,362 / Daily high:373
*	Commissioner F.J. Dutcher passes away	Original Board member served 32 years: 1899 - 1930.
*	Bath House completely remodeled	Cost: $5,000 - special appropriation. Re-opened to swimmers on 6/12. "Hours: 10 AM to 9 PM
	Parkland stone bridge replaced	Cost: $275. Bridge located just below the Dutcher St. entrance *"Help us to make all parts of the Town Park System a source of pleasure to those using it. We will be glad to receive suggestions and promise careful consideration."*
1931	**Budget: $3,500**	Pond attendance: 8,645 / Daily high:302
*	Bath House & Swimming Director named	Mr. R.A. Lafountain 1st Swimming exhibition held to demonstrate progress from lessons
1932	**Budget: $3,500**	Pond attendance: n/a Daily high: n/a
	Fisherman's Island shelter repaired	Cost: $120

1933	**Budget: $2,000**	Pond attendance: n/a Daily high: n/a
1934	**Budget: $2,500**	Pond attendance: n/a Daily high: n/a
1935	**Budget: $4,250**	Pond attendance: 8645 / Swim lessons: 146 passed
	* Red Cross certified swim lessons offered	
	New Float added at Town Beach	Cost: $315
	Tennis courts repaired	Cost: $834.61
1936	**Budget: $4,250**	Pond attendance: 11,303 / Swim lessons: 106 passed
1937	**Budget: $4,750 + $2,000 appropriation**	Pond attendance: 11,000 / Swim lessons: 71 passed
	First N.E.A.A.A.U. swim meet competition	48 children participated
	Parkland roads re-graded	Cost: $1,389.45
1938	**Budget: $5,750 + $2,200 appropriation**	Pond attendance: 10,350 / Swim lessons: 164 passed
	* First tennis tournament held	*"The tennis courts were in almost constant use and a baseball game took place nearly every day."*
	* Sept. 21st Hurricane devastates Parklands	Maroney's Grove leveled. Fallen timber creates a severe fire hazard
1939	**Budget: $4,000 + $7,500 clean-up funding**	Pond attendance: 11,077 / Swim lessons: 145 passed
	Parkland clean-up goes all winter and spring	Dry weather and fire danger prohibits fireplace use all summer
	* First organized "play" at Town Park	Community House conducts organized youth sporting events.
1940	**Budget: $4,000**	Pond attendance: 9,462 / Swim lessons: 69 passed
	Town Park drainage system rebuilt	
1941	**Budget: $4,500**	Pond attendance: 7,521 / Swim lessons: 67 passed
	Tennis courts reconditioned & resurfaced	Cost: $1,014
	Pond swim meet attracts 100 participants	
1942	**Budget: $4,500**	Pond attendance: 12,814 / Swim lessons: 112 passed
	* 80' Wooden flagpole erected at Town Park	Cost: $455.40 *"In accordance with wartime regulations, a Flag is flown at all times."*
1943	**Budget: $6,000**	Pond attendance: 11,275 / Swim lessons: 53 passed
	Park trees & shrubs inspected	*"...certain of the trees were noted as being unusual varieties or specimens, types which are rarely found in such excellent condition in this part of the country."*
	Season ending town swim meet popular	
1944	**Budget: $5,000**	Pond attendance: n/a Swim lessons: not offered
	All facilities used heavily as war limits travel	Limitations on wartime travel keep residents close to home. Facilities getting heavy use. No swim lessons due to labor shortages. Bath House hours expanded to Sundays and holidays. Men's & women's softball introduced
1945	**Budget: $5,500**	Pond attendance: n/a Swim lessons: 49 passed
	* Additional Parkland acreage acquired	Town purchases land for Park Department: 31.5 acres with frontage on Overdale Parkway and Old Salt Box Rd., 12.367 acres form Hope-Dale Coal & Ice Co. where old ice houses once stood.

	* Parkland land acquisitions complete	Connecting existing roads and pathways will provide complete access around the entire pond and Parkland reservation.
1946	**Budget: $8,500**	Pond attendance: 8282 / Swim lessons: 137 passed
	* F. Carlton Miner hired as Waterfront Director	
	Tennis courts individually enclosed	Wire mesh installed to prevent injury from stray balls from ballfield.
	Discussions on "farming" the Parklands	Beautification and fire equipment access cited as goal.
1947	**Budget: $10,100**	Pond attendance: 8282 / Swim lessons: 137 passed
	* Tennis courts refurbished with clay	
	Sandy bottom of swim area extended out	
	* First adult swim lessons offered	
	New maintenance equipment purchased	Commission buys a Jeep and large gang mower. Jeep useful as 24-hour fire patrols needed in the Parklands during a very dry Fall.
	Forester hired to survey the Parklands	
1948	**Budget: $10,000**	Pond attendance: down / Swim lessons: 250 enrolled, 171 passed
	* Supervised Park play now under Park Dept.	Community House supervised program for nine years. 100 children attend morning activities
	* Weeds in Pond become nuisance	"Uninviting" water responsible for low daily swim attendance.
	Parklands roads graded and leveled	
	Proposal to add new playground equipment	
	Raft at Town Beach rebuilt	Cost: $333
1949	**Budget: $11,000**	Pond attendance: 8,740 / Swim lessons: 130 enrolled, 125 passed
	* New Park playground equipment installed	Cost: $1,078.40 Swings, jungle jim, horizontal bars added.
	* Draper Corporation drains Hopedale Pond	Solution to curb weed problem. Pond lowered & cleaned. View at: http://www.hopedale-high-alumni.com/hopepond/dredge/album.htm
	Shade trees planted at Bath House	
	* Draper Field ballpark completed	Constructed by Draper Corporation. View photos of construction at: http://www.hopedale-high-blue-raiders.com/BallFieldAlbum/album.htm
1950	**Budget: $11,300**	Pond attendance: 10,982 / Swim lessons: 100 passed
	* Basketball Court installed at Town Park	Cost: $1135.19
	Park staff added to supervise heavy use	Baseball and basketball "schools" and tennis tournaments offered
	Diving class added at Pond	
	In-town swim meets continue at Pond	An end-of summer tradition started in 1937.
	* Park programs continue to expand	Archery, handicrafts, horseshoes, tennis, baseball and basketball sessions are all well attended
1951	**Budget: $11,300**	Pond attendance: 10,158 / Swim lessons: 162 passed
	* First multi-town swim meet held at Pond	Swim team formed. Competed with teams from Holliston, Franklin

		and the Whitins Community Center.
	Park morning attendance: 125+ children	Badminton and volleyball programs added.
1952	**Budget: $14,000**	Pond attendance: 11,825 / Swim lessons: 197 passed
	Slide and parallel bars added at Town Park	Cost: $286.80 Park open 3 nights a week for games. Croquet added
	Backboard added to 3rd tennis court	Cost $832.09 which includes resurfacing costs
	* Swampy area north of Bath House filled-in	Filled area runs from bath house behind 84-106 Dutcher St.
	Arborvitaes planted	At Ballou Park and at Northeast corner of Park off Northrup St.
	New Parkland tables and benches installed	At first, second, and third fireplaces
1953	**Budget: $14,000**	Pond attendance: 13,718 / Swim lessons: 128 passed
	Park program expands again	Organized AM classes and games, afternoon play, twilight sports Jewel-craft, dominoes and checkers popular pastimes.
	New swim ramps and diving boards at Pond	
	Weeds at Pond a problem once again	Chemical treatment done by helicopter
	* 500 small pine and spruce trees planted	Hopedale Boy Scout Troop 1 places trees in Parklands
1954	**Budget: $14,000**	Pond attendance: 12,177 / Swim lessons: 400 enrolled, 192 passed
	* Shuffleboard court & play equipment added	
	Bandstand roof replaced	
	Storage shed & split rail fence added	North of Bath House behind 84-92 Dutcher St.
	* 1000 small spruce trees planted	Hopedale Boy Scout Troop 1 places additional trees in Parklands
	Busy hurricane season, damage minimal	Area affected by Hurricanes Carol, Edna and Hazel
1955	**Budget: $14,000**	Pond attendance: 10,310 / Swim lessons: 122 passed
	* Large slide installed at Pond	
	* More playground equipment added at Park	Kiddie and horse swings plus overhead ladder bar installed
	* Park evening hours extended to 5 nights	Supervision needed to ease "rowdyism and noise"
	Entrance to Park and Bath House paved	
	More minor hurricane damage	Rains from Hurricane Diane washes out some of Parkland roadway
	* Pond closes for year on August 13th	Flooding and polio epidemic force shutdown of swim season
	* 1200 additional small trees planted	Hopedale Boy Scout Troop 1 places additional trees in Parklands
	Water ballet program at Pond	
1956	**Budget: $14,000**	Pond attendance: 13,537 / Swim lessons: 154 passed
	* Lighting added to first tennis court	
	* Summer morning bus pick-up instituted	58 youngsters pr/day average brought to & from Park. Additional swim lessons added at Pond, 30 classes offered.

		New raft section added	
		Bath House painted	
		Maintenance jeep replaced	Jeep pickup purchased for joint use with Highway Department
	*	Town Park softball diamond rebuilt	
		Playground drainage improved	
	*	Park ballfield sprinkler system enlarged	Coverage increased to cover ballfield and tennis courts
		Playground drainage improved	
1957		**Budget: $14,000**	Pond attendance: n/a Swim lessons: 300 enrolled, 195 passed
		Town Park spruced-up	Sand added at playground, basketball court resurfaced, hot-top floor laid into bandstand. Due to extremely dry summer, lawn consultant hired to help save and maintain grass - fertilization program started
		Cedar picket fence added at Town Beach	Intended to keep youngsters in and dogs out
	*	Additional fireplace built in Parklands	Site added between current first and second fireplaces. Two picnic tables added.
		Parklands road re-graded	
1958		**Budget: $15,000**	Pond attendance: 15,000 / Swim lessons: 149 passed
		Park baseball diamond rehabilitated	Uneven spots leveled and filled.
		Summer recreation program adds golf	Lessons given in conjunction with the Hopedale Country Club
		Hand mowers replaced by gas-powered ones	
		Bath House upgrades made	Bike racks added, large lockers replaced by smaller ones
	*	Entire Pond treated chemically for weeds	
1959		**Budget: $14,000**	Pond attendance: n/a Swim lessons: 171 passed
	*	Weed control program instituted	Allied Biological Control Corp. contracted for 3 years service
1960		**Budget: $14,000**	Pond attendance: n/a Swim lessons: 191 passed
	*	F. Carlton Miner passes away	Served as Park Recreation Supervisor for 15 years, 1946-1960 *"Countless hundreds of Hopedale children will remember him as the man who taught them to swim, organized their games or coached them in school athletics. The enviable position that our Summer Park Program enjoys is due in large measure to the direction it received over the years from "Carl" Miner. He will long be missed and fondly remembered."* Charles Espanet appointed Supervisor and William Ohlsen Swim Director for remainder of season.
		Metal bleachers added at Park ballfield	
1961		**Budget: $14,000**	Pond attendance: n/a Swim lessons passed: n/a
		Roger Hebert named Park Supervisor	
	*	Town Beach area expanded	Kiddie swim area added
	*	Draper Corporation leases Ski Hill to Town	Ski area built under the supervision of Mr. Willard Taft. Park Commission to operate as part of winter sports program

	Skating at Pond very popular	Ice scraper fabricated to help improve ice conditions
	* Pond put on weed control program	*"It has become apparent however, that large infusions of seeds from the upstream areas beyond the Pond will continue to require treatment until these areas are also freed of undesirable weeds."*
1962	**Budget: $14,000**	Pond attendance: n/a Swim lessons passed: n/a
	Parks Maintenance Supervisor passes away	Longtime employee Earl Simmons meticulously maintained grounds
	Diving Tower on little raft added at Pond	
	Tow rope and fencing added at the Ski Tow	
1963	**Budget: $14,800**	Pond attendance: n/a Swim lessons passed: n/a
	Summer and winter programs in full swing	
	* Park Dept. supports retarded youth program	Sponsors four youngsters to attend special program in Bellingham
1964	**Budget: $17,900**	Pond attendance: n/a Swim lessons passed: n/a
	* Charles Espanet named Recreation Director	Park employee since 1950 replaces Roger Hebert.
	* Lights installed at Park basketball court	Funds raised by the Women's Club and the Hopedale Foundation.
	* Small cove next to Bath House filled-in	Material excavated from Adin St. used to extend usable beach area.
	* Swim area re-arranged to Red Cross specs	
	* Boy Scouts construct Adirondack campsite	Shelters built at the Lookout by Troop 1 boys and their dads. Materials donated by Draper Corp.
	* Concrete picnic tables built in Parklands	Two tables placed at first, second, and third fireplaces
	* Conservation Commission Formed	Park Commissioners Phillips, West and Marso also sit on this five-member board, as Park and Conservation initiatives closely related.
	* Discussions begin on South End facility	
1965	**Budget: $20,300**	Pond attendance: 13,700 / Swim lessons passed: 222
	Organized night basketball games started	
	* Bath House renovated	New floor and partitions installed, walls painted. Ramp replaces stairs.
	* Three boat landings added within Parklands	
	Jeep pickup breaks down - replaced	
	Several park benches installed	
1966	**Budget: n/a**	Pond attendance: 15,024 / Swim lessons passed: 151
	Park Tennis Clinic attracts 150 youngsters	
	Park programs heavily utilized	*""...that because of this fine recreational program the destructive acts of personal property by juveniles in the Town is very small."*
	New bubbler installed at Bath House	
	* All-time record Pond attendance	*"The money appropriated to run the recreational program is one of the best investments for the future the town can make."*

	Large, dangerous rock removed at Ski Tow	
	* S.Hopedale land purchased for development	Town appropriates $15,000 to Conservation Commission for purchase of Deluca and Draper property abutting Rt. 140 and Mellen Street Buildings razed and burned on-site. Land survey now needed.
1967	**Budget: n/a**	Pond attendance: >15,000 / Swim lessons passed: 195
	Day trips added to Summer program	Trips taken to Southwick Animal Farm, Longwood Cricket Club for tennis championships, and in the "Impossible Dream" season, a Red Sox game at Fenway Park.
	* Two week Summer tennis program added	Mr. Aram Karoghlanian and Mr. Roger Corey teach over 100 children
	* South End Park has new additions	Six pieces of playground equipment installed, fence & lights installed
	Ski Club buys new rope for Ski Tow	
1968	**Budget: 21,970 (approx $1 on the tax rate)**	Pond attendance: 18,387 / Swim lessons passed: 196
	* Pond attendance jumps 6000 in three years	Approximately $1 on the tax rate allows the Park Commission to *"...not only run one of the best recreational programs in the area but provide all maintenance as well."*
	Merry-go-round installed at Town Park	
	Many decayed trees removed at Town Park	Shrubbery added to Dutcher St. entrance.
	Four-wheel dump truck purchased	
	South End field area bulldozed and leveled	
1969	**Budget: 21,970 (approx $1 on the tax rate)**	Pond attendance: 16,120 / Swim lessons passed: 177
	Summer Program interest remains high	Basketball league play, shuffleboard, paddleball, tetherball, arts & crafts, tennis, archery and baseball offerings all well attended as are various contests such as bike races and decorating, doll contests. Trip to the new New England Aquarium added. Swim team is popular.
	Water Safety Demonstration at Pond	Director Charles Espanet's waterfront staff and Firemen led by Chief Charles Watson perform simulated lifesaving procedures to a large turnout at the Bath House.
	Town park ball diamond reconstruction	Field re-sodded to major league dimensions. This will eliminate un-level spots which may cause injury; plus add a classic appearance.
	No Parking signs added around Town Park	to provide clearer view for motorists and pedestrians alike
	Motor boat permits required at Pond	Must be requested through Police Chief W. Chester Sanborn
	* Park Commission to maintain Draper Field	One year lease for 1970 season arranged with Draper Division of North American Rockwell Corp.
	Bird feeders added by Rustic Bridge area	Built by members of Boy Scout Troop 1.
	Littering around Park becoming a problem	*"It was voted to request the Selectmen to insert an article in the Town Warrant to adopt a by-law prohibiting the discarding of trash on our public ways and Parklands."*
1970	**Budget: n/a**	Pond attendance: 17,620 / Swim lessons passed: n/a
	Summer Recreation program employs 11	

	Summer tennis sessions expand	Aram Karoghlanian and Sandra Folwell add adult lessons to the mix.
*	Bi-weekly bacteria checks made at Pond	Water quality remained excellent all summer for swimming.
	Bleachers added to Park and Draper Field	Concrete for slabs donated and poured by Rosenfeld Concrete Co.
1971	**Budget: n/a**	Pond attendance: 11,996 / Swim lessons passed: 106
	Morning arts & crafts program expanded	Daily weekday sessions added at South End Park.
	Balloon launch highlights summer activities	*"The Park Commissioners feel that the people of Hopedale should all be proud of their summer program, it could not be made possible if it were not for their tax money."*
1972	**Budget: n/a**	Pond attendance: 7,395 / Swim lessons passed: 99
*	Pond attendance way down	Main factor is excessive weed growth that has choked the pond. Community House generously donates funds for weed treatments. *"By July the entire pond looked like a field with only the channel clear of weeds - snaking its way up the from the "shop" to the Rustic Bridge. That summer was also cool, plus the Casey Pool had just opened up in the Heights over in Milford, so our attendance was off quite a bit." That was a tough year for our staff - the swim area was a real mess after the weeds were treated."* *(Former Recreation Director Charles Espanet -2004)*
	South End baseball field graded	
	Fire Dept. helps flood Pond for skating fun	
1973	**Budget: n/a**	Pond attendance: 12,300 / Swim lessons passed: 176
*	Charles Espanet retires as Director	Served 23 seasons, (1950-1972) in the Park Department - thirteen as an assistant to Carl Miner and Roger Hebert, ten as Director *"...from the present Commissioners and the many past Commissioners who worked with Charlie, from the people of Hopedale and particularly the youth of Hopedale, a most sincere Thank You and best wishes in your new endeavor."*
	Paul Lombardi named new Park Director	Clayton Wright serves as Maintenance Foreman
	South End Park morning attendance down	Arts & crafts program at site cut back to three days a week.
	Tennis and Summer golf clinic offered	Instructed by Mr. Joseph Burke and Mr. Jean Stare
	Attendance on summer bus remains high	Children still brought to Parkland Pond for morning fun and lessons.
1974	**Budget: n/a**	Pond attendance: 12,000+ / Swim lessons passed: 176
	Evening adult Water Safety program added	
	Phase three of weed project completed	
	Paul Lombardi resigns as Director	
1975	**Budget: n/a**	Pond attendance: n/a Swim lessons passed: n/a
*	Clay Tennis courts replaced	Surfaces paved due to high maintenance upkeep costs. Tennis instruction offered mornings, afternoon's and evenings.
	Miss Bette Robjent serves as Director	Games, crafts, swimming program and field trips remain popular
1976	**Budget: n/a**	Pond attendance: n/a Swim lessons passed: n/a

	* Susan Griggs named Park Director	
	Tennis and baseball clinics held at Park	Instructed by Mr. Larry Heron
	Park maintenance staff gets State help	State-sponsored CETA workers assist with various jobs
1977	**Budget: n/a**	Pond attendance: n/a Swim lessons passed: n/a
	* South End Field improvements made	The Conservation Commission oversaw the addition of two small ball diamonds and the grading and seeding of the multi-purpose field. *"It is becoming apparent that this area will one day, along with the Town Park, serve as a major site for athletic and recreational activities."*
1978	**Budget: n/a**	Pond attendance: n/a Swim lessons passed: n/a
	Tennis courts resurfaced	
	Roadwork & brush clearing in Parklands	
	* Bath House and Park buildings get facelifts	Painting and many repairs completed
1979	**No Report Issued Budget: n/a**	Pond attendance: n/a Swim lessons passed: n/a
	Mr. Brad Smith named Park Director	Susan Griggs steps down after three outstanding years of service.
1980	**No Report Issued Budget: n/a**	During these "missing years" when Commission reports were not submitted, the Summer Recreation program at both the Pond and Town Park remained intact. No longer were crafts programs offered at South End Field, nor was the daily bus run through town to bring youngsters to and from the Park and Pond on summer mornings
1981	**No Report Issued Budget: n/a**	
1982	**No Report Issued Budget: n/a**	
1983	**No Report Issued Budget: n/a**	
1984	**Budget: n/a**	Pond attendance: n/a Swim lessons passed: n/a
	David Guglielmi serving as Park Director	
	Swim lesson program enjoys a comeback	
	Arts & crafts, tennis popular at Town Park	Tennis tournament and the 2nd annual "island picnic" were held
1985	**No Report Issued Budget: n/a**	Pond attendance: n/a Swim lessons passed: n/a
	Park-related items from Conservation report	Concerns raised over storm drain runoff from Jones Road and Inman street development which empties directly into Hopedale Pond.
	* Sprinkler system added at South End Field	Parking lot and access road work also done at the site - now becoming commonly known as Mellen St. Field. Perimeter barriers, backstops, and a flagpole all added.
1986	**Budget: n/a**	Pond attendance: n/a Swim lessons: 100 enrolled
	Year-end Rocky Point trip very popular	85 youngsters attend this tradition that began in the mid-70's.
1987	**Budget: n/a**	Combined daily attendance at Pond & Park approx. 200 children
	* Ms. Jody Whyte named Park Director	Replaces Former Commissioner David Guglielmi who served 3 years.
	Renovations done at Bath House/Pond	New decking added to Pond raft, Girls locker room refurbished and reopened after several years, new picnic tables added.
	New slide installed at Town Park	
	Band concerts continue to be popular	

	* Parkland foresting controversy creates stir	A major deadwood and brush clearing operation in the Parklands was halted when the forestry agent representing the Town resigned, leaving behind a mess of slash and debris of considerable size
	* Gate installed in Parklands at Hazel St.	Due to vandalism and illegal dumping, old chain gate replaced.
1988	**Budget: n/a**	Pond attendance: n/a Swim lessons: n/a
	Summer bus transportation reinstated	Scheduled morning bus runs bring town children to Park and Pond
	Tennis instruction program returns at Park	
	Town Park basketball court upgrades	Court resurfaced, relined, and new backboards added.
	* Bandstand completely refurbished	Painted, new rails added, new door installed.
	Parkland forestry concerns continue	Firm hired to chip and remove brush and slash, roadways graded and drainage culverts installed at perennial washout areas. *"The process of returning the Parklands to their "original" state with limited resources has proven to be an arduous task. There's still an enormous amount of work to be done restoring Parklands for the use and enjoyment of everyone."*
	* More gates installed at Parkland entrances	Due to vandalism and illegal dumping, old chain gates replaced at the Dutcher, Freedom St. and Overdale Parkway entrances. Gates fabricated by Blackstone Valley Vocational High School
1989	**Budget: n/a**	Pond attendance: n/a Swim lessons: n/a
	Summer bus pick-up discontinued	Prohibitive operating costs cited as factor
	* Water fountains installed at Mellen St. Park	Joint effort by Parks, Highway Dept. and Water & Sewer Dept.
1990	**No Report Issued Budget: n/a**	Pond attendance: n/a Swim lessons: n/a
1991	**No Report Issued Budget: n/a**	Pond attendance: n/a Swim lessons: n/a
	* Condition of fields and grounds a concern	*Concerns raised by Board as field conditions have deteriorated since the Park maintenance position was eliminated years back. The Board will reach out to the Highway Dept. seeking additional co-operation and assistance, and to the Finance Committee seeking reinstatement of the position."*
	* Board votes 2-1 on Mellen Field acquisition	Board feels land which is under Conservation Commission jurisdiction should be considered for movement to the Park Dept.
1992	**Budget: n/a**	Pond attendance: n/a Swim lessons: n/a
	Summer Recreation program activities:	Swimming and swim instruction, tennis lessons and tournament; Field trips: movies, Mendon Golf Range and Rocky Point Activities: fishing derby, cookout, Town Beach winter carnival, bike decorating, pet shows, arts & crafts, and canoeing.
	Ice skating & hockey activities popular	
	* Concern over condition of Draper Field	Field used heavily for school sports and little league with little upkeep *"Since the land is not owned or leased by the Town, public funds for maintenance and repair have not been allocated to the property. As such, the overall condition of this "park" continues to deteriorate year after year in spite of the physical efforts volunteered by residents to keep the area at least usable. It is our hope that steps can be taken by the town to ultimately resolve the long-standing issues surrounding*

		the use of this land as soon as possible."
	Weed control project approved by Board	
*	Field maintenance issues with High School	Board approaches School Athletic Department seeking to have them assume more responsibility for field maintenance - since they utilize all areas heavily three seasons of the year. School cites lack of available funds to assist in this capacity.
1993	**No Report Issued Budget: n/a**	Pond attendance: n/a Swim lessons: n/a
	Conservation Commission acquires land	Multi-acre lot at intersection of Lapworth and Tillotson Roads in the Pinecrest development is potential site for active recreation fields.
*	Huey & Duey issue ruffles feathers	Domesticated ducks placed illegally on Hopedale Pond attract children but also create problems as heavy feeding is contributing to a rapid rise in the Canada Geese population. Some residents want them removed, others insist that they remain. Issue receives coverage in Boston media.
1994	**No Report Issued Budget: n/a**	Pond attendance: n/a Swim lessons: not offered
	Field maintenance issues continue	School Dept. again asked to help subsidize field maintenance and equipment upkeep. Again, lack of available funds cited for lack of assistance.
	Town Park abutters complain about noise	Complaints about disorderly youths and cars speeding down Dutcher St. are brought to the attention of the Police Dept.
	Residents approach Board on playground	Seek new equipment. Request taken under advisement.
1995	**No Report Issued Budget: n/a**	Pond attendance: n/a Daily high: 146 Swim lessons: 54
	(1995 activity documented in 1996 report)	
*	Foundation grant allows for Park facelift	Hopedale Foundation provides a generous grant for the following: New multi-level structure (Phase I of a two-part plan) installed, by Park members and volunteers. This replaced outdated see-saw's, swings, monkey bars and a chin bar. New kiddie swings added. Parklands roadway cleared of brush and widened. East and West sides resurfaced with crushed asphalt obtained free of charge by the Highway Dept. from the Rt. 16 reconstruction project. Comfort station roofed and painted.
	Pond weed infestation worsens	Board seeks matching state grant money to defray costs
	Loitering and rowdyism problems at Park	Police Chief Costanza obtains a Community Policing grant which will help enforce the 10PM curfew at Town Park, as well as the "no swimming after-hours" bylaw at the Town Beach.
	Summer program a success	Attendance for both the Park and re-energized Pond programs has been excellent. Arts & Crafts program extremely well received.
	Swim lesson program returns	Summer fees are $25 for one child, $35 for families with more than one child. Water Safety Instructor Jaime Dalton supervises lessons.
	Parklands road clearing completed	Brush removed on the west shore roadway and at the Lookout
*	Resident volunteerism helps preserve Park	*"The Commission thanks Mr. Bob Colcord of Northrup St. for volunteering his time and energy to restore the Town Park ballfield to its current meticulous condition. This is the kind of community spirit*

		and volunteerism that everyone in Hopedale should be proud of."
	Parkland gates opened on trial basis	Summer trial fails as reports of speeding vehicles, property vandalism, and trash dumping are received.
1996	**Budget: n/a**	Pond attendance: n/a Daily high: 183 Swim lessons: 104
*	More work done via 1995 Foundation grant	PhaseII of new Town Park playground equipment upgrade completed by Gametime, Inc. Bandstand shingle siding replaced with clapboard, new roof added, building painted. All fencing around tennis courts replaced. Light poles structurally repaired and painted. Storage garage door replaced.
*	Park baseball field is the talk of the area	On-going maintenance program led by Commissioner Bob Colcord over the past several years has the field in excellent shape. Safety fence added around most of playground to keep stray baseballs from injuring toddlers.
*	Parklands road renamed for Willard W. Taft	A fall ceremony was held at a granite monument placed on the knoll just north of the Bath House where a group of approximately 30 Town officials and residents gather to honor local naturalist and former Park Commissioner Willard Taft. An inlaid bronze plaque sincerely *"...thanks Mr. Taft for his many years of preserving this special scope for the enjoyment of all."* The stone monument was generously donated by Kimball Sand & Gravel of Blackstone.
*	Summer Town Park bus program revived	Unfortunately, this effort failed as many new parents in Town seemed uncomfortable sending their children off alone to the Park for the day un-supervised. When Park staff noted that parents were following the busses in cars, it was decided to once and for all scrap the idea.
	Loitering and unruliness at Park declines	Community policing effort by HPD continues to be successful.
*	Mellen Field improvements	Old playground swings replaced, implementation of a fee structure for organized leagues with restrictions on non-Hopedale-based teams. Wooden perimeter fence added to keep vehicles from vandalizing the field, new signage posted, new backstop added to first softball field. Predictions made by the Commission on this space in 1977 realized: *"The Mellen Fields have undergone a slow but steady transformation from a lightly-used open space to a well-defined , popular facility. Thanks in great part to the dedication and community spirit of Commissioner Mark Sesona and a score of volunteers from groups like the Hopedale Girls Softball League and the Milford-Hopedale Youth Soccer Assoc., the area now features a concession stand, porta-toilets, scoreboards and regularly groomed infields."*
*	Summer Recreation Director position revived	Ms. Jaime Dalton named to the position.
	Bath House roofed and painted	Painting done under a supervised work-release program offered by the Northeast Corrections Center in Concord, MA., with substantial savings to the taxpayer.
	Brush cleared by Corrections workers	On shore area from the Red Shop to the cove past the Bath House
	Sand added at Park and Town Beach	Varney Bros. Sand & Gravel generously donates several truckloads
	Northern half of Pond choked by weeds	Grant money being actively sought for remediation.

	* Canada Geese problem worsens	Do not feed" signage posted around lower end of the Pond. Plastic" mesh fence added at each end of the raft helps keep geese off beach.
1997	**Budget: n/a**	Pond attendance: n/a Daily high: 203 Swim lessons: 114
	* Wooden Dugouts constructed at Town Park	Hopedale High School industrial arts students design and construct two full-sized dugouts with materials purchased by the Park Dept. The group builds two picnic tables with leftover materials.
	New batting cage added	Base line safety fence also added around Park ballfield.
	Three tennis courts resurfaced.	Years of abuse from un-checked rollerblading and skateboarding take toll on surface. Parks and Police Dept. post & enforce "tennis only."
	Park comfort station painted	
	No dogs" signage added around Town Park	Board attempts to revert Park once again to a "dog free" zone so residents complain about stepping in "surprises."
	Safety fencing added to Mellen Field	Area around open dugouts enclosed.
	* Commission confronts "Duck" issue	Town meeting approves three Park-sponsored "waterfowl bylaws" *"One bylaw prohibits feeding waterfowl on or within the confines of Hopedale Pond, the other forbids the placing of domesticated/privately owned animals on Town land under the jurisdiction of the Park Commission without written approval, and the third levies fines against those who fail to remove illegally placed animals from Park land."*
	* Huey & Duey fly the coop	Park Commission successfully negotiates removal of these fine feathered fowl from Hopedale Pond. Damage has been done however as Canada Geese population has increased ten-fold since the ducks were introduced. Goose droppings foul the shoreline necessitate extra precautions at Town Beach to keep it clean. New signage erected around the Pond citing fines for feeding waterfowl.
	Swim program closed nine days in July	Combination of severe drought and trickle of inflow from upstream headwaters at North Pond (despite that area being near capacity), causes stagnancy. Elevated bacteria count forces interruption of swim program - which never recovers upon re-opening.
	* Board votes to keep Parkland gates closed	Gates to stay shut permanently. Vehicular vandalism and trash dumping primary reasons. Hopedale Police back the decision.
	Parklands open for firewood-cutting day	Residents pay nominal fee to gather and cut dead/downed timber
	Autumn "Day in the Park" a huge success	Sponsored by the Hopedale Arts Council who also sponsors summer band concert series.
1998	**Budget: $43,005**	Pond attendance: n/a Daily high: n/a Swim lessons: n/a
	Jody Whyte returns as Park Director	Jaime Dalton becomes to first female elected to Park Commission.
	* Park Dept. receives $10,000 weed grant	State Representative Marie Parente instrumental in securing funds. Town appropriates matching funds which will allow for full treatment. Unfortunately record-breaking June rainfall postponed this project until Spring 1999.
	* Usage contract entered with Soccer league	Five-year agreement entered with Milford/Hopedale Youth Soccer Association allowing use of Mellen soccer field & facilities in return

		turn for financial investments by MHYSA to improve and assist in the maintenance of the Mellen Field complex. $10,000 in upgrades completed including refurbishment and extension of the old sprinkler system, field leveling and re-seeding, and parking lot improvements - all without cost to the Hopedale taxpayer.
*	Pond open to non-residents for swimming	Reverses Commission policy enacted in 1922. Pond attendance increases marginally. Water quality excellent all summer.
	Bath House improvements made	The Boys changing area was completely refurbished thanks to a generous grant from the Hopedale Foundation. The Bath House bubbler was brought up to code, and repair were made to burst pipes.
	Parklands outdoor maps constructed	Eagle Scout project by Troop 1 candidate Adam Brown,
	Problems arise with Parkland abutters	Parkland behind Cutler St. residence willfully and maliciously cut and thinned. Hopedale Police asked to investigate. Illegal dumping of yard waste at Parkland entrances discussed with some Dutcher St. abutters.
	Security lighting added at Town Park	Lights installed on Dutcher St. perimeter facing into Park. Timed lights illuminate inside of dugouts to curtail evening loitering.
	Basketball light poles repaired and painted	Dangerous exposed wiring condition discovered and corrected
1999	**Budget: n/a**	Pond attendance: closed Swim lessons: closed
	Delayed weed control project completed	Treatment by Aquatic Control Technologies of Sutton, MA completed in May. Next treatments should be needed in 2-3 years.
*	Summer swim program cancelled	A region-wide lifeguard shortage and spiraling wages affects lifeguard staffing. Funding limitations prohibit attracting certified candidates.
*	Mellen Field improvements continue	Volunteerism by the Hopedale Girls Softball Association continues to help keep the ballfield area at Mellen Field in excellent condition. Over the past few years, a snack shack, storage shed, scoreboard, and flagpole were build on-site by league members and volunteers. With assistance from the Water Dept., a water line was run into the storage shed and a backflow check valve was installed HYBA continues an aggressive field restoration project.
	Park comfort station renovated	New toilets and refurbished sinks installed
	Summer tennis lessons return to Town Park	Three-week program expanded to five due to popular demand.
2000	**Budget: n/a**	Pond attendance: n/a Swim lessons: n/a
*	100th anniversary of Adin Ballou statue	Statue and granite base completely refurbished. Bronze work done by Healy Bros, Inc. of Rhode Island. New plaque with wording etched in the statue's base added due to weathering and wear on the statue.
	Swim program returns with new Director	Correne Proctor replaces Jody Whyte as Director Lifeguard budget increase and season-end bonuses help the Dept. attract and retain staff. Chilly summer impacts attendance. Bath House interior painted.
	Summer recreation program interest high	New arts & crafts and games added at Town Park, day trips included stops at the Douglas Waterslides, Pawtucket Red Sox, Crystal Falls Mini Golf, Franklin Park Zoo, Battleship Cove, the popular Boston Duck Boats, and Six Flags. Tennis lessons and a year-end Family

		Fun Day rounded out a very full summer.
	* Park playground equipment upgraded	A generous grant from the Hopedale Foundation allows for the replacement of the 51 yr old jungle jim and horizontal bars with a rock climber tower, a tire swing, and three kiddie spring rides. Also, based on resident feedback, sturdy composite benches and picnic tables were added inside the playground area.
	High school soccer moves to Mellen Field	Games and practices switch venue from Draper Field.
	Parkland dispute at Overdale Parkway	Park Commission asked to rule in land dispute between Blackbrook Realty Corp. and residents of Overdale Parkway. Land in question involves several hundred feet of roadway extending from the current Parklands gate into what has always been considered an entrance to the Parklands. The Old Salt Box road parcel also came into question. When the Commission received a legal ruling from Town Council stating that the disputed land was not Parkland property, it disengaged from further involvement, but not without a word of caution *"...that it would not tolerate the privatization or commercialization of a single square inch of Parkland property - land obtained by our Town forefathers for both active and passive recreation purposes - without exhausting every legal avenue at the our disposal if need be."*
	* Ad-hoc committee formed to find field space	The Hopedale Athletic Recreational and Fields Committee (HARF), a cross-section of residents and Town officials organized in 1999 by the School Committee to seek new land for facilities and fields, becomes an ad-hoc group under the Park Commission. Exploratory funding of $3000 granted at Town Meeting.
	Vehicle Fair held at Town Park	Fundraiser for the school department's Bright Beginnings pre-school. Service trucks, town rescue and highway vehicles, and a fly-in by the Massachusetts Air National Guard helicopter highlight the day.
2001	**Budget: n/a**	Pond attendance: n/a Daily high: n/a Swim lessons: n/a
	Brett Boyd named Park Director	Assisted by Cassie Parrott
	* Soccer agreement terminated and re-written	The Commission voided the existing agreement with Milford/Hopedale Youth Soccer after it was discovered that individuals on their Board had given unauthorized, non-league affiliated, out-of-town teams permission to use at Mellen Field. A new MHYSA board was elected and a formalized, legal document specifically outlining exact usage guidelines was established and agreed to by all. The new contract runs three years, expiring in 2004.
	* Irrigation well installed at Mellen Field	With dry summer conditions and skyrocketing water bills the Park Dept., with funding provided by MHYSA, installs a well at Mellen. *"The sprinkler installation was completed without a dime of taxpayer's money, and it should pay for itself in two years.."*
	* Shed roof dugouts installed at Mellen Field	Built by volunteers from the Hopedale Girls Softball Association
	Weed Control maintenance program returns	9,000 allocated for spot treatment of lower Pond.
	* Bandstand repairs made	Vandalized 2X4 wooden railings on the bandstand, are replaced with sturdy, custom-made, wrought iron rails and a lockable gate. New wrought iron stairs also installed. Cost: $5,700. Signs are posted requesting people to keep off this unique, 96 year old structure.

	Vandalism forces comfort station closure	High repair costs due to repeated vandalism forces closure. Porta-pots placed on grounds.
	* Park Commission direction causes concern	*"Since budget cuts removed the Park maintenance position back in the mid 1980's, the Park Commission has served as both an elected policy-making Board while providing upkeep and maintenence services. We are the only elected Board in Hopedale which operates under these conditions, and the burden is not conducive to retaining interested, dedicated Board members - or attracting new candidates. With the Board currently looking long-term to add additional recreational fields and facilities to meet the needs of a rapidly ex-expanding population, financial support from the Town to provide for a dedicated Park maintenance staff and a part or full -time Director to handle the day-to-day needs of the Board and the community is crucial, else our fields and facilities will fall into disrepair. Those most negatively impacted by this will be the children of Hopedale."* *Park Commission Chairman Rick Espanet to the Board of Selectmen - June 2001*
2002	**Budget: $64, 317**	Pond attendance: n/a Daily high: n/a Swim lessons: n/a
	* Summer Swim Program Discontinued	98 year program affected by increased operating costs and lack of use and support from the community. Proliferation of backyard swimming pools and foul waterfront conditions created by the large Canada Geese population (see 1993, 1996) contribute to the demise This decision will remain in place unless feedback dictates otherwise. of what once one of the premier waterfront programs in the region.
	* Park Dept now "stewards" for Draper Field	Since this property became privatized when the last holdings of Draper Corporation left Town in the mid 1970's, all upkeep has been done by independent youth sports groups. In 2002 the property deedholder - along with the Board of Selectmen - asked the Park Commission to oversee all activities at the field to insure provisions set forth by the deedholder as part of a usage agreement signed with the Selectmen in 2001 are adhered to by all groups utilizing the area.
	Chain link fence added at Mellen Field	Safety fence added along the parking lot area.
	Weed Control maintenance continues	9,000 allocated for spot treatment of lower Pond.
	Renovations made to Town Park ballfield	Volunteers spread loam, lay down sod and re-seed area. A new heavy-duty sprinkler head and timer was installed within the infield and the existing sprinkler system was repaired. Cost: $1,100.
	Ballou Park landscaping improvements	50 yr old arborvitaes which were growing wild and damaged by heavy winter snows were removed. Stumps were pulled. New plantings due.
	Complaints lead to fee-based tennis program	Residents complained that individuals were conducting private, for-pay tennis lessons on our public courts. With tennis lesson interest high among adults and youngsters, but with limited buget resources available to start a program, the Board instituted fee-supported tennis instructions with a portion coming back to the Dept.
2003	**Budget: n/a**	Pond attendance: closed Park Summer Program well attended
	* Commission receives $10,000 EPA grant	Chaired by Commissioner Jim Binney, the Park Department's ad-hoc committee's efforts finally start to get off the ground... *"The Town was awarded $10,000 grant from the U.S. Environmental Protection Agency to conduct the first thorough and comprehensive site assessment of the back section of the old Draper landfill property under the coveted Targeted Brownfields Assessment Program. This*

	is a major step towards not only cleaning/capping the old Draper landfill site, but procuring and revitalizing otherwise useless land to accomodate the recreational facilities needs of the Town safely for generations to come."
Tennis program: ace, set, and match	The Summer Recreation tennis program was run by Barry Gorman. The fee-based tennis program started in 2002 had to be shut down as the Board when was unable to receive an accurate accounting of lesson rosters and subsequent fees collected. Unfortunately due to continued usage abuses on the Town courts, the Board considers levying fines on individuals conducting private enterprise on Park property.
Adin Ballou Park beautifiation completed	Collaborative effort by former Park Commissioner Mark Sesona and Historical Commission member Elaine Malloy acquire a grant from the Blackstone Valley Historical Commission to add granite benches, new walkways, and a granite marker with plaque. *"Combined with recent statue refurbishments completed by the Park Commission, Ballou Park is a landmark that exemplifies how co-operative commitment can help "preserve the trust" of Hopedale's rich heritage."*
Town Park hosts many activities	Hopedale J's Senior Ruth baseball team re-formed nearly 30 years after it's original season. Babe Ruth baseball, men's summer basketball, the annual fall Day in the Park festival, a July fourth baseball outing and picnic, and the 4th annual Bright Beginnings Center Vehicle Fair were all held at the Park this year.
Crushed stone added to Mellen parking lot	
Budget delay postpones weed treatment	Town budget is not formally released to Town boards until late June Without a guarantee of available funds for weed control the Board had no choice but to defer the project until 2004.
Parkland gates sanded and painted	
Pond garage doors replaced	Double wooden doors replaced with single steel/fiberglass door.
* New maintenance equipment obtained	The Park and Highway Departments jointly purchase a state-of-the-art John Deere mowing/bagging tractor which will save many man hours of labor with it's high-volume capacity and mobile capabilities. The Department also took ownership of a 1989 Ford pickup truck which was taken out of commission by the Water Department.
Residents asked to report vandalism	The Commission asks residents to help preserve Park property by reporting any instances of vandalism or flagrant rules violations to the Board and/or the Police Dept. Loose dogs and the failure of some owners to pick up after their pets continues to be a problem. Major damage to plumbing at the Park comfort station was done, porta-pots are tipped and damaged regularly, the Town Park dugouts have been defaced by graffiti and had their lights broken, and the tubular playground slide was destroyed - as were barriers set up to keep youngsters off of it. Budgeting for these repairs is taking money away from worthwhile programs and additions to the program.

Appendix G

Analytical Laboratory Reports

GeoLabs, Inc.
45 Johnson Lane
Braintree MA 02184
Tele: 781 848 7844
Fax: 781 848 7811

Tuesday, June 17, 2008

Carl Nielsen
ESS Group, Inc.
888 Worcester St
Suite 240
Wellesley, MA 02481

TEL: (781) 489-1130
FAX: (781) 431-0500

Project: H153-000.3
Location: Hopedale

Order No.: 0805502

Dear Carl Nielsen:

GeoLabs, Inc. received 7 sample(s) on 5/29/2008 for the analyses presented in the following report.

There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Jim Chen

Jim Chen
Laboratory Director

Certifications:

CT (PH-0148) - MA (M-MA015) - NH (2508) - NJ (MA009) - NY (11796) - RI (LA000252)

GeoLabs, Inc. **Date:** *17-Jun-08*

CLIENT: ESS Group, Inc.
Project: H153-000.3
Lab Order: 0805502

CASE NARRATIVE

Physical Condition of Samples

The project was received by the laboratory in satisfactory condition. The sample(s) were received undamaged, in appropriate containers with the correct preservation.

Project Documentation

The project was accompanied by satisfactory Chain of Custody documentation.

Analysis of Sample(s)

All extractable samples were extracted and analyzed and any Volatile samples were analyzed within method specified holding times and according to GeoLabs documented Standard Operating Procedure. No analytical anomalies or non-conformances were noted by the laboratory during the processing of these samples.

GeoLabs, Inc.

Reported Date: 17-Jun-08

CLIENT:	ESS Group, Inc.	**Client Sample ID:**	Site 7
Lab Order:	0805502	**Collection Date:**	5/29/2008 11:00:00 AM
Project:	H153-000.3	**Date Received:**	5/29/2008
Lab ID:	0805502-001	**Matrix:**	SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **Admi**
Total Suspended Solids	ND	4.00		mg/L	1	5/30/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	ND	0.010		mg/L	1	6/4/2008
NOTES: Sample was analyzed at M-RI010.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*10.0*	0		CFU/100ml	1	5/29/2008
NOTES: Sample was analyzed at M-24353.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	ND	0.010		mg/L	1	6/4/2008
NOTES: Sample was analyzed at M-RI010.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	6/3/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	5/30/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.231*	0.0270		mg/L	1	5/30/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **WFR**
Nitrogen, Total Kjeldahl	*0.416*	0.105		mg/L	1	6/12/2008

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT: ESS Group, Inc.
Lab Order: 0805502
Project: H153-000.3
Lab ID: 0805502-002

Client Sample ID: Site 6
Collection Date: 5/29/2008
Date Received: 5/29/2008
Matrix: SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **Admir**
Total Suspended Solids	ND	4.00		mg/L	1	5/30/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	ND	0.010		mg/L	1	6/4/2008
NOTES: Sample was analyzed at M-RI010.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*110*	0		CFU/100ml	1	5/29/2008
NOTES: Sample was analyzed at M-24353.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	ND	0.010		mg/L	1	6/4/2008
NOTES: Sample was analyzed at M-RI010.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	6/3/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	5/30/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.0566*	0.0270		mg/L	1	5/30/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **WFR**
Nitrogen, Total Kjeldahl	*0.455*	0.105		mg/L	1	6/12/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

CLIENT:	ESS Group, Inc.	**Client Sample ID:**	Site 5
Lab Order:	0805502	**Collection Date:**	5/29/2008
Project:	H153-000.3	**Date Received:**	5/29/2008
Lab ID:	0805502-003	**Matrix:**	SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **Admi**
Total Suspended Solids	ND	4.00		mg/L	1	5/30/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	ND	0.010		mg/L	1	6/4/2008
NOTES: Sample was analyzed at M-RI010.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	<10	0		CFU/100ml	1	5/29/2008
NOTES: Sample was analyzed at M-24353.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	ND	0.010		mg/L	1	6/4/2008
NOTES: Sample was analyzed at M-RI010.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	6/3/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	5/30/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.0421*	0.0270		mg/L	1	5/30/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **WFR**
Nitrogen, Total Kjeldahl	*0.466*	0.105		mg/L	1	6/12/2008

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT: ESS Group, Inc.
Lab Order: 0805502
Project: H153-000.3
Lab ID: 0805502-004

Client Sample ID: Site 4
Collection Date: 5/29/2008
Date Received: 5/29/2008
Matrix: SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **Admi**
Total Suspended Solids	ND	4.00		mg/L	1	5/30/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	0.030	0.010		mg/L	1	6/4/2008
NOTES: Sample was analyzed at M-RI010.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	4000	0		CFU/100ml	1	5/29/2008
NOTES: Sample was analyzed at M-24353.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	0.050	0.010		mg/L	1	6/4/2008
NOTES: Sample was analyzed at M-RI010.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	6/3/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	5/30/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	2.74	0.0540		mg/L	2	5/30/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **WFR**
Nitrogen, Total Kjeldahl	0.482	0.105		mg/L	1	6/12/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

CLIENT: ESS Group, Inc.
Lab Order: 0805502
Project: H153-000.3
Lab ID: 0805502-005

Client Sample ID: Site 1S
Collection Date: 5/29/2008 1:00:00 PM
Date Received: 5/29/2008
Matrix: SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **Admi**
Total Suspended Solids	ND	4.00		mg/L	1	5/30/2008
CHLOROPHYLL - A						Analyst: **SUB**
Chlorophyll a	*3.00*	0.500		mg/m³	1	6/2/2008
NOTES: Sample was analyzed at M-MA003.						
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	ND	0.010		mg/L	1	6/4/2008
NOTES: Sample was analyzed at M-RI010.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*10.0*	0		CFU/100ml	1	5/29/2008
NOTES: Sample was analyzed at M-24353.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	ND	0.010		mg/L	1	6/4/2008
NOTES: Sample was analyzed at M-RI010.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	6/3/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	5/30/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.0536*	0.0270		mg/L	1	5/30/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **WFR**
Nitrogen, Total Kjeldahl	*0.498*	0.105		mg/L	1	6/12/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

CLIENT:	ESS Group, Inc.	**Client Sample ID:**	Site 1B
Lab Order:	0805502	**Collection Date:**	5/29/2008 1:15:00 PM
Project:	H153-000.3	**Date Received:**	5/29/2008
Lab ID:	0805502-006	**Matrix:**	SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL METALS BY ICP - E200.7						Analyst: **QS**
Iron	0.214	0.0600		mg/L	1	6/3/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	ND	0.010		mg/L	1	6/4/2008
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	0.010	0.010		mg/L	1	6/4/2008
NOTES: Sample was analyzed at M-RI010.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	6/3/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	0.0285	0.0220		mg/L	1	5/30/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	0.0520	0.0270		mg/L	1	5/30/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **WFR**
Nitrogen, Total Kjeldahl	0.487	0.105		mg/L	1	6/12/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

GeoLabs, Inc. **Reported Date:** 17-Jun-08

CLIENT: ESS Group, Inc.
Lab Order: 0805502
Project: H153-000.3
Lab ID: 0805502-007

Client Sample ID: Site 2
Collection Date: 5/29/2008 2:00:00 PM
Date Received: 5/29/2008
Matrix: SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **Admi**
Total Suspended Solids	7.00	4.00		mg/L	1	5/30/2008
CHLOROPHYLL - A						Analyst: **SUB**
Chlorophyll a	2.90	0.500		mg/m^3	1	6/2/2008
NOTES: Sample was analyzed at M-MA003.						
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	ND	0.010		mg/L	1	6/4/2008
NOTES: Sample was analyzed at M-RI010.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	<10	0		CFU/100ml	1	5/29/2008
NOTES: Sample was analyzed at M-24353.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	ND	0.010		mg/L	1	6/4/2008
NOTES: Sample was analyzed at M-RI010.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	6/3/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	5/30/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	0.0552	0.0270		mg/L	1	5/30/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **WFR**
Nitrogen, Total Kjeldahl	0.531	0.105		mg/L	1	6/12/2008

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

Page ______ of ______

CHAIN OF CUSTODY RECORD

GeoLabs, Inc. *Environmental Laboratories*
45 Johnson Lane, Braintree, MA 02184
p 781.848.7844 • f 781.848.7811
www.geolabs.com

Sample Handling: circle choice
Filtration: Done / Not Needed / [✓ Lab to do]
Preservation: Lab to do Y / N

Special Instructions
Dissolved + Total Phos. to 0.01 mg/l or better.
0805502 7

Turnaround: circle one
1-day 3-day
2-day 5 / 7-days

Data Delivery: circle choice (s)
Fax email
Format:
Excel PDF

Requirements: circle choice (s)
GW-1 MCP Methods CT RCP (Reasonable Confidence Protocols)
S-1 DEP State / Fed Program - Criteria ______
QC Other ______

Client: ESS Group
Address:
Contact: Carl Nielsen

Phone: 401-330-1274
Fax:
email:

Project: Hopedale
Project PO: H153-000.3
Invoice to *:

Preservative:

DATE	TIME	SAMPLED BY	SAMPLE LOCATION / ID	TYPE	QUANITY	MATRIX	COMP	GRAB	GeoLabs SAMPLE NUMBER	TP DP 2 7	TKN NH4 2	NO3 NO2 7	Chlorophyll A	TSS 7	Total Fe 2	E Coli		TEMPERATURE	LAB pH
5/29	11AM	CDN	Site 7			SW		X	5502-001	X	X	X		X		X		6°C	
	11:46		Site 6			SW		X	002	X	X	X		X		X			
	12:00		Site 5					X	003	X	X	X		X		X			
	12:30		Site 4					X	004	X	X	X		X		X			
	1:00		Site 1S					X	005	X	X	X	X	X		X			
	1:15		Site 1B					X	006	X	X	X			X				
	2:00		Site 2					X	007	X	X	X	X	X		X			

Matrix Codes: Surface water
GW = Ground Water DW = Drinking Water S = Soil A = Air
WW = Waste Water SL = Sludge O = Oil OT = Other

Received on Ice ☒

Preservatives
1 = Hcl 3 = H2SO4 5 = NaOH 7 = Other
2 = HNO3 4 = Na2S2O3 6 = MEOH

Containers:
A = Amber B = Bag O = Other
G = Glass P = Plastic
S = Summa V = Voa

Relinquished by:	Date / Time	Received by:	Date / Time
M. C 5/29/08	2:30 5/29	M. C	5/29/08 2:30
Ken McKenna	5/29/08 3:50	R. B	5-29-08 3:50

280265.J&P.C of CR.03/07/08 * Terms: Payment due within 30 days unless other arrangements are made. Past due balances subject to interest and collection cost.
Note: Homeowners and Law Firms must pay when dropping off samples. We accept cash, check and credit cards.

CT (PH-0148) MA (MA - 015) NH (2508) NJ (MA-009)
NY(11796) PA (68-03417) RI (LA000252)

ALPHA ANALYTICAL

Eight Walkup Drive
Westborough, Massachusetts 01581-1019
(508) 898-9220 www.alphalab.com
MA:M-MA086 NH:2003 CT:PH-0574 ME:MA0086 RI:LAO00065 NY:11148 NJ:MA935 Army:USACE

CERTIFICATE OF ANALYSIS

Client: ESS Group Incorporated

Laboratory Job Number: L0809541

Address: 401 Wampanoag Trail
Suite 400
East Providence, RI 02915

Date Received: 27-JUN-2008

Date Reported: 07-JUL-2008

Attn: Mr. Matt Ladewig

Delivery Method: Client

Project Number: H153

Site: HOPEDALE POND

ALPHA SAMPLE NUMBER	CLIENT IDENTIFICATION	SAMPLE LOCATION
L0809541-01	1	
L0809541-02	2	
L0809541-03	3	
L0809541-04	4	
L0809541-05	5	
L0809541-06	6	
L0809541-07	7	
L0809541-08	1B	

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized by: Michelle M. Morris
Technical Representative

ALPHA ANALYTICAL
NARRATIVE REPORT

Laboratory Job Number: L0809541

The samples were received in accordance with the chain of custody and no significant deviations were encountered during preparation or analysis unless otherwise noted below.

Sample Receipt

The samples were received at the laboratory above the required temperature range. The samples were transported to the laboratory in coolers with ice and delivered directly from the sampling site.

E. Coli

L0809541-01, -02, -03, -05, -07, and -08 have elevated detection limits due to the 2x dilutions required by the method.

Due to the large dilution (100x) required, the results for sample L0809541-04 should be considered estimated. Note also that according to the method, E. Coli results have a high false positive rate.

L0809541-06 has an elevated detection limit due to the 10x dilution required by the elevated concentration present in the sample.

ALPHA ANALYTICAL
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:2003 CT:PH-0574 ME:MA0086 RI:LAO00065 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0809541-01
1
Sample Matrix: WATER

Date Collected: 27-JUN-2008 08:38
Date Received : 27-JUN-2008
Date Reported : 07-JUL-2008

Condition of Sample: Satisfactory

Field Prep: None

Number & Type of Containers: 2-Bacteria,4-Plastic

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATE PREP	DATE ANAL	ID
Solids, Total Suspended	ND	mg/l	5.0	30	2540D		0702 00:05	DW
Nitrogen, Ammonia	ND	mg/l	0.400	30	4500NH3-BE		0702 12:39	JL
Nitrogen, Nitrate/Nitrite	ND	mg/l	0.10	30	4500NO3-F		0627 20:18	DD
Nitrogen, Total Kjeldahl	0.65	mg/l	0.50	30	4500NH3-BE		0703 06:22	JL
Phosphorus, Total	0.020	mg/l	0.010	30	4500P-E		0630 19:13	NM
Phosphorus, Soluble	ND	mg/l	0.010	30	4500P-E		0701 23:31	NM
E. Coli (MF)	56	col/100ml	2.0	30	9213D		0627 16:35	DW
Chlorophyll A	4.92	mg/m3	2.00	30	10200H	0627 16:30	0627 17:40	DW

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:2003 CT:PH-0574 ME:MA0086 RI:LAO00065 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number:	L0809541-02 2	**Date Collected:**	27-JUN-2008 09:53
		Date Received :	27-JUN-2008
Sample Matrix:	WATER	**Date Reported :**	07-JUL-2008
Condition of Sample:	Satisfactory	**Field Prep:**	None

Number & Type of Containers: 2-Bacteria,3-Plastic

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATE PREP	DATE ANAL	ID
Solids, Total Suspended	ND	mg/l	5.0	30	2540D		0702 00:05	DW
Nitrogen, Ammonia	ND	mg/l	0.400	30	4500NH3-BE		0702 12:47	JL
Nitrogen, Nitrate/Nitrite	ND	mg/l	0.10	30	4500NO3-F		0627 20:21	DD
Nitrogen, Total Kjeldahl	0.54	mg/l	0.50	30	4500NH3-BE		0703 06:31	JL
Phosphorus, Total	0.020	mg/l	0.010	30	4500P-E		0630 19:13	NM
Phosphorus, Soluble	ND	mg/l	0.010	30	4500P-E		0701 23:31	NM
E. Coli (MF)	ND	col/100ml	2.0	30	9213D		0627 16:35	DW

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:2003 CT:PH-0574 ME:MA0086 RI:LAO00065 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number:	L0809541-03 3	**Date Collected:**	27-JUN-2008 09:18
		Date Received :	27-JUN-2008
Sample Matrix:	WATER	**Date Reported :**	07-JUL-2008
Condition of Sample:	Satisfactory	**Field Prep:**	None

Number & Type of Containers: 2-Bacteria,3-Plastic

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATE PREP	DATE ANAL	ID
Solids, Total Suspended	ND	mg/l	5.0	30	2540D		0702 00:05	DW
Nitrogen, Ammonia	ND	mg/l	0.400	30	4500NH3-BE		0702 12:57	JL
Nitrogen, Nitrate/Nitrite	0.14	mg/l	0.10	30	4500NO3-F		0627 20:22	DD
Nitrogen, Total Kjeldahl	0.80	mg/l	0.50	30	4500NH3-BE		0703 06:40	JL
Phosphorus, Total	ND	mg/l	0.010	30	4500P-E		0630 19:15	NM
Phosphorus, Soluble	ND	mg/l	0.010	30	4500P-E		0701 23:33	NM
E. Coli (MF)	46	col/100ml	2.0	30	9213D		0627 16:35	DW

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:2003 CT:PH-0574 ME:MA0086 RI:LAO00065 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0809541-04
4
Sample Matrix: WATER

Date Collected: 27-JUN-2008 10:50
Date Received : 27-JUN-2008
Date Reported : 07-JUL-2008

Condition of Sample: Satisfactory

Field Prep: None

Number & Type of Containers: 2-Bacteria,3-Plastic

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATE		ID
						PREP	ANAL	
Solids, Total Suspended	ND	mg/l	5.0	30	2540D		0702 00:05	DW
Nitrogen, Ammonia	0.925	mg/l	0.400	30	4500NH3-BE		0702 13:06	JL
Nitrogen, Nitrate/Nitrite	3.3	mg/l	0.10	30	4500NO3-F		0627 20:22	DD
Nitrogen, Total Kjeldahl	2.0	mg/l	0.50	30	4500NH3-BE		0703 06:49	JL
Phosphorus, Total	0.277	mg/l	0.010	30	4500P-E		0630 19:15	NM
Phosphorus, Soluble	0.244	mg/l	0.010	30	4500P-E		0701 23:35	NM
E. Coli (MF)	>20000	col/100ml	100	30	9213D		0627 16:35	DW

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:2003 CT:PH-0574 ME:MA0086 RI:LAO00065 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0809541-05
5
Sample Matrix: WATER

Date Collected: 27-JUN-2008 11:58
Date Received : 27-JUN-2008
Date Reported : 07-JUL-2008

Condition of Sample: Satisfactory

Field Prep: None

Number & Type of Containers: 2-Bacteria,3-Plastic

PARAMETER	**RESULT**	**UNITS**	**RDL**	**REF**	**METHOD**	**DATE** **PREP**	 **ANAL**	**ID**
Solids, Total Suspended	ND	mg/l	5.0	30	2540D		0702 00:05	DW
Nitrogen, Ammonia	ND	mg/l	0.400	30	4500NH3-BE		0702 13:15	JL
Nitrogen, Nitrate/Nitrite	ND	mg/l	0.10	30	4500NO3-F		0627 20:23	DD
Nitrogen, Total Kjeldahl	0.51	mg/l	0.50	30	4500NH3-BE		0703 06:58	JL
Phosphorus, Total	ND	mg/l	0.010	30	4500P-E		0630 19:16	NM
Phosphorus, Soluble	ND	mg/l	0.010	30	4500P-E		0701 23:36	NM
E. Coli (MF)	41	col/100ml	2.0	30	9213D		0627 16:35	DW

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:2003 CT:PH-0574 ME:MA0086 RI:LAO00065 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0809541-06
6
Sample Matrix: WATER

Date Collected: 27-JUN-2008 11:35
Date Received : 27-JUN-2008
Date Reported : 07-JUL-2008

Condition of Sample: Satisfactory

Field Prep: None

Number & Type of Containers: 2-Bacteria,3-Plastic

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATE PREP	DATE ANAL	ID
Solids, Total Suspended	ND	mg/l	5.0	30	2540D		0702 00:05	DW
Nitrogen, Ammonia	ND	mg/l	0.400	30	4500NH3-BE		0702 13:24	JL
Nitrogen, Nitrate/Nitrite	ND	mg/l	0.10	30	4500NO3-F		0627 20:24	DD
Nitrogen, Total Kjeldahl	1.7	mg/l	0.50	30	4500NH3-BE		0703 07:07	JL
Phosphorus, Total	ND	mg/l	0.010	30	4500P-E		0630 19:16	NM
Phosphorus, Soluble	ND	mg/l	0.010	30	4500P-E		0701 23:36	NM
E. Coli (MF)	420	col/100ml	10	30	9213D		0627 16:35	DW

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:2003 CT:PH-0574 ME:MA0086 RI:LAO00065 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0809541-07
7
Sample Matrix: WATER

Condition of Sample: Satisfactory

Date Collected: 27-JUN-2008 12:33
Date Received : 27-JUN-2008
Date Reported : 07-JUL-2008

Field Prep: None

Number & Type of Containers: 2-Bacteria,3-Plastic

PARAMETER	**RESULT**	**UNITS**	**RDL**	**REF METHOD**	**DATE** **PREP**	 **ANAL**	**ID**
Solids, Total Suspended	ND	mg/l	5.0	30 2540D		0702 00:05	DW
Nitrogen, Ammonia	ND	mg/l	0.400	30 4500NH3-BE		0702 13:32	JL
Nitrogen, Nitrate/Nitrite	0.17	mg/l	0.10	30 4500NO3-F		0627 20:25	DD
Nitrogen, Total Kjeldahl	ND	mg/l	0.50	30 4500NH3-BE		0703 07:17	JL
Phosphorus, Total	ND	mg/l	0.010	30 4500P-E		0630 19:16	NM
Phosphorus, Soluble	ND	mg/l	0.010	30 4500P-E		0701 23:37	NM
E. Coli (MF)	98	col/100ml	2.0	30 9213D		0627 16:35	DW

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL
CERTIFICATE OF ANALYSIS

MA:M-MA086 NH:2003 CT:PH-0574 ME:MA0086 RI:LAO00065 NY:11148 NJ:MA935 Army:USACE

Laboratory Sample Number: L0809541-08
1B
Sample Matrix: WATER

Date Collected: 27-JUN-2008 09:01
Date Received : 27-JUN-2008
Date Reported : 07-JUL-2008

Condition of Sample: Satisfactory

Field Prep: None

Number & Type of Containers: 2-Bacteria,4-Plastic

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATE PREP	DATE ANAL	ID
Solids, Total Suspended	ND	mg/l	5.0	30	2540D		0702 00:05	DW
Nitrogen, Ammonia	ND	mg/l	0.400	30	4500NH3-BE		0702 13:41	JL
Nitrogen, Nitrate/Nitrite	ND	mg/l	0.10	30	4500NO3-F		0627 20:25	DD
Nitrogen, Total Kjeldahl	ND	mg/l	0.50	30	4500NH3-BE		0703 07:26	JL
Phosphorus, Total	0.012	mg/l	0.010	30	4500P-E		0630 19:17	NM
Phosphorus, Soluble	0.016	mg/l	0.010	30	4500P-E		0701 23:38	NM
E. Coli (MF)	64	col/100ml	2.0	30	9213D		0627 16:35	DW
Total Metals								
Iron, Total	0.64	mg/l	0.05	1	6010B	0630 12:00	0701 19:04	TD

Comments: Complete list of References and Glossary of Terms found in Addendum I

ALPHA ANALYTICAL
QUALITY ASSURANCE BATCH DUPLICATE ANALYSIS

Laboratory Job Number: L0809541

Parameter	Value 1	Value 2	Units	RPD	RPD Limits
Solids, Total Suspended for sample(s) 01-08 (L0809641-01, WG327654-2)					
Solids, Total Suspended	1300	1200	mg/l	8	32
Nitrogen, Ammonia for sample(s) 01-08 (L0809544-02, WG327747-3)					
Nitrogen, Ammonia	21.0	20.8	mg/l	1	20
Nitrogen, Nitrate/Nitrite for sample(s) 01-08 (L0809665-03, WG327311-4)					
Nitrogen, Nitrate/Nitrite	ND	ND	mg/l	NC	20
Nitrogen, Total Kjeldahl for sample(s) 01-08 (L0809544-02, WG327748-3)					
Nitrogen, Total Kjeldahl	25	25	mg/l	0	20
Phosphorus, Total for sample(s) 01-08 (L0809473-05, WG327468-3)					
Phosphorus, Total	0.069	0.070	mg/l	1	20
Phosphorus, Soluble for sample(s) 01-08 (L0809541-01, WG327661-3)					
Phosphorus, Soluble	ND	0.010	mg/l	NC	
Total Metals for sample(s) 08 (L0809541-08, WG327486-1)					
Iron, Total	0.64	0.64	mg/l	0	20

ALPHA ANALYTICAL
QUALITY ASSURANCE BATCH SPIKE ANALYSES

Laboratory Job Number: L0809541

Parameter	**% Recovery**	**QC Criteria**
Nitrogen, Ammonia LCS for sample(s) 01-08 (WG327747-2)		
Nitrogen, Ammonia	99	80-120
Nitrogen, Nitrate/Nitrite LCS for sample(s) 01-08 (WG327311-1)		
Nitrogen, Nitrate/Nitrite	102	90-110
Nitrogen, Total Kjeldahl LCS for sample(s) 01-08 (WG327748-2)		
Nitrogen, Total Kjeldahl	100	75-125
Phosphorus, Total LCS for sample(s) 01-08 (WG327468-2)		
Phosphorus, Total	92	85-115
Phosphorus, Soluble LCS for sample(s) 01-08 (WG327661-2)		
Phosphorus, Soluble	98	
Total Metals LCS for sample(s) 08 (WG327486-4)		
Iron, Total	96	80-120
Nitrogen, Ammonia SPIKE for sample(s) 01-08 (L0809544-02, WG327747-4)		
Nitrogen, Ammonia	92	75-125
Nitrogen, Nitrate/Nitrite SPIKE for sample(s) 01-08 (L0809387-02, WG327311-3)		
Nitrogen, Nitrate/Nitrite	100	80-120
Nitrogen, Total Kjeldahl SPIKE for sample(s) 01-08 (L0809544-02, WG327748-4)		
Nitrogen, Total Kjeldahl	90	60-140
Phosphorus, Total SPIKE for sample(s) 01-08 (L0809473-06, WG327468-4)		
Phosphorus, Total	97	80-120
Phosphorus, Soluble SPIKE for sample(s) 01-08 (L0809541-02, WG327661-4)		
Phosphorus, Soluble	101	
Total Metals SPIKE for sample(s) 08 (L0809541-08, WG327486-2)		
Iron, Total	96	75-125

ALPHA ANALYTICAL
QUALITY ASSURANCE BATCH BLANK ANALYSIS

Laboratory Job Number: L0809541

PARAMETER	RESULT	UNITS	RDL	REF	METHOD	DATE		ID
						PREP	ANAL	
Blank Analysis for sample(s) 01-08 (WG327654-1)								
Solids, Total Suspended	ND	mg/l	5.0	30	2540D		0702 00:05	DW
Blank Analysis for sample(s) 01-08 (WG327747-1)								
Nitrogen, Ammonia	ND	mg/l	0.400	30	4500NH3-BE		0702 12:09	JL
Blank Analysis for sample(s) 01-08 (WG327311-2)								
Nitrogen, Nitrate/Nitrite	ND	mg/l	0.10	30	4500NO3-F		0627 19:48	DD
Blank Analysis for sample(s) 01-08 (WG327748-1)								
Nitrogen, Total Kjeldahl	ND	mg/l	0.50	30	4500NH3-BE		0703 05:57	JL
Blank Analysis for sample(s) 01-08 (WG327468-1)								
Phosphorus, Total	ND	mg/l	0.010	30	4500P-E		0630 19:03	NM
Blank Analysis for sample(s) 01-08 (WG327661-1)								
Phosphorus, Soluble	ND	mg/l	0.010	30	4500P-E		0701 23:24	NM
Blank Analysis for sample(s) 01-08 (WG327330-1)								
E. Coli (MF)	ND	col/100ml	1.0	30	9213D		0627 16:35	DW
Blank Analysis for sample(s) 01 (WG327332-1)								
Chlorophyll A	ND	mg/m3	2.00	30	10200H	0627 16:30	0627 17:40	DW
Blank Analysis for sample(s) 08 (WG327486-3)								
Total Metals								
Iron, Total	ND	mg/l	0.05	1	6010B	0630 12:00	0701 18:57	TD

REFERENCES

1. Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IIIA, 1997.

30. Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WPCF. 18th Edition. 1992.

GLOSSARY OF TERMS AND SYMBOLS

REF	Reference number in which test method may be found.
METHOD	Method number by which analysis was performed.
ID	Initials of the analyst.
ND	Not detected in comparison to the reported detection limit.
NI	Not Ignitable.
ug/cart	Micrograms per Cartridge.
H	The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

LIMITATION OF LIABILITIES

Alpha Analytical, Inc. performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical, Inc., shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical, Inc. be held liable for any incidental consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical, Inc.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding times and splitting of samples in the field.

CHAIN OF COUSTODY

PAGE OF

ALPHA ANALYTICAL

Westborough, MA
TEL: 508-898-9220
FAX: 508-898-9193

Mansfield, MA
TEL: 508-822-9300
FAX: 508-822-3288

Date Rec'd in Lab: 6/27/08

ALPHA Job #: L0809541

Client Information

Client: ESS Group, Inc., Attn: Matt Ladewig

Address: 401 Wampanoag Trail, Suite 400

East Povidence, RI 02905

Phone: (401)330-1204

Fax:

Email: mladewig@essgroup.com

☐ These samples have been Previously analyzed by Alpha

Project Information

Project Name: Hopedale Pond

Project Location:

Project #: H153

Project Manager: Carl Nielsen

ALPHA Quote #:

Turn-Around Time

☑ Standard ☐ Rush (ONLY IF PRE-APPROVED)

Due Date: 7/3/08 Time:

Report Information Data Deliverables

☐ FAX ☒ EMAIL

☐ ADEx ☐ Add'l Deliverables

Billing Information

☑ Same as Client info PO #:

Regulatory Requirements/Report Limits

State/Fed Program *Criteria*

MCP PRESUMPTIVE CERTAINTY-CT REASONABLE CONFIDENCE PROTOCOLS

☐ Yes ☐ No Are MCP Analytical Methods Required?

☐ Yes ☐ No Are CT RCP (Reasonable Confidence Protocols) Required?

Other Project Specific Requirements/Comments/Detection Limits:

ANALYSIS

SAMPLE HANDLING

Filtration
☐ Done
☐ Not Needed
☒ Lab to do

Preservation
☐ Lab to do

(Please specify below)

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler's Initials	Dissolved Phos	TPhos, NO3/NO2, NH3, TKN	TSS	EColi	Total Fe	Chlorophyll A							Sample Specific Comments	TOTAL # BOTTLES
9541.1	1	6/27	8:38	SW	CJ/mf	X	X	X	X	[illegible]	X								7
2	2	6/27	9:53	SW	CJ/mf	X	X	X	X	[illegible]	[illegible]								7
3	3	6/27	9:18	SW	CJ/mf	X	X	X	X										5
4	4	6/27	10:50	SW	CJ/mf	X	X	X	X										5
5	5	6/27	11:58	SW	CJ/mf	X	X	X	X										5
6	6	6/27	11:35	SW	CJ/mf	X	X	X	X										5
7	7	6/27	12:33	SW	CJ/mf	X	X	X	X										5
8	818	6/27	9:01	SW	CJ/mf	X	X	X	X	X									5
					Container Type	P	P	P	B	P	P								
					Preservative	A	D	A	A	C	A	-	-	-	-	-	-		

PLEASE ANSWER QUESTIONS ABOVE!

IS YOUR PROJECT MA MCP or CT RCP?

Relinquished By:	Date/Time	Received By:	Date/Time
Carl	6/27 1:48pm	M Bailey	6/27/08 1345

Please print clearly, legibly and completely. Samples can not be logged in and turnaround time clock will not start until any ambiguities are resolved. All samples submitted are subject to Alpha's Payment Terms.

FORM NO: 01-01(I)
(rev. 30-JUL-07)

GeoLabs, Inc.
45 Johnson Lane
Braintree MA 02184
Tele: 781 848 7844
Fax: 781 848 7811

Tuesday, July 29, 2008

Dan Herzlinger
ESS - Group
401 Wampanoag Trail Suite #400
E. Providence, RI 02915

TEL: (401) 330-1210
FAX:

Project: Hopedale Pond
Location: H153-000

Order No.: 0807275

Dear Dan Herzlinger:

GeoLabs, Inc. received 7 sample(s) on 7/17/2008 for the analyses presented in the following report.

There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications, except when noted in the Case Narrative.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Jim Chen
Laboratory Director

For current certifications, please visit our website at www.geolabs.com

Certifications:

CT (PH-0148) - MA (M-MA015) - NH (2508) - NJ (MA009) - NY (11796) - RI (LA000252)

GeoLabs, Inc. **Date:** *29-Jul-08*

CLIENT: ESS - Group
Project: Hopedale Pond
Lab Order: 0807275

CASE NARRATIVE

Physical Condition of Samples

The project was received by the laboratory in satisfactory condition. The sample(s) were received undamaged, in appropriate containers with the correct preservation.

Project Documentation

The project was accompanied by satisfactory Chain of Custody documentation.

Analysis of Sample(s)

All extractable samples were extracted and analyzed and any Volatile samples were analyzed within method specified holding times and according to GeoLabs documented Standard Operating Procedure. No analytical anomalies or non-conformances were noted by the laboratory during the processing of these samples.

GeoLabs, Inc.

Reported Date: 29-Jul-08

CLIENT:	ESS - Group	**Client Sample ID:**	HP-1
Lab Order:	0807275	**Collection Date:**	7/17/2008 10:30:00 AM
Project:	Hopedale Pond	**Date Received:**	7/17/2008
Lab ID:	0807275-001	**Matrix:**	SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **Admi**
Total Suspended Solids	ND	4.00		mg/L	1	7/18/2008
CHLOROPHYLL - A						Analyst: **SUB**
Chlorophyll a	*3.70*	0.500		mg/m³	1	7/18/2008
NOTES: Sample was analyzed at M-MA003.						
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	ND	0.010		mg/L	1	7/22/2008
NOTES: Sample was analyzed at M-RI010.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*10*	0		Colonies/100ml	1	7/17/2008
NOTES: Sample was analyzed at M-24353.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	ND	0.010		mg/L	1	7/22/2008
NOTES: Sample was analyzed at M-RI010.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	7/25/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	7/18/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.0374*	0.0270		mg/L	1	7/18/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **WFR**
Nitrogen, Total Kjeldahl	*0.559*	0.105		mg/L	1	7/23/2008
TURBIDITY - E180.1						Analyst: **WFR**
Turbidity	*1.06*	0.0283		NTU	1	7/18/2008

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

GeoLabs, Inc.

Reported Date: 29-Jul-08

CLIENT: ESS - Group
Lab Order: 0807275
Project: Hopedale Pond
Lab ID: 0807275-002

Client Sample ID: HP-1B
Collection Date: 7/17/2008 10:50:00 AM
Date Received: 7/17/2008
Matrix: SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **Admir**
Total Suspended Solids	ND	4.00		mg/L	1	7/18/2008
TOTAL METALS BY ICP - E200.7						Analyst: **QS**
Iron	*1.13*	0.0600		mg/L	1	7/18/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	ND	0.010		mg/L	1	7/22/2008
NOTES: Sample was analyzed at M-RI010.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	<10	0		Colonies/100ml	1	7/17/2008
NOTES: Sample was analyzed at M-24353.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	ND	0.010		mg/L	1	7/22/2008
NOTES: Sample was analyzed at M-RI010.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	*0.156*	0.130		mg/L	1	7/25/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	7/18/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.0323*	0.0270		mg/L	1	7/18/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **WFR**
Nitrogen, Total Kjeldahl	*0.519*	0.105		mg/L	1	7/23/2008
TURBIDITY - E180.1						Analyst: **WFR**
Turbidity	*1.01*	0.0283		NTU	1	7/18/2008

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

Reported Date: 29-Jul-08

CLIENT:	ESS - Group	**Client Sample ID:**	HP-2
Lab Order:	0807275	**Collection Date:**	7/17/2008 11:30:00 AM
Project:	Hopedale Pond	**Date Received:**	7/17/2008
Lab ID:	0807275-003	**Matrix:**	SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **Admi**
Total Suspended Solids	ND	4.00		mg/L	1	7/18/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	ND	0.010		mg/L	1	7/22/2008
NOTES: Sample was analyzed at M-RI010.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*30*	0		Colonies/100ml	1	7/17/2008
NOTES: Sample was analyzed at M-24353.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	ND	0.010		mg/L	1	7/22/2008
NOTES: Sample was analyzed at M-RI010.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	7/25/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	7/18/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.0447*	0.0270		mg/L	1	7/18/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **WFR**
Nitrogen, Total Kjeldahl	*0.606*	0.105		mg/L	1	7/23/2008
TURBIDITY - E180.1						Analyst: **WFR**
Turbidity	*0.860*	0.0283		NTU	1	7/18/2008

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

GeoLabs, Inc.

Reported Date: 29-Jul-08

CLIENT: ESS - Group
Lab Order: 0807275
Project: Hopedale Pond
Lab ID: 0807275-004

Client Sample ID: HP-3
Collection Date: 7/17/2008 1:45:00 PM
Date Received: 7/17/2008
Matrix: SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **Admi**
Total Suspended Solids	ND	4.00		mg/L	1	7/18/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	ND	0.010		mg/L	1	7/22/2008
NOTES: Sample was analyzed at M-RI010.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	<10	0		Colonies/100ml	1	7/17/2008
NOTES: Sample was analyzed at M-24353.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	ND	0.010		mg/L	1	7/22/2008
NOTES: Sample was analyzed at M-RI010.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	7/25/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	7/18/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	ND	0.0270		mg/L	1	7/18/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **WFR**
Nitrogen, Total Kjeldahl	*0.536*	0.105		mg/L	1	7/23/2008
TURBIDITY - E180.1						Analyst: **WFR**
Turbidity	*0.610*	0.0283		NTU	1	7/18/2008

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

GeoLabs, Inc.

Reported Date: 29-Jul-08

CLIENT: ESS - Group
Lab Order: 0807275
Project: Hopedale Pond
Lab ID: 0807275-005

Client Sample ID: HP-4
Collection Date: 7/17/2008 12:30:00 PM
Date Received: 7/17/2008
Matrix: SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **Admi**
Total Suspended Solids	ND	4.00		mg/L	1	7/18/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	ND	0.010		mg/L	1	7/22/2008
NOTES: Sample was analyzed at M-RI010.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*255*	0		Colonies/100ml	1	7/17/2008
NOTES: Sample was analyzed at M-24353.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	ND	0.010		mg/L	1	7/22/2008
NOTES: Sample was analyzed at M-RI010.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	*1.89*	0.130		mg/L	1	7/25/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	*0.0733*	0.0220		mg/L	1	7/18/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*2.46*	0.0540		mg/L	2	7/18/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **WFR**
Nitrogen, Total Kjeldahl	*2.73*	0.105		mg/L	1	7/23/2008
TURBIDITY - E180.1						Analyst: **WFR**
Turbidity	*0.660*	0.0283		NTU	1	7/18/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

GeoLabs, Inc.

Reported Date: 29-Jul-08

CLIENT: ESS - Group
Lab Order: 0807275
Project: Hopedale Pond
Lab ID: 0807275-006

Client Sample ID: HP-5
Collection Date: 7/17/2008 1:15:00 PM
Date Received: 7/17/2008
Matrix: SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **Admi**
Total Suspended Solids	ND	4.00		mg/L	1	7/18/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	ND	0.010		mg/L	1	7/22/2008
NOTES: Sample was analyzed at M-RI010.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	<10	0		Colonies/100ml	1	7/17/2008
NOTES: Sample was analyzed at M-24353.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	ND	0.010		mg/L	1	7/22/2008
NOTES: Sample was analyzed at M-RI010.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	7/25/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	7/18/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.0337*	0.0270		mg/L	1	7/18/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **WFR**
Nitrogen, Total Kjeldahl	*0.669*	0.105		mg/L	1	7/23/2008
TURBIDITY - E180.1						Analyst: **WFR**
Turbidity	*0.610*	0.0283		NTU	1	7/18/2008

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT:	ESS - Group	**Client Sample ID:**	HP-7
Lab Order:	0807275	**Collection Date:**	7/17/2008 2:10:00 PM
Project:	Hopedale Pond	**Date Received:**	7/17/2008
Lab ID:	0807275-007	**Matrix:**	SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **Admi**
Total Suspended Solids	ND	4.00		mg/L	1	7/18/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	ND	0.010		mg/L	1	7/22/2008
NOTES: Sample was analyzed at M-RI010.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*30*	0		Colonies/100ml	1	7/17/2008
NOTES: Sample was analyzed at M-24353.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	*0.11*	0.010		mg/L	1	7/22/2008
NOTES: Sample was analyzed at M-RI010.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	7/25/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	7/18/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.0729*	0.0270		mg/L	1	7/18/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **WFR**
Nitrogen, Total Kjeldahl	*0.496*	0.105		mg/L	1	7/23/2008
TURBIDITY - E180.1						Analyst: **WFR**
Turbidity	*0.520*	0.0283		NTU	1	7/18/2008

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

Page ______ of ______

CHAIN OF CUSTODY RECORD

GeoLabs, Inc. *Environmental Laboratories*
45 Johnson Lane, Braintree, MA 02184
p 781.848.7844 • f 781.848.7811
www.geolabs.com

Sample Handling: circle choice
Filtration: Done / Not Needed / Lab to do
Preservation: Lab to do Y / N

Special Instructions
LAB TO FILTER P SAMPLES
NOTE LOW DETECTION LIMITS FOR TOTAL P & DISS P (0.01)

Turnaround: circle one
1-day 3-day
2-day [✓ 5 / 7-days]

Data Delivery: circle choice (s)
Fax [✓ email]
Format:
Excel [✓ PDF]

Requirements: circle choice (s) 0807275
GW-1 MCP Methods CT RCP (Reasonable Confidence Protocols)
S-1 DEP State / Fed Program - Criteria ______
QC Other ______

Client: ESS GROUP
Address: 401 WAMPANOAG TRAIL, SUITE 400
EAST PROVIDENCE, RI
Contact: DAN HERZLINGER

Phone: (401) 330-1210
Fax:
email: dherzlinger@essgroup.com

Project: HOPEDALE POND
Project PO: H153-000
Invoice to *:

COLLECTION DATE	TIME	SAMPLED BY	SAMPLE LOCATION / ID	CONTAINER TYPE	CONTAINER QUANITITY	MATRIX	COMP	GRAB	GeoLabs SAMPLE NUMBER	TOTAL P (DT 0.01)	DISS P (DT 0.01)	TKN, NO2, NO3, NH4	TSS	E Coli	Total Fe	Chlorophyll A	TURBIDITY	TEMPERATURE	LAB pH
Preservative:																			
7/17/08	DH/ MS	10:30	HP-1	A/P	6	SW		X	7275-001	X	X	X	X	X		X	X	5°C	
↓	↓	10:50	HP-1B	A/P	6	SW		X	002	X	X	X	X	X	X		X		
		11:30	HP-2	A/P	5	SW		X	003	X	X	X	X	X			X		
		1:45	HP-3	A/P	5	SW		X	004	X	X	X	X	X			X		
		12:30	HP-4	A/P	5	SW		X	005	X	X	X	X	X			X		
		1:15	HP-5	A/P	5	SW		X	006	X	X	X	X	X			X		
		2:10	HP-7	A/P	5	SW		X	007	X	X	X	X	X			X		

Matrix Codes:
GW = Ground Water DW = Drinking Water S = Soil A = Air
WW = Waste Water SL = Sludge O = Oil OT = Other

Received on Ice ☑

Preservatives
1 = Hcl 3 = H2SO4 5 = NaOH 7 = Other
2 = HNO3 4 = Na2S2O3 6 = MEOH

Containers:
A = Amber B = Bag O = Other
G = Glass P = Plastic
S = Summa V = Voa

Relinquished by:	Date / Time	Received by:	Date / Time
	7/17/08		7/17/08 3:00
		KC	7/17/08 4:40

280451.J&P.C of CR.06/17/08

*Terms: Payment due within 30 days unless other arrangements are made. Past due balances subject to interest and collection cost. Note: Homeowners and Law Firms must pay when dropping off samples. We accept cash, check and credit cards.

CT (PH-0148) MA (MA - 015) NH (2508) NJ (MA-009)
NY(11796) PA (68-03417) RI (LA000252)

GeoLabs, Inc.
45 Johnson Lane
Braintree MA 02184
Tele: 781 848 7844
Fax: 781 848 7811

Wednesday, August 20, 2008

Carissa Lord
ESS - Group
401 Wampanoag Trail Suite #400
E. Providence, RI 02915

TEL: (401) 330-1244
FAX:

Project: H153-0W
Location: Hopedale

Order No.: 0808064

Dear Carissa Lord:

GeoLabs, Inc. received 8 sample(s) on 8/7/2008 for the analyses presented in the following report.

There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications, except when noted in the Case Narrative.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Jim Chen
Laboratory Director

For current certifications, please visit our website at www.geolabs.com

Certifications:

CT (PH-0148) - MA (M-MA015) - NH (2508) - NJ (MA009) - NY (11796) - RI (LA000252)

GeoLabs, Inc. **Date:** *20-Aug-08*

CLIENT: ESS - Group
Project: H153-0W
Lab Order: 0808064

CASE NARRATIVE

Physical Condition of Samples

The project was received by the laboratory in satisfactory condition. The sample(s) were received undamaged, in appropriate containers with the correct preservation.

Project Documentation

The project was accompanied by satisfactory Chain of Custody documentation.

Analysis of Sample(s)

All extractable samples were extracted and analyzed and any Volatile samples were analyzed within method specified holding times and according to GeoLabs documented Standard Operating Procedure. No analytical anomalies or non-conformances were noted by the laboratory during the processing of these samples.

GeoLabs, Inc.

Reported Date: 20-Aug-08

CLIENT: ESS - Group
Lab Order: 0808064
Project: H153-0W
Lab ID: 0808064-001

Client Sample ID: 4
Collection Date: 8/6/2008 8:37:00 AM
Date Received: 8/7/2008
Matrix: SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **Admi**
Total Suspended Solids	*6.00*	4.00		mg/L	1	8/7/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	*0.13*	0.010		mg/L	1	8/11/2008
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*2400*	0		Colonies/100ml	1	8/6/2008
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	*0.97*	0.010		mg/L	1	8/11/2008
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	*0.424*	0.130		mg/L	1	8/8/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	*0.0483*	0.0220		mg/L	1	8/8/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*2.72*	0.0540		mg/L	2	8/8/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.985*	0.105		mg/L	1	8/15/2008

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT:	ESS - Group	**Client Sample ID:**	SS11
Lab Order:	0808064	**Collection Date:**	8/6/2008 9:09:00 AM
Project:	H153-0W	**Date Received:**	8/7/2008
Lab ID:	0808064-002	**Matrix:**	SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **Admi**
Total Suspended Solids	15.0	4.00		mg/L	1	8/7/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	0.14	0.010		mg/L	1	8/11/2008
NOTES:						
Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	1980	0		Colonies/100ml	1	8/6/2008
NOTES:						
Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	1.1	0.010		mg/L	1	8/11/2008
NOTES:						
Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	0.219	0.130		mg/L	1	8/8/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	8/8/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	0.569	0.0270		mg/L	1	8/8/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	0.896	0.105		mg/L	1	8/15/2008

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

GeoLabs, Inc.

Reported Date: 20-Aug-08

CLIENT:	ESS - Group	**Client Sample ID:**	SS2
Lab Order:	0808064	**Collection Date:**	8/6/2008 9:51:00 AM
Project:	H153-0W	**Date Received:**	8/7/2008
Lab ID:	0808064-003	**Matrix:**	SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **Admi**
Total Suspended Solids	ND	4.00		mg/L	1	8/7/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	*0.20*	0.010		mg/L	1	8/11/2008
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*1750*	0		Colonies/100ml	1	8/6/2008
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	*1.2*	0.010		mg/L	1	8/11/2008
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	*0.197*	0.130		mg/L	1	8/8/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	8/8/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.453*	0.0270		mg/L	1	8/8/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.709*	0.105		mg/L	1	8/15/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

CLIENT:	ESS - Group	**Client Sample ID:**	SS3
Lab Order:	0808064	**Collection Date:**	8/6/2008 12:49:00 PM
Project:	H153-0W	**Date Received:**	8/7/2008
Lab ID:	0808064-004	**Matrix:**	SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **Admi**
Total Suspended Solids	15.0	4.00		mg/L	1	8/7/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	0.19	0.010		mg/L	1	8/11/2008
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	3000	0		Colonies/100ml	1	8/6/2008
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	2.3	0.020		mg/L	2	8/11/2008
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	0.325	0.130		mg/L	1	8/8/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	8/8/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	0.314	0.0270		mg/L	1	8/8/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	0.786	0.105		mg/L	1	8/15/2008

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

GeoLabs, Inc.

Reported Date: 20-Aug-08

CLIENT: ESS - Group
Lab Order: 0808064
Project: H153-0W
Lab ID: 0808064-005

Client Sample ID: SS8
Collection Date: 8/6/2008 10:25:00 AM
Date Received: 8/7/2008
Matrix: SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **Admi**
Total Suspended Solids	ND	4.00		mg/L	1	8/7/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	*0.051*	0.010		mg/L	1	8/11/2008
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*820*	0		Colonies/100ml	1	8/6/2008
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	*1.6*	0.010		mg/L	1	8/11/2008
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	8/8/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	8/8/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*1.04*	0.0270		mg/L	1	8/8/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.256*	0.105		mg/L	1	8/15/2008

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

GeoLabs, Inc. **Reported Date:** 20-Aug-08

CLIENT:	ESS - Group	**Client Sample ID:**	5
Lab Order:	0808064	**Collection Date:**	8/6/2008 10:59:00 AM
Project:	H153-0W	**Date Received:**	8/7/2008
Lab ID:	0808064-006	**Matrix:**	SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **Admi**
Total Suspended Solids	ND	4.00		mg/L	1	8/7/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	*0.032*	0.010		mg/L	1	8/11/2008
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*170*	0		Colonies/100ml	1	8/6/2008
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	*1.5*	0.010		mg/L	1	8/11/2008
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	8/8/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	8/8/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.125*	0.0270		mg/L	1	8/8/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.461*	0.105		mg/L	1	8/15/2008

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT:	ESS - Group	**Client Sample ID:**	6
Lab Order:	0808064	**Collection Date:**	8/6/2008 11:29:00 AM
Project:	H153-0W	**Date Received:**	8/7/2008
Lab ID:	0808064-007	**Matrix:**	SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **Admi**
Total Suspended Solids	ND	4.00		mg/L	1	8/7/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	*0.034*	0.010		mg/L	1	8/11/2008
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*140*	0		Colonies/100ml	1	8/6/2008
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	*1.6*	0.010		mg/L	1	8/11/2008
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	8/8/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	8/8/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.143*	0.0270		mg/L	1	8/8/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.825*	0.105		mg/L	1	8/15/2008

GeoLabs, Inc. **Reported Date:** 20-Aug-08

CLIENT:	ESS - Group	**Client Sample ID:**	7
Lab Order:	0808064	**Collection Date:**	8/6/2008 12:01:00 PM
Project:	H153-0W	**Date Received:**	8/7/2008
Lab ID:	0808064-008	**Matrix:**	SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **Admi**
Total Suspended Solids	13.0	4.00		mg/L	1	8/7/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	0.017	0.010		mg/L	1	8/11/2008
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	60.0	0		Colonies/100ml	1	8/6/2008
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	1.6	0.010		mg/L	1	8/11/2008
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	8/8/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	8/8/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	0.156	0.0270		mg/L	1	8/8/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	0.378	0.105		mg/L	1	8/15/2008

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

Page ____ of ____

CHAIN OF CUSTODY RECORD
GeoLabs, Inc. *Environmental Laboratories*
45 Johnson Lane, Braintree, MA 02184
p 781.848.7844 • f 781.848.7811
www.geolabs.com

Sample Handling: circle choice
Filtration: Done / Not Needed / Lab to do
Preservation: Lab to do Y / N

Special Instructions
Lab to Filter P samples
Note low detection limits for total P & diss. P (.01)

Turnaround: circle one
1-day 3-day
2-day [✓ 5 / 7-days]

Data Delivery: circle choice (s)
Fax [✓ email]
Format:
Excel [✓ PDF]

Requirements: circle choice (s) 0808064
GW-1 MCP Methods CT RCP (Reasonable Confidence Protocols)
S-1 DEP State / Fed Program - Criteria ____
QC Other ____

Client: ESS Group
Address: 401 Wampanoag Trail, Suite 400
East Providence, RI 02915
Contact: Carissa Lord

Phone: 401-330-1244
Fax:
email: clord@essgroup.com

Project: Hopedale
Project PO: H153-000
Invoice to *:

Preservative:

DATE	TIME	SAMPLED BY	SAMPLE LOCATION / ID	TYPE	QUANITY	MATRIX	COMP	GRAB	GeoLabs SAMPLE NUMBER	Total P (DT 0.01)	Diss P (DT 0.01)	NH3TKN	TSS	E.coli	NO2NO3			TEMPERATURE	LAB pH
8/6/08	8:37	CTL	4	A/P	6	SW		X	8064- 001	X	X	X	X	X	X			5°C	
	9:09		SS11		6	SW		X	002	X	X	X	X	X	X				
	9:51		SS2		6	SW		X	003	X	X	X	X	X	X				
	12:49		SS3		6	SW		X	004	X	X	X	X	X	X				
	10:25		SS8		6	SW		X	005	X	X	X	X	X	X				
	10:59		5		6	SW		X	006	X	X	X	X	X	X				
	11:29		6		6	SW		X	007	X	X	X	X	X	X				
	12:01		7		6	SW		X	008	X	X	X	X	X	X				

Matrix Codes:
GW = Ground Water DW = Drinking Water S = Soil A = Air
WW = Waste Water SL = Sludge O = Oil OT = Other

Received on Ice ☑

Preservatives
1 = Hcl 3 = H2SO4 5 = NaOH 7 = Other
2 = HNO3 4 = Na2S2O3 6 = MEOH

Containers:
A = Amber B = Bag O = Other
G = Glass P = Plastic
S = Summa V = Voa

Relinquished by:	Date / Time	Received by:	Date / Time
	8/6/08		8/6/08 1:50
Ken McKenna	8/6/08 6PM	R.B.	8-7-08 8:00 AM

280507.J&PC of CR.07/14/08

* Terms: Payment due within 30 days unless other arrangements are made. Past due balances subject to interest and collection cost.
Note: Homeowners and Law Firms must pay when dropping off samples. We accept cash, check and credit cards.

CT (PH-0148) MA (MA - 015) NH (2508) NJ (MA-009)
NY(11796) PA (68-03417) RI (LA000252)

Monday, October 27, 2008

GeoLabs, Inc.
45 Johnson Lane
Braintree MA 02184
Tele: 781 848 7844
Fax: 781 848 7811

Matt Ladewig
ESS - Group
401 Wampanoag Trail Suite #400
E. Providence, RI 02915

TEL: 401-330-1200
FAX:

Project: H153-000
Location: Hopedale Pond

Order No.: 0810148

Dear Matt Ladewig:

GeoLabs, Inc. received 7 sample(s) on 10/9/2008 for the analyses presented in the following report.

There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications, except when noted in the Case Narrative.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Jim Chen
Laboratory Director

For current certifications, please visit our website at www.geolabs.com

Certifications:

CT (PH-0148) - MA (M-MA015) - NH (2508) - NJ (MA009) - NY (11796) - RI (LA000252)

CLIENT: ESS - Group
Project: H153-000
Lab Order: 0810148

CASE NARRATIVE

Physical Condition of Samples

The project was received by the laboratory in satisfactory condition. The sample(s) were received undamaged, in appropriate containers with the correct preservation.

Project Documentation

The project was accompanied by satisfactory Chain of Custody documentation.

Analysis of Sample(s)

All extractable samples were extracted and analyzed and any Volatile samples were analyzed within method specified holding times and according to GeoLabs documented Standard Operating Procedure. No analytical anomalies or non-conformances were noted by the laboratory during the processing of these samples.

GeoLabs, Inc.

Reported Date: 27-Oct-08

CLIENT: ESS - Group
Lab Order: 0810148
Project: H153-000
Lab ID: 0810148-001

Client Sample ID: HP-1S
Collection Date: 10/9/2008
Date Received: 10/9/2008
Matrix: GROUNDWATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	10/10/2008
CHLOROPHYLL - A						Analyst: **SUB**
Chlorophyll a	ND	0.500		mg/m^3	1	10/10/2008
NOTES: Sample was analyzed at M-MA003.						
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	ND	0.010		mg/L	1	10/16/2008
NOTES: Sample was analyzed at M-RI010.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	<10	10.0		Colonies/100ml	1	10/9/2008 4:50:00 PM
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	ND	0.010		mg/L	1	10/16/2008
NOTES: Sample was analyzed at M-RI010.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	10/10/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	10/10/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.100*	0.0270		mg/L	1	10/10/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.534*	0.105		mg/L	1	10/24/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

GeoLabs, Inc. **Reported Date:** 27-Oct-08

CLIENT:	ESS - Group	**Client Sample ID:**	HP-1B
Lab Order:	0810148	**Collection Date:**	10/9/2008
Project:	H153-000	**Date Received:**	10/9/2008
Lab ID:	0810148-002	**Matrix:**	GROUNDWATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	10/10/2008
TOTAL METALS BY ICP - SW6010B						Analyst: **QS**
Iron	*0.387*	0.0600		mg/L	1	10/10/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	ND	0.010		mg/L	1	10/16/2008
NOTES: Sample was analyzed at M-RI010.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*30*	10.0		Colonies/100ml	1	10/9/2008 4:50:00 PM
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	ND	0.010		mg/L	1	10/16/2008
NOTES: Sample was analyzed at M-RI010.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	10/10/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	10/10/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.151*	0.0270		mg/L	1	10/10/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.523*	0.105		mg/L	1	10/24/2008

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT:	ESS - Group	**Client Sample ID:**	HP-2
Lab Order:	0810148	**Collection Date:**	10/9/2008
Project:	H153-000	**Date Received:**	10/9/2008
Lab ID:	0810148-003	**Matrix:**	GROUNDWATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	10/10/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	ND	0.010		mg/L	1	10/16/2008
NOTES: Sample was analyzed at M-RI010.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*50*	10.0		Colonies/100ml	1	10/9/2008 4:50:00 PM
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	ND	0.010		mg/L	1	10/16/2008
NOTES: Sample was analyzed at M-RI010.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	10/10/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	10/10/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.0383*	0.0270		mg/L	1	10/10/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.362*	0.105		mg/L	1	10/24/2008

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

GeoLabs, Inc.

Reported Date: 27-Oct-08

CLIENT:	ESS - Group	**Client Sample ID:**	HP-4
Lab Order:	0810148	**Collection Date:**	10/9/2008
Project:	H153-000	**Date Received:**	10/9/2008
Lab ID:	0810148-004	**Matrix:**	GROUNDWATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	10/10/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	ND	0.010		mg/L	1	10/16/2008
NOTES: Sample was analyzed at M-RI010.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*40*	10.0		Colonies/100ml	1	10/9/2008 4:50:00 PM
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	*0.020*	0.010		mg/L	1	10/16/2008
NOTES: Sample was analyzed at M-RI010.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	10/10/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	10/10/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*2.53*	0.0540		mg/L	2	10/10/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.356*	0.105		mg/L	1	10/24/2008

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT:	ESS - Group	**Client Sample ID:**	HP-5
Lab Order:	0810148	**Collection Date:**	10/9/2008
Project:	H153-000	**Date Received:**	10/9/2008
Lab ID:	0810148-005	**Matrix:**	GROUNDWATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	10/10/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	ND	0.010		mg/L	1	10/16/2008
NOTES: Sample was analyzed at M-RI010.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	<10	10.0		Colonies/100ml	1	10/9/2008 4:50:00 PM
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	ND	0.010		mg/L	1	10/16/2008
NOTES: Sample was analyzed at M-RI010.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	10/10/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	10/10/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.0416*	0.0270		mg/L	1	10/10/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.456*	0.105		mg/L	1	10/24/2008

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

GeoLabs, Inc.

Reported Date: 27-Oct-08

CLIENT:	ESS - Group	**Client Sample ID:**	HP-6
Lab Order:	0810148	**Collection Date:**	10/9/2008
Project:	H153-000	**Date Received:**	10/9/2008
Lab ID:	0810148-006	**Matrix:**	GROUNDWATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	10/10/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	ND	0.010		mg/L	1	10/16/2008
NOTES: Sample was analyzed at M-RI010.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*60*	10.0		Colonies/100ml	1	10/9/2008 4:50:00 PM
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	ND	0.010		mg/L	1	10/16/2008
NOTES: Sample was analyzed at M-RI010.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	10/10/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	10/10/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.0374*	0.0270		mg/L	1	10/10/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.301*	0.105		mg/L	1	10/24/2008

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT:	ESS - Group	**Client Sample ID:**	HP-7
Lab Order:	0810148	**Collection Date:**	10/9/2008
Project:	H153-000	**Date Received:**	10/9/2008
Lab ID:	0810148-007	**Matrix:**	GROUNDWATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	10/10/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	ND	0.010		mg/L	1	10/16/2008
NOTES: Sample was analyzed at M-RI010.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*100*	10.0		Colonies/100ml	1	10/9/2008 4:50:00 PM
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	ND	0.010		mg/L	1	10/16/2008
NOTES: Sample was analyzed at M-RI010.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	10/10/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	10/10/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.0709*	0.0270		mg/L	1	10/10/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.301*	0.105		mg/L	1	10/24/2008

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

Page ____ of 7

CHAIN OF CUSTODY RECORD

GeoLabs, Inc. *Environmental Laboratories*
45 Johnson Lane, Braintree, MA 02184
p 781.848.7844 • f 781.848.7811
www.geolabs.com

Sample Handling: circle choice
Filtration: Done / Not Needed / Lab to do
Preservation: Lab to do Y / N

Special Instructions
Lab to Filter P samples
Note low detection limits for total P & Diss P (0.01)

Turnaround: circle one
1-day   3-day
2-day   [✓ 5 / 7-days]

Data Delivery: circle choice (s)
Fax   [✓ email]
Format:
Excel   [✓ PDF]

Requirements: circle choice (s) 0810148
GW-1   MCP Methods   CT RCP (Reasonable Confidence Protocols)
S-1   DEP   State / Fed Program - Criteria ____________
QC   Other ________

Client: ESS Group
Address: 401 Wampanoag Trail, Suite 400
East Providence, RI
Contact: Carissa Lord

Phone: (401) 330-1244
Fax:
email: clord@essgroup.com

Project: Hopedale Pond
Project PO: H153-000
Invoice to *:

COLLECTION				CONTAINER						Preservative:										
										Analysis Requested										
DATE	TIME	SAMPLED BY	SAMPLE LOCATION / ID	TYPE	QUANTITY	MATRIX	COMP	GRAB	GeoLabs SAMPLE NUMBER	Total P (DT 0.01)	Diss P (DT 0.01)	TKN, NO2, NO3, NH4	TSS	E Coli	Total Fe	Chlorophyll A	~~Turbidity~~	TEMPERATURE	LAB pH
10/9		SL	HP-1S						0148- 001	X	X	X	X	X		X			
		SL	HP-1B						002	X	X	X	X	X	X				
		SL	HP-2						003	X	X	X	X	X					
		SL	HP-4						004	X	X	X	X	X					
		SL	HP-5						005	X	X	X	X	X					
		SL	HP-6						006	X	X	X	X	X					
↓		SL	HP-7						007	X	X	X	X	X					

Matrix Codes:
GW = Ground Water   DW = Drinking Water   S = Soil   A = Air
WW = Waste Water   SL = Sludge   O = Oil   OT = Other

Received on Ice ☒

Preservatives
1 = Hcl   3 = H2SO4   5 = NaOH   7 = Other
2 = HNO3   4 = Na2S2O3   6 = MEOH

Containers:
A = Amber   B = Bag   O = Other
G = Glass   P = Plastic
S = Summa   V = Voa

Relinquished by:	Date / Time	Received by:	Date / Time
	10/9 2:08pm		10/9/08 2:08PM
		R.B	10-9-08 3:10pm

280598.J&P.C of CR.08/19/08

* Terms: Payment due within 30 days unless other arrangements are made. Past due balances subject to interest and collection cost.
Note: Homeowners and Law Firms must pay when dropping off samples. We accept cash, check and credit cards.

CT (PH-0148)   MA (MA - 015)   NH (2508)   NJ (MA-009)
NY(11796)   PA (68-03417)   RI (LA000252)

Friday, November 14, 2008

GeoLabs, Inc.
45 Johnson Lane
Braintree MA 02184
Tele: 781 848 7844
Fax: 781 848 7811

Matt Ladewig
ESS - Group
401 Wampanoag Trail Suite #400
E. Providence, RI 02915

TEL: 401-330-1200
FAX:

Project: H153-000
Location: Hopedale Pond

Order No.: 0810148

Dear Matt Ladewig:

GeoLabs, Inc. received 7 sample(s) on 10/9/2008 for the analyses presented in the following report.

This report is being re-issued with rerun results for Total and Dissolved Phosphorus. There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications, except when noted in the Case Narrative.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Jim Chen

Jim Chen
Laboratory Director

For current certifications, please visit our website at www.geolabs.com

Certifications:

CT (PH-0148) - MA (M-MA015) - NH (2508) - NJ (MA009) - NY (11796) - RI (LA000252)

GeoLabs, Inc. **Date:** *14-Nov-08*

CLIENT:	ESS - Group
Project:	H153-000
Lab Order:	0810148

CASE NARRATIVE

Physical Condition of Samples

The project was received by the laboratory in satisfactory condition. The sample(s) were received undamaged, in appropriate containers with the correct preservation.

Project Documentation

The project was accompanied by satisfactory Chain of Custody documentation.

Analysis of Sample(s)

All extractable samples were extracted and analyzed and any Volatile samples were analyzed within method specified holding times and according to GeoLabs documented Standard Operating Procedure, with the following exceptions:

Total Phosphorus and Dissolved Phosphorus were sent to a different subcontracted laboratory for re-analysis out of holding time per client request.

No analytical anomalies or non-conformances were noted by the laboratory during the processing of these samples.

GeoLabs, Inc.

Reissue Date: *14-Nov-08*
Original Reported Date: 27-Oct-08

CLIENT: ESS - Group
Project: H153-000
Lab Order: 0810148

Lab ID: 0810148-001
Client Sample ID: HP-1S
Collection Date: 10/9/2008
Matrix: GROUNDWATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	10/10/2008
CHLOROPHYLL - A						Analyst: **SUB**
Chlorophyll a	ND	0.500		mg/m³	1	10/10/2008
NOTES: Sample was analyzed at M-MA003.						
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	*0.012*	0.010	H	mg/L	1	11/14/2008
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	<10	10.0		Colonies/100ml	1	10/9/2008 4:50:00 PM
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	*0.016*	0.010	H	mg/L	1	11/7/2008
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	10/10/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	10/10/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.100*	0.0270		mg/L	1	10/10/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.534*	0.105		mg/L	1	10/24/2008

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

GeoLabs, Inc.

Reissue Date: *14-Nov-08*
Original Reported Date: 27-Oct-08

CLIENT: ESS - Group
Project: H153-000
Lab Order: 0810148

Lab ID: 0810148-002
Client Sample ID: HP-1B
Collection Date: 10/9/2008
Matrix: GROUNDWATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	10/10/2008
TOTAL METALS BY ICP - SW6010B						Analyst: **QS**
Iron	*0.387*	0.0600		mg/L	1	10/10/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	*0.015*	0.010	H	mg/L	1	11/14/2008
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*30*	10.0		Colonies/100ml	1	10/9/2008 4:50:00 PM
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	*0.018*	0.010	H	mg/L	1	11/7/2008
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	10/10/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	10/10/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.151*	0.0270		mg/L	1	10/10/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.523*	0.105		mg/L	1	10/24/2008

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT: ESS - Group
Project: H153-000
Lab Order: 0810148

Lab ID: 0810148-003
Collection Date: 10/9/2008
Client Sample ID: HP-2
Matrix: GROUNDWATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	10/10/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	*0.016*	0.010	H	mg/L	1	11/14/2008
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*50*	10.0		Colonies/100ml	1	10/9/2008 4:50:00 PM
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	*0.019*	0.010	H	mg/L	1	11/7/2008
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	10/10/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	10/10/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.0383*	0.0270		mg/L	1	10/10/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.362*	0.105		mg/L	1	10/24/2008

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT: ESS - Group
Project: H153-000
Lab Order: 0810148

Lab ID: 0810148-004
Client Sample ID: HP-4
Collection Date: 10/9/2008
Matrix: GROUNDWATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	10/10/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	*0.028*	0.010	H	mg/L	1	11/14/2008
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*40*	10.0		Colonies/100ml	1	10/9/2008 4:50:00 PM
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	*0.055*	0.010	H	mg/L	1	11/7/2008
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	10/10/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	10/10/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*2.53*	0.0540		mg/L	2	10/10/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.356*	0.105		mg/L	1	10/24/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

CLIENT:	ESS - Group	**Lab Order:**	0810148
Project:	H153-000		

Lab ID:	0810148-005	**Collection Date:**	10/9/2008
Client Sample ID:	HP-5	**Matrix:**	GROUNDWATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	10/10/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	*0.018*	0.010	H	mg/L	1	11/14/2008
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	<10	10.0		Colonies/100ml	1	10/9/2008 4:50:00 PM
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	*0.020*	0.010	H	mg/L	1	11/7/2008
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	10/10/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	10/10/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.0416*	0.0270		mg/L	1	10/10/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.456*	0.105		mg/L	1	10/24/2008

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

Reissue Date: *14-Nov-08*
Original Reported Date: 27-Oct-08

CLIENT: ESS - Group
Project: H153-000
Lab Order: 0810148

Lab ID: 0810148-006
Client Sample ID: HP-6
Collection Date: 10/9/2008
Matrix: GROUNDWATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	10/10/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	*0.014*	0.010	H	mg/L	1	11/14/2008
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*60*	10.0		Colonies/100ml	1	10/9/2008 4:50:00 PM
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	*0.015*	0.010	H	mg/L	1	11/7/2008
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	10/10/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	10/10/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.0374*	0.0270		mg/L	1	10/10/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.301*	0.105		mg/L	1	10/24/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

CLIENT: ESS - Group
Project: H153-000
Lab Order: 0810148

Lab ID: 0810148-007
Client Sample ID: HP-7
Collection Date: 10/9/2008
Matrix: GROUNDWATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	10/10/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	*0.017*	0.010	H	mg/L	1	11/14/2008
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*100*	10.0		Colonies/100ml	1	10/9/2008 4:50:00 PM
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	*0.022*	0.010	H	mg/L	1	11/7/2008
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	10/10/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	10/10/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.0709*	0.0270		mg/L	1	10/10/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.301*	0.105		mg/L	1	10/24/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

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CHAIN OF CUSTODY RECORD

GeoLabs, Inc. *Environmental Laboratories*
45 Johnson Lane, Braintree, MA 02184
p 781.848.7844 • f 781.848.7811
www.geolabs.com

Sample Handling: circle choice
Filtration: Done / Not Needed / Lab to do
Preservation: Lab to do Y / N

Special Instructions
Lab to Filter P samples
Note low detection limits for total P & Diss P (0.01)

Turnaround: circle one
1-day 3-day
2-day [✓ 5 / 7-days]

Data Delivery: circle choice (s)
Fax [✓ email]
Format:
Excel [✓ PDF]

Requirements: circle choice (s) 0810148
GW-1 MCP Methods CT RCP (Reasonable Confidence Protocols)
S-1 DEP State / Fed Program - Criteria ____________
QC Other ________

Client: ESS Group
Address: 401 Wampanoag Trail, Suite 400
East Providence, RI
Contact: Carissa Lord

Phone: (401) 330-1244
Fax:
email: clord@essgroup.com

Project: Hopedale Pond
Project PO: H153-000
Invoice to *:

COLLECTION				CONTAINER						Analysis Requested									
DATE	TIME	SAMPLED BY	SAMPLE LOCATION / ID	TYPE	QUANTITY	MATRIX	COMP	GRAB	GeoLabs SAMPLE NUMBER	Total P (DT 0.01)	Diss P (DT 0.01)	TKN, NO2, NO3, NH4	TSS	E Coli	Total Fe	Chlorophyll A	~~Turbidity~~	TEMPERATURE	LAB pH
									Preservative:										
10/9		SL	HP-1S						0148-001	X	X	X	X	X		X			
		SL	HP-1B						002	X	X	X	X	X	X				
		SL	HP-2						003	X	X	X	X	X					
		SL	HP-4						004	X	X	X	X	X					
		SL	HP-5						005	X	X	X	X	X					
		SL	HP-6						006	X	X	X	X	X					
		SL	HP-7						007	X	X	X	X	X					

Matrix Codes:
GW = Ground Water DW = Drinking Water S = Soil A = Air
WW = Waste Water SL = Sludge O = Oil OT = Other

Received on Ice ☒

Preservatives
1 = Hcl 3 = H2SO4 5 = NaOH 7 = Other
2 = HNO3 4 = Na2S2O3 6 = MEOH

Containers:
A = Amber B = Bag O = Other
G = Glass P = Plastic
S = Summa V = Voa

Relinquished by: Carissa L. Lord Date / Time 10/9 2:08pm
Received by: Kenneth McKenna Date / Time 10/9/08 208PM
R.B 10-9-08 3:10pm

280598.J&P.C of CR.08/19/08

* Terms: Payment due within 30 days unless other arrangements are made. Past due balances subject to interest and collection cost.
Note: Homeowners and Law Firms must pay when dropping off samples. We accept cash, check and credit cards.

CT (PH-0148) MA (MA - 015) NH (2508) NJ (MA-009)
NY(11796) PA (68-03417) RI (LA000252)

GeoLabs, Inc.
45 Johnson Lane
Braintree MA 02184
Tele: 781 848 7844
Fax: 781 848 7811

Monday, December 01, 2008

Carissa Lord
ESS - Group
401 Wampanoag Trail Suite #400
E. Providence, RI 02915

TEL: (401) 330-1244
FAX:

Project:	Hopedale Pond
Location:	H153-000

Order No.: 0811167

Dear Carissa Lord:

GeoLabs, Inc. received 8 sample(s) on 11/12/2008 for the analyses presented in the following report.

There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications, except when noted in the Case Narrative.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Jim Chen
Laboratory Director

For current certifications, please visit our website at www.geolabs.com

Certifications:

CT (PH-0148) - MA (M-MA015) - NH (2508) - NJ (MA009) - NY (11796) - RI (LA000252)

GeoLabs, Inc. **Date:** *01-Dec-08*

CLIENT: ESS - Group
Project: Hopedale Pond
Lab Order: 0811167

CASE NARRATIVE

Physical Condition of Samples

The project was received by the laboratory in satisfactory condition. The sample(s) were received undamaged, in appropriate containers with the correct preservation.

Project Documentation

The project was accompanied by satisfactory Chain of Custody documentation.

Analysis of Sample(s)

All extractable samples were extracted and analyzed and any Volatile samples were analyzed within method specified holding times and according to GeoLabs documented Standard Operating Procedure. No analytical anomalies or non-conformances were noted by the laboratory during the processing of these samples.

GeoLabs, Inc.

Reported Date: 01-Dec-08

CLIENT: ESS - Group
Lab Order: 0811167
Project: Hopedale Pond
Lab ID: 0811167-001

Client Sample ID: 1S
Collection Date: 11/12/2008 11:45:00 AM
Date Received: 11/12/2008
Matrix: SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	11/12/2008
CHLOROPHYLL - A						Analyst: **SUB**
Chlorophyll a	ND	0.500		mg/m^3	1	11/13/2008
NOTES: Sample was analyzed at M-MA003.						
DISSOLVED PHOSPHORUS - E365.1						Analyst: **SUB**
Phosphorus, Dissolved	*0.014*	0.010		mg/L	1	11/14/2008 1:00:00 PM
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	<10	10.0		Colonies/100ml	1	11/12/2008 6:00:00 PM
NOTES: Sample was analyzed at M-RI010.						
NITRITE - SM4500-NO3-F						Analyst: **SUB**
Nitrite	ND	0.00700		mg/L	1	11/13/2008 10:00:00 AM
NOTES: Analyzed by New England Testing Laboratory RI-010						
NITRATE - SM4500-NO3-F						Analyst: **SUB**
Nitrate	*0.0400*	0.0300		mg/L	1	11/13/2008 10:00:00 AM
NOTES: Analyzed by New England Testing Laboratory RI-010						
TOTAL PHOSPHOROUS - E365.1						Analyst: **SUB**
Phosphorus, Total (As P)	*0.019*	0.010		mg/L	1	11/14/2008 1:00:00 PM
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **RP**
Ammonia (as N)	ND	0.130		mg/L	1	11/21/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.475*	0.105		mg/L	1	11/20/2008

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

GeoLabs, Inc.

Reported Date: 01-Dec-08

CLIENT: ESS - Group
Lab Order: 0811167
Project: Hopedale Pond
Lab ID: 0811167-002

Client Sample ID: 1B
Collection Date: 11/12/2008 12:10:00 PM
Date Received: 11/12/2008
Matrix: SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	11/12/2008
TOTAL METALS BY ICP - E200.7						Analyst: **QS**
Iron	*0.395*	0.0600		mg/L	1	11/13/2008
CHLOROPHYLL - A						Analyst: **SUB**
Chlorophyll a	*0.810*	0.500		mg/m³	1	11/13/2008
NOTES:						
Sample was analyzed at M-MA003.						
DISSOLVED PHOSPHORUS - E365.1						Analyst: **SUB**
Phosphorus, Dissolved	*0.016*	0.010		mg/L	1	11/14/2008 1:00:00 PM
NOTES:						
Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*50*	10.0		Colonies/100ml	1	11/12/2008 6:00:00 PM
NOTES:						
Sample was analyzed at M-RI010.						
NITRITE - SM4500-NO3-F						Analyst: **SUB**
Nitrite	ND	0.00700		mg/L	1	11/13/2008 10:00:00 AM
NOTES:						
Analyzed by New England Testing Laboratory RI-010						
NITRATE - SM4500-NO3-F						Analyst: **SUB**
Nitrate	ND	0.0300		mg/L	1	11/13/2008 10:00:00 AM
NOTES:						
Analyzed by New England Testing Laboratory RI-010						
TOTAL PHOSPHOROUS - E365.1						Analyst: **SUB**
Phosphorus, Total (As P)	*0.020*	0.010		mg/L	1	11/14/2008 1:00:00 PM
NOTES:						
Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **RP**
Ammonia (as N)	ND	0.130		mg/L	1	11/21/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.451*	0.105		mg/L	1	11/20/2008

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

GeoLabs, Inc.

Reported Date: 01-Dec-08

CLIENT:	ESS - Group	**Client Sample ID:**	2
Lab Order:	0811167	**Collection Date:**	11/12/2008 11:13:00 AM
Project:	Hopedale Pond	**Date Received:**	11/12/2008
Lab ID:	0811167-003	**Matrix:**	SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	11/12/2008
DISSOLVED PHOSPHORUS - E365.1						Analyst: **SUB**
Phosphorus, Dissolved	*0.014*	0.010		mg/L	1	11/14/2008 1:00:00 PM
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*40*	10.0		Colonies/100ml	1	11/12/2008 6:00:00 PM
NOTES: Sample was analyzed at M-RI010.						
NITRITE - SM4500-NO3-F						Analyst: **SUB**
Nitrite	ND	0.00700		mg/L	1	11/13/2008 10:00:00 AM
NOTES: Analyzed by New England Testing Laboratory RI-010						
NITRATE - SM4500-NO3-F						Analyst: **SUB**
Nitrate	ND	0.0300		mg/L	1	11/13/2008 10:00:00 AM
NOTES: Analyzed by New England Testing Laboratory RI-010						
TOTAL PHOSPHOROUS - E365.1						Analyst: **SUB**
Phosphorus, Total (As P)	*0.016*	0.010		mg/L	1	11/14/2008 1:00:00 PM
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **RP**
Ammonia (as N)	ND	0.130		mg/L	1	11/21/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.516*	0.105		mg/L	1	11/20/2008

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

GeoLabs, Inc. **Reported Date:** 01-Dec-08

CLIENT:	ESS - Group	**Client Sample ID:**	3
Lab Order:	0811167	**Collection Date:**	11/12/2008 11:45:00 AM
Project:	Hopedale Pond	**Date Received:**	11/12/2008
Lab ID:	0811167-004	**Matrix:**	SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	11/12/2008
DISSOLVED PHOSPHORUS - E365.1						Analyst: **SUB**
Phosphorus, Dissolved	*0.016*	0.010		mg/L	1	11/14/2008 1:00:00 PM
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*20*	10.0		Colonies/100ml	1	11/12/2008 6:00:00 PM
NOTES: Sample was analyzed at M-RI010.						
NITRITE - SM4500-NO3-F						Analyst: **SUB**
Nitrite	ND	0.00700		mg/L	1	11/13/2008 10:30:00 AM
NOTES: Analyzed by New England Testing Laboratory RI-010						
NITRATE - SM4500-NO3-F						Analyst: **SUB**
Nitrate	*0.0300*	0.0300		mg/L	1	11/13/2008 10:30:00 AM
NOTES: Analyzed by New England Testing Laboratory RI-010						
TOTAL PHOSPHOROUS - E365.1						Analyst: **SUB**
Phosphorus, Total (As P)	*0.017*	0.010		mg/L	1	11/14/2008 1:00:00 PM
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **RP**
Ammonia (as N)	ND	0.130		mg/L	1	11/21/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.434*	0.105		mg/L	1	11/20/2008

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

GeoLabs, Inc.

Reported Date: 01-Dec-08

CLIENT: ESS - Group
Lab Order: 0811167
Project: Hopedale Pond
Lab ID: 0811167-005

Client Sample ID: 4
Collection Date: 11/12/2008 10:13:00 AM
Date Received: 11/12/2008
Matrix: SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	11/12/2008
DISSOLVED PHOSPHORUS - E365.1						Analyst: **SUB**
Phosphorus, Dissolved	0.039	0.010		mg/L	1	11/14/2008 1:00:00 PM
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	<10	10.0		Colonies/100ml	1	11/12/2008 6:00:00 PM
NOTES: Sample was analyzed at M-RI010.						
NITRITE - SM4500-NO3-F						Analyst: **SUB**
Nitrite	0.0210	0.00700		mg/L	1	11/13/2008 10:30:00 AM
NOTES: Analyzed by New England Testing Laboratory RI-010						
NITRATE - SM4500-NO3-F						Analyst: **SUB**
Nitrate	2.10	0.0300		mg/L	1	11/13/2008 10:30:00 AM
NOTES: Analyzed by New England Testing Laboratory RI-010						
TOTAL PHOSPHOROUS - E365.1						Analyst: **SUB**
Phosphorus, Total (As P)	0.049	0.010		mg/L	1	11/14/2008 1:00:00 PM
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **RP**
Ammonia (as N)	0.168	0.130		mg/L	1	11/21/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	0.398	0.105		mg/L	1	11/20/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

CLIENT: ESS - Group
Lab Order: 0811167
Project: Hopedale Pond
Lab ID: 0811167-006

Client Sample ID: 5
Collection Date: 11/12/2008 9:20:00 AM
Date Received: 11/12/2008
Matrix: SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	11/12/2008
DISSOLVED PHOSPHORUS - E365.1						Analyst: **SUB**
Phosphorus, Dissolved	*0.012*	0.010		mg/L	1	11/14/2008 1:00:00 PM
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*20*	10.0		Colonies/100ml	1	11/12/2008 6:00:00 PM
NOTES: Sample was analyzed at M-RI010.						
NITRITE - SM4500-NO3-F						Analyst: **SUB**
Nitrite	ND	0.00700		mg/L	1	11/13/2008 10:30:00 AM
NOTES: Analyzed by New England Testing Laboratory RI-010						
NITRATE - SM4500-NO3-F						Analyst: **SUB**
Nitrate	*0.0500*	0.0300		mg/L	1	11/13/2008 10:30:00 AM
NOTES: Analyzed by New England Testing Laboratory RI-010						
TOTAL PHOSPHOROUS - E365.1						Analyst: **SUB**
Phosphorus, Total (As P)	*0.018*	0.010		mg/L	1	11/14/2008 1:00:00 PM
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **RP**
Ammonia (as N)	ND	0.130		mg/L	1	11/21/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.522*	0.105		mg/L	1	11/20/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

CLIENT:	ESS - Group	**Client Sample ID:**	6
Lab Order:	0811167	**Collection Date:**	11/12/2008 9:40:00 AM
Project:	Hopedale Pond	**Date Received:**	11/12/2008
Lab ID:	0811167-007	**Matrix:**	SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	11/12/2008
DISSOLVED PHOSPHORUS - E365.1						Analyst: **SUB**
Phosphorus, Dissolved	*0.018*	0.010		mg/L	1	11/14/2008 1:00:00 PM
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*10*	10.0		Colonies/100ml	1	11/12/2008 6:00:00 PM
NOTES: Sample was analyzed at M-RI010.						
NITRITE - SM4500-NO3-F						Analyst: **SUB**
Nitrite	ND	0.00700		mg/L	1	11/13/2008 11:00:00 AM
NOTES: Analyzed by New England Testing Laboratory RI-010						
NITRATE - SM4500-NO3-F						Analyst: **SUB**
Nitrate	ND	0.0300		mg/L	1	11/13/2008 11:00:00 AM
NOTES: Analyzed by New England Testing Laboratory RI-010						
TOTAL PHOSPHOROUS - E365.1						Analyst: **SUB**
Phosphorus, Total (As P)	*0.019*	0.010		mg/L	1	11/14/2008 1:00:00 PM
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **RP**
Ammonia (as N)	ND	0.130		mg/L	1	11/21/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.451*	0.105		mg/L	1	11/20/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

CLIENT:	ESS - Group	**Client Sample ID:**	7
Lab Order:	0811167	**Collection Date:**	11/12/2008 8:50:00 AM
Project:	Hopedale Pond	**Date Received:**	11/12/2008
Lab ID:	0811167-008	**Matrix:**	SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	11/12/2008
DISSOLVED PHOSPHORUS - E365.1						Analyst: **SUB**
Phosphorus, Dissolved	*0.016*	0.010		mg/L	1	11/14/2008 1:00:00 PM
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*60*	10.0		Colonies/100ml	1	11/12/2008 6:00:00 PM
NOTES: Sample was analyzed at M-RI010.						
NITRITE - SM4500-NO3-F						Analyst: **SUB**
Nitrite	ND	0.00700		mg/L	1	11/13/2008 11:00:00 AM
NOTES: Analyzed by New England Testing Laboratory RI-010						
NITRATE - SM4500-NO3-F						Analyst: **SUB**
Nitrate	*0.0900*	0.0300		mg/L	1	11/13/2008 11:00:00 AM
NOTES: Analyzed by New England Testing Laboratory RI-010						
TOTAL PHOSPHOROUS - E365.1						Analyst: **SUB**
Phosphorus, Total (As P)	*0.018*	0.010		mg/L	1	11/14/2008 1:00:00 PM
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **RP**
Ammonia (as N)	ND	0.130		mg/L	1	11/21/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.481*	0.105		mg/L	1	11/20/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

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CHAIN OF CUSTODY RECORD

GeoLabs, Inc. *Environmental Laboratories*
45 Johnson Lane, Braintree, MA 02184
p 781.848.7844 • f 781.848.7811
www.geolabs.com

Sample Handling: circle choice
Filtration: Done / Not Needed / Lab to do
Preservation: Lab to do Y / N

Special Instructions
Lab to Filter P samples
Note low detection limits for Total P + Diss P (0.01)

Turnaround: circle one
1-day 3-day 2-day [✓ 5 / 7-days]

Data Delivery: circle choice (s)
Fax [✓ email]
Format: Excel [✓ PDF]

Requirements: circle choice (s) 0811167
GW-1 S-1 QC
MCP Methods DEP Other ______
CT RCP (Reasonable Confidence Protocols)
State / Fed Program - Criteria ______

Client: ESS Group
Address: 401 Wampanoag Trail Suite 400
East Providence, RI
Contact: Carissa Lord

Phone: 401-330-1244
Fax:
email: clord@essgroup.com

Project: Hopedale Pond
Project PO: H153-000
Invoice to *:

Preservative:

DATE	TIME	SAMPLED BY	SAMPLE LOCATION / ID	CONTAINER TYPE	CONTAINER QUANITY	MATRIX	COMP	GRAB	GeoLabs SAMPLE NUMBER	Total P (070.01) 2	Diss P (070.01) 7	NO2 NO3 TSS 7	TKN NH3 2	E Coli	Total Fe 2	Chlorophyll A 7		TEMPERATURE	LAB pH
11/12	1145	CL/JF	1s	A/P		SW		X	11167-001	X	X	X	X	X		X		4C	
	1210		1b					X	002	X	X	X	X	X	X	X			
	1113		2					X	003	X	X	X	X	X					
	1145		3					X	004	X	X	X	X	X					
	1013		4					X	005	X	X	X	X	X					
	920		5					X	006	X	X	X	X	X					
	940		6					X	007	X	X	X	X	X					
	850		7					X	008	X	X	X	X	X					

Matrix Codes:
GW = Ground Water DW = Drinking Water S = Soil A = Air
WW = Waste Water SL = Sludge O = Oil OT = Other

Received on Ice ☒

Preservatives
1 = Hcl 3 = H2S04 5 = NaOH 7 = Other
2 = HN03 4 = Na2S203 6 = MEOH

Containers:
A = Amber B = Bag O = Other
G = Glass P = Plastic
S = Summa V = Voa

Relinquished by:	Date / Time	Received by:	Date / Time
Carissa	11/12/08	M. C	11/12/08 12:45
M. C	11/12/08 1:55	KC	11/12/08 2:10

280688.J&P.C of CR.09/24/08 * Terms: Payment due within 30 days unless other arrangements are made. Past due balances subject to interest and collection cost.
Note: Homeowners and Law Firms must pay when dropping off samples. We accept cash, check and credit cards.

CT (PH-0148) NY(11796) MA (MA - 015) PA (68-03417) NH (2508) NJ (MA-009) RI (LA000252)

GeoLabs, Inc.
45 Johnson Lane
Braintree MA 02184
Tele: 781 848 7844
Fax: 781 848 7811

Monday, December 01, 2008

Dan Herzlinger
ESS - Group
401 Wampanoag Trail Suite #400
E. Providence, RI 02915

TEL: (401) 330-1210
FAX:

Project: Hopedale Pond
Location: H153-000

Order No.: 0811238

Dear Dan Herzlinger:

GeoLabs, Inc. received 4 sample(s) on 11/14/2008 for the analyses presented in the following report.

There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications, except when noted in the Case Narrative.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Jim Chen

Jim Chen
Laboratory Director

For current certifications, please visit our website at www.geolabs.com

Certifications:

CT (PH-0148) - MA (M-MA015) - NH (2508) - NJ (MA009) - NY (11796) - RI (LA000252)

Date: *01-Dec-08*

CLIENT: ESS - Group
Project: Hopedale Pond
Lab Order: 0811238

CASE NARRATIVE

Physical Condition of Samples

The project was received by the laboratory in satisfactory condition. The sample(s) were received undamaged, in appropriate containers with the correct preservation.

Project Documentation

The project was accompanied by satisfactory Chain of Custody documentation.

Analysis of Sample(s)

All extractable samples were extracted and analyzed and any Volatile samples were analyzed within method specified holding times and according to GeoLabs documented Standard Operating Procedure, with the following exception:

E. coli was received and analyzed out of holding time per client request.

No analytical anomalies or non-conformances were noted by the laboratory during the processing of these samples.

GeoLabs, Inc. **Reported Date:** 01-Dec-08

CLIENT: ESS - Group **Lab Order:** 0811238
Project: Hopedale Pond

Lab ID: 0811238-001 **Collection Date:** 11/13/2008 3:10:00 PM
Client Sample ID: 4 (Dutcher Outfall) **Matrix:** SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	*15.0*	4.00		mg/L	1	11/17/2008
DISSOLVED PHOSPHORUS - E365.1						Analyst: **SUB**
Dissolved Phosphorus	*0.37*	0.010		mg/L	1	11/20/2008
NOTES: Analyzed by Premier Labs M-CT008						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*60*	10.0	H	Colonies/100ml	1	11/14/2008 6:00:00 PM
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - E365.1						Analyst: **SUB**
Phosphorus, Total (As P)	*0.66*	0.010		mg/L	1	11/20/2008
NOTES: Analyzed by Premier Labs M-CT008						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **RP**
Ammonia (as N)	*0.345*	0.130		mg/L	1	11/21/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	*0.0260*	0.0220		mg/L	1	11/15/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*2.35*	0.0540		mg/L	2	11/15/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*1.73*	0.105		mg/L	1	11/20/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

CLIENT: ESS - Group **Lab Order:** 0811238
Project: Hopedale Pond

Lab ID: 0811238-002 **Collection Date:** 11/13/2008 3:40:00 PM
Client Sample ID: 11 **Matrix:** SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	11/17/2008
DISSOLVED PHOSPHORUS - E365.1						Analyst: **SUB**
Dissolved Phosphorus	*0.082*	0.010		mg/L	1	11/20/2008
NOTES: Analyzed by Premier Labs M-CT008						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*20*	10.0	H	Colonies/100ml	1	11/14/2008 6:00:00 PM
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - E365.1						Analyst: **SUB**
Phosphorus, Total (As P)	*0.24*	0.010		mg/L	1	11/20/2008
NOTES: Analyzed by Premier Labs M-CT008						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **RP**
Ammonia (as N)	ND	0.130		mg/L	1	11/21/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	11/15/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*2.11*	0.0540		mg/L	2	11/15/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*1.05*	0.105		mg/L	1	11/20/2008

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT: ESS - Group **Lab Order:** 0811238
Project: Hopedale Pond

Lab ID: 0811238-003 **Collection Date:** 11/13/2008 4:56:00 PM
Client Sample ID: 5 **Matrix:** SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	11/17/2008
DISSOLVED PHOSPHORUS - E365.1						Analyst: **SUB**
Dissolved Phosphorus	ND	0.010		mg/L	1	11/20/2008
NOTES: Analyzed by Premier Labs M-CT008						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	10	10.0	H	Colonies/100ml	1	11/14/2008 6:00:00 PM
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - E365.1						Analyst: **SUB**
Phosphorus, Total (As P)	ND	0.010		mg/L	1	11/20/2008
NOTES: Analyzed by Premier Labs M-CT008						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **RP**
Ammonia (as N)	ND	0.130		mg/L	1	11/21/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	11/15/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	0.136	0.0270		mg/L	1	11/15/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	0.469	0.105		mg/L	1	11/20/2008
TURBIDITY - E180.1						Analyst: **RP**
Turbidity	0.710	0.0283		NTU	1	11/15/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

GeoLabs, Inc.

Reported Date: 01-Dec-08

CLIENT: ESS - Group **Lab Order:** 0811238
Project: Hopedale Pond

Lab ID: 0811238-004 **Collection Date:** 11/13/2008 4:30:00 PM
Client Sample ID: 6 **Matrix:** SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	11/17/2008
DISSOLVED PHOSPHORUS - E365.1						Analyst: **SUB**
Dissolved Phosphorus	ND	0.010		mg/L	1	11/20/2008
NOTES: Analyzed by Premier Labs M-CT008						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*70*	10.0	H	Colonies/100ml	1	11/14/2008 6:00:00 PM
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - E365.1						Analyst: **SUB**
Phosphorus, Total (As P)	ND	0.010		mg/L	1	11/20/2008
NOTES: Analyzed by Premier Labs M-CT008						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **RP**
Ammonia (as N)	ND	0.130		mg/L	1	11/21/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	11/15/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.161*	0.0270		mg/L	1	11/15/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.416*	0.105		mg/L	1	11/20/2008
TURBIDITY - E180.1						Analyst: **RP**
Turbidity	*0.880*	0.0283		NTU	1	11/15/2008

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

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CHAIN OF CUSTODY RECORD

GeoLabs, Inc. *Environmental Laboratories*
45 Johnson Lane, Braintree, MA 02184
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Sample Handling: circle choice
Filtration: Done / Not Needed / [✓ Lab to do] Total & Diss P
Preservation: Lab to do Y / N

Special Instructions
LAB TO FILTER P SAMPLES
NOTE LOW DETECTION LIMITS FOR TOTAL & DISS P (0.01)
*SUB P SAMPLES TO LAB M-CT008 *
** Please proceed w/ E.coli despite 081238 exceeded hold time

Turnaround: circle one
1-day 3-day
2-day [✓ 5 / 7-days]

Data Delivery: circle choice (s)
Fax [✓ email]
Format:
Excel [✓ PDF]

Requirements: circle choice (s)
GW-1 MCP Methods CT RCP (Reasonable Confidence Protocols)
S-1 DEP State / Fed Program - Criteria
QC Other

Client: ESS GROUP
Address: 401 WAMPANOAG TRAIL, SUITE 400
EAST PROVIDENCE, RI 02915
Contact: DAN HERZLINGER
Phone: 401 330-1210
Fax:
email: dherzlinger@essgroup.com
Project: HOPEDALE POND
Project PO: H153-000
Invoice to *:

COLLECTION DATE	TIME	SAMPLED BY	SAMPLE LOCATION / ID	CONTAINER TYPE	QUANITY	MATRIX	COMP	GRAB	GeoLabs SAMPLE NUMBER	TOTAL P (DT 0.01) 2	DISS P (DT 0.01) 7	TKN, ~~NO2~~, ~~NO3~~, NH3 2	TSS, NO2, NO3 7	E. COLI **	TURBIDITY 7			TEMPERATURE	LAB pH
Preservative:										3		3/							
11/13/08	15:10	DH/SL	4 (DUTCHER OUTFALL)	A/P	5	SW		X	11238-001	X	X	X	X	X				5°C	
11/13/08	15:40	↓	11	A/P	5	SW		X	002	X	X	X	X	X					
11/13/08	16:56		5	A/P	5	SW		X	003	X	X	X	X	X	X				
11/13/08	16:30		6	A/P	5	SW		X	004	X	X	X	X	X	X				

Matrix Codes: SW = SURFACE WATER
GW = Ground Water DW = Drinking Water S = Soil A = Air
WW = Waste Water SL = Sludge O = Oil OT = Other

Received on Ice ☑

Preservatives
1 = Hcl 3 = H2SO4 5 = NaOH 7 = Other
2 = HNO3 4 = Na2S2O3 6 = MEOH

Containers:
A = Amber B = Bag O = Other
G = Glass P = Plastic
S = Summa V = Voa

Relinquished by:	Date / Time	Received by:	Date / Time
	11/14/08 10:00		11/14/08 10:00
	11/14/08 12:48	KC	11/14/08 2:05

280688.J&P.C of CR.09/24/08

* Terms: Payment due within 30 days unless other arrangements are made. Past due balances subject to interest and collection cost.
Note: Homeowners and Law Firms must pay when dropping off samples. We accept cash, check and credit cards.

0148) MA (MA - 015) NH (2508) NJ (MA-009)
PA (68-03417) RI (LA000252)

GeoLabs, Inc.
45 Johnson Lane
Braintree MA 02184
Tele: 781 848 7844
Fax: 781 848 7811

Monday, December 01, 2008

Dan Herzlinger
ESS - Group
401 Wampanoag Trail Suite #400
E. Providence, RI 02915

TEL: (401) 330-1210
FAX:

Project: Hopedale Pond
Location: H153-000

Order No.: 0811238

Dear Dan Herzlinger:

GeoLabs, Inc. received 4 sample(s) on 11/14/2008 for the analyses presented in the following report.

There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications, except when noted in the Case Narrative.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Jim Chen

Jim Chen
Laboratory Director

For current certifications, please visit our website at www.geolabs.com

Certifications:

CT (PH-0148) - MA (M-MA015) - NH (2508) - NJ (MA009) - NY (11796) - RI (LA000252)

GeoLabs, Inc. **Date:** *01-Dec-08*

CLIENT: ESS - Group
Project: Hopedale Pond
Lab Order: 0811238

CASE NARRATIVE

Physical Condition of Samples

The project was received by the laboratory in satisfactory condition. The sample(s) were received undamaged, in appropriate containers with the correct preservation.

Project Documentation

The project was accompanied by satisfactory Chain of Custody documentation.

Analysis of Sample(s)

All extractable samples were extracted and analyzed and any Volatile samples were analyzed within method specified holding times and according to GeoLabs documented Standard Operating Procedure, with the following exception:

E. coli was received and analyzed out of holding time per client request.

No analytical anomalies or non-conformances were noted by the laboratory during the processing of these samples.

GeoLabs, Inc.

Reported Date: 01-Dec-08

CLIENT: ESS - Group
Project: Hopedale Pond
Lab Order: 0811238

Lab ID: 0811238-001
Client Sample ID: 4 (Dutcher Outfall)
Collection Date: 11/13/2008 3:10:00 PM
Matrix: SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	*15.0*	4.00		mg/L	1	11/17/2008
DISSOLVED PHOSPHORUS - E365.1						Analyst: **SUB**
Dissolved Phosphorus	*0.37*	0.010		mg/L	1	11/20/2008
NOTES: Analyzed by Premier Labs M-CT008						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*60*	10.0	H	Colonies/100ml	1	11/14/2008 6:00:00 PM
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - E365.1						Analyst: **SUB**
Phosphorus, Total (As P)	*0.66*	0.010		mg/L	1	11/20/2008
NOTES: Analyzed by Premier Labs M-CT008						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **RP**
Ammonia (as N)	*0.345*	0.130		mg/L	1	11/21/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	*0.0260*	0.0220		mg/L	1	11/15/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*2.35*	0.0540		mg/L	2	11/15/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*1.73*	0.105		mg/L	1	11/20/2008

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT: ESS - Group **Lab Order:** 0811238
Project: Hopedale Pond

Lab ID: 0811238-002 **Collection Date:** 11/13/2008 3:40:00 PM
Client Sample ID: 11 **Matrix:** SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	11/17/2008
DISSOLVED PHOSPHORUS - E365.1						Analyst: **SUB**
Dissolved Phosphorus	0.082	0.010		mg/L	1	11/20/2008
NOTES: Analyzed by Premier Labs M-CT008						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	20	10.0	H	Colonies/100ml	1	11/14/2008 6:00:00 PM
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - E365.1						Analyst: **SUB**
Phosphorus, Total (As P)	0.24	0.010		mg/L	1	11/20/2008
NOTES: Analyzed by Premier Labs M-CT008						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **RP**
Ammonia (as N)	ND	0.130		mg/L	1	11/21/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	11/15/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	2.11	0.0540		mg/L	2	11/15/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	1.05	0.105		mg/L	1	11/20/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

CLIENT: ESS - Group **Lab Order:** 0811238
Project: Hopedale Pond

Lab ID: 0811238-003 **Collection Date:** 11/13/2008 4:56:00 PM
Client Sample ID: 5 **Matrix:** SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	11/17/2008
DISSOLVED PHOSPHORUS - E365.1						Analyst: **SUB**
Dissolved Phosphorus	ND	0.010		mg/L	1	11/20/2008
NOTES: Analyzed by Premier Labs M-CT008						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*10*	10.0	H	Colonies/100ml	1	11/14/2008 6:00:00 PM
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - E365.1						Analyst: **SUB**
Phosphorus, Total (As P)	ND	0.010		mg/L	1	11/20/2008
NOTES: Analyzed by Premier Labs M-CT008						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **RP**
Ammonia (as N)	ND	0.130		mg/L	1	11/21/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	11/15/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.136*	0.0270		mg/L	1	11/15/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.469*	0.105		mg/L	1	11/20/2008
TURBIDITY - E180.1						Analyst: **RP**
Turbidity	*0.710*	0.0283		NTU	1	11/15/2008

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT: ESS - Group **Lab Order:** 0811238
Project: Hopedale Pond

Lab ID: 0811238-004 **Collection Date:** 11/13/2008 4:30:00 PM
Client Sample ID: 6 **Matrix:** SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	11/17/2008
DISSOLVED PHOSPHORUS - E365.1						Analyst: **SUB**
Dissolved Phosphorus	ND	0.010		mg/L	1	11/20/2008
NOTES: Analyzed by Premier Labs M-CT008						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*70*	10.0	H	Colonies/100ml	1	11/14/2008 6:00:00 PM
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - E365.1						Analyst: **SUB**
Phosphorus, Total (As P)	ND	0.010		mg/L	1	11/20/2008
NOTES: Analyzed by New England Testing RI-010						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **RP**
Ammonia (as N)	ND	0.130		mg/L	1	11/21/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	11/15/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.161*	0.0270		mg/L	1	11/15/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.416*	0.105		mg/L	1	11/20/2008
TURBIDITY - E180.1						Analyst: **RP**
Turbidity	*0.880*	0.0283		NTU	1	11/15/2008

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

Page 1 of 1

CHAIN OF CUSTODY RECORD

GeoLabs, Inc. *Environmental Laboratories*
45 Johnson Lane, Braintree, MA 02184
p 781.848.7844 • f 781.848.7811
www.geolabs.com

Sample Handling: circle choice
Filtration: Done / Not Needed / [✓ Lab to do] Total & DISS P
Preservation: Lab to do Y / N

Special Instructions
LAB TO FILTER P SAMPLES
NOTE LOW DETECTION LIMITS FOR TOTAL & DISS P (0.01)
*SUB P SAMPLES TO LAB M-CT008 *
** Please proceed w/ E.coli despite exceeded hold time

Turnaround: circle one
1-day 3-day
2-day [✓ 5 / 7-days]

Data Delivery: circle choice (s)
Fax [✓ email]
Format:
Excel [✓ PDF]

Requirements: circle choice (s) 081238
GW-1 MCP Methods CT RCP (Reasonable Confidence Protocols)
S-1 DEP State / Fed Program - Criteria
QC Other

Client: ESS GROUP
Address: 401 WAMPANOAG TRAIL, SUITE 400
EAST PROVIDENCE, RI 02915
Contact: DAN HERZLINGER

Phone: 401 330-1210
Fax:
email: dherzlinger@essgroup.com

Project: HOPEDALE POND
Project PO: H153-000
Invoice to *:

									Preserative:	3		3/[illegible]							
COLLECTION				CONTAINER						Analysis Requested									
DATE	TIME	SAMPLED BY	SAMPLE LOCATION / ID	TYPE	QUANITY	MATRIX	COMP	GRAB	GeoLabs SAMPLE NUMBER	TOTAL P (DT 0.01) 2	DISS P (DT 0.01) 7	TKN, ~~NO2~~, ~~NO3~~, NH3 2	TSS, NO2, NO3 7	E.COLI **	TURBIDITY 7			TEMPERATURE	LAB pH
11/13/08	15:10	DH/SL	4 (DUTCHER OUTFALL)	A/P	5	SW		X	11238-001	X	X	X	X	X				5°C	
11/13/08	15:40	↓	11	A/P	5	SW		X	002	X	X	X	X	X					
11/13/08	16:56		5	A/P	5	SW		X	003	X	X	X	X	X	X				
11/13/08	16:30		6	A/P	5	SW		X	004	X	X	X	X	X	X				

Matrix Codes: SW = SURFACE WATER
GW = Ground Water DW = Drinking Water S = Soil A = Air
WW = Waste Water SL = Sludge O = Oil OT = Other

Received on Ice ☑

Preservatives
1 = Hcl 3 = H2SO4 5 = NaOH 7 = Other
2 = HNO3 4 = Na2S2O3 6 = MEOH

Containers:
A = Amber B = Bag O = Other
G = Glass P = Plastic
S = Summa V = Voa

Relinquished by:	Date / Time		Received by:	Date / Time	
	11/14/08	10:00		11/14/08	10:00
	11/14/08	12:48	KC	11/14/08	2:05

280688.J&P.C of CR.09/24/08

* Terms: Payment due within 30 days unless other arrangements are made. Past due balances subject to interest and collection cost.
Note: Homeowners and Law Firms must pay when dropping off samples. We accept cash, check and credit cards.

C 0148) MA (MA - 015) NH (2508) NJ (MA-009)
PA (68-03417) RI (LA000252)

GeoLabs, Inc.
45 Johnson Lane
Braintree MA 02184
Tele: 781 848 7844
Fax: 781 848 7811

Monday, September 15, 2008

Carl Nielsen
ESS Group, Inc.
888 Worcester St
Suite 240
Wellesley, MA 02481

TEL: (781) 489-1130
FAX: (781) 431-0500

Project:	H153-000.4
Location:	Hopedale Pond

Order No.: 0808467

Dear Carl Nielsen:

GeoLabs, Inc. received 6 sample(s) on 8/29/2008 for the analyses presented in the following report.

There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications, except when noted in the Case Narrative.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Jim Chen
Laboratory Director

For current certifications, please visit our website at www.geolabs.com

Certifications:

CT (PH-0148) - MA (M-MA015) - NH (2508) - NJ (MA009) - NY (11796) - RI (LA000252)

GeoLabs, Inc. **Date:** *15-Sep-08*

CLIENT: ESS Group, Inc.
Project: H153-000.4
Lab Order: 0808467

CASE NARRATIVE

Physical Condition of Samples

The project was received by the laboratory in satisfactory condition. The sample(s) were received undamaged, in appropriate containers with the correct preservation.

Project Documentation

The project was accompanied by satisfactory Chain of Custody documentation.

Analysis of Sample(s)

All extractable samples were extracted and analyzed and any Volatile samples were analyzed within method specified holding times and according to GeoLabs documented Standard Operating Procedure. No analytical anomalies or non-conformances were noted by the laboratory during the processing of these samples.

GeoLabs, Inc.

Reported Date: 15-Sep-08

CLIENT: ESS Group, Inc.
Lab Order: 0808467
Project: H153-000.4
Lab ID: 0808467-001

Client Sample ID: Site 7
Collection Date: 8/29/2008
Date Received: 8/29/2008
Matrix: SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	9/5/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	0.015	0.010		mg/L	1	9/8/2008
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	136	10.0		CFU/100ml	1	8/29/2008
NOTES: Sample was analyzed at M-24353.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	1.7	0.010		mg/L	1	9/8/2008
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **RP**
Ammonia (as N)	ND	0.130		mg/L	1	9/9/2008
SPECIFIC CONDUCTANCE - E120.1						Analyst: **RP**
Specific Conductance	640	0.100		µmhos/cm	1	8/29/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	8/29/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	0.462	0.0270		mg/L	1	8/29/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **WFR**
Nitrogen, Total Kjeldahl	0.419	0.105		mg/L	1	9/4/2008
TURBIDITY - E180.1						Analyst: **RP**
Turbidity	1.87	0.0283		NTU	1	8/29/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

GeoLabs, Inc.

Reported Date: 15-Sep-08

CLIENT:	ESS Group, Inc.	**Client Sample ID:**	Site 5
Lab Order:	0808467	**Collection Date:**	8/29/2008
Project:	H153-000.4	**Date Received:**	8/29/2008
Lab ID:	0808467-002	**Matrix:**	SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	9/5/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	*0.016*	0.010		mg/L	1	9/8/2008
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*20*	10.0		CFU/100ml	1	8/29/2008
NOTES: Sample was analyzed at M-24353.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	*1.6*	0.010		mg/L	1	9/8/2008
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **RP**
Ammonia (as N)	ND	0.130		mg/L	1	9/9/2008
SPECIFIC CONDUCTANCE - E120.1						Analyst: **RP**
Specific Conductance	*240*	0.100		µmhos/cm	1	8/29/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	*0.0360*	0.0220		mg/L	1	8/29/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.288*	0.0270		mg/L	1	8/29/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **WFR**
Nitrogen, Total Kjeldahl	*0.478*	0.105		mg/L	1	9/4/2008
TURBIDITY - E180.1						Analyst: **RP**
Turbidity	*1.22*	0.0283		NTU	1	8/29/2008

Qualifiers:

Code	Description	Code	Description
B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

GeoLabs, Inc.

Reported Date: 15-Sep-08

CLIENT:	ESS Group, Inc.	**Client Sample ID:**	Site 4
Lab Order:	0808467	**Collection Date:**	8/29/2008
Project:	H153-000.4	**Date Received:**	8/29/2008
Lab ID:	0808467-003	**Matrix:**	SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	9/5/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	*0.10*	0.010		mg/L	1	9/8/2008
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*14000*	10.0		CFU/100ml	1	8/29/2008
NOTES: Sample was analyzed at M-24353.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	*1.7*	0.010		mg/L	1	9/8/2008
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **RP**
Ammonia (as N)	*0.296*	0.130		mg/L	1	9/9/2008
SPECIFIC CONDUCTANCE - E120.1						Analyst: **RP**
Specific Conductance	*820*	0.100		µmhos/cm	1	8/29/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	*0.0415*	0.0220		mg/L	1	8/29/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*2.97*	0.0540		mg/L	2	8/29/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **WFR**
Nitrogen, Total Kjeldahl	*0.489*	0.105		mg/L	1	9/4/2008
TURBIDITY - E180.1						Analyst: **RP**
Turbidity	*0.640*	0.0283		NTU	1	8/29/2008

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

GeoLabs, Inc. **Reported Date:** 15-Sep-08

CLIENT:	ESS Group, Inc.	**Client Sample ID:**	Site 2
Lab Order:	0808467	**Collection Date:**	8/29/2008
Project:	H153-000.4	**Date Received:**	8/29/2008
Lab ID:	0808467-004	**Matrix:**	SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	*0.015*	0.010		mg/L	1	9/8/2008
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	<10	10.0		CFU/100ml	1	8/29/2008
NOTES: Sample was analyzed at M-24353.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	*3.8*	0.030		mg/L	3	9/8/2008
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **RP**
Ammonia (as N)	ND	0.130		mg/L	1	9/9/2008
SPECIFIC CONDUCTANCE - E120.1						Analyst: **RP**
Specific Conductance	*500*	0.100		µmhos/cm	1	8/29/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	*0.0456*	0.0220		mg/L	1	8/29/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.159*	0.0270		mg/L	1	8/29/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **WFR**
Nitrogen, Total Kjeldahl	*0.429*	0.105		mg/L	1	9/4/2008
TURBIDITY - E180.1						Analyst: **RP**
Turbidity	*0.740*	0.0283		NTU	1	8/29/2008

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

GeoLabs, Inc.

Reported Date: 15-Sep-08

CLIENT: ESS Group, Inc.
Lab Order: 0808467
Project: H153-000.4
Lab ID: 0808467-005

Client Sample ID: Site 1S
Collection Date: 8/29/2008
Date Received: 8/29/2008
Matrix: SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
CHLOROPHYLL - A						Analyst: **SUB**
Chlorophyll a	2.80	0.500		mg/m³	1	9/8/2008
NOTES: Sample was analyzed at M-MA003.						
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	0.017	0.010		mg/L	1	9/8/2008
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	<10	10.0		CFU/100ml	1	8/29/2008
NOTES: Sample was analyzed at M-24353.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	1.5	0.010		mg/L	1	9/8/2008
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **RP**
Ammonia (as N)	ND	0.130		mg/L	1	9/9/2008
SPECIFIC CONDUCTANCE - E120.1						Analyst: **RP**
Specific Conductance	480	0.100		µmhos/cm	1	8/29/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	8/29/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	0.337	0.0270		mg/L	1	8/29/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **WFR**
Nitrogen, Total Kjeldahl	0.489	0.105		mg/L	1	9/4/2008
TURBIDITY - E180.1						Analyst: **RP**
Turbidity	1.87	0.0283		NTU	1	8/29/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

GeoLabs, Inc.

Reported Date: 15-Sep-08

CLIENT:	ESS Group, Inc.	**Client Sample ID:**	Site 1b
Lab Order:	0808467	**Collection Date:**	8/29/2008
Project:	H153-000.4	**Date Received:**	8/29/2008
Lab ID:	0808467-006	**Matrix:**	SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL METALS BY ICP - SW6010B						Analyst: **QS**
Iron	0.511	0.0600		mg/L	1	9/5/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	0.016	0.010		mg/L	1	9/8/2008
NOTES: Sample was analyzed at M-CT008.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	2.1	0.020		mg/L	2	9/8/2008
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **RP**
Ammonia (as N)	ND	0.130		mg/L	1	9/9/2008
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	8/29/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	0.280	0.0270		mg/L	1	8/29/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **WFR**
Nitrogen, Total Kjeldahl	0.587	0.105		mg/L	1	9/4/2008

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

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CHAIN OF CUSTODY RECORD

GeoLabs, Inc. *Environmental Laboratories*
45 Johnson Lane, Braintree, MA 02184
p 781.848.7844 • f 781.848.7811
www.geolabs.com

Sample Handling: circle choice
Filtration: Done / Not Needed / [✓ Lab to do]
Preservation: Lab to do Y / N

Special Instructions
Low Level phos. det. 0.01 mg/l

Turnaround: circle one
1-day 3-day
2-day 5 / 7-days

Data Delivery: circle choice (s)
Fax email
Format:
Excel PDF

Requirements: circle choice (s) 0808467
GW-1 MCP Methods CT RCP (Reasonable Confidence Protocols)
S-1 DEP State / Fed Program - Criteria __________
QC Other __________

Client: ~~Hopedale Pond~~ ESS Group
Address: __________
Contact: Carl Nielsen

Phone: 401-330-1224
Fax: __________
email: __________

Project: H 153-000.4
Project PO: Hopedale Pond
Invoice to *: __________

COLLECTION				CONTAINER						Preservative: / Analysis Requested									
DATE	TIME	SAMPLED BY	SAMPLE LOCATION / ID	TYPE	QUANITY	MATRIX	COMP	GRAB	GeoLabs SAMPLE NUMBER	TKN 2	NO3/NO2 2	NH4 2	TP/DP 2	chlorophyll a	TSS 2	total ~~Metal~~ Iron 2	Cond/turb 2	~~Bacteria~~ TEMPERATURE e-coli	LAB pH
8/29			Site 7			SW		X	8467-001	X	X	X	X		X		X	X	
			~~Site 6~~					X											
			Site 5						002	X	X	X	X		X		X	X	
			Site 4						003	X	X	X	X		X		X	X	
			Site 2						004	X	X	X	X				X	X	
			Site 1S						005	X	X	X	X	X			X	X	
			Site 1b						006	X	X	X	X			X			

Matrix Codes:
GW = Ground Water DW = Drinking Water S = Soil A = Air
WW = Waste Water SL = Sludge O = Oil OT = Other

Received on Ice ☒

Preservatives
1 = Hcl [✓ 3 = H2SO4] 5 = NaOH 7 = Other
2 = HNO3 4 = Na2S2O3 6 = MEOH

Containers:
A = Amber B = Bag O = Other
G = Glass P = Plastic
S = Summa V = Voa

Relinquished by:	Date / Time	Received by:	Date / Time
	8/29/ 2:15 pm	Ken McStence	8/29/08 2:20
		KC	8/29/08

280451.J&P.C of CR.06/17/08

* Terms: Payment due within 30 days unless other arrangements are made. Past due balances subject to interest and collection cost.
Note: Homeowners and Law Firms must pay when dropping off samples. We accept cash, check and credit cards.

CT (PH-0148) MA (MA - 015) NH (2508) NJ (MA-009)
NY(11796) PA (68-03417) RI (LA000252)

508 341
[illegible]

Wednesday, January 28, 2009

GeoLabs, Inc.
45 Johnson Lane
Braintree MA 02184
Tele: 781 848 7844
Fax: 781 848 7811

Matt Ladewig
ESS Group, Inc.
888 Worcester St
Suite 240
Wellesley, MA 02481

TEL: (781) 489-1116
FAX: (781) 431-0500

Project: Hopedale
Location: H-153-000

Order No.: 0901205

Dear Matt Ladewig:

GeoLabs, Inc. received 7 sample(s) on 1/19/2009 for the analyses presented in the following report.

There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications, except when noted in the Case Narrative.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Jim Chen
Laboratory Director

For current certifications, please visit our website at www.geolabs.com

Certifications:

CT (PH-0148) - MA (M-MA015) - NH (2508) - NJ (MA009) - NY (11796) - RI (LA000252)

GeoLabs, Inc. **Date:** *28-Jan-09*

CLIENT: ESS Group, Inc.
Project: Hopedale
Lab Order: 0901205

CASE NARRATIVE

Physical Condition of Samples

The project was received by the laboratory in satisfactory condition. The sample(s) were received undamaged, in appropriate containers with the correct preservation.

Project Documentation

The project was accompanied by satisfactory Chain of Custody documentation.

Analysis of Sample(s)

All extractable samples were extracted and analyzed and any Volatile samples were analyzed within method specified holding times and according to GeoLabs documented Standard Operating Procedure. No analytical anomalies or non-conformances were noted by the laboratory during the processing of these samples.

GeoLabs, Inc.

Reported Date: 28-Jan-09

CLIENT:	ESS Group, Inc.	**Client Sample ID:**	1S
Lab Order:	0901205	**Collection Date:**	1/19/2009 8:30:00 AM
Project:	Hopedale	**Date Received:**	1/19/2009
Lab ID:	0901205-001	**Matrix:**	OTHER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	1/19/2009
CHLOROPHYLL - A						Analyst: **SUB**
Chlorophyll a	ND	0.500		mg/m³	1	1/21/2009
NOTES: Sample was analyzed at M-MA003.						
DISSOLVED PHOSPHORUS - E365.1						Analyst: **SUB**
Phosphorus, Dissolved	ND	0.010		mg/L	1	1/22/2009
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	<10	10.0		CFU/100ml	1	1/19/2009 5:30:00 PM
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - E365.1						Analyst: **SUB**
Phosphorus, Total (As P)	ND	0.010		mg/L	1	1/22/2009
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **RP**
Ammonia (as N)	*0.208*	0.130		mg/L	1	1/27/2009
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	1/21/2009
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.308*	0.0270		mg/L	1	1/21/2009
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.655*	0.105		mg/L	1	1/27/2009

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT:	ESS Group, Inc.	**Client Sample ID:**	1B
Lab Order:	0901205	**Collection Date:**	1/19/2009 9:00:00 AM
Project:	Hopedale	**Date Received:**	1/19/2009
Lab ID:	0901205-002	**Matrix:**	OTHER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	1/19/2009
TOTAL METALS BY ICP - SW6010B						Analyst: **ZYZ**
Iron	*0.776*	0.0600		mg/L	1	1/20/2009
DISSOLVED PHOSPHORUS - E365.1						Analyst: **SUB**
Phosphorus, Dissolved	ND	0.010		mg/L	1	1/22/2009
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	<10	10.0		CFU/100ml	1	1/19/2009 5:30:00 PM
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - E365.1						Analyst: **SUB**
Phosphorus, Total (As P)	ND	0.010		mg/L	1	1/22/2009
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **RP**
Ammonia (as N)	*0.225*	0.130		mg/L	1	1/27/2009
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	1/21/2009
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.582*	0.0270		mg/L	1	1/21/2009
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.481*	0.105		mg/L	1	1/27/2009

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

Reported Date: 28-Jan-09

CLIENT:	ESS Group, Inc.	**Client Sample ID:**	3
Lab Order:	0901205	**Collection Date:**	1/19/2009 10:30:00 AM
Project:	Hopedale	**Date Received:**	1/19/2009
Lab ID:	0901205-003	**Matrix:**	OTHER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	*105*	4.00		mg/L	1	1/19/2009
DISSOLVED PHOSPHORUS - E365.1						Analyst: **SUB**
Phosphorus, Dissolved	ND	0.010		mg/L	1	1/22/2009
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	<10	10.0		CFU/100ml	1	1/19/2009 5:30:00 PM
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - E365.1						Analyst: **SUB**
Phosphorus, Total (As P)	*0.061*	0.010		mg/L	1	1/22/2009
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **RP**
Ammonia (as N)	*0.138*	0.130		mg/L	1	1/27/2009
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	1/21/2009
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.303*	0.0270		mg/L	1	1/21/2009
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.443*	0.105		mg/L	1	1/27/2009

Reported Date: 28-Jan-09

CLIENT:	ESS Group, Inc.	**Client Sample ID:**	4
Lab Order:	0901205	**Collection Date:**	1/19/2009 9:15:00 AM
Project:	Hopedale	**Date Received:**	1/19/2009
Lab ID:	0901205-004	**Matrix:**	OTHER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	1/19/2009
DISSOLVED PHOSPHORUS - E365.1						Analyst: **SUB**
Phosphorus, Dissolved	*0.018*	0.010		mg/L	1	1/22/2009
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	<10	10.0		CFU/100ml	1	1/19/2009 5:30:00 PM
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - E365.1						Analyst: **SUB**
Phosphorus, Total (As P)	*0.031*	0.010		mg/L	1	1/22/2009
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **RP**
Ammonia (as N)	*0.230*	0.130		mg/L	1	1/27/2009
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	1/21/2009
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*2.73*	0.0540		mg/L	2	1/21/2009
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.465*	0.105		mg/L	1	1/27/2009

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

CLIENT: ESS Group, Inc.
Lab Order: 0901205
Project: Hopedale
Lab ID: 0901205-005

Client Sample ID: 5
Collection Date: 1/19/2009 11:10:00 AM
Date Received: 1/19/2009
Matrix: OTHER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	1/19/2009
DISSOLVED PHOSPHORUS - E365.1						Analyst: **SUB**
Phosphorus, Dissolved	ND	0.010		mg/L	1	1/22/2009
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	<10	10.0		CFU/100ml	1	1/19/2009 5:30:00 PM
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - E365.1						Analyst: **SUB**
Phosphorus, Total (As P)	ND	0.010		mg/L	1	1/22/2009
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **RP**
Ammonia (as N)	0.192	0.130		mg/L	1	1/27/2009
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	1/21/2009
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	0.335	0.0270		mg/L	1	1/21/2009
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	0.454	0.105		mg/L	1	1/27/2009

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

Reported Date: 28-Jan-09

CLIENT: ESS Group, Inc.
Lab Order: 0901205
Project: Hopedale
Lab ID: 0901205-006

Client Sample ID: 6
Collection Date: 1/19/2009 11:40:00 AM
Date Received: 1/19/2009
Matrix: OTHER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	1/19/2009
DISSOLVED PHOSPHORUS - E365.1						Analyst: **SUB**
Phosphorus, Dissolved	ND	0.010		mg/L	1	1/22/2009
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	<10	10.0		CFU/100ml	1	1/19/2009 5:30:00 PM
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - E365.1						Analyst: **SUB**
Phosphorus, Total (As P)	ND	0.010		mg/L	1	1/22/2009
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **RP**
Ammonia (as N)	*0.208*	0.130		mg/L	1	1/27/2009
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	1/21/2009
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.105*	0.0270		mg/L	1	1/21/2009
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.416*	0.105		mg/L	1	1/27/2009

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

Reported Date: 28-Jan-09

CLIENT: ESS Group, Inc.
Lab Order: 0901205
Project: Hopedale
Lab ID: 0901205-007

Client Sample ID: 7
Collection Date: 1/19/2009 10:20:00 AM
Date Received: 1/19/2009
Matrix: OTHER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	1/19/2009
DISSOLVED PHOSPHORUS - E365.1						Analyst: **SUB**
Phosphorus, Dissolved	ND	0.010		mg/L	1	1/22/2009
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	<10	10.0		CFU/100ml	1	1/19/2009 5:30:00 PM
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - E365.1						Analyst: **SUB**
Phosphorus, Total (As P)	ND	0.010		mg/L	1	1/22/2009
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **RP**
Ammonia (as N)	*0.181*	0.130		mg/L	1	1/27/2009
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	1/21/2009
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.380*	0.0270		mg/L	1	1/21/2009
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.399*	0.105		mg/L	1	1/27/2009

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

PAGE 1 OF 1

CHAIN OF CUSTODY RECORD

GeoLabs, Inc. *Environmental Laboratories*
45 Johnson Lane, Braintree, MA 02184
p 781.848.7844 • f 781.848.7811
www.geolabs.com

Sample Handling: circle choice
Filtration: Done / Not Needed / [✓ Lab to do]
Preservation: Lab to do Y / N

Special Instructions
-Lab filter Diss P.
-Low Detect on P (0.01 mg/L)
-Phos to CT008 (Premiere), please

Turnaround: circle one
1-day 3-day
2-day [✓ 5 / 7-days]

Data Delivery: circle choice (s)
Fax [✓ email]
Format:
Excel PDF

Requirements: circle choice (s) 0901205
GW-1 MCP Methods CT RCP (Reasonable Confidence Protocols)
S-1 DEP State / Fed Program - Criteria
QC Other

Client: ESS GROUP, INC
Address: 401 Wampanoag, Suite 400
East Providence, RI 02915
Contact: Matt Ladewig

Phone: 401-330-1204
Fax: 401-434-8158
email: mladewig@essgroup.com

Project: Hopedale
Project PO: H153-000
Invoice to *: Carl Nielsen

COLLECTION				CONTAINER						Preservative:	3			3	2					
											Analysis Requested									
DATE	TIME	SAMPLED BY	SAMPLE LOCATION / ID	TYPE	QUANITY	MATRIX	COMP	GRAB		GeoLabs SAMPLE NUMBER	Total P 2	Diss P 7	NO2NO3 TSS 7	TKN-NH3 2	Total Fe 2	Chlorophyll A 7	E. Coli		TEMPERATURE	LAB pH
1/19/09	8:30		1S	APO	6	OT		X		1205-001	X	X	X	X		X	X		4c	
↓	9:00		1B	↓	7	↓		↓		002	↓	↓	↓	↓	X		↓		↓	
↓	10:30		3	↓	5	↓		↓		003	↓	↓	↓	↓			↓		↓	
↓	9:15		4	↓	5	↓		↓		004	↓	↓	↓	↓			↓		↓	
↓	11:10		5	↓	5	↓		↓		005	↓	↓	↓	↓			↓		↓	
↓	11:40		6	↓	5	↓		↓		006	↓	↓	↓	↓			↓		↓	
↓	10:20		7	↓	6	↓		↓		007	↓	↓	↓	↓			↓		↓	

Matrix Codes:
GW = Ground Water DW = Drinking Water S = Soil A = Air
WW = Waste Water SL = Sludge O = Oil OT = Other

Received on Ice ☑

Preservatives
1 = Hcl 3 = H2SO4 5 = NaOH 7 = Other
2 = HNO3 4 = Na2S2O3 6 = MEOH

Containers:
A = Amber B = Bag O = Other
G = Glass P = Plastic
S = Summa V = Voa

Relinquished by:	Date / Time	Received by:	Date / Time
	1/19/09 1:15	M C	1/19/09 1:15
Ken McKenna	1/19/09 3PM	KC	1/19/09 3:10

290024.J&P.C of CR.01/12/09

* Terms: Payment due within 30 days unless other arrangements are made. Past due balances subject to interest and collection cost.
Note: Homeowners and Law Firms must pay when dropping off samples. We accept cash, check and credit cards.

CT (PH-0148) MA (MA - 015) NH (2508) NJ (MA-009)
NY(11796) PA (68-03417) RI (LA000252)

GeoLabs, Inc.
45 Johnson Lane
Braintree MA 02184
Tele: 781 848 7844
Fax: 781 848 7811

Thursday, January 29, 2009

Matt Ladewig
ESS - Group
401 Wampanoag Trail Suite #400
E. Providence, RI 02915

TEL: 401-330-1200
FAX:

Project: Hopedale
Location: H153.000

Order No.: 0901215

Dear Matt Ladewig:

GeoLabs, Inc. received 1 sample(s) on 1/20/2009 for the analyses presented in the following report.

There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications, except when noted in the Case Narrative.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Jim Chen
Laboratory Director

For current certifications, please visit our website at www.geolabs.com

Certifications:

CT (PH-0148) - MA (M-MA015) - NH (2508) - NJ (MA009) - NY (11796) - RI (LA000252)

GeoLabs, Inc. **Date:** *29-Jan-09*

CLIENT: ESS - Group
Project: Hopedale
Lab Order: 0901215

CASE NARRATIVE

Physical Condition of Samples

The project was received by the laboratory in satisfactory condition. The sample(s) were received undamaged, in appropriate containers with the correct preservation.

Project Documentation

The project was accompanied by satisfactory Chain of Custody documentation.

Analysis of Sample(s)

All extractable samples were extracted and analyzed and any Volatile samples were analyzed within method specified holding times and according to GeoLabs documented Standard Operating Procedure. No analytical anomalies or non-conformances were noted by the laboratory during the processing of these samples.

GeoLabs, Inc.

Reported Date: 29-Jan-09

CLIENT:	ESS - Group	**Client Sample ID:**	2
Lab Order:	0901215	**Collection Date:**	1/19/2009 3:00:00 PM
Project:	Hopedale	**Date Received:**	1/20/2009
Lab ID:	0901215-001	**Matrix:**	WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	1/21/2009
DISSOLVED PHOSPHORUS - E365.1						Analyst: **SUB**
Phosphorus, Dissolved	ND	0.010		mg/L	1	1/23/2009
NOTES: Sample was analyzed at M-CT008.						
TOTAL PHOSPHOROUS - E365.1						Analyst: **SUB**
Phosphorus, Total (As P)	ND	0.020		mg/L	1	1/23/2009
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **RP**
Ammonia (as N)	*0.247*	0.130		mg/L	1	1/27/2009
NITRITE - L10-107-05-1-A						Analyst: **RP**
Nitrite (as N)	ND	0.0220		mg/L	1	1/21/2009
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	*0.303*	0.0270		mg/L	1	1/21/2009
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **RP**
Nitrogen, Total Kjeldahl	*0.459*	0.105		mg/L	1	1/27/2009

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

Page 1 of 1

CHAIN OF CUSTODY RECORD

GeoLabs, Inc. *Environmental Laboratories*
45 Johnson Lane, Braintree, MA 02184
p 781.848.7844 • f 781.848.7811
www.geolabs.com

Sample Handling: circle choice
Filtration: Done / Not Needed / [✓ Lab to do]
Preservation: Lab to do Y / N

Special Instructions
- Lab filter
- Low detect on phos (0.01 mg/L)
- Please send phos to Premiere (CT008)

Turnaround: circle one
1-day 3-day
2-day [✓ 5 / 7-days]

Data Delivery: circle choice (s)
Fax [✓ email]
Format:
Excel PDF

Requirements: circle choice (s) 0901215
GW-1 MCP Methods CT RCP (Reasonable Confidence Protocols)
S-1 DEP State / Fed Program - Criteria ____
QC Other ____

Client: ESS Group, Inc.
Address: 401 Wampanoag Trail, Suite 400
East Providence, RI 02915
Contact: Matt Ladewig

Phone: 401-330-1204
Fax: 401-434-8158
email: mladewig@essgroup.com

Project: Hopedale
Project PO: H153-000
Invoice to *: Carl Nielsen

COLLECTION				CONTAINER						Analysis Requested									
									Preservative:	3		3							
DATE	TIME	SAMPLED BY	SAMPLE LOCATION / ID	TYPE	QUANITY	MATRIX	COMP	GRAB	GeoLabs SAMPLE NUMBER	2 TKN/NH3	2 NO2 NO3 TSS	2 Total Phos	DSS Phos					TEMPERATURE	LAB pH
1/19/09	1500	SL/ML	2	A,P,O	4	O		X	1215-001	X	X	X	X					4C	

Matrix Codes:
GW = Ground Water DW = Drinking Water S = Soil A = Air
WW = Waste Water SL = Sludge O = Oil OT = Other

Received on Ice ☑

Preservatives
1 = Hcl 3 = H2SO4 5 = NaOH 7 = Other
2 = HNO3 4 = Na2S2O3 6 = MEOH

Containers:
A = Amber B = Bag O = Other
G = Glass P = Plastic
S = Summa V = Voa

Relinquished by:	Date / Time	Received by:	Date / Time
	1/20/09 11:00	M. C	1/20/09 11:00
	1/20/09 1:30	KC	1/20/09 3:00

280507.J&P.C of CR.07/14/08

* Terms: Payment due within 30 days unless other arrangements are made. Past due balances subject to interest and collection cost.
Note: Homeowners and Law Firms must pay when dropping off samples. We accept cash, check and credit cards.

CT (PH-0148) MA (MA - 015) NH (2508) NJ (MA-009)
NY(11796) PA (68-03417) RI (LA000252)

Friday, October 03, 2008

GeoLabs, Inc.
45 Johnson Lane
Braintree MA 02184
Tele: 781 848 7844
Fax: 781 848 7811

Carissa Lord
ESS - Group
401 Wampanoag Trail Suite #400
E. Providence, RI 02915

TEL: (401) 330-1244
FAX:

Project: Hopedale Pond
Location:

Order No.: 0809323

Dear Carissa Lord:

GeoLabs, Inc. received 8 sample(s) on 9/18/2008 for the analyses presented in the following report.

There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications, except when noted in the Case Narrative.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Jim Chen
Laboratory Director

For current certifications, please visit our website at www.geolabs.com

Certifications:

CT (PH-0148) - MA (M-MA015) - NH (2508) - NJ (MA009) - NY (11796) - RI (LA000252)

GeoLabs, Inc. **Date:** *03-Oct-08*

CLIENT: ESS - Group
Project: Hopedale Pond
Lab Order: 0809323

CASE NARRATIVE

Physical Condition of Samples

The project was received by the laboratory in satisfactory condition. The sample(s) were received undamaged, in appropriate containers with the correct preservation.

Project Documentation

The project was accompanied by satisfactory Chain of Custody documentation.

Analysis of Sample(s)

All extractable samples were extracted and analyzed and any Volatile samples were analyzed within method specified holding times and according to GeoLabs documented Standard Operating Procedure. No analytical anomalies or non-conformances were noted by the laboratory during the processing of these samples.

GeoLabs, Inc.

Reported Date: 03-Oct-08

CLIENT:	ESS - Group	**Client Sample ID:**	1S
Lab Order:	0809323	**Collection Date:**	9/18/2008
Project:	Hopedale Pond	**Date Received:**	9/18/2008
Lab ID:	0809323-001	**Matrix:**	SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	9/19/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	*0.01*	0.010		mg/L	1	9/23/2008
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*100*	10.0		MPN	1	9/18/2008 6:00:00 PM
NOTES: Sample was analyzed at M-RI010.						
NITRITE - SM4500-NO3-F						Analyst: **SUB**
Nitrite	ND	0.00700		mg/L	1	9/19/2008
NOTES: Sample was analyzed at M-RI010.						
NITRATE - SM4500-NO3-F						Analyst: **SUB**
Nitrate	*0.220*	0.0300		mg/L	1	9/19/2008
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	*0.012*	0.010		mg/L	1	9/23/2008
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	9/25/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **WFR**
Nitrogen, Total Kjeldahl	*0.398*	0.105		mg/L	1	10/1/2008
TURBIDITY - E180.1						Analyst: **RP**
Turbidity	*1.58*	0.0283		NTU	1	9/19/2008

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT:	ESS - Group	**Client Sample ID:**	1B
Lab Order:	0809323	**Collection Date:**	9/18/2008
Project:	Hopedale Pond	**Date Received:**	9/18/2008
Lab ID:	0809323-002	**Matrix:**	SURFACE WATER

Analyses	**Result**	**Det. Limit**	**Qual**	**Units**	**DF**	**Date Analyzed**
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	9/19/2008
TOTAL METALS BY ICP - E200.7						Analyst: **QS**
Iron	0.626	0.0600		mg/L	1	9/25/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	0.016	0.010		mg/L	1	9/23/2008
NOTES: Sample was analyzed at M-CT008.						
NITRITE - SM4500-NO3-F						Analyst: **SUB**
Nitrite	ND	0.00700		mg/L	1	9/19/2008
NOTES: Sample was analyzed at M-RI010.						
NITRATE - SM4500-NO3-F						Analyst: **SUB**
Nitrate	0.0400	0.0300		mg/L	1	9/19/2008
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	0.038	0.010		mg/L	1	9/23/2008
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	9/25/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **WFR**
Nitrogen, Total Kjeldahl	0.398	0.105		mg/L	1	10/1/2008
TURBIDITY - E180.1						Analyst: **RP**
Turbidity	2.64	0.0283		NTU	1	9/19/2008

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT: ESS - Group
Lab Order: 0809323
Project: Hopedale Pond
Lab ID: 0809323-003

Client Sample ID: 2
Collection Date: 9/18/2008
Date Received: 9/18/2008
Matrix: SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	9/19/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	0.014	0.010		mg/L	1	9/23/2008
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	30	10.0		MPN	1	9/18/2008 6:00:00 PM
NOTES: Sample was analyzed at M-RI010.						
NITRITE - SM4500-NO3-F						Analyst: **SUB**
Nitrite	ND	0.00700		mg/L	1	9/19/2008
NOTES: Sample was analyzed at M-RI010.						
NITRATE - SM4500-NO3-F						Analyst: **SUB**
Nitrate	ND	0.0300		mg/L	1	9/19/2008
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	0.019	0.010		mg/L	1	9/23/2008
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	0.143	0.130		mg/L	1	9/25/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **WFR**
Nitrogen, Total Kjeldahl	0.353	0.105		mg/L	1	10/1/2008
TURBIDITY - E180.1						Analyst: **RP**
Turbidity	0.680	0.0283		NTU	1	9/19/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

GeoLabs, Inc.

Reported Date: 03-Oct-08

CLIENT: ESS - Group
Lab Order: 0809323
Project: Hopedale Pond
Lab ID: 0809323-004

Client Sample ID: 3
Collection Date: 9/18/2008
Date Received: 9/18/2008
Matrix: SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	9/19/2008
TOTAL METALS BY ICP - E200.7						Analyst: **QS**
Iron	0.689	0.0600		mg/L	1	9/25/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	0.018	0.010		mg/L	1	9/23/2008
NOTES: Sample was analyzed at M-CT008.						
NITRITE - SM4500-NO3-F						Analyst: **SUB**
Nitrite	0.007	0.00700		mg/L	1	9/19/2008
NOTES: Sample was analyzed at M-RI010.						
NITRATE - SM4500-NO3-F						Analyst: **SUB**
Nitrate	0.0400	0.0300		mg/L	1	9/19/2008
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	0.042	0.010		mg/L	1	9/23/2008
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	0.192	0.130		mg/L	1	9/25/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **WFR**
Nitrogen, Total Kjeldahl	0.409	0.105		mg/L	1	10/1/2008
TURBIDITY - E180.1						Analyst: **RP**
Turbidity	3.46	0.0283		NTU	1	9/19/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

CLIENT: ESS - Group
Lab Order: 0809323
Project: Hopedale Pond
Lab ID: 0809323-005

Client Sample ID: 4
Collection Date: 9/18/2008
Date Received: 9/18/2008
Matrix: SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	9/19/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	*0.10*	0.010		mg/L	1	9/23/2008
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*4000*	10.0		MPN	1	9/18/2008 6:00:00 PM
NOTES: Sample was analyzed at M-RI010.						
NITRITE - SM4500-NO3-F						Analyst: **SUB**
Nitrite	*0.0260*	0.00700		mg/L	1	9/19/2008
NOTES: Sample was analyzed at M-RI010.						
NITRATE - SM4500-NO3-F						Analyst: **SUB**
Nitrate	*2.50*	0.300		mg/L	1	9/19/2008
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	*0.11*	0.010		mg/L	1	9/23/2008
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	*0.317*	0.130		mg/L	1	9/25/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **WFR**
Nitrogen, Total Kjeldahl	*0.670*	0.105		mg/L	1	10/1/2008
TURBIDITY - E180.1						Analyst: **RP**
Turbidity	*0.730*	0.0283		NTU	1	9/19/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

GeoLabs, Inc. **Reported Date:** 03-Oct-08

CLIENT: ESS - Group
Lab Order: 0809323
Project: Hopedale Pond
Lab ID: 0809323-006

Client Sample ID: 5
Collection Date: 9/18/2008
Date Received: 9/18/2008
Matrix: SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	9/19/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	*0.014*	0.010		mg/L	1	9/23/2008
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*50*	10.0		MPN	1	9/18/2008 6:00:00 PM
NOTES: Sample was analyzed at M-RI010.						
NITRITE - SM4500-NO3-F						Analyst: **SUB**
Nitrite	ND	0.00700		mg/L	1	9/19/2008
NOTES: Sample was analyzed at M-RI010.						
NITRATE - SM4500-NO3-F						Analyst: **SUB**
Nitrate	ND	0.0300		mg/L	1	9/19/2008
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	*0.015*	0.010		mg/L	1	9/23/2008
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	9/25/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **WFR**
Nitrogen, Total Kjeldahl	*0.392*	0.105		mg/L	1	10/1/2008
TURBIDITY - E180.1						Analyst: **RP**
Turbidity	*0.540*	0.0283		NTU	1	9/19/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

Reported Date: 03-Oct-08

CLIENT:	ESS - Group	**Client Sample ID:**	6
Lab Order:	0809323	**Collection Date:**	9/18/2008
Project:	Hopedale Pond	**Date Received:**	9/18/2008
Lab ID:	0809323-007	**Matrix:**	SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	*7.00*	4.00		mg/L	1	9/19/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	*0.017*	0.010		mg/L	1	9/23/2008
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*150*	10.0		MPN	1	9/18/2008 6:00:00 PM
NOTES: Sample was analyzed at M-RI010.						
NITRITE - SM4500-NO3-F						Analyst: **SUB**
Nitrite	ND	0.00700		mg/L	1	9/19/2008
NOTES: Sample was analyzed at M-RI010.						
NITRATE - SM4500-NO3-F						Analyst: **SUB**
Nitrate	ND	0.0300		mg/L	1	9/19/2008
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	*0.026*	0.010		mg/L	1	9/23/2008
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	9/25/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **WFR**
Nitrogen, Total Kjeldahl	*0.370*	0.105		mg/L	1	10/1/2008
TURBIDITY - E180.1						Analyst: **RP**
Turbidity	*0.330*	0.0283		NTU	1	9/19/2008

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT:	ESS - Group	**Client Sample ID:**	7
Lab Order:	0809323	**Collection Date:**	9/18/2008
Project:	Hopedale Pond	**Date Received:**	9/18/2008
Lab ID:	0809323-008	**Matrix:**	SURFACE WATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL SUSPENDED SOLIDS - SM2540-D						Analyst: **FC**
Total Suspended Solids	ND	4.00		mg/L	1	9/19/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	*0.015*	0.010		mg/L	1	9/23/2008
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*10*	10.0		MPN	1	9/18/2008 6:00:00 PM
NOTES: Sample was analyzed at M-RI010.						
NITRITE - SM4500-NO3-F						Analyst: **SUB**
Nitrite	ND	0.00700		mg/L	1	9/19/2008
NOTES: Sample was analyzed at M-RI010.						
NITRATE - SM4500-NO3-F						Analyst: **SUB**
Nitrate	*0.0400*	0.0300		mg/L	1	9/19/2008
NOTES: Sample was analyzed at M-RI010.						
TOTAL PHOSPHOROUS - SM 4500-P-B,E						Analyst: **SUB**
Phosphorus, Total (As P)	*0.015*	0.010		mg/L	1	9/23/2008
NOTES: Sample was analyzed at M-CT008.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	9/25/2008
TOTAL KJELDAHL NITROGEN - SM18 B,C						Analyst: **WFR**
Nitrogen, Total Kjeldahl	*0.347*	0.105		mg/L	1	10/1/2008
TURBIDITY - E180.1						Analyst: **RP**
Turbidity	*1.21*	0.0283		NTU	1	9/19/2008

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

Page ____ of ____

CHAIN OF CUSTODY RECORD

GeoLabs, Inc. *Environmental Laboratories*
45 Johnson Lane, Braintree, MA 02184
p 781.848.7844 • f 781.848.7811
www.geolabs.com

Sample Handling: circle choice
Filtration: Done, ~~Not Needed~~, [✓ Lab to do]
Preservation: ~~Lab to do~~ Y / N

Special Instructions
- lab Filter P + diss Fe
- Please send diss. P to CZ008 + note lowdetect

Turnaround: circle one
1-day 3-day
2-day [✓ 5 / 7-days]

Data Delivery: circle choice (s)
Fax [✓ email]
Format:
Excel PDF

Requirements: circle choice (s) 0809323
GW-1 MCP Methods CT RCP (Reasonable Confidence Protocols)
S-1 DEP State / Fed Program - Criteria ____
QC Other ____

Client: ESS Group
Address: 401 Wampanoag Trail
East Providence
Contact: Carissa Lord

Phone: 401-330-1244
Fax:
email: clord@essgroup.com

Project: Hopedale
Project PO:
Invoice to *:

COLLECTION				CONTAINER						Preservative: / Analysis Requested										
DATE	TIME	SAMPLED BY	SAMPLE LOCATION / ID	TYPE	QUANITY	MATRIX	COMP	GRAB	GeoLabs SAMPLE NUMBER	Diss Ph.	T.Phos	TKN	TSS	NH4	NO3 nitrate nitrite	E.coli	metals	~~TEMPERATURE~~ Turbidity	LAB pH
9/18		CL	1S						9323-001	|	|	|	|	|	|	X		| 4c	
|		|	1B						002	|	|	|	|	|	|		X	|	
|		|	2						003	|	|	|	|	|	|	X		|	
|		|	3						004	|	|	|	|	|	|		X	|	
|		|	4						005	|	|	|	|	|	|	X		|	
|		|	5						006	|	|	|	|	|	|	X		|	
|		|	6						007	|	|	|	|	|	|	X		|	
|		|	7						008		|		|	|	|	X		X	

Matrix Codes:
GW = Ground Water DW = Drinking Water S = Soil A = Air
WW = Waste Water SL = Sludge O = Oil OT = Other

Received on Ice ☑

Preservatives
1 = Hcl 3 = H2SO4 5 = NaOH 7 = Other
2 = HNO3 4 = Na2S2O3 6 = MEOH

Containers:
A = Amber B = Bag O = Other
G = Glass P = Plastic
S = Summa V = Voa

Relinquished by:	Date / Time	Received by:	Date / Time
Carissa T. Lord	9/18 1:23	M.C	9/18/08 1:25
M.C	9/18/08 2:35	R.B.	9-18-08 2:50pm

280598.J&P.C of CR.08/19/08

* Terms: Payment due within 30 days unless other arrangements are made. Past due balances subject to interest and collection cost.
Note: Homeowners and Law Firms must pay when dropping off samples. We accept cash, check and credit cards.

CT (PH-0148) NY(11796) MA (MA - 015) PA (68-03417) NH (2508) NJ (MA-009) RI (LA000252)

Monday, August 11, 2008

GeoLabs, Inc.
45 Johnson Lane
Braintree MA 02184
Tele: 781 848 7844
Fax: 781 848 7811

Matt Ladewig
ESS Group, Inc.
888 Worcester St
Suite 240
Wellesley, MA 02481

TEL: (781) 489-1116
FAX: (781) 431-0500

Project:
Location:

Order No.: 0807479

Dear Matt Ladewig:

GeoLabs, Inc. received 2 sample(s) on 7/30/2008 for the analyses presented in the following report.

There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications, except when noted in the Case Narrative.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Jim Chen
Laboratory Director

For current certifications, please visit our website at www.geolabs.com

Certifications:

CT (PH-0148) - MA (M-MA015) - NH (2508) - NJ (MA009) - NY (11796) - RI (LA000252)

GeoLabs, Inc. **Date:** *11-Aug-08*

CLIENT: ESS Group, Inc.
Project:
Lab Order: 0807479

CASE NARRATIVE

Physical Condition of Samples

The project was received by the laboratory in satisfactory condition. The sample(s) were received undamaged, in appropriate containers with the correct preservation.

Project Documentation

The project was accompanied by satisfactory Chain of Custody documentation.

Analysis of Sample(s)

All extractable samples were extracted and analyzed and any Volatile samples were analyzed within method specified holding times and according to GeoLabs documented Standard Operating Procedure. No analytical anomalies or non-conformances were noted by the laboratory during the processing of these samples.

Reported Date: 11-Aug-08

CLIENT: ESS Group, Inc.
Lab Order: 0807479
Project:
Lab ID: 0807479-002

Client Sample ID: HPS2
Collection Date: 7/30/2008 11:40:00 AM
Date Received: 7/30/2008
Matrix: GROUNDWATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL METALS BY ICP - SW6010B						Analyst: **QS**
Iron	8.92	0.0600		mg/L	1	8/5/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	ND	0.010		mg/L	1	8/4/2008
NOTES: Sample was analyzed at M-RI010.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	<10	10.0		CFU/100ml	1	7/30/2008
NOTES: Sample was analyzed at M-RI010.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	ND	0.130		mg/L	1	8/8/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	2.54	0.0540		mg/L	2	7/30/2008

Qualifiers:				
B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

Reported Date: 11-Aug-08

CLIENT: ESS Group, Inc.
Lab Order: 0807479
Project:
Lab ID: 0807479-003

Client Sample ID: HPS3
Collection Date: 7/30/2008 12:20:00 PM
Date Received: 7/30/2008
Matrix: GROUNDWATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL METALS BY ICP - SW6010B						Analyst: **QS**
Iron	*12.5*	0.600		mg/L	10	8/5/2008
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	ND	0.010		mg/L	1	8/4/2008
NOTES: Sample was analyzed at M-RI010.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	*20*	10.0		CFU/100ml	1	7/30/2008
NOTES: Sample was analyzed at M-RI010.						
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **WFR**
Ammonia (as N)	*1.01*	0.130		mg/L	1	8/8/2008
NITRATE - L10-107-04-1-C						Analyst: **RP**
Nitrate (as N)	ND	0.0270		mg/L	1	7/30/2008

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

CHAIN OF CUSTODY RECORD

GeoLabs, Inc. *Environmental Laboratories*
45 Johnson Lane, Braintree, MA 02184
p 781.848.7844 • f 781.848.7811
www.geolabs.com

Sample Handling: circle choice
Filtration: Done / Not Needed / [✓ Lab to do]
Preservatic Lab to do Y / N

Special instructions
LAB FILTER DISS-P + ~~[illegible]~~ DET LIMIT OF 0.01 mg/L
0802479

Turnaround: circle one
1-day 3-day
2-day [✓ 5 / 7-days]

Data Delivery: circle choice (s)
Fax [✓ email]
Format:
Excel PDF

Requirements: circle choice (s) ~~[illegible]~~
GW-1 MCP Methods CT RCP (Reasonable Confidence Protocols)
S-1 DEP State / Fed Program - Criteria
QC Other

Client: ESS GROUP, INC
Address: 401 WAMPANOAG TRL, SUITE 400
EAST PROVIDENCE, RI 02915
Contact: MATT LADEWIG

Phone: 401 330-1204
Fax:
email: mladewig@essgroup.com

Project:
Project PO:
Invoice to *:

COLLECTION DATE	COLLECTION TIME	SAMPLED BY	SAMPLE LOCATION / ID	CONTAINER TYPE	CONTAINER QUANITY	MATRIX	COMP	GRAB	GeoLabs SAMPLE NUMBER	NO3	Ammonia	Diss-P	Total Iron	E.Coli				TEMPERATURE	LAB pH
Preservative:											3		2						
										1	2	2	2						
				A	1	GW	X		~~7499-001~~			~~X~~						5	
7/30	1043	ML/MS	~~HPS1~~	P	3				↓	~~X~~	~~X~~		~~X~~						
	↓			O	1									~~X~~					
				A	1				7499-002			X							
	1140		HPS2	P	3					X	X		X						
				O	1				↓					X					
				A	1				003	~~[illegible]~~	~~X~~	X							
	1220		HPS3	P	3					X	X								
				O	1									X					
↓		↓				↓	↓												

DW = Drinking Water S = Soil A = Air
SL = Sludge O = Oil OT = Other

Received on Ice
☑

Preservatives
1 = Hcl
2 = HNO3
3 = H2SO4
4 = Na2S2O3
5 = NaOH
6 = MEOH
7 = Other

Containers:
A = Amber
G = Glass
S = Summa
B = Bag
P = Plastic
V = Voa
O = Other

	Date / Time	Received by:	Date / Time
	7/30/08 1400	M	7/30/08 17:00
7/30/08	2:30	KC	7/30/08 4:15

within 30 days unless other arrangements are made. Past due balances subject to interest and collection cost.
ners and Law Firms must pay when dropping off samples. We accept cash, check and credit cards.

CT (PH-0148)
NY(11796)
MA (MA - 015)
PA (68-03417)
NH (2508) NJ (MA-009)
RI (LA000252)

CHAIN OF CUSTODY RECORD

GeoLabs, Inc. *Environmental Laboratories*
45 Johnson Lane, Braintree, MA 02184
p 781.848.7844 • f 781.848.7811
www.geolabs.com

Sample Handling: circle choice

Filtration: Done / Not Needed / [✓ Lab to do]

Preservation: Lab to do Y / N

Special Instructions

LAB FILTER DISS-P + DL of 0.01 mg/L

Turnaround: circle one

1-day 3-day 2-day [✓ 5 / 7-days]

Data Delivery: circle choice (s)

Fax [✓ email]
Format:
Excel PDF

Requirements: circle choice (s)

GW-1 MCP Methods CT RCP (Reasonable Confidence Protocols)
S-1 DEP State / Fed Program - Criteria ____
QC Other ____

Client: ESS GROUP INC
Address:
Contact: MATT LODEWIG

Phone: 401 330-1204
Fax:
email:

Project:
Project PO:
Invoice to *:

COLLECTION				CONTAINER						Analysis Requested									
									Preservative:		3		2						
										2	2	7	2						
DATE	TIME	SAMPLED BY	SAMPLE LOCATION / ID	TYPE	QUANITY	MATRIX	COMP	GRAB	GeoLabs SAMPLE NUMBER	NO3	Ammonia	Diss-P	Total Iron	Ecoli				TEMPERATURE	LAB pH
7/30	1	ML/MS	~~HPS4~~	A	1	GW	X		~~7479-004~~										
				P	3	↓	↓		↓										
				O	1														

Cancel all testing for HPS1 and HPS-4, per Matt Lodewig 7/31/08 CS

Matrix Codes:
GW = Ground Water
WW = Waste Water
DW = Drinking Water
SL = Sludge
S = Soil
O = Oil
A = Air
OT = Other

Received on Ice ☑

Preservatives
1 = Hcl
2 = HNO3
3 = H2SO4
4 = Na2S2O3
5 = NaOH
6 = MEOH
7 = Other

Containers:
A = Amber
G = Glass
S = Summa
B = Bag
P = Plastic
V = Voa
O = Other

Relinquished by:	Date / Time	Received by:	Date / Time
	7/30/08 1400		7/30/08 1400
	7/30/08 2:30	KL	7/30/08 4:15

280265.J&P.C of CR.03/07/08

* Terms: Payment due within 30 days unless other arrangements are made. Past due balances subject to interest and collection cost. Note: Homeowners and Law Firms must pay when dropping off samples. We accept cash dit cards.

CT (PH-0148)
NY(11796)
MA (MA - 015)
PA (68-03417)
NH (2508) NJ (MA-009)
RI (LA000252)

GeoLabs, Inc.
45 Johnson Lane
Braintree MA 02184
Tele: 781 848 7844
Fax: 781 848 7811

Monday, September 29, 2008

Matt Ladewig
ESS Group, Inc.
888 Worcester St
Suite 240
Wellesley, MA 02481

TEL: (781) 489-1116
FAX: (781) 431-0500

Project: H153 - Hopedale
Location:

Order No.: 0809328

Dear Matt Ladewig:

GeoLabs, Inc. received 3 sample(s) on 9/18/2008 for the analyses presented in the following report.

There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications, except when noted in the Case Narrative.

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Jim Chen

Jim Chen
Laboratory Director

For current certifications, please visit our website at www.geolabs.com

Certifications:

CT (PH-0148) - MA (M-MA015) - NH (2508) - NJ (MA009) - NY (11796) - RI (LA000252)

GeoLabs, Inc. **Date:** *29-Sep-08*

CLIENT: ESS Group, Inc.
Project: H153 - Hopedale
Lab Order: 0809328

CASE NARRATIVE

Physical Condition of Samples

The project was received by the laboratory in satisfactory condition. The sample(s) were received undamaged, in appropriate containers with the correct preservation.

Project Documentation

The project was accompanied by satisfactory Chain of Custody documentation.

Analysis of Sample(s)

All extractable samples were extracted and analyzed and any Volatile samples were analyzed within method specified holding times and according to GeoLabs documented Standard Operating Procedure. No analytical anomalies or non-conformances were noted by the laboratory during the processing of these samples.

GeoLabs, Inc.

Reported Date: 29-Sep-08

CLIENT: ESS Group, Inc.
Lab Order: 0809328
Project: H153 - Hopedale
Lab ID: 0809328-002

Client Sample ID: HPS03
Collection Date: 9/18/2008 9:40:00 AM
Date Received: 9/18/2008
Matrix: GROUNDWATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
DISSOLVED ICP METALS - SW6010B						Analyst: **QS**
Iron	ND	0.0600		mg/L	1	9/23/2008
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **SUB**
Ammonia	2.10	0.100		mg/L	1	9/26/2008
NOTES: Sample was analyzed at M-RI010.						
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	0.26	0.010		mg/L	1	9/24/2008 1:25:00 PM
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	<10	10.0		MPN	1	9/18/2008 4:00:00 PM
NOTES: Sample was analyzed at M-RI010.						
NITRATE - SM4500-NO3-F						Analyst: **SUB**
Nitrate	ND	0.0300		mg/L	1	9/19/2008
NOTES: Sample was analyzed at M-RI010.						

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

CLIENT:	ESS Group, Inc.	**Client Sample ID:**	HPS01
Lab Order:	0809328	**Collection Date:**	9/18/2008 10:50:00 AM
Project:	H153 - Hopedale	**Date Received:**	9/18/2008
Lab ID:	0809328-003	**Matrix:**	GROUNDWATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
DISSOLVED ICP METALS - SW6010B						Analyst: **QS**
Iron	15.8	0.600		mg/L	10	9/23/2008
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **SUB**
Ammonia	12.7	0.100		mg/L	1	9/26/2008
NOTES: Sample was analyzed at M-RI010.						
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	0.45	0.010		mg/L	1	9/24/2008 1:29:00 PM
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	<10	10.0		MPN	1	9/18/2008 4:00:00 PM
NOTES: Sample was analyzed at M-RI010.						
NITRATE - SM4500-NO3-F						Analyst: **SUB**
Nitrate	ND	0.0300		mg/L	1	9/19/2008
NOTES: Sample was analyzed at M-RI010.						

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

GeoLabs, Inc.

Reported Date: 29-Sep-08

CLIENT: ESS Group, Inc.
Lab Order: 0809328
Project: H153 - Hopedale
Lab ID: 0809328-004

Client Sample ID: HPS02
Collection Date: 9/18/2008 12:00:00 PM
Date Received: 9/18/2008
Matrix: GROUNDWATER

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
DISSOLVED ICP METALS - SW6010B						Analyst: **QS**
Iron	ND	0.0600		mg/L	1	9/23/2008
AMMONIA (AS N) - SM18 4500-NH3-B,C						Analyst: **SUB**
Ammonia	ND	0.100		mg/L	1	9/26/2008
NOTES: Sample was analyzed at M-RI010.						
DISSOLVED PHOSPHORUS - SM 4500-P-B, E						Analyst: **SUB**
Phosphorus, Dissolved	*0.050*	0.010		mg/L	1	9/24/2008 1:30:00 PM
NOTES: Sample was analyzed at M-CT008.						
E-COLI - SM9221F						Analyst: **SUB**
E. Coli	<10	10.0		MPN	1	9/18/2008 4:00:00 PM
NOTES: Sample was analyzed at M-RI010.						
NITRATE - SM4500-NO3-F						Analyst: **SUB**
Nitrate	*2.10*	0.0300		mg/L	1	9/19/2008
NOTES: Sample was analyzed at M-RI010.						

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

Page 1 of 1

CHAIN OF CUSTODY RECORD

GeoLabs, Inc. *Environmental Laboratories*
45 Johnson Lane, Braintree, MA 02184
p 781.848.7844 • f 781.848.7811
www.geolabs.com

Sample Handling: circle choice
Filtration: Done / Not Needed / [✓ Lab to do]
Preservation: Lab to do Y / N

Special Instructions Client cancelled HpS04 - 9/18 KC
- Lab filter diss P + diss Fe
- Please send diss P to CT008 + note low detect (0.01 mg/L)

Turnaround: circle one
1-day 3-day
2-day [✓ 5 / 7-days]

Data Delivery: circle choice (s)
Fax [✓ email]
Format:
Excel PDF

Requirements: circle choice (s) 0809328
GW-1 MCP Methods CT RCP (Reasonable Confidence Protocols)
S-1 DEP State / Fed Program - Criteria
QC Other

Client: ESS GROUP, INC
Address: 401 WAMPANOAG TRAIL, SUITE 400
EAST PROVIDENCE, RI 02915
Contact: MATT LADEWIG

Phone: 401-330-1204
Fax:
email: mladewig@essgroup.com

Project: H153-HOPEDALE
Project PO:
Invoice to *: CARL NIELSEN

									Preservative:		3		NONE						
COLLECTION				CONTAINER						7	2	7	Analysis Requested						
DATE	TIME	SAMPLED BY	SAMPLE LOCATION / ID	TYPE	QUANITY	MATRIX	COMP	GRAB	GeoLabs SAMPLE NUMBER	NO3	NH3	Diss P	7 Diss Iron	E.Coli				TEMPERATURE	LAB pH
9/18/08	0750	ML/GB	HPS04	A	1	GW	X		~~9328~~ 001			/						4c	
↓	↓	↓		P	4	↓	↓		~~001~~	X	X		X	X				↓	
	0940		HPS03	A	1				9328 002			X							
	↓			P	4				↓	X	X		X	X					
	1050		HPS01	A	1				003			X							
	↓			P	4				↓	X	X		X	X					
	1200		HPS02	A	1				004			X							
	↓			P	4				↓	X	X		X	X				↓	

Matrix Codes:
GW = Ground Water DW = Drinking Water S = Soil A = Air
WW = Waste Water SL = Sludge O = Oil OT = Other

Received on Ice ☑

Preservatives
1 = Hcl 3 = H2SO4 5 = NaOH 7 = Other
2 = HNO3 4 = Na2S2O3 6 = MEOH

Containers:
A = Amber B = Bag O = Other
G = Glass P = Plastic
S = Summa V = Voa

Relinquished by:	Date / Time	Received by:	Date / Time
	9/18 1:23		9/18/08 1:25
	9/18/08 2:35	R.B.	9-18-08 200pm

280598.J&P.C of CR.08/19/08

* Terms: Payment due within 30 days unless other arrangements are made. Past due balances subject to interest and collection cost.
Note: Homeowners and Law Firms must pay when dropping off samples. We accept cash, check and credit cards.

CT (PH-0148) MA (MA - 015) NH (2508) NJ (MA-009)
NY(11796) PA (68-03417) RI (LA000252)

Friday, January 30, 2009

GeoLabs, Inc.
45 Johnson Lane
Braintree MA 02184
Tele: 781 848 7844
Fax: 781 848 7811

Matt Ladewig
ESS - Group
401 Wampanoag Trail Suite #400
E. Providence, RI 02915

TEL: 401-330-1200
FAX:

Project: Hopedale
Location: H153-000

Order No.: 0901214

Dear Matt Ladewig:

GeoLabs, Inc. received 7 sample(s) on 1/20/2009 for the analyses presented in the following report.

There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications except where noted in the Case Narrative.

Analytical methods and results meet requirements of 310CMR 40.1056(J) as per MADEP Compendium of Analytical Methods (CAM).

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Jim Chen
Laboratory Director

For current certifications, please visit our website at www.geolabs.com

Certifications:

CT (PH-0148) - MA (M-MA015) - NH (2508) - NJ (MA009) - NY (11796) - RI (LA000252)

GeoLabs, Inc.

Date: *30-Jan-09*

CLIENT: ESS - Group
Project: Hopedale
Lab Order: 0901214

CASE NARRATIVE

MADEP MCP Response Action Analytical Report Certification Form

Laboratory Name: GeoLabs, Inc.
Project Location: Hopedale

Project # H153-000
MADEP RTN #:

This form provides certification for the following data set: 0901214 (001-007)

Sample Matrix: Soil

MCP Methods Used: 6010B, 7471A, 8260B, 8270C, EPH, 8082

An affirmative answer to questions A, B, C and D are required for "Presumptive Certainty" status

A. Were all samples received by the laboratory in a condition consistent with that described on the Chain of custody documentation for the data set? YES

B. Were all QA/QC procedures required for the specified method(s) included in this report followed, including the requirement to note and discuss in a narrative QC data that did not meet appropriate standards or guidelines? YES

C. Does the analytical data included in this report meet all the requirements for "Presumptive Certainty" as described in Section 2.0 of the MADEP documents CAM VII A "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"? YES

D. VPH and EPH Methods only: Was the VPH or EPH Method conducted without significant modifications (see Section 11.3 of respective Methods) YES

A response to questions E and F are required for "Presumptive Certainty" status

E. Were all QC performance standards and recommendations for the specified methods achieved? NO
F. Were results for all analyte-list compounds/elements for the specified method(s) reported? NO

All NO answers need to be addressed in an attached Environmental Laboratory case narrative.

CLIENT: ESS - Group
Project: Hopedale
Lab Order: 0901214

CASE NARRATIVE

CASE NARRATIVE

Physical Condition of Samples

The project was received by the laboratory in satisfactory condition. The sample(s) were received undamaged, in appropriate containers with the correct preservation.

Project Documentation

The project was accompanied by satisfactory Chain of Custody documentation.

Analysis of Sample(s)

PAH compounds only analyzed by 8270C per client request.

Selected metals analyzed by 6010B per client request.

The following analytical anomalies or non-conformances were noted by the laboratory during the processing of these samples:

8270 RPD for Chrysene is outside the limit.

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature: Position: Lab Director

Printed Name: Jim Chen Date: January 30, 2009

CLIENT: ESS - Group
Project: Hopedale
Lab Order: 0901214

CASE NARRATIVE

EPH Methods

Method for Ranges: MADEP EPH 04-1.1
Method for Target Analytes: 8270 GC/MS

Carbon Range data exclude concentrations of any surrogate(s) and/or internal standards eluting in that range
C11-C22 Aromatic Hydrocarbons exclude concentrations of Target PAH Analytes

CERTIFICATION:
Were all QA/QC procedures REQUIRED by the EPH Method followed? YES
Were all performance/acceptance standards achieved? YES
Were any significant modifications made to the EPH method? NO

I attest under the pains and penalties of perjury that, based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

SIGNATURE: LAB DIRECTOR

PRINTED NAME: Jim Chen

DATE: January 30, 2009

CLIENT: ESS - Group
Lab Order: 0901214
Project: Hopedale
Lab ID: 0901214-001

Client Sample ID: SC 1
Collection Date: 1/19/2009 12:00:00 PM
Date Received: 1/20/2009
Matrix: SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
ASH - ASTM D-482-87						Analyst: **FC**
Ash	*81.4*	1.00		%	1	1/22/2009
PERCENT MOISTURE - 209A						Analyst: **FC**
Percent Moisture	*10*	1.0		wt%	1	1/21/2009
EPH RANGES - MADEP EPH						Analyst: **RuP**
Adjusted C11-C22 Aromatics	*104*	11.1		mg/Kg-dry	1	1/22/2009
C09-C18 Aliphatics	ND	11.1		mg/Kg-dry	1	1/22/2009
C19-C36 Aliphatics	*136*	11.1		mg/Kg-dry	1	1/22/2009
Unadjusted C11-C22 Aromatics	*137*	11.1		mg/Kg-dry	1	1/22/2009
Surr: 1-Chlorooctadecane	86.0	40-140		%REC	1	1/22/2009
Surr: o-Terphenyl	78.0	40-140		%REC	1	1/22/2009
POLYCHLORINATED BIPHENYLS - SW8082						Analyst: **GP**
Aroclor 1016/1242	ND	55.6		µg/Kg-dry	1	1/22/2009
Aroclor 1221	ND	55.6		µg/Kg-dry	1	1/22/2009
Aroclor 1232	ND	55.6		µg/Kg-dry	1	1/22/2009
Aroclor 1248	ND	55.6		µg/Kg-dry	1	1/22/2009
Aroclor 1254	ND	55.6		µg/Kg-dry	1	1/22/2009
Aroclor 1260	ND	55.6		µg/Kg-dry	1	1/22/2009
Aroclor 1262	ND	55.6		µg/Kg-dry	1	1/22/2009
Aroclor 1268	ND	55.6		µg/Kg-dry	1	1/22/2009
Surr: Decachlorobiphenyl Sig 1	78.0	30-150		%REC	1	1/22/2009
Surr: Decachlorobiphenyl Sig 2	44.0	30-150		%REC	1	1/22/2009
Surr: Tetrachloro-m-Xylene Sig 1	76.0	30-150		%REC	1	1/22/2009
Surr: Tetrachloro-m-Xylene Sig 2	66.0	30-150		%REC	1	1/22/2009
TOTAL METALS BY ICP - SW6010B						Analyst: **ZYZ**
Arsenic	*27.4*	5.27		mg/Kg-dry	1	1/22/2009
Cadmium	ND	5.27		mg/Kg-dry	1	1/22/2009
Chromium	*9.70*	5.27		mg/Kg-dry	1	1/22/2009
Copper	*40.9*	5.27		mg/Kg-dry	1	1/22/2009
Lead	*66.2*	5.27		mg/Kg-dry	1	1/22/2009
Nickel	*6.26*	5.27		mg/Kg-dry	1	1/22/2009
Zinc	*11.0*	5.27		mg/Kg-dry	1	1/22/2009
MERCURY - SW7471A						Analyst: **EC**
Mercury	*0.128*	0.111		mg/Kg-dry	1	1/22/2009

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

GeoLabs, Inc.

Reported Date: 30-Jan-09

CLIENT:	ESS - Group	**Client Sample ID:**	SC 1
Lab Order:	0901214	**Collection Date:**	1/19/2009 12:00:00 PM
Project:	Hopedale	**Date Received:**	1/20/2009
Lab ID:	0901214-001	**Matrix:**	SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
MERCURY - SW7471A						Analyst: **EC**
PAH - SW8270C						Analyst: **MR**
2-Methylnaphthalene	ND	1110		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Acenaphthene	ND	1110		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Acenaphthylene	ND	1110		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Anthracene	*1400*	1110		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Benz(a)Anthracene	*2170*	111		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Benzo(a)Pyrene	*3050*	111		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Benzo(b)Fluoranthene	*4220*	1110		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Benzo(g,h,i)Perylene	*2410*	1110		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Benzo(k)Fluoranthene	*2330*	1110		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Chrysene	*4110*	1110		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Dibenz(a,h)Anthracene	ND	111		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Fluoranthene	*9410*	1110		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Fluorene	ND	1110		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Indeno(1,2,3-cd)Pyrene	*2300*	111		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Naphthalene	ND	1110		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Phenanthrene	*4410*	1110		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Pyrene	*6060*	1110		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Surr: 2-Fluorobiphenyl	52.1	30-130		%REC	10	1/22/2009 1:14:00 PM
Surr: Nitrobenzene-d5	32.5	30-130		%REC	10	1/22/2009 1:14:00 PM
Surr: Terphenyl-d14	65.6	30-130		%REC	10	1/22/2009 1:14:00 PM
EPH TARGET ANALYTES - MADEP EPH						Analyst: **MR**
Naphthalene	ND	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
2-Methylnaphthalene	ND	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Acenaphthene	ND	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Phenanthrene	*3.19*	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Acenaphthylene	*0.147*	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Fluorene	ND	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Anthracene	ND	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Fluoranthene	*7.90*	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Pyrene	*6.41*	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Benzo(a)Anthracene	*2.75*	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Chrysene	*3.55*	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Benzo(b)Fluoranthene	*2.14*	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Benzo(k)Fluoranthene	*2.79*	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Benzo(a)Pyrene	*2.83*	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Indeno(1,2,3-cd)Pyrene	*0.478*	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT:	ESS - Group	**Client Sample ID:**	SC 1
Lab Order:	0901214	**Collection Date:**	1/19/2009 12:00:00 PM
Project:	Hopedale	**Date Received:**	1/20/2009
Lab ID:	0901214-001	**Matrix:**	SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
EPH TARGET ANALYTES - MADEP EPH						Analyst: **MR**
Dibenz(a,h)Anthracene	ND	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Benzo(g,h,i)Perylene	*0.483*	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Total PAH Target Concentration	*32.7*	0		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Surr: 2,2'-Difluorobiphenyl	101	40-140		%REC	1	1/22/2009 12:44:00 PM
Surr: 2-Fluorobiphenyl	80.6	40-140		%REC	1	1/22/2009 12:44:00 PM
TOTAL ORGANIC CARBON- SW 9060						Analyst: **RP**
Total Organic Carbon	*60300*	444		mg/Kg-dry	1	1/27/2009

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

GeoLabs, Inc.

Reported 30-Jan-09

CLIENT: ESS - Group
Lab Order: 0901214
Project: Hopedale
Lab ID: 0901214-002

Client Sample SC 2
Collection 1/19/2009 3:15:00 PM
Date Received: 1/20/2009
Matrix: SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
ASH - ASTM D-482-87						Analyst: **FC**
Ash	50.8	1.00		%	1	1/22/2009
PERCENT MOISTURE - 209A						Analyst: **FC**
Percent Moisture	0	0		wt%	1	1/21/2009
EPH RANGES - MADEP EPH						Analyst: **RuP**
Adjusted C11-C22 Aromatics	85.8	10.0		mg/Kg-dry	1	1/22/2009
C09-C18 Aliphatics	ND	10.0		mg/Kg-dry	1	1/22/2009
C19-C36 Aliphatics	122	10.0		mg/Kg-dry	1	1/22/2009
Unadjusted C11-C22 Aromatics	93.9	10.0		mg/Kg-dry	1	1/22/2009
Surr: 1-Chlorooctadecane	63.0	40-140		%REC	1	1/22/2009
Surr: o-Terphenyl	70.0	40-140		%REC	1	1/22/2009
POLYCHLORINATED BIPHENYLS - SW8082						Analyst: **GP**
Aroclor 1016/1242	ND	50.0		µg/Kg-dry	1	1/22/2009
Aroclor 1221	ND	50.0		µg/Kg-dry	1	1/22/2009
Aroclor 1232	ND	50.0		µg/Kg-dry	1	1/22/2009
Aroclor 1248	ND	50.0		µg/Kg-dry	1	1/22/2009
Aroclor 1254	ND	50.0		µg/Kg-dry	1	1/22/2009
Aroclor 1260	ND	50.0		µg/Kg-dry	1	1/22/2009
Aroclor 1262	ND	50.0		µg/Kg-dry	1	1/22/2009
Aroclor 1268	ND	50.0		µg/Kg-dry	1	1/22/2009
Surr: Decachlorobiphenyl Sig 1	98.0	30-150		%REC	1	1/22/2009
Surr: Decachlorobiphenyl Sig 2	70.0	30-150		%REC	1	1/22/2009
Surr: Tetrachloro-m-Xylene Sig 1	88.0	30-150		%REC	1	1/22/2009
Surr: Tetrachloro-m-Xylene Sig 2	82.0	30-150		%REC	1	1/22/2009
TOTAL METALS BY ICP - SW6010B						Analyst: **ZYZ**
Arsenic	ND	4.90		mg/Kg-dry	1	1/22/2009
Cadmium	ND	4.90		mg/Kg-dry	1	1/22/2009
Chromium	ND	4.90		mg/Kg-dry	1	1/22/2009
Copper	18.8	4.90		mg/Kg-dry	1	1/22/2009
Lead	6.99	4.90		mg/Kg-dry	1	1/22/2009
Nickel	ND	4.90		mg/Kg-dry	1	1/22/2009
Zinc	ND	4.90		mg/Kg-dry	1	1/22/2009
MERCURY - SW7471A						Analyst: **EC**
Mercury	ND	0.100		mg/Kg-dry	1	1/22/2009

Qualifiers:

B	Analyte detected in the associated Method Blank
E	Value above quantitation range
J	Analyte detected below quantitation limits
S	Spike Recovery outside recovery limits
BRL	Below Reporting Limit
H	Holding times for preparation or analysis exceeded
ND	Not Detected at the Reporting Limit

GeoLabs, Inc. **Reported Date:** 30-Jan-09

CLIENT:	ESS - Group	**Client Sample ID:**	SC 2
Lab Order:	0901214	**Collection Date:**	1/19/2009 3:15:00 PM
Project:	Hopedale	**Date Received:**	1/20/2009
Lab ID:	0901214-002	**Matrix:**	SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
MERCURY - SW7471A						Analyst: **EC**
PAH - SW8270C						Analyst: **MR**
2-Methylnaphthalene	ND	100		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Acenaphthene	ND	100		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Acenaphthylene	ND	100		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Anthracene	ND	100		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Benz(a)Anthracene	ND	10.0		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Benzo(a)Pyrene	ND	10.0		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Benzo(b)Fluoranthene	ND	100		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Benzo(g,h,i)Perylene	ND	100		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Benzo(k)Fluoranthene	ND	100		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Chrysene	ND	100		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Dibenz(a,h)Anthracene	ND	10.0		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Fluoranthene	ND	100		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Fluorene	ND	100		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Indeno(1,2,3-cd)Pyrene	ND	10.0		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Naphthalene	ND	100		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Phenanthrene	ND	100		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Pyrene	ND	100		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Surr: 2-Fluorobiphenyl	31.7	30-130		%REC	1	1/22/2009 5:41:00 PM
Surr: Nitrobenzene-d5	30.1	30-130		%REC	1	1/22/2009 5:41:00 PM
Surr: Terphenyl-d14	31.5	30-130		%REC	1	1/22/2009 5:41:00 PM
EPH TARGET ANALYTES - MADEP EPH						Analyst: **MR**
Naphthalene	ND	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
2-Methylnaphthalene	ND	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Acenaphthene	ND	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Phenanthrene	*0.724*	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Acenaphthylene	ND	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Fluorene	ND	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Anthracene	*0.123*	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Fluoranthene	*1.70*	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Pyrene	*1.69*	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Benzo(a)Anthracene	*0.604*	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Chrysene	*0.918*	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Benzo(b)Fluoranthene	*0.736*	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Benzo(k)Fluoranthene	*0.443*	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Benzo(a)Pyrene	*0.650*	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Indeno(1,2,3-cd)Pyrene	*0.111*	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT:	ESS - Group	**Client Sample ID:**	SC 2
Lab Order:	0901214	**Collection Date:**	1/19/2009 3:15:00 PM
Project:	Hopedale	**Date Received:**	1/20/2009
Lab ID:	0901214-002	**Matrix:**	SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
EPH TARGET ANALYTES - MADEP EPH						Analyst: **MR**
Dibenz(a,h)Anthracene	ND	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Benzo(g,h,i)Perylene	*0.370*	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Total PAH Target Concentration	*8.06*	0		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Surr: 2,2'-Difluorobiphenyl	97.9	40-140		%REC	1	1/22/2009 1:23:00 PM
Surr: 2-Fluorobiphenyl	74.4	40-140		%REC	1	1/22/2009 1:23:00 PM
TOTAL ORGANIC CARBON- SW 9060						Analyst: **RP**
Total Organic Carbon	*100000*	400		mg/Kg-dry	1	1/27/2009

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

CLIENT:	ESS - Group	**Client Sample ID:**	SC 1B
Lab Order:	0901214	**Collection Date:**	1/19/2009 11:30:00 AM
Project:	Hopedale	**Date Received:**	1/20/2009
Lab ID:	0901214-003	**Matrix:**	SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS - 8260B						Analyst: **ZYZ**
1,1,1,2-Tetrachloroethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,1,1-Trichloroethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,1,2,2-Tetrachloroethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,1,2-Trichloroethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,1-Dichloroethane	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
1,1-Dichloroethene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,1-Dichloropropene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2,3-Trichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2,3-Trichloropropane	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
1,2,4-Trichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2,4-Trimethylbenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2-Dibromo-3-Chloropropane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2-Dibromoethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2-Dichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2-Dichloroethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2-Dichloropropane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,3,5-Trimethylbenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,3-Dichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,3-Dichloropropane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,4-Dichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
2,2-Dichloropropane	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
2-Butanone	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
2-Chloroethyl Vinyl Ether	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
2-Chlorotoluene	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
2-Hexanone	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
4-Chlorotoluene	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
4-Isopropyltoluene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
4-Methyl-2-Pentanone	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Acetone	ND	500		µg/Kg	1	1/22/2009 9:56:00 PM
Acrylonitrile	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Benzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Bromobenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Bromochloromethane	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
Bromodichloromethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Bromoform	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Bromomethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Carbon Disulfide	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Carbon Tetrachloride	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Chlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Chloroethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT:	ESS - Group	**Client Sample ID:**	SC 1B
Lab Order:	0901214	**Collection Date:**	1/19/2009 11:30:00 AM
Project:	Hopedale	**Date Received:**	1/20/2009
Lab ID:	0901214-003	**Matrix:**	SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS - 8260B						Analyst: **ZYZ**
Chloroform	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Chloromethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
cis-1,2-Dichloroethene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
cis-1,3-Dichloropropene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Dibromochloromethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Dibromomethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Dichlorodifluoromethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Ethylbenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Hexachlorobutadiene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Isopropylbenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Methyl Tert-Butyl Ether	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Methylene Chloride	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Naphthalene	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
n-Butylbenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
n-Propylbenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
sec-Butylbenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Styrene	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
tert-Butylbenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Tetrachloroethene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Toluene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
trans-1,2-Dichloroethene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
trans-1,3-Dichloropropene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Trichloroethene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Trichlorofluoromethane	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
Vinyl Chloride	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Xylenes, Total	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
Surr: 1,2-Dichloroethane-d4	102	70-130		%REC	1	1/22/2009 9:56:00 PM
Surr: 4-Bromofluorobenzene	91.1	70-130		%REC	1	1/22/2009 9:56:00 PM
Surr: Dibromofluoromethane	95.4	70-130		%REC	1	1/22/2009 9:56:00 PM
Surr: Toluene-d8	97.5	70-130		%REC	1	1/22/2009 9:56:00 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT:	ESS - Group	**Client Sample ID:**	SC 2C
Lab Order:	0901214	**Collection Date:**	1/19/2009 3:10:00 PM
Project:	Hopedale	**Date Received:**	1/20/2009
Lab ID:	0901214-004	**Matrix:**	SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS - 8260B						Analyst: **ZYZ**
1,1,1,2-Tetrachloroethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,1,1-Trichloroethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,1,2,2-Tetrachloroethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,1,2-Trichloroethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,1-Dichloroethane	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
1,1-Dichloroethene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,1-Dichloropropene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2,3-Trichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2,3-Trichloropropane	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
1,2,4-Trichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2,4-Trimethylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2-Dibromo-3-Chloropropane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2-Dibromoethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2-Dichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2-Dichloroethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2-Dichloropropane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,3,5-Trimethylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,3-Dichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,3-Dichloropropane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,4-Dichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
2,2-Dichloropropane	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
2-Butanone	836	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
2-Chloroethyl Vinyl Ether	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
2-Chlorotoluene	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
2-Hexanone	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
4-Chlorotoluene	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
4-Isopropyltoluene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
4-Methyl-2-Pentanone	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Acetone	ND	500		µg/Kg	1	1/22/2009 10:33:00 PM
Acrylonitrile	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Benzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Bromobenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Bromochloromethane	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
Bromodichloromethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Bromoform	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Bromomethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Carbon Disulfide	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Carbon Tetrachloride	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Chlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Chloroethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT:	ESS - Group	**Client Sample ID:**	SC 2C
Lab Order:	0901214	**Collection Date:**	1/19/2009 3:10:00 PM
Project:	Hopedale	**Date Received:**	1/20/2009
Lab ID:	0901214-004	**Matrix:**	SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS - 8260B						Analyst: **ZYZ**
Chloroform	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Chloromethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
cis-1,2-Dichloroethene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
cis-1,3-Dichloropropene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Dibromochloromethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Dibromomethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Dichlorodifluoromethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Ethylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Hexachlorobutadiene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Isopropylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Methyl Tert-Butyl Ether	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Methylene Chloride	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Naphthalene	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
n-Butylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
n-Propylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
sec-Butylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Styrene	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
tert-Butylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Tetrachloroethene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Toluene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
trans-1,2-Dichloroethene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
trans-1,3-Dichloropropene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Trichloroethene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Trichlorofluoromethane	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
Vinyl Chloride	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Xylenes, Total	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
Surr: 1,2-Dichloroethane-d4	101	70-130		%REC	1	1/22/2009 10:33:00 PM
Surr: 4-Bromofluorobenzene	97.0	70-130		%REC	1	1/22/2009 10:33:00 PM
Surr: Dibromofluoromethane	92.7	70-130		%REC	1	1/22/2009 10:33:00 PM
Surr: Toluene-d8	99.9	70-130		%REC	1	1/22/2009 10:33:00 PM

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

Reported Date: 30-Jan-09

CLIENT:	ESS - Group	**Client Sample ID:**	N 1
Lab Order:	0901214	**Collection Date:**	1/19/2009 12:00:00 PM
Project:	Hopedale	**Date Received:**	1/20/2009
Lab ID:	0901214-005	**Matrix:**	SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL NITROGEN IN SOIL						Analyst: **RP**
Total Nitrogen	*4600*	4.2		mg/Kg-dry	1	1/27/2009
TOTAL PHOSPHOROUS - L10-115-01-1-E						Analyst: **RP**
Total Phosphorous	*229*	2.93		mg/Kg-dry	2	1/29/2009

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

CLIENT:	ESS - Group	**Client Sample ID:**	N 2
Lab Order:	0901214	**Collection Date:**	1/19/2009 3:45:00 PM
Project:	Hopedale	**Date Received:**	1/20/2009
Lab ID:	0901214-006	**Matrix:**	SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL NITROGEN IN SOIL						Analyst: **RP**
Total Nitrogen	*3500*	3.8		mg/Kg-dry	1	1/27/2009
TOTAL PHOSPHOROUS - L10-115-01-1-E						Analyst: **RP**
Total Phosphorous	*66.0*	1.32		mg/Kg-dry	1	1/29/2009

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT: ESS - Group
Lab Order: 0901214
Project: Hopedale
Lab ID: 0901214-007

Client Sample ID: N 3
Collection Date: 1/19/2009 3:15:00 PM
Date Received: 1/20/2009
Matrix: SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL NITROGEN IN SOIL						Analyst: **RP**
Total Nitrogen	6300	4.5		mg/Kg-dry	1	1/27/2009
TOTAL PHOSPHOROUS - L10-115-01-1-E						Analyst: **RP**
Total Phosphorous	53.9	1.58		mg/Kg-dry	1	1/29/2009

GeoLabs, Inc.
Environmental Laboratories

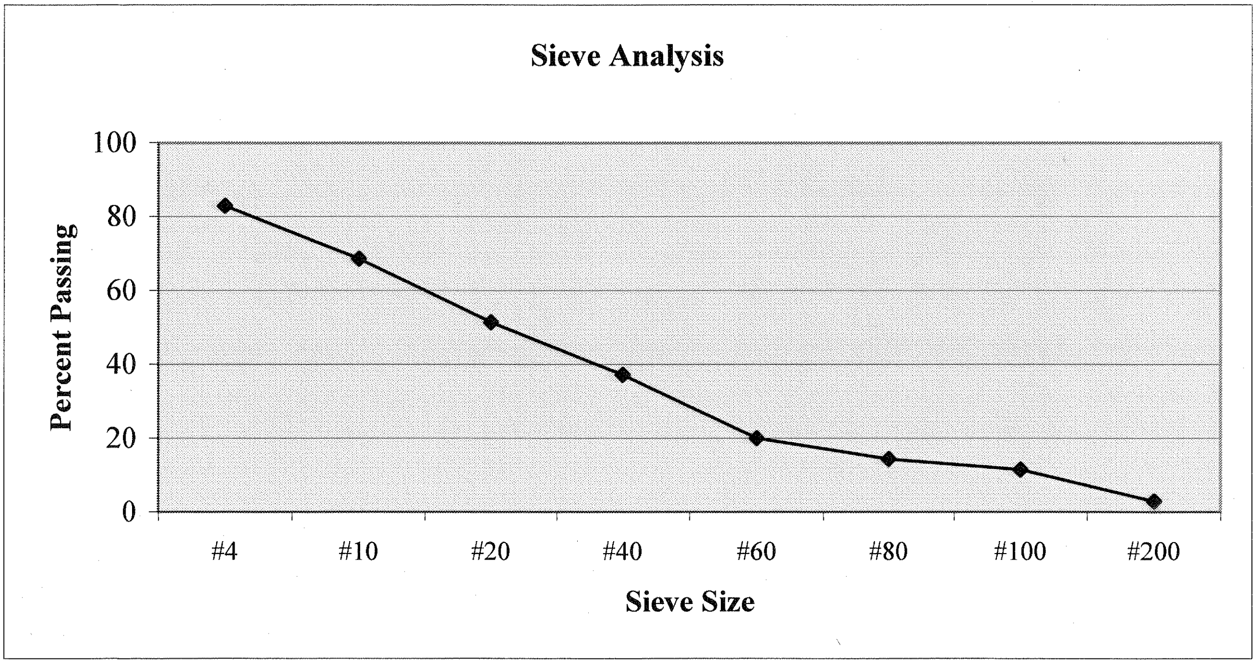
CLIENT NAME:	**ESS GROUP**	PROJECT ID:	HOPEDALE
SAMPLE TYPE:	SOIL	REPORT DATE:	01/22/09
COLLECTION DATE:	01/19/09	ANALYZED BY:	BP
REC'D BY LAB:	01/20/09	ANALYSIS DATE:	01/21/09
COLLECTED BY:	CLIENT	DIGESTION DATE:	N/A

SIEVE ANALYSIS

SAMPLE NUMBER: 0901214-001
SAMPLE LOCATION: SC1

SIEVE SIZE	#4	#10	#20	#40	#60	#80	#100
RESULTS **(% Passing by Wt.)**	82.9	68.6	51.4	37.1	20.0	14.3	11.4

SIEVE SIZE	#200
RESULTS **(% Passing by Wt.)**	2.86



ASTM C 136, ASTM C117

GeoLabs, Inc.
Environmental Laboratories

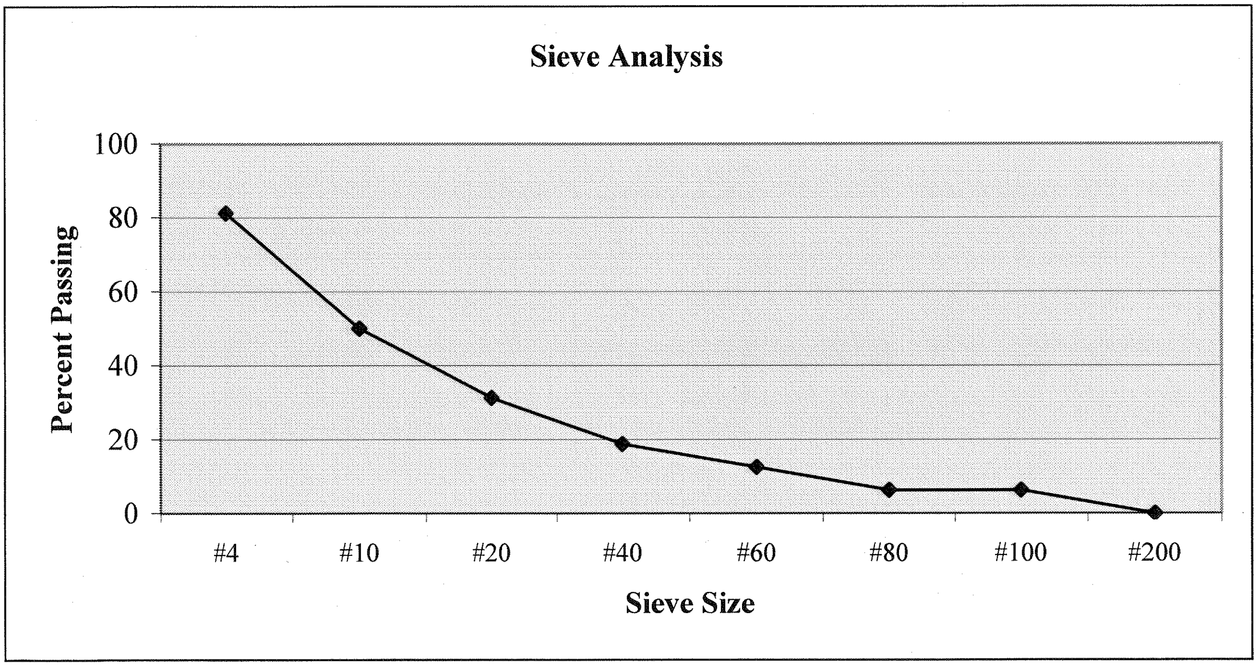
CLIENT NAME:	**ESS GROUP**	PROJECT ID:	HOPEDALE
SAMPLE TYPE:	SOIL	REPORT DATE:	01/22/09
COLLECTION DATE:	01/19/09	ANALYZED BY:	BP
REC'D BY LAB:	01/20/09	ANALYSIS DATE:	01/21/09
COLLECTED BY:	CLIENT	DIGESTION DATE:	N/A

SIEVE ANALYSIS

SAMPLE NUMBER: 0901214-002
SAMPLE LOCATION: SC2

SIEVE SIZE	#4	#10	#20	#40	#60	#80	#100
RESULTS (% Passing by Wt.)	81.3	50.0	31.3	18.8	12.5	6.25	6.25

SIEVE SIZE	#200
RESULTS (% Passing by Wt.)	0.00



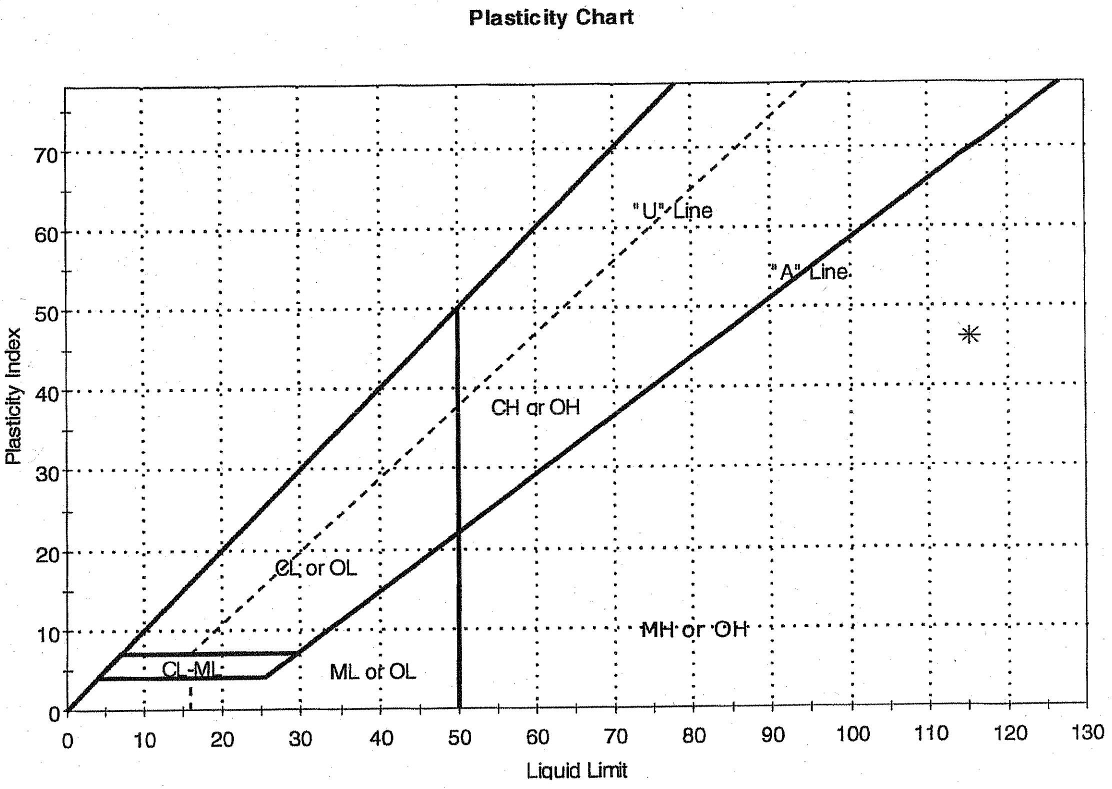
ASTM C 136, ASTM C117

GeoTesting express
a subsidiary of Geocomp Corporation

Client: GeoLabs, Inc.			
Project: 0901214			
Location: ---		Project No:	GTX-8819
Boring ID: ---	Sample Type: jar	Tested By:	ap
Sample ID:0901214-001A	Test Date: 01/27/09	Checked By:	jdt
Depth : ---	Test Id: 145690		

Test Comment: ---
Sample Description: Moist, gray silt with organics
Sample Comment: ---

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
✳	0901214-001A	---	---	9	115	69	46	-1	

Sample Prepared using the WET method

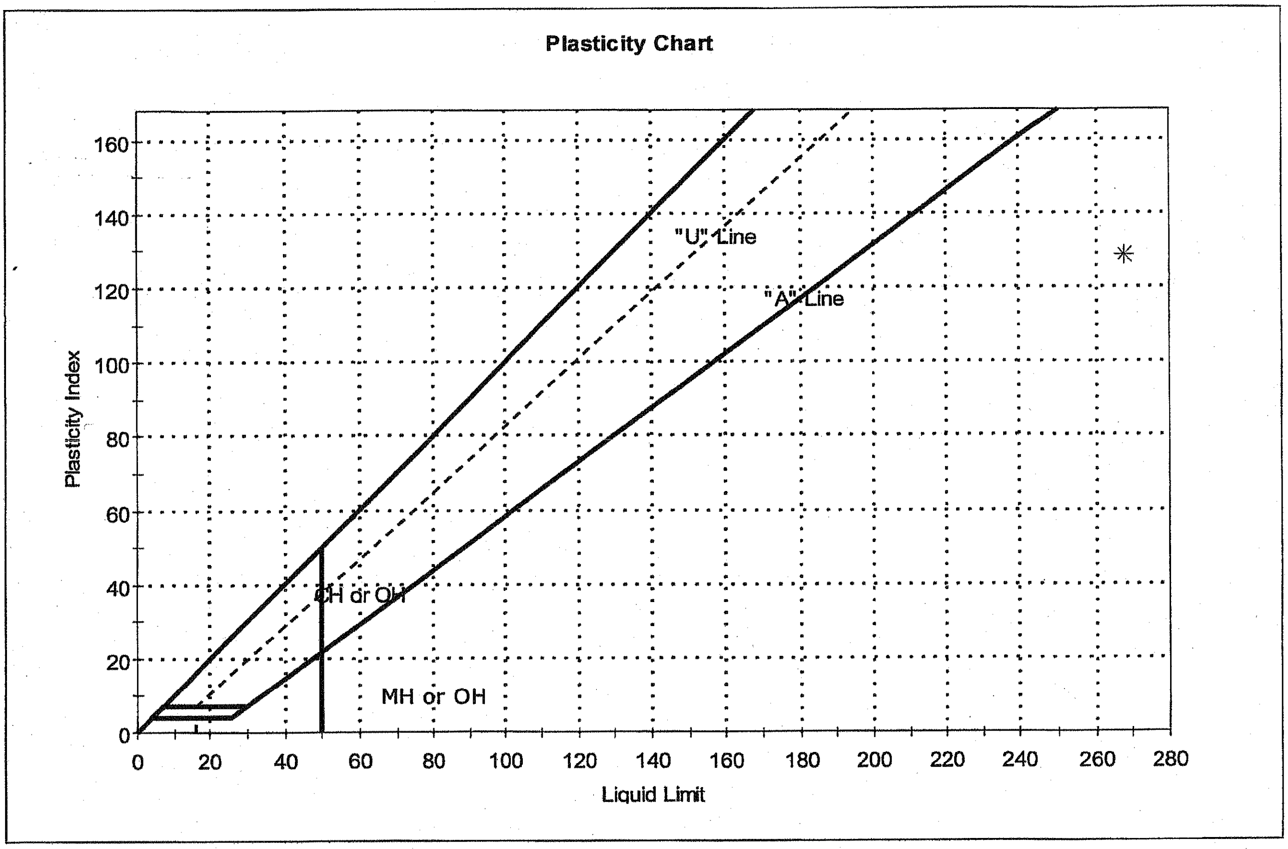
Dry Strength: HIGH
Dilentancy: SLOW
Toughness: LOW

printed 1/28/2009 1:48:30 PM

GeoTesting express
a subsidiary of Geocomp Corporation

Client: GeoLabs, Inc.
Project: 0901214
Location: --- Project No: GTX-8819
Boring ID: --- Sample Type: jar Tested By: ap
Sample ID:0901214-002A Test Date: 01/29/09 Checked By: jdt
Depth : --- Test Id: 145691
Test Comment: ---
Sample Description: Moist, brown silt with organics
Sample Comment: ---

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
✳	0901214-002A	---	---	15	268	139	129	-1	

Sample Prepared using the WET method

Dry Strength: HIGH
Dilentancy: SLOW
Toughness: LOW

printed 1/29/2009 8:36:58 AM

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010b_S

Sample ID: **MBLK-12422** SampType: **MBLK** TestCode: **6010b_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28312**
Client ID: **ZZZZZ** Batch ID: **12422** TestNo: **SW6010B** **(SW3050B)** Analysis Date: **1/22/2009** SeqNo: **297946**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	5.00									
Cadmium	ND	5.00									
Chromium	ND	5.00									
Copper	ND	5.00									
Lead	ND	5.00									
Nickel	ND	5.00									
Zinc	ND	5.00									

Sample ID: **LCS-12422** SampType: **LCS** TestCode: **6010b_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28312**
Client ID: **ZZZZZ** Batch ID: **12422** TestNo: **SW6010B** **(SW3050B)** Analysis Date: **1/22/2009** SeqNo: **297947**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	126.4	5.00	133.3	0.06667	94.8	80	120				
Cadmium	125.0	5.00	133.3	1	93.0	80	120				
Chromium	133.1	5.00	133.3	0.1333	99.8	80	120				
Copper	152.9	5.00	133.3	0	115	80	120				
Lead	127.7	5.00	133.3	0.06667	95.7	80	120				
Nickel	127.3	5.00	133.3	0	95.5	80	120				
Zinc	134.6	5.00	133.3	0	101	80	120				

Sample ID: **LCSD-12422** SampType: **LCSD** TestCode: **6010B_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28312**
Client ID: **ZZZZZ** Batch ID: **12422** TestNo: **SW6010B** **(SW3050B)** Analysis Date: **1/22/2009** SeqNo: **298064**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	126.9	5.00	133.3	0	95.2	80	120	126.4	0.421	30	
Cadmium	124.1	5.00	133.3	0	93.1	80	120	125	0.749	30	
Chromium	131.7	5.00	133.3	0	98.8	80	120	133.1	1.11	30	
Copper	153.9	5.00	133.3	0	115	80	120	152.9	0.652	30	
Lead	126.7	5.00	133.3	0	95.0	80	120	127.7	0.786	30	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010b_S

Sample ID: **LCSD-12422** SampType: **LCSD** TestCode: **6010B_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28312**
Client ID: **ZZZZZ** Batch ID: **12422** TestNo: **SW6010B** **(SW3050B)** Analysis Date: **1/22/2009** SeqNo: **298064**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nickel	126.6	5.00	133.3	0	95.0	80	120	127.3	0.578	30	
Zinc	134.1	5.00	133.3	0	101	80	120	134.6	0.397	30	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8082_s_ase

Sample ID: **MBLK-12417**	SampType: **MBLK**	TestCode: **8082_s_ase**	Units: **µg/Kg**		Prep Date: **1/22/2009**			RunNo: **28313**			
Client ID: **ZZZZZ**	Batch ID: **12417**	TestNo: **SW8082**	**(SW3545A)**		Analysis Date: **1/22/2009**			SeqNo: **297971**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016/1242	ND	50.0									
Aroclor 1221	ND	50.0									
Aroclor 1232	ND	50.0									
Aroclor 1248	ND	50.0									
Aroclor 1254	ND	50.0									
Aroclor 1260	ND	50.0									
Aroclor 1262	ND	50.0									
Aroclor 1268	ND	50.0									
Surr: Decachlorobiphenyl Sig 1	80.00	0	100	0	80.0	30	150				
Surr: Decachlorobiphenyl Sig 2	58.00	0	100	0	58.0	30	150				
Surr: Tetrachloro-m-Xylene Sig 1	64.00	0	100	0	64.0	30	150				
Surr: Tetrachloro-m-Xylene Sig 2	66.00	0	100	0	66.0	30	150				

Sample ID: **LCS-12417**	SampType: **LCS**	TestCode: **8082_s_ase**	Units: **µg/Kg**		Prep Date: **1/22/2009**			RunNo: **28313**			
Client ID: **ZZZZZ**	Batch ID: **12417**	TestNo: **SW8082**	**(SW3545A)**		Analysis Date: **1/22/2009**			SeqNo: **297965**			

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016/1242	72.00	50.0	100	0	72.0	30	150				
Aroclor 1221	ND	50.0									
Aroclor 1232	ND	50.0									
Aroclor 1248	ND	50.0									
Aroclor 1254	ND	50.0									
Aroclor 1260	75.00	50.0	100	0	75.0	30	150				
Aroclor 1262	ND	50.0									
Aroclor 1268	ND	50.0									
Surr: Decachlorobiphenyl Sig 1	82.00	0	100	0	82.0	30	150				
Surr: Decachlorobiphenyl Sig 2	58.00	0	100	0	58.0	30	150				
Surr: Tetrachloro-m-Xylene Sig 1	70.00	0	100	0	70.0	30	150				
Surr: Tetrachloro-m-Xylene Sig 2	74.00	0	100	0	74.0	30	150				

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT:	ESS - Group
Work Order:	0901214
Project:	Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8082_s_ase

Sample ID: **LCSD-12417** SampType: **LCSD** TestCode: **8082_s_ase** Units: **µg/Kg** Prep Date: **1/22/2009** RunNo: **28313**

Client ID: **ZZZZZ** Batch ID: **12417** TestNo: **SW8082** **(SW3545A)** Analysis Date: **1/22/2009** SeqNo: **297970**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016/1242	61.00	50.0	100	0	61.0	30	150	72	16.5	30	
Aroclor 1221	ND	50.0						0	0	0	
Aroclor 1232	ND	50.0						0	0	0	
Aroclor 1248	ND	50.0						0	0	0	
Aroclor 1254	ND	50.0						0	0	0	
Aroclor 1260	67.00	50.0	100	0	67.0	30	150	75	11.3	30	
Aroclor 1262	ND	50.0						0	0	0	
Aroclor 1268	ND	50.0						0	0	0	
Surr: Decachlorobiphenyl Sig 1	74.00	0	100	0	74.0	30	150	0	0	0	
Surr: Decachlorobiphenyl Sig 2	64.00	0	100	0	64.0	30	150	0	0	0	
Surr: Tetrachloro-m-Xylene Sig 1	62.00	0	100	0	62.0	30	150	0	0	0	
Surr: Tetrachloro-m-Xylene Sig 2	72.00	0	100	0	72.0	30	150	0	0	0	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **SB** SampType: **MBLK** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297974**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1,2-Tetrachloroethane	ND	50.0									
1,1,1-Trichloroethane	ND	50.0									
1,1,2,2-Tetrachloroethane	ND	50.0									
1,1,2-Trichloroethane	ND	50.0									
1,1-Dichloroethane	ND	125									
1,1-Dichloroethene	ND	50.0									
1,1-Dichloropropene	ND	50.0									
1,2,3-Trichlorobenzene	ND	50.0									
1,2,3-Trichloropropane	ND	125									
1,2,4-Trichlorobenzene	ND	50.0									
1,2,4-Trimethylbenzene	ND	50.0									
1,2-Dibromo-3-Chloropropane	ND	50.0									
1,2-Dibromoethane	ND	50.0									
1,2-Dichlorobenzene	ND	50.0									
1,2-Dichloroethane	ND	50.0									
1,2-Dichloropropane	ND	50.0									
1,3,5-Trimethylbenzene	ND	50.0									
1,3-Dichlorobenzene	ND	50.0									
1,3-Dichloropropane	ND	50.0									
1,4-Dichlorobenzene	ND	50.0									
2,2-Dichloropropane	ND	125									
2-Butanone	ND	50.0									
2-Chloroethyl Vinyl Ether	ND	50.0									
2-Chlorotoluene	ND	125									
2-Hexanone	ND	125									
4-Chlorotoluene	ND	125									
4-Isopropyltoluene	ND	50.0									
4-Methyl-2-Pentanone	ND	50.0									
Acetone	ND	500									
Acrylonitrile	ND	50.0									
Benzene	ND	50.0									

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **SB**	SampType: **MBLK**	TestCode: **8260B_S**	Units: **µg/Kg**	Prep Date:	RunNo: **28314**
Client ID: **ZZZZZ**	Batch ID: **R28314**	TestNo: **SW8260B**		Analysis Date: **1/22/2009**	SeqNo: **297974**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromobenzene	ND	50.0									
Bromochloromethane	ND	125									
Bromodichloromethane	ND	50.0									
Bromoform	ND	50.0									
Bromomethane	ND	50.0									
Carbon Disulfide	ND	50.0									
Carbon Tetrachloride	ND	50.0									
Chlorobenzene	ND	50.0									
Chloroethane	ND	50.0									
Chloroform	ND	50.0									
Chloromethane	ND	50.0									
cis-1,2-Dichloroethene	ND	50.0									
cis-1,3-Dichloropropene	ND	50.0									
Dibromochloromethane	ND	50.0									
Dibromomethane	ND	50.0									
Dichlorodifluoromethane	ND	50.0									
Ethylbenzene	ND	50.0									
Hexachlorobutadiene	ND	50.0									
Isopropylbenzene	ND	50.0									
Methyl Tert-Butyl Ether	ND	50.0									
Methylene Chloride	ND	50.0									
Naphthalene	ND	125									
n-Butylbenzene	ND	50.0									
n-Propylbenzene	ND	50.0									
sec-Butylbenzene	ND	50.0									
Styrene	ND	125									
tert-Butylbenzene	ND	50.0									
Tetrachloroethene	ND	50.0									
Toluene	ND	50.0									
trans-1,2-Dichloroethene	ND	50.0									
trans-1,3-Dichloropropene	ND	50.0									

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **SB** SampType: **MBLK** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297974**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Trichloroethene	ND	50.0									
Trichlorofluoromethane	ND	125									
Vinyl Chloride	ND	50.0									
Xylenes, Total	ND	125									
Surr: 1,2-Dichloroethane-d4	746.0	0	750	0	99.5	70	130				
Surr: 4-Bromofluorobenzene	750.5	0	750	0	100	70	130				
Surr: Dibromofluoromethane	708.0	0	750	0	94.4	70	130				
Surr: Toluene-d8	736.8	0	750	0	98.2	70	130				

Sample ID: **LCS** SampType: **LCS** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297972**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1,2-Tetrachloroethane	1276	50.0	1250	0	102	70	130				
1,1,1-Trichloroethane	1190	50.0	1250	0	95.2	70	130				
1,1,2,2-Tetrachloroethane	1248	50.0	1250	0	99.8	70	130				
1,1,2-Trichloroethane	1257	50.0	1250	0	101	70	130				
1,1-Dichloroethane	1287	125	1250	0	103	70	130				
1,1-Dichloroethene	1238	50.0	1250	0	99.0	70	130				
1,1-Dichloropropene	1271	50.0	1250	0	102	70	130				
1,2,3-Trichlorobenzene	1144	50.0	1250	0	91.5	70	130				
1,2,3-Trichloropropane	1227	125	1250	0	98.1	70	130				
1,2,4-Trichlorobenzene	1179	50.0	1250	0	94.3	70	130				
1,2,4-Trimethylbenzene	1430	50.0	1250	0	114	70	130				
1,2-Dibromo-3-Chloropropane	1189	50.0	1250	0	95.1	70	130				
1,2-Dibromoethane	1236	50.0	1250	0	98.9	70	130				
1,2-Dichlorobenzene	1238	50.0	1250	0	99.0	70	130				
1,2-Dichloroethane	1279	50.0	1250	0	102	70	130				
1,2-Dichloropropane	1257	50.0	1250	0	101	70	130				
1,3,5-Trimethylbenzene	1343	50.0	1250	0	107	70	130				

Qualifiers:

BRL Below Reporting Limit
J Analyte detected below quantitation limits
S Spike Recovery outside recovery limits
E Value above quantitation range
ND Not Detected at the Reporting Limit
H Holding times for preparation or analysis exceeded
R RPD outside recovery limits

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **LCS** SampType: **LCS** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297972**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,3-Dichlorobenzene	1270	50.0	1250	0	102	70	130				
1,3-Dichloropropane	1262	50.0	1250	0	101	70	130				
1,4-Dichlorobenzene	1285	50.0	1250	0	103	70	130				
2,2-Dichloropropane	1095	125	1250	0	87.6	70	130				
2-Butanone	1288	50.0	1250	0	103	70	130				
2-Chloroethyl Vinyl Ether	1208	50.0	1250	0	96.6	70	130				
2-Chlorotoluene	1339	125	1250	0	107	70	130				
2-Hexanone	1337	125	1250	0	107	70	130				
4-Chlorotoluene	1319	125	1250	0	106	70	130				
4-Isopropyltoluene	1324	50.0	1250	0	106	70	130				
4-Methyl-2-Pentanone	1256	50.0	1250	0	100	70	130				
Acetone	1316	500	1250	0	105	70	130				
Acrylonitrile	2604	50.0	2500	0	104	70	130				
Benzene	1268	50.0	1250	0	101	70	130				
Bromobenzene	1288	50.0	1250	0	103	70	130				
Bromochloromethane	1274	125	1250	0	102	70	130				
Bromodichloromethane	1268	50.0	1250	0	101	70	130				
Bromoform	1308	50.0	1250	0	105	70	130				
Bromomethane	1369	50.0	1250	0	110	70	130				
Carbon Disulfide	1222	50.0	1250	0	97.8	70	130				
Carbon Tetrachloride	1012	50.0	1250	0	81.0	70	130				
Chlorobenzene	1269	50.0	1250	0	102	70	130				
Chloroethane	1464	50.0	1250	0	117	70	130				
Chloroform	1284	50.0	1250	0	103	70	130				
Chloromethane	1377	50.0	1250	0	110	70	130				
cis-1,2-Dichloroethene	1287	50.0	1250	0	103	70	130				
cis-1,3-Dichloropropene	1249	50.0	1250	0	99.9	70	130				
Dibromochloromethane	1259	50.0	1250	0	101	70	130				
Dibromomethane	1272	50.0	1250	0	102	70	130				
Dichlorodifluoromethane	1172	50.0	1250	0	93.8	70	130				
Ethylbenzene	1369	50.0	1250	0	110	70	130				

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **LCS** SampType: **LCS** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297972**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Hexachlorobutadiene	1271	50.0	1250	0	102	70	130				
Isopropylbenzene	1340	50.0	1250	0	107	70	130				
Methyl Tert-Butyl Ether	1283	50.0	1250	0	103	70	130				
Methylene Chloride	1298	50.0	1250	0	104	70	130				
Naphthalene	1131	125	1250	0	90.5	70	130				
n-Butylbenzene	1315	50.0	1250	0	105	70	130				
n-Propylbenzene	1252	50.0	1250	0	100	70	130				
sec-Butylbenzene	1348	50.0	1250	0	108	70	130				
Styrene	1313	125	1250	0	105	70	130				
tert-Butylbenzene	1325	50.0	1250	0	106	70	130				
Tetrachloroethene	1262	50.0	1250	0	101	70	130				
Toluene	1307	50.0	1250	0	105	70	130				
trans-1,2-Dichloroethene	1307	50.0	1250	0	105	70	130				
trans-1,3-Dichloropropene	1191	50.0	1250	0	95.3	70	130				
Trichloroethene	1264	50.0	1250	0	101	70	130				
Trichlorofluoromethane	1333	125	1250	0	107	70	130				
Vinyl Chloride	1306	50.0	1250	0	105	70	130				
Xylenes, Total	4304	125	3750	0	115	70	130				
Surr: 1,2-Dichloroethane-d4	739.2	0	750	0	98.6	70	130				
Surr: 4-Bromofluorobenzene	741.5	0	750	0	98.9	70	130				
Surr: Dibromofluoromethane	783.2	0	750	0	104	70	130				
Surr: Toluene-d8	756.0	0	750	0	101	70	130				

Sample ID: **LCSD** SampType: **LCSD** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297973**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1,2-Tetrachloroethane	1280	50.0	1250	0	102	70	130	1276	0.352	25	
1,1,1-Trichloroethane	1262	50.0	1250	0	101	70	130	1190	5.91	25	
1,1,2,2-Tetrachloroethane	1265	50.0	1250	0	101	70	130	1248	1.33	25	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **LCSD** SampType: **LCSD** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297973**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,2-Trichloroethane	1286	50.0	1250	0	103	70	130	1257	2.36	25	
1,1-Dichloroethane	1194	125	1250	0	95.6	70	130	1287	7.47	25	
1,1-Dichloroethene	1223	50.0	1250	0	97.9	70	130	1238	1.20	25	
1,1-Dichloropropene	1242	50.0	1250	0	99.4	70	130	1271	2.27	25	
1,2,3-Trichlorobenzene	1286	50.0	1250	0	103	70	130	1144	11.7	25	
1,2,3-Trichloropropane	1241	125	1250	0	99.3	70	130	1227	1.13	25	
1,2,4-Trichlorobenzene	1265	50.0	1250	0	101	70	130	1179	7.08	25	
1,2,4-Trimethylbenzene	1474	50.0	1250	0	118	70	130	1430	2.96	25	
1,2-Dibromo-3-Chloropropane	1234	50.0	1250	0	98.7	70	130	1189	3.73	25	
1,2-Dibromoethane	1288	50.0	1250	0	103	70	130	1236	4.16	25	
1,2-Dichlorobenzene	1286	50.0	1250	0	103	70	130	1238	3.88	25	
1,2-Dichloroethane	1249	50.0	1250	0	99.9	70	130	1279	2.37	25	
1,2-Dichloropropane	1257	50.0	1250	0	101	70	130	1257	0	25	
1,3,5-Trimethylbenzene	1389	50.0	1250	0	111	70	130	1343	3.40	25	
1,3-Dichlorobenzene	1310	50.0	1250	0	105	70	130	1270	3.12	25	
1,3-Dichloropropane	1290	50.0	1250	0	103	70	130	1262	2.17	25	
1,4-Dichlorobenzene	1327	50.0	1250	0	106	70	130	1285	3.25	25	
2,2-Dichloropropane	1351	125	1250	0	108	70	130	1095	20.9	25	
2-Butanone	1293	50.0	1250	0	103	70	130	1288	0.407	25	
2-Chloroethyl Vinyl Ether	1216	50.0	1250	0	97.3	70	130	1208	0.722	25	
2-Chlorotoluene	1368	125	1250	0	109	70	130	1339	2.14	25	
2-Hexanone	1346	125	1250	0	108	70	130	1337	0.671	25	
4-Chlorotoluene	1371	125	1250	0	110	70	130	1319	3.89	25	
4-Isopropyltoluene	1369	50.0	1250	0	110	70	130	1324	3.40	25	
4-Methyl-2-Pentanone	1246	50.0	1250	0	99.7	70	130	1256	0.779	25	
Acetone	1228	500	1250	0	98.2	70	130	1316	6.88	25	
Acrylonitrile	2410	50.0	2500	0	96.4	70	130	2604	7.74	25	
Benzene	1285	50.0	1250	0	103	70	130	1268	1.27	25	
Bromobenzene	1326	50.0	1250	0	106	70	130	1288	2.91	25	
Bromochloromethane	1262	125	1250	0	101	70	130	1274	0.966	25	
Bromodichloromethane	1282	50.0	1250	0	103	70	130	1268	1.06	25	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **LCSD** SampType: **LCSD** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297973**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromoform	1336	50.0	1250	0	107	70	130	1308	2.10	25	
Bromomethane	1464	50.0	1250	0	117	70	130	1369	6.74	25	
Carbon Disulfide	1228	50.0	1250	0	98.2	70	130	1222	0.469	25	
Carbon Tetrachloride	1111	50.0	1250	0	88.9	70	130	1012	9.30	25	
Chlorobenzene	1315	50.0	1250	0	105	70	130	1269	3.58	25	
Chloroethane	1409	50.0	1250	0	113	70	130	1464	3.86	25	
Chloroform	1278	50.0	1250	0	102	70	130	1284	0.527	25	
Chloromethane	1336	50.0	1250	0	107	70	130	1377	3.02	25	
cis-1,2-Dichloroethene	1275	50.0	1250	0	102	70	130	1287	0.956	25	
cis-1,3-Dichloropropene	1277	50.0	1250	0	102	70	130	1249	2.22	25	
Dibromochloromethane	1268	50.0	1250	0	101	70	130	1259	0.732	25	
Dibromomethane	1282	50.0	1250	0	103	70	130	1272	0.705	25	
Dichlorodifluoromethane	1162	50.0	1250	0	92.9	70	130	1172	0.878	25	
Ethylbenzene	1406	50.0	1250	0	112	70	130	1369	2.63	25	
Hexachlorobutadiene	1332	50.0	1250	0	107	70	130	1271	4.67	25	
Isopropylbenzene	1385	50.0	1250	0	111	70	130	1340	3.32	25	
Methyl Tert-Butyl Ether	1235	50.0	1250	0	98.8	70	130	1283	3.81	25	
Methylene Chloride	1242	50.0	1250	0	99.4	70	130	1298	4.43	25	
Naphthalene	1262	125	1250	0	101	70	130	1131	10.9	25	
n-Butylbenzene	1364	50.0	1250	0	109	70	130	1315	3.70	25	
n-Propylbenzene	1290	50.0	1250	0	103	70	130	1252	2.95	25	
sec-Butylbenzene	1391	50.0	1250	0	111	70	130	1348	3.14	25	
Styrene	1342	125	1250	0	107	70	130	1313	2.20	25	
tert-Butylbenzene	1371	50.0	1250	0	110	70	130	1325	3.45	25	
Tetrachloroethene	1323	50.0	1250	0	106	70	130	1262	4.68	25	
Toluene	1356	50.0	1250	0	108	70	130	1307	3.66	25	
trans-1,2-Dichloroethene	1234	50.0	1250	0	98.8	70	130	1307	5.71	25	
trans-1,3-Dichloropropene	1306	50.0	1250	0	104	70	130	1191	9.15	25	
Trichloroethene	1283	50.0	1250	0	103	70	130	1264	1.43	25	
Trichlorofluoromethane	1383	125	1250	0	111	70	130	1333	3.65	25	
Vinyl Chloride	1285	50.0	1250	0	103	70	130	1306	1.68	25	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **LCSD** SampType: **LCSD** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297973**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Xylenes, Total	4364	125	3750	0	116	70	130	4304	1.40	25	
Surr: 1,2-Dichloroethane-d4	724.5	0	750	0	96.6	70	130	0	0	25	
Surr: 4-Bromofluorobenzene	745.0	0	750	0	99.3	70	130	0	0	25	
Surr: Dibromofluoromethane	732.0	0	750	0	97.6	70	130	0	0	25	
Surr: Toluene-d8	756.5	0	750	0	101	70	130	0	0	25	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_PAHASE

Sample ID: **MB-12414** SampType: **MBLK** TestCode: **8270_S_PAH** Units: **µg/Kg** Prep Date: **1/22/2009** RunNo: **28307**
Client ID: **ZZZZZ** Batch ID: **12414** TestNo: **SW8270C** **(SW3545A)** Analysis Date: **1/22/2009** SeqNo: **299285**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
2-Methylnaphthalene	ND	100									
Acenaphthene	ND	100									
Acenaphthylene	ND	100									
Anthracene	ND	100									
Benz(a)Anthracene	ND	10.0									
Benzo(a)Pyrene	ND	10.0									
Benzo(b)Fluoranthene	ND	100									
Benzo(g,h,i)Perylene	ND	100									
Benzo(k)Fluoranthene	ND	100									
Chrysene	ND	100									
Dibenz(a,h)Anthracene	ND	10.0									
Fluoranthene	ND	100									
Fluorene	ND	100									
Indeno(1,2,3-cd)Pyrene	ND	10.0									
Naphthalene	ND	100									
Phenanthrene	ND	100									
Pyrene	ND	100									
Surr: 2-Fluorobiphenyl	3696	0	5000	0	73.9	30	130				
Surr: Nitrobenzene-d5	2883	0	5000	0	57.7	30	130				
Surr: Terphenyl-d14	3740	0	5000	0	74.8	30	130				

Sample ID: **LCS-12414** SampType: **LCS** TestCode: **8270_S_PAH** Units: **µg/Kg** Prep Date: **1/22/2009** RunNo: **28307**
Client ID: **ZZZZZ** Batch ID: **12414** TestNo: **SW8270C** **(SW3545A)** Analysis Date: **1/22/2009** SeqNo: **299286**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
2-Methylnaphthalene	2202	100	2500	0	88.1	40	140				
Acenaphthene	2000	100	2500	0	80.0	40	140				
Acenaphthylene	2212	100	2500	0	88.5	40	140				
Anthracene	2407	100	2500	0	96.3	40	140				
Benz(a)Anthracene	1258	10.0	2500	0	50.3	40	140				

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_PAHASE

Sample ID: **LCS-12414** SampType: **LCS** TestCode: **8270_S_PAH** Units: **µg/Kg** Prep Date: **1/22/2009** RunNo: **28307**
Client ID: **ZZZZZ** Batch ID: **12414** TestNo: **SW8270C** **(SW3545A)** Analysis Date: **1/22/2009** SeqNo: **299286**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzo(a)Pyrene	2148	10.0	2500	0	85.9	40	140				
Benzo(b)Fluoranthene	2207	100	2500	0	88.3	40	140				
Benzo(g,h,i)Perylene	1918	100	2500	0	76.7	40	140				
Benzo(k)Fluoranthene	2272	100	2500	0	90.9	40	140				
Chrysene	1277	100	2500	0	51.1	40	140				
Dibenz(a,h)Anthracene	1981	10.0	2500	0	79.2	40	140				
Fluoranthene	2339	100	2500	0	93.6	40	140				
Fluorene	2166	100	2500	0	86.6	40	140				
Indeno(1,2,3-cd)Pyrene	2026	10.0	2500	0	81.0	40	140				
Naphthalene	2211	100	2500	0	88.4	40	140				
Phenanthrene	1840	100	2500	0	73.6	40	140				
Pyrene	1592	100	2500	0	63.7	40	140				
Surr: 2-Fluorobiphenyl	3632	0	5000	0	72.6	30	130				
Surr: Nitrobenzene-d5	3072	0	5000	0	61.4	30	130				
Surr: Terphenyl-d14	3422	0	5000	0	68.4	30	130				

Sample ID: **LCSD-12414** SampType: **LCSD** TestCode: **8270_S_PAH** Units: **µg/Kg** Prep Date: **1/22/2009** RunNo: **28307**
Client ID: **ZZZZZ** Batch ID: **12414** TestNo: **SW8270C** **(SW3545A)** Analysis Date: **1/22/2009** SeqNo: **299287**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
2-Methylnaphthalene	2329	100	2500	0	93.2	40	140	2202	5.61	30	
Acenaphthene	2182	100	2500	0	87.3	40	140	2000	8.66	30	
Acenaphthylene	2413	100	2500	0	96.5	40	140	2212	8.69	30	
Anthracene	2567	100	2500	0	103	40	140	2407	6.43	30	
Benz(a)Anthracene	1350	10.0	2500	0	54.0	40	140	1258	7.06	30	
Benzo(a)Pyrene	2178	10.0	2500	0	87.1	40	140	2148	1.36	30	
Benzo(b)Fluoranthene	2176	100	2500	0	87.0	40	140	2207	1.44	30	
Benzo(g,h,i)Perylene	1984	100	2500	0	79.3	40	140	1918	3.36	30	
Benzo(k)Fluoranthene	2312	100	2500	0	92.5	40	140	2272	1.77	30	
Chrysene	2198	100	2500	0	87.9	40	140	1277	53.0	30	R

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_PAHASE

Sample ID: **LCSD-12414** SampType: **LCSD** TestCode: **8270_S_PAH** Units: **µg/Kg** Prep Date: **1/22/2009** RunNo: **28307**
Client ID: **ZZZZZ** Batch ID: **12414** TestNo: **SW8270C** **(SW3545A)** Analysis Date: **1/22/2009** SeqNo: **299287**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dibenz(a,h)Anthracene	2009	10.0	2500	0	80.4	40	140	1981	1.40	30	
Fluoranthene	2424	100	2500	0	97.0	40	140	2339	3.59	30	
Fluorene	2292	100	2500	0	91.7	40	140	2166	5.65	30	
Indeno(1,2,3-cd)Pyrene	2082	10.0	2500	0	83.3	40	140	2026	2.78	30	
Naphthalene	2386	100	2500	0	95.5	40	140	2211	7.63	30	
Phenanthrene	1814	100	2500	0	72.5	40	140	1840	1.42	30	
Pyrene	1749	100	2500	0	70.0	40	140	1592	9.37	30	
Surr: 2-Fluorobiphenyl	3975	0	5000	0	79.5	30	130	0	0	0	
Surr: Nitrobenzene-d5	3413	0	5000	0	68.3	30	130	0	0	0	
Surr: Terphenyl-d14	3694	0	5000	0	73.9	30	130	0	0	0	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: EPHP_S

Sample ID: **MBLK-12412** SampType: **MBLK** TestCode: **EPHP_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28297**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH_ (eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **297821**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	ND	0.100									
2-Methylnaphthalene	ND	0.100									
Acenaphthene	ND	0.100									
Phenanthrene	ND	0.100									
Acenaphthylene	ND	0.100									
Fluorene	ND	0.100									
Anthracene	ND	0.100									
Fluoranthene	ND	0.100									
Pyrene	ND	0.100									
Benzo(a)Anthracene	ND	0.100									
Chrysene	ND	0.100									
Benzo(b)Fluoranthene	ND	0.100									
Benzo(k)Fluoranthene	ND	0.100									
Benzo(a)Pyrene	ND	0.100									
Indeno(1,2,3-cd)Pyrene	ND	0.100									
Dibenz(a,h)Anthracene	ND	0.100									
Benzo(g,h,i)Perylene	ND	0.100									
Total PAH Target Concentration	ND	0									
Surr: 2,2'-Difluorobiphenyl	2.003	0	2.5	0	80.1	40	140				
Surr: 2-Fluorobiphenyl	1.867	0	2.5	0	74.7	40	140				

Sample ID: **LCS1-12412** SampType: **LCS** TestCode: **EPHP_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28297**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH_ (eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **297822**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	3.209	0.100	5	0	64.2	40	140				
2-Methylnaphthalene	3.331	0.100	5	0	66.6	40	140				
Acenaphthene	2.360	0.100	5	0	47.2	40	140				
Phenanthrene	3.437	0.100	5	0	68.7	40	140				
Acenaphthylene	2.364	0.100	5	0	47.3	40	140				

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: EPHP_S

Sample ID: **LCS1-12412** SampType: **LCS** TestCode: **EPHP_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28297**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH_ (eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **297822**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluorene	2.637	0.100	5	0	52.7	40	140				
Anthracene	3.560	0.100	5	0	71.2	40	140				
Fluoranthene	3.485	0.100	5	0	69.7	40	140				
Pyrene	4.005	0.100	5	0	80.1	40	140				
Benzo(a)Anthracene	4.082	0.100	5	0	81.6	40	140				
Chrysene	4.437	0.100	5	0	88.7	40	140				
Benzo(b)Fluoranthene	4.379	0.100	5	0	87.6	40	140				
Benzo(k)Fluoranthene	2.748	0.100	5	0	55.0	40	140				
Benzo(a)Pyrene	3.270	0.100	5	0	65.4	40	140				
Indeno(1,2,3-cd)Pyrene	2.931	0.100	5	0	58.6	40	140				
Dibenz(a,h)Anthracene	2.715	0.100	5	0	54.3	40	140				
Benzo(g,h,i)Perylene	3.064	0.100	5	0	61.3	40	140				
Total PAH Target Concentration	56.01	0									
Surr: 2,2'-Difluorobiphenyl	2.380	0	2.5	0	95.2	40	140				
Surr: 2-Fluorobiphenyl	1.651	0	2.5	0	66.0	40	140				

Sample ID: **LCSD-12412** SampType: **LCSD** TestCode: **EPHP_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28297**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH_ (eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **297823**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	2.952	0.100	5	0	59.0	40	140	3.209	8.34	50	
2-Methylnaphthalene	3.676	0.100	5	0	73.5	40	140	3.331	9.85	50	
Acenaphthene	2.375	0.100	5	0	47.5	40	140	2.36	0.634	50	
Phenanthrene	3.239	0.100	5	0	64.8	40	140	3.437	5.93	50	
Acenaphthylene	2.372	0.100	5	0	47.4	40	140	2.364	0.338	50	
Fluorene	2.371	0.100	5	0	47.4	40	140	2.637	10.6	50	
Anthracene	3.120	0.100	5	0	62.4	40	140	3.56	13.2	50	
Fluoranthene	3.505	0.100	5	0	70.1	40	140	3.485	0.572	50	
Pyrene	3.743	0.100	5	0	74.9	40	140	4.005	6.76	50	
Benzo(a)Anthracene	3.509	0.100	5	0	70.2	40	140	4.082	15.1	50	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: EPHP_S

Sample ID: **LCSD-12412** SampType: **LCSD** TestCode: **EPHP_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28297**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH_ (eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **297823**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chrysene	3.858	0.100	5	0	77.2	40	140	4.437	14.0	50	
Benzo(b)Fluoranthene	3.777	0.100	5	0	75.5	40	140	4.379	14.8	50	
Benzo(k)Fluoranthene	3.295	0.100	5	0	65.9	40	140	2.748	18.1	50	
Benzo(a)Pyrene	3.015	0.100	5	0	60.3	40	140	3.27	8.11	50	
Indeno(1,2,3-cd)Pyrene	2.691	0.100	5	0	53.8	40	140	2.931	8.54	50	
Dibenz(a,h)Anthracene	2.676	0.100	5	0	53.5	40	140	2.715	1.45	50	
Benzo(g,h,i)Perylene	3.069	0.100	5	0	61.4	40	140	3.064	0.163	50	
Total PAH Target Concentration	53.24	0						56.01	5.07	0	
Surr: 2,2'-Difluorobiphenyl	2.584	0	2.5	0	103	40	140	0	0	0	
Surr: 2-Fluorobiphenyl	1.603	0	2.5	0	64.1	40	140	0	0	0	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: **epht_s**

Sample ID: **MBLK-12412** SampType: **MBLK** TestCode: **epht_s** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28319**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH** **(eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **298039**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Adjusted C11-C22 Aromatics	ND	10.0									
C09-C18 Aliphatics	ND	10.0									
C19-C36 Aliphatics	ND	10.0									
Unadjusted C11-C22 Aromatics	ND	10.0									
Surr: 1-Chlorooctadecane	5.400	0	10	0	54.0	40	140				
Surr: o-Terphenyl	7.700	0	10	0	77.0	40	140				

Sample ID: **LCS-12412** SampType: **LCS** TestCode: **epht_s** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28319**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH** **(eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **298023**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
C09-C18 Aliphatics	ND	10.0	10	0	57.0	40	140				
C19-C36 Aliphatics	ND	10.0	10	0	81.0	40	140				
Unadjusted C11-C22 Aromatics	ND	10.0	10	0	57.0	40	140				
Surr: 1-Chlorooctadecane	6.900	0	10	0	69.0	40	140				
Surr: o-Terphenyl	7.500	0	10	0	75.0	40	140				

Sample ID: **LCSD-12412** SampType: **LCSD** TestCode: **epht_s** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28319**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH** **(eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **298038**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
C09-C18 Aliphatics	ND	10.0	10	0	62.0	40	140	5.7	0	50	
C19-C36 Aliphatics	ND	10.0	10	0	82.0	40	140	8.1	0	50	
Unadjusted C11-C22 Aromatics	ND	10.0	10	0	74.0	40	140	5.7	0	50	
Surr: 1-Chlorooctadecane	5.700	0	10	0	57.0	40	140	0	0		
Surr: o-Terphenyl	8.600	0	10	0	86.0	40	140	0	0	0	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: hg_7471a_s

Sample ID: **MBLK-12426** SampType: **MBLK** TestCode: **hg_7471a_s** Units: **mg/Kg** Prep Date: **1/23/2009** RunNo: **28315**
Client ID: **ZZZZZ** Batch ID: **12426** TestNo: **SW 7471A** **(SW7471A)** Analysis Date: **1/22/2009** SeqNo: **298000**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.100									

Sample ID: **LCS-12426** SampType: **LCS** TestCode: **hg_7471a_s** Units: **mg/Kg** Prep Date: **1/23/2009** RunNo: **28315**
Client ID: **ZZZZZ** Batch ID: **12426** TestNo: **SW 7471A** **(SW7471A)** Analysis Date: **1/22/2009** SeqNo: **297984**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	2.645	0.100	2.5	0	106	80	120				

Sample ID: **LCSD-12426** SampType: **LCSD** TestCode: **hg_7471a_s** Units: **mg/Kg** Prep Date: **1/23/2009** RunNo: **28315**
Client ID: **ZZZZZ** Batch ID: **12426** TestNo: **SW 7471A** **(SW7471A)** Analysis Date: **1/22/2009** SeqNo: **297999**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	2.650	0.100	2.5	0	106	80	120	2.645	0.189	30	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

Page 1 of 1

CHAIN OF CUSTODY RECORD

GeoLabs, Inc. *Environmental Laboratories*
45 Johnson Lane, Braintree, MA 02184
p 781.848.7844 • f 781.848.7811
www.geolabs.com

Sample Handling: circle choice
Filtration: Done / Not Needed / Lab to do
Preservation: Lab to do Y / N

Special Instructions
*As, Cd, Cr, Cu, Hg, Pb, Ni, Zn

Turnaround: circle one
1-day 3-day 2-day [✓ 5 / 7-days]

Data Delivery: circle choice (s)
Fax [✓ email]
Format:
Excel PDF

Requirements: circle choice (s) 0901214
GW-1 MCP Methods CT RCP (Reasonable Confidence Protocols)
S-1 ~~DEP~~ State / Fed Program - Criteria ____
QC Other ____

Client: ESS GROUP, INC
Address: 401 WAMPANOAG TRAIL, SUITE 400
EAST PROVIDENCE, RI 02915
Contact: ~~MAT~~ LADEWIG

Phone: 401-330-1204
Fax: 401-434-8158
email: mladewig@essgroup.com

Project: HOPEDALE
Project PO: H153-000
Invoice to *: CARL NIELSEN

DATE	TIME	SAMPLED BY	SAMPLE LOCATION / ID	CONTAINER TYPE	CONTAINER QUANTITY	MATRIX	COMP	GRAB	GeoLabs SAMPLE NUMBER	METALS*	VOCs	PAHs	EPH	PCBs	TOC	% WATER	% ASH	ASTM GRAIN SIZE	ATTERBERG LIMITS	TOTAL N	TOTAL P	LAB pH
Preservative:											6											
1/19/09	~~1130~~ 1200 MDL	SL/MZ	SC1	A	2	S	X		1214-001	X		X	X	X	X	X	X	X	X			
	1515		SC2	A	3		X		002	X		X	X	X	X	X	X	X	X			
	1130		SC1~~A~~B MDL	V	1			X	003		X											
	1516		SC2~~A~~C MDL	~~A~~ V	1			X	004		X											
	1200		N1	G	2		X		005											X	X	
	1545		N2	G	~~2~~ 1 MDL		X		006											X	X	
	1515		N3	G	2		X		007											X	X	

TEMPERATURE
Temp 4°C

Matrix Codes:
GW = Ground Water DW = Drinking Water S = Soil A = Air
WW = Waste Water SL = Sludge O = Oil OT = Other

Received on Ice ☑

Preservatives
1 = Hcl 3 = H2SO4 5 = NaOH 7 = Other
2 = HNO3 4 = Na2S2O3 6 = MEOH

Containers:
A = Amber B = Bag O = Other
G = Glass P = Plastic
S = Summa V = Voa

Relinquished by:	Date / Time	Received by:	Date / Time
	1/20/09 11:00	M. C	1/20/09 11:00
MC	1/20/09 1:50	KC	1/20/09 3:00

270675.J&P.C of OR.07/09/07

Terms: Payment due within 30 days unless other arrangements are made. Past due balances subject to interest and collection cost.
Note: Homeowners and Law Firms must pay when dropping off samples. We accept cash, check and credit cards.

CT (PH-0148) NY(11796) MA (MA - 015) PA (68-03417) NH (2508) NJ (MA-009) RI (LA000252)

Friday, January 30, 2009

GeoLabs, Inc.
45 Johnson Lane
Braintree MA 02184
Tele: 781 848 7844
Fax: 781 848 7811

Matt Ladewig
ESS - Group
401 Wampanoag Trail Suite #400
E. Providence, RI 02915

TEL: 401-330-1200
FAX:

Project: Hopedale
Location: H153-000

Order No.: 0901214

Dear Matt Ladewig:

GeoLabs, Inc. received 7 sample(s) on 1/20/2009 for the analyses presented in the following report.

There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications except where noted in the Case Narrative.

Analytical methods and results meet requirements of 310CMR 40.1056(J) as per MADEP Compendium of Analytical Methods (CAM).

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Jim Chen
Laboratory Director

For current certifications, please visit our website at www.geolabs.com

Certifications:

CT (PH-0148) - MA (M-MA015) - NH (2508) - NJ (MA009) - NY (11796) - RI (LA000252)

CLIENT: ESS - Group
Project: Hopedale
Lab Order: 0901214

CASE NARRATIVE

MADEP MCP Response Action Analytical Report Certification Form

Laboratory Name: GeoLabs, Inc.
Project Location: Hopedale
Project # H153-000
MADEP RTN #:

This form provides certification for the following data set: 0901214 (001-007)

Sample Matrix: Soil

MCP Methods Used: 6010B, 7471A, 8260B, 8270C, EPH, 8082

An affirmative answer to questions A, B, C and D are required for "Presumptive Certainty" status

A. Were all samples received by the laboratory in a condition consistent with that described on the Chain of custody documentation for the data set? YES

B. Were all QA/QC procedures required for the specified method(s) included in this report followed, including the requirement to note and discuss in a narrative QC data that did not meet appropriate standards or guidelines? YES

C. Does the analytical data included in this report meet all the requirements for "Presumptive Certainty" as described in Section 2.0 of the MADEP documents CAM VII A "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"? YES

D. VPH and EPH Methods only: Was the VPH or EPH Method conducted without significant modifications (see Section 11.3 of respective Methods) YES

A response to questions E and F are required for "Presumptive Certainty" status

E. Were all QC performance standards and recommendations for the specified methods achieved? NO
F. Were results for all analyte-list compounds/elements for the specified method(s) reported? NO

All NO answers need to be addressed in an attached Environmental Laboratory case narrative.

CLIENT:	ESS - Group
Project:	Hopedale
Lab Order:	0901214

CASE NARRATIVE

CASE NARRATIVE

Physical Condition of Samples

The project was received by the laboratory in satisfactory condition. The sample(s) were received undamaged, in appropriate containers with the correct preservation.

Project Documentation

The project was accompanied by satisfactory Chain of Custody documentation.

Analysis of Sample(s)

PAH compounds only analyzed by 8270C per client request.

Selected metals analyzed by 6010B per client request.

The following analytical anomalies or non-conformances were noted by the laboratory during the processing of these samples:

8270 RPD for Chrysene is outside the limit.

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature:

Position: Lab Director

Printed Name: Jim Chen

Date: January 30, 2009

CLIENT: ESS - Group
Project: Hopedale
Lab Order: 0901214

CASE NARRATIVE

EPH Methods

Method for Ranges: MADEP EPH 04-1.1
Method for Target Analytes: 8270 GC/MS

Carbon Range data exclude concentrations of any surrogate(s) and/or internal standards eluting in that range
C11-C22 Aromatic Hydrocarbons exclude concentrations of Target PAH Analytes

CERTIFICATION:
Were all QA/QC procedures REQUIRED by the EPH Method followed? YES
Were all performance/acceptance standards achieved? YES
Were any significant modifications made to the EPH method? NO

I attest under the pains and penalties of perjury that, based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

SIGNATURE: LAB DIRECTOR

PRINTED NAME: Jim Chen

DATE: January 30, 2009

GeoLabs, Inc.

Reported Date: 30-Jan-09

CLIENT:	ESS - Group	**Client Sample ID:**	SC 1
Lab Order:	0901214	**Collection Date:**	1/19/2009 12:00:00 PM
Project:	Hopedale	**Date Received:**	1/20/2009
Lab ID:	0901214-001	**Matrix:**	SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
ASH - ASTM D-482-87						Analyst: **FC**
Ash	*81.4*	1.00		%	1	1/22/2009
PERCENT MOISTURE - 209A						Analyst: **FC**
Percent Moisture	*10*	1.0		wt%	1	1/21/2009
EPH RANGES - MADEP EPH						Analyst: **RuP**
Adjusted C11-C22 Aromatics	*104*	11.1		mg/Kg-dry	1	1/22/2009
C09-C18 Aliphatics	ND	11.1		mg/Kg-dry	1	1/22/2009
C19-C36 Aliphatics	*136*	11.1		mg/Kg-dry	1	1/22/2009
Unadjusted C11-C22 Aromatics	*137*	11.1		mg/Kg-dry	1	1/22/2009
Surr: 1-Chlorooctadecane	86.0	40-140		%REC	1	1/22/2009
Surr: o-Terphenyl	78.0	40-140		%REC	1	1/22/2009
POLYCHLORINATED BIPHENYLS - SW8082						Analyst: **GP**
Aroclor 1016/1242	ND	55.6		µg/Kg-dry	1	1/22/2009
Aroclor 1221	ND	55.6		µg/Kg-dry	1	1/22/2009
Aroclor 1232	ND	55.6		µg/Kg-dry	1	1/22/2009
Aroclor 1248	ND	55.6		µg/Kg-dry	1	1/22/2009
Aroclor 1254	ND	55.6		µg/Kg-dry	1	1/22/2009
Aroclor 1260	ND	55.6		µg/Kg-dry	1	1/22/2009
Aroclor 1262	ND	55.6		µg/Kg-dry	1	1/22/2009
Aroclor 1268	ND	55.6		µg/Kg-dry	1	1/22/2009
Surr: Decachlorobiphenyl Sig 1	78.0	30-150		%REC	1	1/22/2009
Surr: Decachlorobiphenyl Sig 2	44.0	30-150		%REC	1	1/22/2009
Surr: Tetrachloro-m-Xylene Sig 1	76.0	30-150		%REC	1	1/22/2009
Surr: Tetrachloro-m-Xylene Sig 2	66.0	30-150		%REC	1	1/22/2009
TOTAL METALS BY ICP - SW6010B						Analyst: **ZYZ**
Arsenic	*27.4*	5.27		mg/Kg-dry	1	1/22/2009
Cadmium	ND	5.27		mg/Kg-dry	1	1/22/2009
Chromium	*9.70*	5.27		mg/Kg-dry	1	1/22/2009
Copper	*40.9*	5.27		mg/Kg-dry	1	1/22/2009
Lead	*66.2*	5.27		mg/Kg-dry	1	1/22/2009
Nickel	*6.26*	5.27		mg/Kg-dry	1	1/22/2009
Zinc	*11.0*	5.27		mg/Kg-dry	1	1/22/2009
MERCURY - SW7471A						Analyst: **EC**
Mercury	*0.128*	0.111		mg/Kg-dry	1	1/22/2009

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

GeoLabs, Inc. **Reported Date:** 30-Jan-09

CLIENT:	ESS - Group	**Client Sample ID:**	SC 1
Lab Order:	0901214	**Collection Date:**	1/19/2009 12:00:00 PM
Project:	Hopedale	**Date Received:**	1/20/2009
Lab ID:	0901214-001	**Matrix:**	SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
MERCURY - SW7471A						Analyst: **EC**
PAH - SW8270C						Analyst: **MR**
2-Methylnaphthalene	ND	1110		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Acenaphthene	ND	1110		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Acenaphthylene	ND	1110		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Anthracene	*1400*	1110		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Benz(a)Anthracene	*2170*	111		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Benzo(a)Pyrene	*3050*	111		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Benzo(b)Fluoranthene	*4220*	1110		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Benzo(g,h,i)Perylene	*2410*	1110		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Benzo(k)Fluoranthene	*2330*	1110		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Chrysene	*4110*	1110		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Dibenz(a,h)Anthracene	ND	111		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Fluoranthene	*9410*	1110		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Fluorene	ND	1110		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Indeno(1,2,3-cd)Pyrene	*2300*	111		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Naphthalene	ND	1110		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Phenanthrene	*4410*	1110		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Pyrene	*6060*	1110		µg/Kg-dry	10	1/22/2009 1:14:00 PM
Surr: 2-Fluorobiphenyl	52.1	30-130		%REC	10	1/22/2009 1:14:00 PM
Surr: Nitrobenzene-d5	32.5	30-130		%REC	10	1/22/2009 1:14:00 PM
Surr: Terphenyl-d14	65.6	30-130		%REC	10	1/22/2009 1:14:00 PM
EPH TARGET ANALYTES - MADEP EPH						Analyst: **MR**
Naphthalene	ND	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
2-Methylnaphthalene	ND	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Acenaphthene	ND	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Phenanthrene	*3.19*	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Acenaphthylene	*0.147*	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Fluorene	ND	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Anthracene	ND	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Fluoranthene	*7.90*	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Pyrene	*6.41*	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Benzo(a)Anthracene	*2.75*	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Chrysene	*3.55*	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Benzo(b)Fluoranthene	*2.14*	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Benzo(k)Fluoranthene	*2.79*	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Benzo(a)Pyrene	*2.83*	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Indeno(1,2,3-cd)Pyrene	*0.478*	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

Reported Date: 30-Jan-09

CLIENT:	ESS - Group	**Client Sample ID:**	SC 1
Lab Order:	0901214	**Collection Date:**	1/19/2009 12:00:00 PM
Project:	Hopedale	**Date Received:**	1/20/2009
Lab ID:	0901214-001	**Matrix:**	SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
EPH TARGET ANALYTES - MADEP EPH						Analyst: **MR**
Dibenz(a,h)Anthracene	ND	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Benzo(g,h,i)Perylene	*0.483*	0.111		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Total PAH Target Concentration	*32.7*	0		mg/Kg-dry	1	1/22/2009 12:44:00 PM
Surr: 2,2'-Difluorobiphenyl	101	40-140		%REC	1	1/22/2009 12:44:00 PM
Surr: 2-Fluorobiphenyl	80.6	40-140		%REC	1	1/22/2009 12:44:00 PM
TOTAL ORGANIC CARBON- SW 9060						Analyst: **RP**
Total Organic Carbon	*60300*	444		mg/Kg-dry	1	1/27/2009

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

GeoLabs, Inc.

Reported 30-Jan-09

CLIENT:	ESS - Group	**Client Sample**	SC 2
Lab Order:	0901214	**Collection**	1/19/2009 3:15:00 PM
Project:	Hopedale	**Date Received:**	1/20/2009
Lab ID:	0901214-002	**Matrix:**	SOIL

Analyses	**Result**	**Det. Limit**	**Qual**	**Units**	**DF**	**Date Analyzed**
ASH - ASTM D-482-87						Analyst: **FC**
Ash	50.8	1.00		%	1	1/22/2009
PERCENT MOISTURE - 209A						Analyst: **FC**
Percent Moisture	15.0	1.00		wt%	1	1/21/2009
EPH RANGES - MADEP EPH						Analyst: **RuP**
Adjusted C11-C22 Aromatics	85.8	10.0		mg/Kg-dry	1	1/22/2009
C09-C18 Aliphatics	ND	10.0		mg/Kg-dry	1	1/22/2009
C19-C36 Aliphatics	122	10.0		mg/Kg-dry	1	1/22/2009
Unadjusted C11-C22 Aromatics	93.9	10.0		mg/Kg-dry	1	1/22/2009
Surr: 1-Chlorooctadecane	63.0	40-140		%REC	1	1/22/2009
Surr: o-Terphenyl	70.0	40-140		%REC	1	1/22/2009
POLYCHLORINATED BIPHENYLS - SW8082						Analyst: **GP**
Aroclor 1016/1242	ND	50.0		µg/Kg-dry	1	1/22/2009
Aroclor 1221	ND	50.0		µg/Kg-dry	1	1/22/2009
Aroclor 1232	ND	50.0		µg/Kg-dry	1	1/22/2009
Aroclor 1248	ND	50.0		µg/Kg-dry	1	1/22/2009
Aroclor 1254	ND	50.0		µg/Kg-dry	1	1/22/2009
Aroclor 1260	ND	50.0		µg/Kg-dry	1	1/22/2009
Aroclor 1262	ND	50.0		µg/Kg-dry	1	1/22/2009
Aroclor 1268	ND	50.0		µg/Kg-dry	1	1/22/2009
Surr: Decachlorobiphenyl Sig 1	98.0	30-150		%REC	1	1/22/2009
Surr: Decachlorobiphenyl Sig 2	70.0	30-150		%REC	1	1/22/2009
Surr: Tetrachloro-m-Xylene Sig 1	88.0	30-150		%REC	1	1/22/2009
Surr: Tetrachloro-m-Xylene Sig 2	82.0	30-150		%REC	1	1/22/2009
TOTAL METALS BY ICP - SW6010B						Analyst: **ZYZ**
Arsenic	ND	4.90		mg/Kg-dry	1	1/22/2009
Cadmium	ND	4.90		mg/Kg-dry	1	1/22/2009
Chromium	ND	4.90		mg/Kg-dry	1	1/22/2009
Copper	18.8	4.90		mg/Kg-dry	1	1/22/2009
Lead	6.99	4.90		mg/Kg-dry	1	1/22/2009
Nickel	ND	4.90		mg/Kg-dry	1	1/22/2009
Zinc	ND	4.90		mg/Kg-dry	1	1/22/2009
MERCURY - SW7471A						Analyst: **EC**
Mercury	ND	0.100		mg/Kg-dry	1	1/22/2009

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

Reported Date: 30-Jan-09

CLIENT:	ESS - Group	**Client Sample ID:**	SC 2
Lab Order:	0901214	**Collection Date:**	1/19/2009 3:15:00 PM
Project:	Hopedale	**Date Received:**	1/20/2009
Lab ID:	0901214-002	**Matrix:**	SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
MERCURY - SW7471A						Analyst: **EC**
PAH - SW8270C						Analyst: **MR**
2-Methylnaphthalene	ND	100		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Acenaphthene	ND	100		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Acenaphthylene	ND	100		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Anthracene	ND	100		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Benz(a)Anthracene	ND	10.0		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Benzo(a)Pyrene	ND	10.0		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Benzo(b)Fluoranthene	ND	100		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Benzo(g,h,i)Perylene	ND	100		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Benzo(k)Fluoranthene	ND	100		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Chrysene	ND	100		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Dibenz(a,h)Anthracene	ND	10.0		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Fluoranthene	ND	100		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Fluorene	ND	100		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Indeno(1,2,3-cd)Pyrene	ND	10.0		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Naphthalene	ND	100		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Phenanthrene	ND	100		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Pyrene	ND	100		µg/Kg-dry	1	1/22/2009 5:41:00 PM
Surr: 2-Fluorobiphenyl	31.7	30-130		%REC	1	1/22/2009 5:41:00 PM
Surr: Nitrobenzene-d5	30.1	30-130		%REC	1	1/22/2009 5:41:00 PM
Surr: Terphenyl-d14	31.5	30-130		%REC	1	1/22/2009 5:41:00 PM
EPH TARGET ANALYTES - MADEP EPH						Analyst: **MR**
Naphthalene	ND	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
2-Methylnaphthalene	ND	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Acenaphthene	ND	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Phenanthrene	*0.724*	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Acenaphthylene	ND	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Fluorene	ND	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Anthracene	*0.123*	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Fluoranthene	*1.70*	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Pyrene	*1.69*	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Benzo(a)Anthracene	*0.604*	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Chrysene	*0.918*	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Benzo(b)Fluoranthene	*0.736*	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Benzo(k)Fluoranthene	*0.443*	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Benzo(a)Pyrene	*0.650*	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Indeno(1,2,3-cd)Pyrene	*0.111*	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

Reported Date: 30-Jan-09

CLIENT:	ESS - Group	**Client Sample ID:**	SC 2
Lab Order:	0901214	**Collection Date:**	1/19/2009 3:15:00 PM
Project:	Hopedale	**Date Received:**	1/20/2009
Lab ID:	0901214-002	**Matrix:**	SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
EPH TARGET ANALYTES - MADEP EPH						Analyst: **MR**
Dibenz(a,h)Anthracene	ND	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Benzo(g,h,i)Perylene	*0.370*	0.100		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Total PAH Target Concentration	*8.06*	0		mg/Kg-dry	1	1/22/2009 1:23:00 PM
Surr: 2,2'-Difluorobiphenyl	97.9	40-140		%REC	1	1/22/2009 1:23:00 PM
Surr: 2-Fluorobiphenyl	74.4	40-140		%REC	1	1/22/2009 1:23:00 PM
TOTAL ORGANIC CARBON- SW 9060						Analyst: **RP**
Total Organic Carbon	*100000*	400		mg/Kg-dry	1	1/27/2009

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

CLIENT:	ESS - Group	**Client Sample ID:**	SC 1B
Lab Order:	0901214	**Collection Date:**	1/19/2009 11:30:00 AM
Project:	Hopedale	**Date Received:**	1/20/2009
Lab ID:	0901214-003	**Matrix:**	SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS - 8260B						Analyst: **ZYZ**
1,1,1,2-Tetrachloroethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,1,1-Trichloroethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,1,2,2-Tetrachloroethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,1,2-Trichloroethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,1-Dichloroethane	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
1,1-Dichloroethene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,1-Dichloropropene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2,3-Trichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2,3-Trichloropropane	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
1,2,4-Trichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2,4-Trimethylbenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2-Dibromo-3-Chloropropane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2-Dibromoethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2-Dichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2-Dichloroethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2-Dichloropropane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,3,5-Trimethylbenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,3-Dichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,3-Dichloropropane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,4-Dichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
2,2-Dichloropropane	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
2-Butanone	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
2-Chloroethyl Vinyl Ether	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
2-Chlorotoluene	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
2-Hexanone	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
4-Chlorotoluene	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
4-Isopropyltoluene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
4-Methyl-2-Pentanone	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Acetone	ND	500		µg/Kg	1	1/22/2009 9:56:00 PM
Acrylonitrile	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Benzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Bromobenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Bromochloromethane	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
Bromodichloromethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Bromoform	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Bromomethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Carbon Disulfide	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Carbon Tetrachloride	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Chlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Chloroethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

CLIENT:	ESS - Group	**Client Sample ID:**	SC 1B
Lab Order:	0901214	**Collection Date:**	1/19/2009 11:30:00 AM
Project:	Hopedale	**Date Received:**	1/20/2009
Lab ID:	0901214-003	**Matrix:**	SOIL

VOLATILE ORGANIC COMPOUNDS - 8260B Analyst: **ZYZ**

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
Chloroform	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Chloromethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
cis-1,2-Dichloroethene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
cis-1,3-Dichloropropene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Dibromochloromethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Dibromomethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Dichlorodifluoromethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Ethylbenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Hexachlorobutadiene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Isopropylbenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Methyl Tert-Butyl Ether	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Methylene Chloride	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Naphthalene	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
n-Butylbenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
n-Propylbenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
sec-Butylbenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Styrene	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
tert-Butylbenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Tetrachloroethene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Toluene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
trans-1,2-Dichloroethene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
trans-1,3-Dichloropropene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Trichloroethene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Trichlorofluoromethane	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
Vinyl Chloride	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Xylenes, Total	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
Surr: 1,2-Dichloroethane-d4	102	70-130		%REC	1	1/22/2009 9:56:00 PM
Surr: 4-Bromofluorobenzene	91.1	70-130		%REC	1	1/22/2009 9:56:00 PM
Surr: Dibromofluoromethane	95.4	70-130		%REC	1	1/22/2009 9:56:00 PM
Surr: Toluene-d8	97.5	70-130		%REC	1	1/22/2009 9:56:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

CLIENT:	ESS - Group	**Client Sample ID:**	SC 2C
Lab Order:	0901214	**Collection Date:**	1/19/2009 3:10:00 PM
Project:	Hopedale	**Date Received:**	1/20/2009
Lab ID:	0901214-004	**Matrix:**	SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS - 8260B						Analyst: **ZYZ**
1,1,1,2-Tetrachloroethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,1,1-Trichloroethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,1,2,2-Tetrachloroethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,1,2-Trichloroethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,1-Dichloroethane	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
1,1-Dichloroethene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,1-Dichloropropene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2,3-Trichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2,3-Trichloropropane	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
1,2,4-Trichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2,4-Trimethylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2-Dibromo-3-Chloropropane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2-Dibromoethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2-Dichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2-Dichloroethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2-Dichloropropane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,3,5-Trimethylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,3-Dichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,3-Dichloropropane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,4-Dichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
2,2-Dichloropropane	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
2-Butanone	836	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
2-Chloroethyl Vinyl Ether	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
2-Chlorotoluene	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
2-Hexanone	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
4-Chlorotoluene	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
4-Isopropyltoluene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
4-Methyl-2-Pentanone	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Acetone	ND	500		µg/Kg	1	1/22/2009 10:33:00 PM
Acrylonitrile	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Benzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Bromobenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Bromochloromethane	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
Bromodichloromethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Bromoform	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Bromomethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Carbon Disulfide	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Carbon Tetrachloride	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Chlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Chloroethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT:	ESS - Group	**Client Sample ID:**	SC 2C
Lab Order:	0901214	**Collection Date:**	1/19/2009 3:10:00 PM
Project:	Hopedale	**Date Received:**	1/20/2009
Lab ID:	0901214-004	**Matrix:**	SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS - 8260B						Analyst: **ZYZ**
Chloroform	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Chloromethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
cis-1,2-Dichloroethene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
cis-1,3-Dichloropropene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Dibromochloromethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Dibromomethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Dichlorodifluoromethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Ethylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Hexachlorobutadiene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Isopropylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Methyl Tert-Butyl Ether	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Methylene Chloride	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Naphthalene	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
n-Butylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
n-Propylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
sec-Butylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Styrene	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
tert-Butylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Tetrachloroethene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Toluene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
trans-1,2-Dichloroethene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
trans-1,3-Dichloropropene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Trichloroethene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Trichlorofluoromethane	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
Vinyl Chloride	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Xylenes, Total	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
Surr: 1,2-Dichloroethane-d4	101	70-130		%REC	1	1/22/2009 10:33:00 PM
Surr: 4-Bromofluorobenzene	97.0	70-130		%REC	1	1/22/2009 10:33:00 PM
Surr: Dibromofluoromethane	92.7	70-130		%REC	1	1/22/2009 10:33:00 PM
Surr: Toluene-d8	99.9	70-130		%REC	1	1/22/2009 10:33:00 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

Reported Date: 30-Jan-09

CLIENT:	ESS - Group	**Client Sample ID:**	N 1
Lab Order:	0901214	**Collection Date:**	1/19/2009 12:00:00 PM
Project:	Hopedale	**Date Received:**	1/20/2009
Lab ID:	0901214-005	**Matrix:**	SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL NITROGEN IN SOIL						Analyst: **RP**
Total Nitrogen	*4600*	4.2		mg/Kg-dry	1	1/27/2009
TOTAL PHOSPHOROUS - L10-115-01-1-E						Analyst: **RP**
Total Phosphorous	*229*	2.93		mg/Kg-dry	2	1/29/2009

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

Reported Date: 30-Jan-09

CLIENT: ESS - Group
Lab Order: 0901214
Project: Hopedale
Lab ID: 0901214-006

Client Sample ID: N 2
Collection Date: 1/19/2009 3:45:00 PM
Date Received: 1/20/2009
Matrix: SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL NITROGEN IN SOIL						Analyst: **RP**
Total Nitrogen	*3500*	3.8		mg/Kg-dry	1	1/27/2009
TOTAL PHOSPHOROUS - L10-115-01-1-E						Analyst: **RP**
Total Phosphorous	*66.0*	1.32		mg/Kg-dry	1	1/29/2009

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT:	ESS - Group	**Client Sample ID:**	N 3
Lab Order:	0901214	**Collection Date:**	1/19/2009 3:15:00 PM
Project:	Hopedale	**Date Received:**	1/20/2009
Lab ID:	0901214-007	**Matrix:**	SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL NITROGEN IN SOIL						Analyst: **RP**
Total Nitrogen	*6300*	4.5		mg/Kg-dry	1	1/27/2009
TOTAL PHOSPHOROUS - L10-115-01-1-E						Analyst: **RP**
Total Phosphorous	*53.9*	1.58		mg/Kg-dry	1	1/29/2009

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

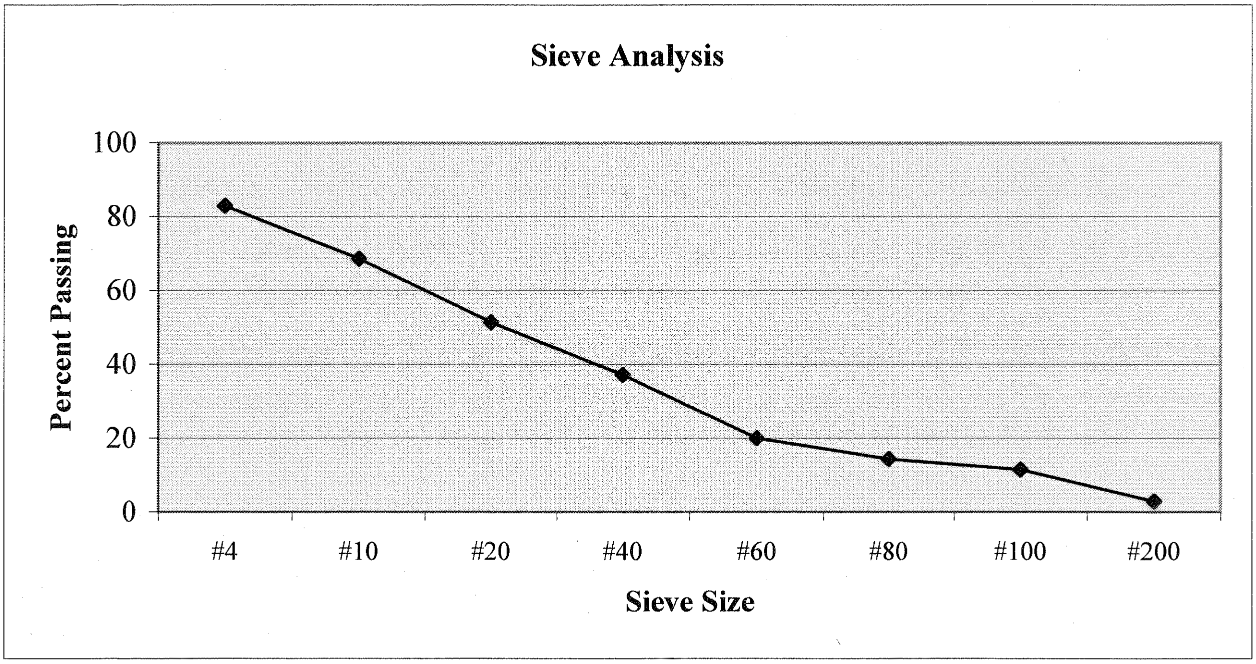
CLIENT NAME:	**ESS GROUP**	PROJECT ID:	HOPEDALE
SAMPLE TYPE:	SOIL	REPORT DATE:	01/22/09
COLLECTION DATE:	01/19/09	ANALYZED BY:	BP
REC'D BY LAB:	01/20/09	ANALYSIS DATE:	01/21/09
COLLECTED BY:	CLIENT	DIGESTION DATE:	N/A

SIEVE ANALYSIS

SAMPLE NUMBER: 0901214-001
SAMPLE LOCATION: SC1

SIEVE SIZE	#4	#10	#20	#40	#60	#80	#100
RESULTS (% Passing by Wt.)	82.9	68.6	51.4	37.1	20.0	14.3	11.4

SIEVE SIZE	#200
RESULTS (% Passing by Wt.)	2.86



ASTM C 136, ASTM C117

GeoLabs, Inc.
Environmental Laboratories

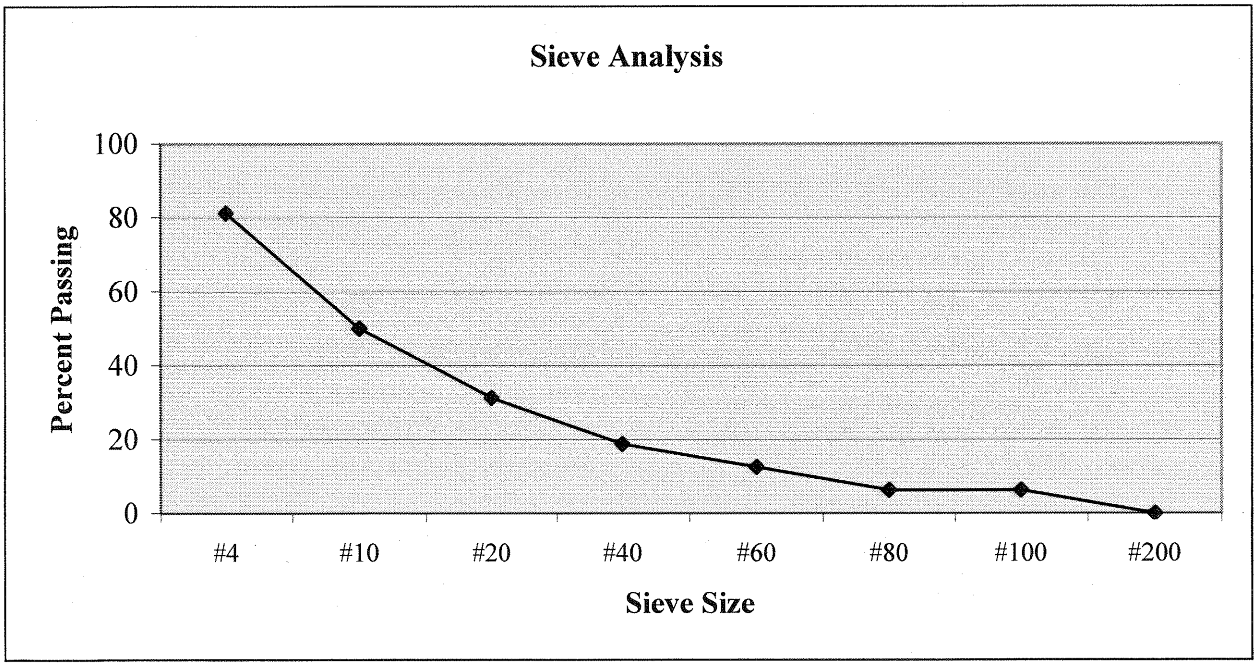
CLIENT NAME:	**ESS GROUP**	PROJECT ID:	HOPEDALE
SAMPLE TYPE:	SOIL	REPORT DATE:	01/22/09
COLLECTION DATE:	01/19/09	ANALYZED BY:	BP
REC'D BY LAB:	01/20/09	ANALYSIS DATE:	01/21/09
COLLECTED BY:	CLIENT	DIGESTION DATE:	N/A

SIEVE ANALYSIS

SAMPLE NUMBER: 0901214-002
SAMPLE LOCATION: SC2

SIEVE SIZE	#4	#10	#20	#40	#60	#80	#100
RESULTS (% Passing by Wt.)	81.3	50.0	31.3	18.8	12.5	6.25	6.25

SIEVE SIZE	#200
RESULTS (% Passing by Wt.)	0.00



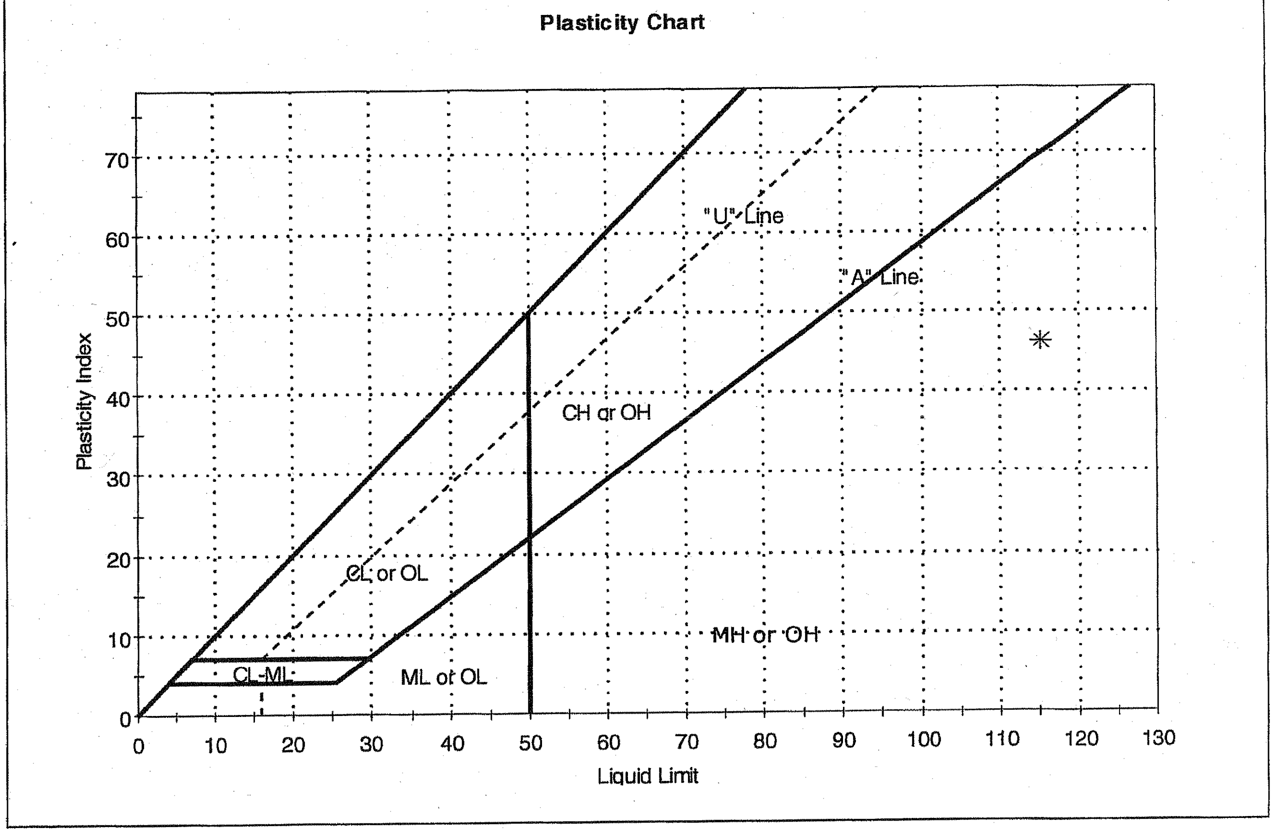
ASTM C 136, ASTM C117

GeoTesting express
a subsidiary of Geocomp Corporation

Client: GeoLabs, Inc.			
Project: 0901214			
Location: ---		Project No:	GTX-8819
Boring ID: ---	Sample Type: jar	Tested By:	ap
Sample ID:0901214-001A	Test Date: 01/27/09	Checked By:	jdt
Depth : ---	Test Id: 145690		

Test Comment: ---
Sample Description: Moist, gray silt with organics
Sample Comment: ---

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
✳	0901214-001A	---	---	9	115	69	46	-1	

Sample Prepared using the WET method

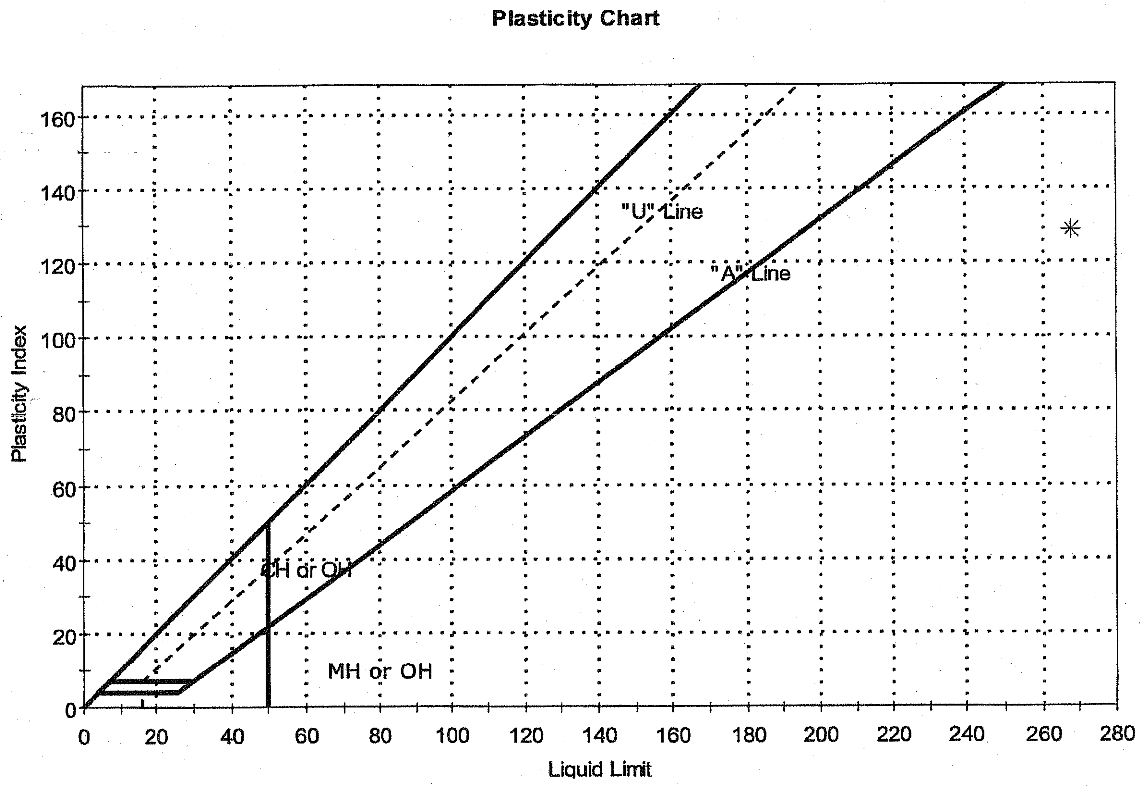
Dry Strength: HIGH
Dilentancy: SLOW
Toughness: LOW

printed 1/28/2009 1:48:30 PM

GeoTesting express
a subsidiary of Geocomp Corporation

Client:	GeoLabs, Inc.				
Project:	0901214				
Location:	---			Project No:	GTX-8819
Boring ID:	---	Sample Type:	jar	Tested By:	ap
Sample ID:	0901214-002A	Test Date:	01/29/09	Checked By:	jdt
Depth :	---	Test Id:	145691		
Test Comment:	---				
Sample Description:	Moist, brown silt with organics				
Sample Comment:	---				

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
*	0901214-002A	---	---	15	268	139	129	-1	

Sample Prepared using the WET method

Dry Strength: HIGH

Dilentancy: SLOW

Toughness: LOW

GeoLabs, Inc.

Date: *30-Jan-09*

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010b_S

Sample ID: **MBLK-12422** SampType: **MBLK** TestCode: **6010b_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28312**
Client ID: **ZZZZZ** Batch ID: **12422** TestNo: **SW6010B** **(SW3050B)** Analysis Date: **1/22/2009** SeqNo: **297946**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	5.00									
Cadmium	ND	5.00									
Chromium	ND	5.00									
Copper	ND	5.00									
Lead	ND	5.00									
Nickel	ND	5.00									
Zinc	ND	5.00									

Sample ID: **LCS-12422** SampType: **LCS** TestCode: **6010b_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28312**
Client ID: **ZZZZZ** Batch ID: **12422** TestNo: **SW6010B** **(SW3050B)** Analysis Date: **1/22/2009** SeqNo: **297947**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	126.4	5.00	133.3	0.06667	94.8	80	120				
Cadmium	125.0	5.00	133.3	1	93.0	80	120				
Chromium	133.1	5.00	133.3	0.1333	99.8	80	120				
Copper	152.9	5.00	133.3	0	115	80	120				
Lead	127.7	5.00	133.3	0.06667	95.7	80	120				
Nickel	127.3	5.00	133.3	0	95.5	80	120				
Zinc	134.6	5.00	133.3	0	101	80	120				

Sample ID: **LCSD-12422** SampType: **LCSD** TestCode: **6010B_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28312**
Client ID: **ZZZZZ** Batch ID: **12422** TestNo: **SW6010B** **(SW3050B)** Analysis Date: **1/22/2009** SeqNo: **298064**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	126.9	5.00	133.3	0	95.2	80	120	126.4	0.421	30	
Cadmium	124.1	5.00	133.3	0	93.1	80	120	125	0.749	30	
Chromium	131.7	5.00	133.3	0	98.8	80	120	133.1	1.11	30	
Copper	153.9	5.00	133.3	0	115	80	120	152.9	0.652	30	
Lead	126.7	5.00	133.3	0	95.0	80	120	127.7	0.786	30	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010b_S

Sample ID: **LCSD-12422** SampType: **LCSD** TestCode: **6010B_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28312**
Client ID: **ZZZZZ** Batch ID: **12422** TestNo: **SW6010B** **(SW3050B)** Analysis Date: **1/22/2009** SeqNo: **298064**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nickel	126.6	5.00	133.3	0	95.0	80	120	127.3	0.578	30	
Zinc	134.1	5.00	133.3	0	101	80	120	134.6	0.397	30	

Qualifiers:					
BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8082_s_ase

Sample ID: **MBLK-12417** SampType: **MBLK** TestCode: **8082_s_ase** Units: **µg/Kg** Prep Date: **1/22/2009** RunNo: **28313**
Client ID: **ZZZZZ** Batch ID: **12417** TestNo: **SW8082** **(SW3545A)** Analysis Date: **1/22/2009** SeqNo: **297971**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016/1242	ND	50.0									
Aroclor 1221	ND	50.0									
Aroclor 1232	ND	50.0									
Aroclor 1248	ND	50.0									
Aroclor 1254	ND	50.0									
Aroclor 1260	ND	50.0									
Aroclor 1262	ND	50.0									
Aroclor 1268	ND	50.0									
Surr: Decachlorobiphenyl Sig 1	80.00	0	100	0	80.0	30	150				
Surr: Decachlorobiphenyl Sig 2	58.00	0	100	0	58.0	30	150				
Surr: Tetrachloro-m-Xylene Sig 1	64.00	0	100	0	64.0	30	150				
Surr: Tetrachloro-m-Xylene Sig 2	66.00	0	100	0	66.0	30	150				

Sample ID: **LCS-12417** SampType: **LCS** TestCode: **8082_s_ase** Units: **µg/Kg** Prep Date: **1/22/2009** RunNo: **28313**
Client ID: **ZZZZZ** Batch ID: **12417** TestNo: **SW8082** **(SW3545A)** Analysis Date: **1/22/2009** SeqNo: **297965**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016/1242	72.00	50.0	100	0	72.0	30	150				
Aroclor 1221	ND	50.0									
Aroclor 1232	ND	50.0									
Aroclor 1248	ND	50.0									
Aroclor 1254	ND	50.0									
Aroclor 1260	75.00	50.0	100	0	75.0	30	150				
Aroclor 1262	ND	50.0									
Aroclor 1268	ND	50.0									
Surr: Decachlorobiphenyl Sig 1	82.00	0	100	0	82.0	30	150				
Surr: Decachlorobiphenyl Sig 2	58.00	0	100	0	58.0	30	150				
Surr: Tetrachloro-m-Xylene Sig 1	70.00	0	100	0	70.0	30	150				
Surr: Tetrachloro-m-Xylene Sig 2	74.00	0	100	0	74.0	30	150				

Qualifiers:	BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
	S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8082_s_ase

Sample ID: **LCSD-12417** SampType: **LCSD** TestCode: **8082_s_ase** Units: **µg/Kg** Prep Date: **1/22/2009** RunNo: **28313**
Client ID: **ZZZZZ** Batch ID: **12417** TestNo: **SW8082** **(SW3545A)** Analysis Date: **1/22/2009** SeqNo: **297970**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016/1242	61.00	50.0	100	0	61.0	30	150	72	16.5	30	
Aroclor 1221	ND	50.0						0	0	0	
Aroclor 1232	ND	50.0						0	0	0	
Aroclor 1248	ND	50.0						0	0	0	
Aroclor 1254	ND	50.0						0	0	0	
Aroclor 1260	67.00	50.0	100	0	67.0	30	150	75	11.3	30	
Aroclor 1262	ND	50.0						0	0	0	
Aroclor 1268	ND	50.0						0	0	0	
Surr: Decachlorobiphenyl Sig 1	74.00	0	100	0	74.0	30	150	0	0	0	
Surr: Decachlorobiphenyl Sig 2	64.00	0	100	0	64.0	30	150	0	0	0	
Surr: Tetrachloro-m-Xylene Sig 1	62.00	0	100	0	62.0	30	150	0	0	0	
Surr: Tetrachloro-m-Xylene Sig 2	72.00	0	100	0	72.0	30	150	0	0	0	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **SB** SampType: **MBLK** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297974**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1,2-Tetrachloroethane	ND	50.0									
1,1,1-Trichloroethane	ND	50.0									
1,1,2,2-Tetrachloroethane	ND	50.0									
1,1,2-Trichloroethane	ND	50.0									
1,1-Dichloroethane	ND	125									
1,1-Dichloroethene	ND	50.0									
1,1-Dichloropropene	ND	50.0									
1,2,3-Trichlorobenzene	ND	50.0									
1,2,3-Trichloropropane	ND	125									
1,2,4-Trichlorobenzene	ND	50.0									
1,2,4-Trimethylbenzene	ND	50.0									
1,2-Dibromo-3-Chloropropane	ND	50.0									
1,2-Dibromoethane	ND	50.0									
1,2-Dichlorobenzene	ND	50.0									
1,2-Dichloroethane	ND	50.0									
1,2-Dichloropropane	ND	50.0									
1,3,5-Trimethylbenzene	ND	50.0									
1,3-Dichlorobenzene	ND	50.0									
1,3-Dichloropropane	ND	50.0									
1,4-Dichlorobenzene	ND	50.0									
2,2-Dichloropropane	ND	125									
2-Butanone	ND	50.0									
2-Chloroethyl Vinyl Ether	ND	50.0									
2-Chlorotoluene	ND	125									
2-Hexanone	ND	125									
4-Chlorotoluene	ND	125									
4-Isopropyltoluene	ND	50.0									
4-Methyl-2-Pentanone	ND	50.0									
Acetone	ND	500									
Acrylonitrile	ND	50.0									
Benzene	ND	50.0									

Qualifiers:	BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
	S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **SB** SampType: **MBLK** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297974**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromobenzene	ND	50.0									
Bromochloromethane	ND	125									
Bromodichloromethane	ND	50.0									
Bromoform	ND	50.0									
Bromomethane	ND	50.0									
Carbon Disulfide	ND	50.0									
Carbon Tetrachloride	ND	50.0									
Chlorobenzene	ND	50.0									
Chloroethane	ND	50.0									
Chloroform	ND	50.0									
Chloromethane	ND	50.0									
cis-1,2-Dichloroethene	ND	50.0									
cis-1,3-Dichloropropene	ND	50.0									
Dibromochloromethane	ND	50.0									
Dibromomethane	ND	50.0									
Dichlorodifluoromethane	ND	50.0									
Ethylbenzene	ND	50.0									
Hexachlorobutadiene	ND	50.0									
Isopropylbenzene	ND	50.0									
Methyl Tert-Butyl Ether	ND	50.0									
Methylene Chloride	ND	50.0									
Naphthalene	ND	125									
n-Butylbenzene	ND	50.0									
n-Propylbenzene	ND	50.0									
sec-Butylbenzene	ND	50.0									
Styrene	ND	125									
tert-Butylbenzene	ND	50.0									
Tetrachloroethene	ND	50.0									
Toluene	ND	50.0									
trans-1,2-Dichloroethene	ND	50.0									
trans-1,3-Dichloropropene	ND	50.0									

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **SB** SampType: **MBLK** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297974**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Trichloroethene	ND	50.0									
Trichlorofluoromethane	ND	125									
Vinyl Chloride	ND	50.0									
Xylenes, Total	ND	125									
Surr: 1,2-Dichloroethane-d4	746.0	0	750	0	99.5	70	130				
Surr: 4-Bromofluorobenzene	750.5	0	750	0	100	70	130				
Surr: Dibromofluoromethane	708.0	0	750	0	94.4	70	130				
Surr: Toluene-d8	736.8	0	750	0	98.2	70	130				

Sample ID: **LCS** SampType: **LCS** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297972**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1,2-Tetrachloroethane	1276	50.0	1250	0	102	70	130				
1,1,1-Trichloroethane	1190	50.0	1250	0	95.2	70	130				
1,1,2,2-Tetrachloroethane	1248	50.0	1250	0	99.8	70	130				
1,1,2-Trichloroethane	1257	50.0	1250	0	101	70	130				
1,1-Dichloroethane	1287	125	1250	0	103	70	130				
1,1-Dichloroethene	1238	50.0	1250	0	99.0	70	130				
1,1-Dichloropropene	1271	50.0	1250	0	102	70	130				
1,2,3-Trichlorobenzene	1144	50.0	1250	0	91.5	70	130				
1,2,3-Trichloropropane	1227	125	1250	0	98.1	70	130				
1,2,4-Trichlorobenzene	1179	50.0	1250	0	94.3	70	130				
1,2,4-Trimethylbenzene	1430	50.0	1250	0	114	70	130				
1,2-Dibromo-3-Chloropropane	1189	50.0	1250	0	95.1	70	130				
1,2-Dibromoethane	1236	50.0	1250	0	98.9	70	130				
1,2-Dichlorobenzene	1238	50.0	1250	0	99.0	70	130				
1,2-Dichloroethane	1279	50.0	1250	0	102	70	130				
1,2-Dichloropropane	1257	50.0	1250	0	101	70	130				
1,3,5-Trimethylbenzene	1343	50.0	1250	0	107	70	130				

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **LCS** SampType: **LCS** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297972**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,3-Dichlorobenzene	1270	50.0	1250	0	102	70	130				
1,3-Dichloropropane	1262	50.0	1250	0	101	70	130				
1,4-Dichlorobenzene	1285	50.0	1250	0	103	70	130				
2,2-Dichloropropane	1095	125	1250	0	87.6	70	130				
2-Butanone	1288	50.0	1250	0	103	70	130				
2-Chloroethyl Vinyl Ether	1208	50.0	1250	0	96.6	70	130				
2-Chlorotoluene	1339	125	1250	0	107	70	130				
2-Hexanone	1337	125	1250	0	107	70	130				
4-Chlorotoluene	1319	125	1250	0	106	70	130				
4-Isopropyltoluene	1324	50.0	1250	0	106	70	130				
4-Methyl-2-Pentanone	1256	50.0	1250	0	100	70	130				
Acetone	1316	500	1250	0	105	70	130				
Acrylonitrile	2604	50.0	2500	0	104	70	130				
Benzene	1268	50.0	1250	0	101	70	130				
Bromobenzene	1288	50.0	1250	0	103	70	130				
Bromochloromethane	1274	125	1250	0	102	70	130				
Bromodichloromethane	1268	50.0	1250	0	101	70	130				
Bromoform	1308	50.0	1250	0	105	70	130				
Bromomethane	1369	50.0	1250	0	110	70	130				
Carbon Disulfide	1222	50.0	1250	0	97.8	70	130				
Carbon Tetrachloride	1012	50.0	1250	0	81.0	70	130				
Chlorobenzene	1269	50.0	1250	0	102	70	130				
Chloroethane	1464	50.0	1250	0	117	70	130				
Chloroform	1284	50.0	1250	0	103	70	130				
Chloromethane	1377	50.0	1250	0	110	70	130				
cis-1,2-Dichloroethene	1287	50.0	1250	0	103	70	130				
cis-1,3-Dichloropropene	1249	50.0	1250	0	99.9	70	130				
Dibromochloromethane	1259	50.0	1250	0	101	70	130				
Dibromomethane	1272	50.0	1250	0	102	70	130				
Dichlorodifluoromethane	1172	50.0	1250	0	93.8	70	130				
Ethylbenzene	1369	50.0	1250	0	110	70	130				

Qualifiers:

BRL Below Reporting Limit
J Analyte detected below quantitation limits
S Spike Recovery outside recovery limits
E Value above quantitation range
ND Not Detected at the Reporting Limit
H Holding times for preparation or analysis exceeded
R RPD outside recovery limits

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **LCS** SampType: **LCS** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297972**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Hexachlorobutadiene	1271	50.0	1250	0	102	70	130				
Isopropylbenzene	1340	50.0	1250	0	107	70	130				
Methyl Tert-Butyl Ether	1283	50.0	1250	0	103	70	130				
Methylene Chloride	1298	50.0	1250	0	104	70	130				
Naphthalene	1131	125	1250	0	90.5	70	130				
n-Butylbenzene	1315	50.0	1250	0	105	70	130				
n-Propylbenzene	1252	50.0	1250	0	100	70	130				
sec-Butylbenzene	1348	50.0	1250	0	108	70	130				
Styrene	1313	125	1250	0	105	70	130				
tert-Butylbenzene	1325	50.0	1250	0	106	70	130				
Tetrachloroethene	1262	50.0	1250	0	101	70	130				
Toluene	1307	50.0	1250	0	105	70	130				
trans-1,2-Dichloroethene	1307	50.0	1250	0	105	70	130				
trans-1,3-Dichloropropene	1191	50.0	1250	0	95.3	70	130				
Trichloroethene	1264	50.0	1250	0	101	70	130				
Trichlorofluoromethane	1333	125	1250	0	107	70	130				
Vinyl Chloride	1306	50.0	1250	0	105	70	130				
Xylenes, Total	4304	125	3750	0	115	70	130				
Surr: 1,2-Dichloroethane-d4	739.2	0	750	0	98.6	70	130				
Surr: 4-Bromofluorobenzene	741.5	0	750	0	98.9	70	130				
Surr: Dibromofluoromethane	783.2	0	750	0	104	70	130				
Surr: Toluene-d8	756.0	0	750	0	101	70	130				

Sample ID: **LCSD** SampType: **LCSD** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297973**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1,2-Tetrachloroethane	1280	50.0	1250	0	102	70	130	1276	0.352	25	
1,1,1-Trichloroethane	1262	50.0	1250	0	101	70	130	1190	5.91	25	
1,1,2,2-Tetrachloroethane	1265	50.0	1250	0	101	70	130	1248	1.33	25	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **LCSD** SampType: **LCSD** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297973**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,2-Trichloroethane	1286	50.0	1250	0	103	70	130	1257	2.36	25	
1,1-Dichloroethane	1194	125	1250	0	95.6	70	130	1287	7.47	25	
1,1-Dichloroethene	1223	50.0	1250	0	97.9	70	130	1238	1.20	25	
1,1-Dichloropropene	1242	50.0	1250	0	99.4	70	130	1271	2.27	25	
1,2,3-Trichlorobenzene	1286	50.0	1250	0	103	70	130	1144	11.7	25	
1,2,3-Trichloropropane	1241	125	1250	0	99.3	70	130	1227	1.13	25	
1,2,4-Trichlorobenzene	1265	50.0	1250	0	101	70	130	1179	7.08	25	
1,2,4-Trimethylbenzene	1474	50.0	1250	0	118	70	130	1430	2.96	25	
1,2-Dibromo-3-Chloropropane	1234	50.0	1250	0	98.7	70	130	1189	3.73	25	
1,2-Dibromoethane	1288	50.0	1250	0	103	70	130	1236	4.16	25	
1,2-Dichlorobenzene	1286	50.0	1250	0	103	70	130	1238	3.88	25	
1,2-Dichloroethane	1249	50.0	1250	0	99.9	70	130	1279	2.37	25	
1,2-Dichloropropane	1257	50.0	1250	0	101	70	130	1257	0	25	
1,3,5-Trimethylbenzene	1389	50.0	1250	0	111	70	130	1343	3.40	25	
1,3-Dichlorobenzene	1310	50.0	1250	0	105	70	130	1270	3.12	25	
1,3-Dichloropropane	1290	50.0	1250	0	103	70	130	1262	2.17	25	
1,4-Dichlorobenzene	1327	50.0	1250	0	106	70	130	1285	3.25	25	
2,2-Dichloropropane	1351	125	1250	0	108	70	130	1095	20.9	25	
2-Butanone	1293	50.0	1250	0	103	70	130	1288	0.407	25	
2-Chloroethyl Vinyl Ether	1216	50.0	1250	0	97.3	70	130	1208	0.722	25	
2-Chlorotoluene	1368	125	1250	0	109	70	130	1339	2.14	25	
2-Hexanone	1346	125	1250	0	108	70	130	1337	0.671	25	
4-Chlorotoluene	1371	125	1250	0	110	70	130	1319	3.89	25	
4-Isopropyltoluene	1369	50.0	1250	0	110	70	130	1324	3.40	25	
4-Methyl-2-Pentanone	1246	50.0	1250	0	99.7	70	130	1256	0.779	25	
Acetone	1228	500	1250	0	98.2	70	130	1316	6.88	25	
Acrylonitrile	2410	50.0	2500	0	96.4	70	130	2604	7.74	25	
Benzene	1285	50.0	1250	0	103	70	130	1268	1.27	25	
Bromobenzene	1326	50.0	1250	0	106	70	130	1288	2.91	25	
Bromochloromethane	1262	125	1250	0	101	70	130	1274	0.966	25	
Bromodichloromethane	1282	50.0	1250	0	103	70	130	1268	1.06	25	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **LCSD** SampType: **LCSD** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297973**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromoform	1336	50.0	1250	0	107	70	130	1308	2.10	25	
Bromomethane	1464	50.0	1250	0	117	70	130	1369	6.74	25	
Carbon Disulfide	1228	50.0	1250	0	98.2	70	130	1222	0.469	25	
Carbon Tetrachloride	1111	50.0	1250	0	88.9	70	130	1012	9.30	25	
Chlorobenzene	1315	50.0	1250	0	105	70	130	1269	3.58	25	
Chloroethane	1409	50.0	1250	0	113	70	130	1464	3.86	25	
Chloroform	1278	50.0	1250	0	102	70	130	1284	0.527	25	
Chloromethane	1336	50.0	1250	0	107	70	130	1377	3.02	25	
cis-1,2-Dichloroethene	1275	50.0	1250	0	102	70	130	1287	0.956	25	
cis-1,3-Dichloropropene	1277	50.0	1250	0	102	70	130	1249	2.22	25	
Dibromochloromethane	1268	50.0	1250	0	101	70	130	1259	0.732	25	
Dibromomethane	1282	50.0	1250	0	103	70	130	1272	0.705	25	
Dichlorodifluoromethane	1162	50.0	1250	0	92.9	70	130	1172	0.878	25	
Ethylbenzene	1406	50.0	1250	0	112	70	130	1369	2.63	25	
Hexachlorobutadiene	1332	50.0	1250	0	107	70	130	1271	4.67	25	
Isopropylbenzene	1385	50.0	1250	0	111	70	130	1340	3.32	25	
Methyl Tert-Butyl Ether	1235	50.0	1250	0	98.8	70	130	1283	3.81	25	
Methylene Chloride	1242	50.0	1250	0	99.4	70	130	1298	4.43	25	
Naphthalene	1262	125	1250	0	101	70	130	1131	10.9	25	
n-Butylbenzene	1364	50.0	1250	0	109	70	130	1315	3.70	25	
n-Propylbenzene	1290	50.0	1250	0	103	70	130	1252	2.95	25	
sec-Butylbenzene	1391	50.0	1250	0	111	70	130	1348	3.14	25	
Styrene	1342	125	1250	0	107	70	130	1313	2.20	25	
tert-Butylbenzene	1371	50.0	1250	0	110	70	130	1325	3.45	25	
Tetrachloroethene	1323	50.0	1250	0	106	70	130	1262	4.68	25	
Toluene	1356	50.0	1250	0	108	70	130	1307	3.66	25	
trans-1,2-Dichloroethene	1234	50.0	1250	0	98.8	70	130	1307	5.71	25	
trans-1,3-Dichloropropene	1306	50.0	1250	0	104	70	130	1191	9.15	25	
Trichloroethene	1283	50.0	1250	0	103	70	130	1264	1.43	25	
Trichlorofluoromethane	1383	125	1250	0	111	70	130	1333	3.65	25	
Vinyl Chloride	1285	50.0	1250	0	103	70	130	1306	1.68	25	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **LCSD** SampType: **LCSD** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297973**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Xylenes, Total	4364	125	3750	0	116	70	130	4304	1.40	25	
Surr: 1,2-Dichloroethane-d4	724.5	0	750	0	96.6	70	130	0	0	25	
Surr: 4-Bromofluorobenzene	745.0	0	750	0	99.3	70	130	0	0	25	
Surr: Dibromofluoromethane	732.0	0	750	0	97.6	70	130	0	0	25	
Surr: Toluene-d8	756.5	0	750	0	101	70	130	0	0	25	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_PAHASE

Sample ID: **MB-12414** SampType: **MBLK** TestCode: **8270_S_PAH** Units: **µg/Kg** Prep Date: **1/22/2009** RunNo: **28307**
Client ID: **ZZZZZ** Batch ID: **12414** TestNo: **SW8270C** **(SW3545A)** Analysis Date: **1/22/2009** SeqNo: **299285**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
2-Methylnaphthalene	ND	100									
Acenaphthene	ND	100									
Acenaphthylene	ND	100									
Anthracene	ND	100									
Benz(a)Anthracene	ND	10.0									
Benzo(a)Pyrene	ND	10.0									
Benzo(b)Fluoranthene	ND	100									
Benzo(g,h,i)Perylene	ND	100									
Benzo(k)Fluoranthene	ND	100									
Chrysene	ND	100									
Dibenz(a,h)Anthracene	ND	10.0									
Fluoranthene	ND	100									
Fluorene	ND	100									
Indeno(1,2,3-cd)Pyrene	ND	10.0									
Naphthalene	ND	100									
Phenanthrene	ND	100									
Pyrene	ND	100									
Surr: 2-Fluorobiphenyl	3696	0	5000	0	73.9	30	130				
Surr: Nitrobenzene-d5	2883	0	5000	0	57.7	30	130				
Surr: Terphenyl-d14	3740	0	5000	0	74.8	30	130				

Sample ID: **LCS-12414** SampType: **LCS** TestCode: **8270_S_PAH** Units: **µg/Kg** Prep Date: **1/22/2009** RunNo: **28307**
Client ID: **ZZZZZ** Batch ID: **12414** TestNo: **SW8270C** **(SW3545A)** Analysis Date: **1/22/2009** SeqNo: **299286**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
2-Methylnaphthalene	2202	100	2500	0	88.1	40	140				
Acenaphthene	2000	100	2500	0	80.0	40	140				
Acenaphthylene	2212	100	2500	0	88.5	40	140				
Anthracene	2407	100	2500	0	96.3	40	140				
Benz(a)Anthracene	1258	10.0	2500	0	50.3	40	140				

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_PAHASE

Sample ID: **LCS-12414** SampType: **LCS** TestCode: **8270_S_PAH** Units: **µg/Kg** Prep Date: **1/22/2009** RunNo: **28307**
Client ID: **ZZZZZ** Batch ID: **12414** TestNo: **SW8270C** **(SW3545A)** Analysis Date: **1/22/2009** SeqNo: **299286**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzo(a)Pyrene	2148	10.0	2500	0	85.9	40	140				
Benzo(b)Fluoranthene	2207	100	2500	0	88.3	40	140				
Benzo(g,h,i)Perylene	1918	100	2500	0	76.7	40	140				
Benzo(k)Fluoranthene	2272	100	2500	0	90.9	40	140				
Chrysene	1277	100	2500	0	51.1	40	140				
Dibenz(a,h)Anthracene	1981	10.0	2500	0	79.2	40	140				
Fluoranthene	2339	100	2500	0	93.6	40	140				
Fluorene	2166	100	2500	0	86.6	40	140				
Indeno(1,2,3-cd)Pyrene	2026	10.0	2500	0	81.0	40	140				
Naphthalene	2211	100	2500	0	88.4	40	140				
Phenanthrene	1840	100	2500	0	73.6	40	140				
Pyrene	1592	100	2500	0	63.7	40	140				
Surr: 2-Fluorobiphenyl	3632	0	5000	0	72.6	30	130				
Surr: Nitrobenzene-d5	3072	0	5000	0	61.4	30	130				
Surr: Terphenyl-d14	3422	0	5000	0	68.4	30	130				

Sample ID: **LCSD-12414** SampType: **LCSD** TestCode: **8270_S_PAH** Units: **µg/Kg** Prep Date: **1/22/2009** RunNo: **28307**
Client ID: **ZZZZZ** Batch ID: **12414** TestNo: **SW8270C** **(SW3545A)** Analysis Date: **1/22/2009** SeqNo: **299287**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
2-Methylnaphthalene	2329	100	2500	0	93.2	40	140	2202	5.61	30	
Acenaphthene	2182	100	2500	0	87.3	40	140	2000	8.66	30	
Acenaphthylene	2413	100	2500	0	96.5	40	140	2212	8.69	30	
Anthracene	2567	100	2500	0	103	40	140	2407	6.43	30	
Benz(a)Anthracene	1350	10.0	2500	0	54.0	40	140	1258	7.06	30	
Benzo(a)Pyrene	2178	10.0	2500	0	87.1	40	140	2148	1.36	30	
Benzo(b)Fluoranthene	2176	100	2500	0	87.0	40	140	2207	1.44	30	
Benzo(g,h,i)Perylene	1984	100	2500	0	79.3	40	140	1918	3.36	30	
Benzo(k)Fluoranthene	2312	100	2500	0	92.5	40	140	2272	1.77	30	
Chrysene	2198	100	2500	0	87.9	40	140	1277	53.0	30	R

Qualifiers:

BRL Below Reporting Limit
J Analyte detected below quantitation limits
S Spike Recovery outside recovery limits
E Value above quantitation range
ND Not Detected at the Reporting Limit
H Holding times for preparation or analysis exceeded
R RPD outside recovery limits

ANALYTICAL QC SUMMARY REPORT

Sample ID: **LCSD-12414** SampType: **LCSD** TestCode: **8270_S_PAH** Units: **µg/Kg** Prep Date: **1/22/2009** RunNo: **28307**
Client ID: **ZZZZZ** Batch ID: **12414** TestNo: **SW8270C** **(SW3545A)** Analysis Date: **1/22/2009** SeqNo: **299287**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dibenz(a,h)Anthracene	2009	10.0	2500	0	80.4	40	140	1981	1.40	30	
Fluoranthene	2424	100	2500	0	97.0	40	140	2339	3.59	30	
Fluorene	2292	100	2500	0	91.7	40	140	2166	5.65	30	
Indeno(1,2,3-cd)Pyrene	2082	10.0	2500	0	83.3	40	140	2026	2.78	30	
Naphthalene	2386	100	2500	0	95.5	40	140	2211	7.63	30	
Phenanthrene	1814	100	2500	0	72.5	40	140	1840	1.42	30	
Pyrene	1749	100	2500	0	70.0	40	140	1592	9.37	30	
Surr: 2-Fluorobiphenyl	3975	0	5000	0	79.5	30	130	0	0	0	
Surr: Nitrobenzene-d5	3413	0	5000	0	68.3	30	130	0	0	0	
Surr: Terphenyl-d14	3694	0	5000	0	73.9	30	130	0	0	0	

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: EPHP_S

Sample ID: **MBLK-12412** SampType: **MBLK** TestCode: **EPHP_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28297**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH_ (eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **297821**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	ND	0.100									
2-Methylnaphthalene	ND	0.100									
Acenaphthene	ND	0.100									
Phenanthrene	ND	0.100									
Acenaphthylene	ND	0.100									
Fluorene	ND	0.100									
Anthracene	ND	0.100									
Fluoranthene	ND	0.100									
Pyrene	ND	0.100									
Benzo(a)Anthracene	ND	0.100									
Chrysene	ND	0.100									
Benzo(b)Fluoranthene	ND	0.100									
Benzo(k)Fluoranthene	ND	0.100									
Benzo(a)Pyrene	ND	0.100									
Indeno(1,2,3-cd)Pyrene	ND	0.100									
Dibenz(a,h)Anthracene	ND	0.100									
Benzo(g,h,i)Perylene	ND	0.100									
Total PAH Target Concentration	ND	0									
Surr: 2,2'-Difluorobiphenyl	2.003	0	2.5	0	80.1	40	140				
Surr: 2-Fluorobiphenyl	1.867	0	2.5	0	74.7	40	140				

Sample ID: **LCS1-12412** SampType: **LCS** TestCode: **EPHP_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28297**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH_ (eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **297822**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	3.209	0.100	5	0	64.2	40	140				
2-Methylnaphthalene	3.331	0.100	5	0	66.6	40	140				
Acenaphthene	2.360	0.100	5	0	47.2	40	140				
Phenanthrene	3.437	0.100	5	0	68.7	40	140				
Acenaphthylene	2.364	0.100	5	0	47.3	40	140				

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: EPHP_S

Sample ID: **LCS1-12412** SampType: **LCS** TestCode: **EPHP_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28297**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH_ (eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **297822**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluorene	2.637	0.100	5	0	52.7	40	140				
Anthracene	3.560	0.100	5	0	71.2	40	140				
Fluoranthene	3.485	0.100	5	0	69.7	40	140				
Pyrene	4.005	0.100	5	0	80.1	40	140				
Benzo(a)Anthracene	4.082	0.100	5	0	81.6	40	140				
Chrysene	4.437	0.100	5	0	88.7	40	140				
Benzo(b)Fluoranthene	4.379	0.100	5	0	87.6	40	140				
Benzo(k)Fluoranthene	2.748	0.100	5	0	55.0	40	140				
Benzo(a)Pyrene	3.270	0.100	5	0	65.4	40	140				
Indeno(1,2,3-cd)Pyrene	2.931	0.100	5	0	58.6	40	140				
Dibenz(a,h)Anthracene	2.715	0.100	5	0	54.3	40	140				
Benzo(g,h,i)Perylene	3.064	0.100	5	0	61.3	40	140				
Total PAH Target Concentration	56.01	0									
Surr: 2,2'-Difluorobiphenyl	2.380	0	2.5	0	95.2	40	140				
Surr: 2-Fluorobiphenyl	1.651	0	2.5	0	66.0	40	140				

Sample ID: **LCSD-12412** SampType: **LCSD** TestCode: **EPHP_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28297**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH_ (eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **297823**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	2.952	0.100	5	0	59.0	40	140	3.209	8.34	50	
2-Methylnaphthalene	3.676	0.100	5	0	73.5	40	140	3.331	9.85	50	
Acenaphthene	2.375	0.100	5	0	47.5	40	140	2.36	0.634	50	
Phenanthrene	3.239	0.100	5	0	64.8	40	140	3.437	5.93	50	
Acenaphthylene	2.372	0.100	5	0	47.4	40	140	2.364	0.338	50	
Fluorene	2.371	0.100	5	0	47.4	40	140	2.637	10.6	50	
Anthracene	3.120	0.100	5	0	62.4	40	140	3.56	13.2	50	
Fluoranthene	3.505	0.100	5	0	70.1	40	140	3.485	0.572	50	
Pyrene	3.743	0.100	5	0	74.9	40	140	4.005	6.76	50	
Benzo(a)Anthracene	3.509	0.100	5	0	70.2	40	140	4.082	15.1	50	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: EPHP_S

Sample ID: **LCSD-12412** SampType: **LCSD** TestCode: **EPHP_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28297**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH_ (eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **297823**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chrysene	3.858	0.100	5	0	77.2	40	140	4.437	14.0	50	
Benzo(b)Fluoranthene	3.777	0.100	5	0	75.5	40	140	4.379	14.8	50	
Benzo(k)Fluoranthene	3.295	0.100	5	0	65.9	40	140	2.748	18.1	50	
Benzo(a)Pyrene	3.015	0.100	5	0	60.3	40	140	3.27	8.11	50	
Indeno(1,2,3-cd)Pyrene	2.691	0.100	5	0	53.8	40	140	2.931	8.54	50	
Dibenz(a,h)Anthracene	2.676	0.100	5	0	53.5	40	140	2.715	1.45	50	
Benzo(g,h,i)Perylene	3.069	0.100	5	0	61.4	40	140	3.064	0.163	50	
Total PAH Target Concentration	53.24	0						56.01	5.07	0	
Surr: 2,2'-Difluorobiphenyl	2.584	0	2.5	0	103	40	140	0	0	0	
Surr: 2-Fluorobiphenyl	1.603	0	2.5	0	64.1	40	140	0	0	0	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: **epht_s**

Sample ID: **MBLK-12412** SampType: **MBLK** TestCode: **epht_s** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28319**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH** **(eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **298039**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Adjusted C11-C22 Aromatics	ND	10.0									
C09-C18 Aliphatics	ND	10.0									
C19-C36 Aliphatics	ND	10.0									
Unadjusted C11-C22 Aromatics	ND	10.0									
Surr: 1-Chlorooctadecane	5.400	0	10	0	54.0	40	140				
Surr: o-Terphenyl	7.700	0	10	0	77.0	40	140				

Sample ID: **LCS-12412** SampType: **LCS** TestCode: **epht_s** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28319**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH** **(eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **298023**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
C09-C18 Aliphatics	ND	10.0	10	0	57.0	40	140				
C19-C36 Aliphatics	ND	10.0	10	0	81.0	40	140				
Unadjusted C11-C22 Aromatics	ND	10.0	10	0	57.0	40	140				
Surr: 1-Chlorooctadecane	6.900	0	10	0	69.0	40	140				
Surr: o-Terphenyl	7.500	0	10	0	75.0	40	140				

Sample ID: **LCSD-12412** SampType: **LCSD** TestCode: **epht_s** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28319**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH** **(eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **298038**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
C09-C18 Aliphatics	ND	10.0	10	0	62.0	40	140	5.7	0	50	
C19-C36 Aliphatics	ND	10.0	10	0	82.0	40	140	8.1	0	50	
Unadjusted C11-C22 Aromatics	ND	10.0	10	0	74.0	40	140	5.7	0	50	
Surr: 1-Chlorooctadecane	5.700	0	10	0	57.0	40	140	0	0		
Surr: o-Terphenyl	8.600	0	10	0	86.0	40	140	0	0	0	

Qualifiers:	BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
	S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: hg_7471a_s

Sample ID: **MBLK-12426** SampType: **MBLK** TestCode: **hg_7471a_s** Units: **mg/Kg** Prep Date: **1/23/2009** RunNo: **28315**
Client ID: **ZZZZZ** Batch ID: **12426** TestNo: **SW 7471A** **(SW7471A)** Analysis Date: **1/22/2009** SeqNo: **298000**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.100									

Sample ID: **LCS-12426** SampType: **LCS** TestCode: **hg_7471a_s** Units: **mg/Kg** Prep Date: **1/23/2009** RunNo: **28315**
Client ID: **ZZZZZ** Batch ID: **12426** TestNo: **SW 7471A** **(SW7471A)** Analysis Date: **1/22/2009** SeqNo: **297984**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	2.645	0.100	2.5	0	106	80	120				

Sample ID: **LCSD-12426** SampType: **LCSD** TestCode: **hg_7471a_s** Units: **mg/Kg** Prep Date: **1/23/2009** RunNo: **28315**
Client ID: **ZZZZZ** Batch ID: **12426** TestNo: **SW 7471A** **(SW7471A)** Analysis Date: **1/22/2009** SeqNo: **297999**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	2.650	0.100	2.5	0	106	80	120	2.645	0.189	30	

Qualifiers:	BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
	S	Spike Recovery outside recovery limits				

Page 1 of 1

CHAIN OF CUSTODY RECORD

GeoLabs, Inc. *Environmental Laboratories*
45 Johnson Lane, Braintree, MA 02184
p 781.848.7844 • f 781.848.7811
www.geolabs.com

Sample Handling: circle choice
Filtration: Done / Not Needed / Lab to do
Preservation: Lab to do Y / N

Special Instructions
*As, Cd, Cr, Cu, Hg, Pb, Ni, Zn

Turnaround: circle one
1-day 3-day
2-day [✓ 5 / 7-days]

Data Delivery: circle choice (s)
Fax [✓ email]
Format:
Excel PDF

Requirements: circle choice (s) 0901214
GW-1 MCP Methods CT RCP (Reasonable Confidence Protocols)
S-1 DEP State / Fed Program - Criteria
QC Other

Client: ESS GROUP, INC
Address: 401 WAMPANOAG TRAIL, SUITE 400
EAST PROVIDENCE, RI 02915
Contact: ~~MAT~~ LADEWIG
Phone: 401-330-1204
Fax: 401-434-8158
email: mladewig@essgroup.com
Project: HOPEDALE
Project PO: H153-000
Invoice to *: CARL NIELSEN

DATE	TIME	SAMPLED BY	SAMPLE LOCATION / ID	CONTAINER TYPE	CONTAINER QUANITY	MATRIX	COMP	GRAB	GeoLabs SAMPLE NUMBER	METALS*	VOCs	PAHS	EPH	PCBs	TOC	% WATER	% ASH	ASTM GRAIN SIZE	ATTERBERG LIMITS	TOTAL N	~~TEMPERATURE~~ TOTAL P	LAB pH	Temp
Preservative:											6												
1/19/09	~~1130~~ 1200 MDL	SL/ML	SC1	A	2	S	X		1214-001	X		X	X	X	X	X	X	X	X				4c
↓	1515	↓	SC2	A	3	↓	X		002	X		X	X	X	X	X	X	X	X				↓
↓	1130	↓	SC1~~A~~B MDL	V	1	↓		X	003		X												↓
↓	1516	↓	SC2~~A~~C MDL	~~A~~ V	1	↓		X	004		X												↓
↓	1200	↓	N1	G	2	↓	X		005											X	X		↓
↓	1545	↓	N2	G	~~2~~ 1 MDL	↓	X		006											X	X		↓
↓	1515	↓	N3	G	2	↓	X		007											X	X		↓

Matrix Codes:
GW = Ground Water DW = Drinking Water S = Soil A = Air
WW = Waste Water SL = Sludge O = Oil OT = Other

Received on Ice ☑

Preservatives
1 = Hcl 3 = H2SO4 5 = NaOH 7 = Other
2 = HNO3 4 = Na2S2O3 6 = MEOH

Containers:
A = Amber B = Bag O = Other
G = Glass P = Plastic
S = Summa V = Voa

Relinquished by:	Date / Time	Received by:	Date / Time
	1/20/09 11:00		1/20/09 11:00
	1/20/09 1:50	KC	1/20/09 3:00

270675.J&P.C of OR.07/09/07

Terms: Payment due within 30 days unless other arrangements are made. Past due balances subject to interest and collection cost.
Note: Homeowners and Law Firms must pay when dropping off samples. We accept cash, check and credit cards.

CT (PH-0148) MA (MA - 015) NH (2508) NJ (MA-009)
NY(11796) PA (68-03417) RI (LA000252)

Wednesday, February 11, 2009

GeoLabs, Inc.
45 Johnson Lane
Braintree MA 02184
Tele: 781 848 7844
Fax: 781 848 7811

Matt Ladewig
ESS - Group
401 Wampanoag Trail Suite #400
E. Providence, RI 02915

TEL: 401-330-1200
FAX:

Project: Hopedale
Location: H153-000

Order No.: 0901214

Dear Matt Ladewig:

GeoLabs, Inc. received 7 sample(s) on 1/20/2009 for the analyses presented in the following report.

This report is being re-issued with rerun results for Sieve Analysis. There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications except where noted in the Case Narrative.

Analytical methods and results meet requirements of 310CMR 40.1056(J) as per MADEP Compendium of Analytical Methods (CAM).

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Jim Chen

Jim Chen
Laboratory Director

For current certifications, please visit our website at www.geolabs.com

Certifications:

CT (PH-0148) - MA (M-MA015) - NH (2508) - NJ (MA009) - NY (11796) - RI (LA000252)

CLIENT:	ESS - Group
Project:	Hopedale
Lab Order:	0901214

CASE NARRATIVE

MADEP MCP Response Action Analytical Report Certification Form

Laboratory Name: GeoLabs, Inc. Project # H153-000
Project Location: Hopedale MADEP RTN #:

This form provides certification for the following data set: 0901214 (001-007)

Sample Matrix: Soil

MCP Methods Used: 6010B, 7471A, 8260B, 8270C, EPH, 8082

An affirmative answer to questions A, B, C and D are required for "Presumptive Certainty" status

A. Were all samples received by the laboratory in a condition consistent with that described on the Chain of custody documentation for the data set? YES

B. Were all QA/QC procedures required for the specified method(s) included in this report followed, including the requirement to note and discuss in a narrative QC data that did not meet appropriate standards or guidelines? YES

C. Does the analytical data included in this report meet all the requirements for "Presumptive Certainty" as described in Section 2.0 of the MADEP documents CAM VII A "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"? YES

D. VPH and EPH Methods only: Was the VPH or EPH Method conducted without significant modifications (see Section 11.3 of respective Methods) YES

A response to questions E and F are required for "Presumptive Certainty" status

E. Were all QC performance standards and recommendations for the specified methods achieved? NO
F. Were results for all analyte-list compounds/elements for the specified method(s) reported? NO

All NO answers need to be addressed in an attached Environmental Laboratory case narrative.

CLIENT: ESS - Group
Project: Hopedale
Lab Order: 0901214

CASE NARRATIVE

CASE NARRATIVE

Physical Condition of Samples

The project was received by the laboratory in satisfactory condition. The sample(s) were received undamaged, in appropriate containers with the correct preservation.

Project Documentation

The project was accompanied by satisfactory Chain of Custody documentation.

Analysis of Sample(s)

PAH compounds only analyzed by 8270C per client request.

Selected metals analyzed by 6010B per client request.

The following analytical anomalies or non-conformances were noted by the laboratory during the processing of these samples:

8270 RPD for Chrysene is outside the limit.

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature: Jim Chen

Position: Lab Director

Printed Name: Jim Chen

Date: February 11, 2009

CLIENT: ESS - Group
Project: Hopedale
Lab Order: 0901214

CASE NARRATIVE

EPH Methods

Method for Ranges: MADEP EPH 04-1.1
Method for Target Analytes: 8270 GC/MS

Carbon Range data exclude concentrations of any surrogate(s) and/or internal standards eluting in that range
C11-C22 Aromatic Hydrocarbons exclude concentrations of Target PAH Analytes

CERTIFICATION:
Were all QA/QC procedures REQUIRED by the EPH Method followed? YES
Were all performance/acceptance standards achieved? YES
Were any significant modifications made to the EPH method? NO

I attest under the pains and penalties of perjury that, based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

SIGNATURE: Jim Chen LAB DIRECTOR

PRINTED NAME: Jim Chen

DATE: February 11, 2009

GeoLabs, Inc.

Reissue Date: *11-Feb-09*
Original Reported Date: 30-Jan-09

CLIENT: ESS - Group
Project: Hopedale

Lab Order: 0901214

Lab ID: 0901214-001
Client Sample ID: SC 1

Collection Date: 1/19/2009 12:00:00 PM
Matrix: SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
ASH - ASTM D-482-87						Analyst: **FC**
Ash	*81.4*	1.00		%	1	1/22/2009
PERCENT MOISTURE - 209A						Analyst: **FC**
Percent Moisture	*10*	1.0		wt%	1	1/21/2009
EPH RANGES - MADEP EPH						Analyst: **RuP**
Adjusted C11-C22 Aromatics	*104*	11.1		mg/Kg-dry	1	1/22/2009
C09-C18 Aliphatics	ND	11.1		mg/Kg-dry	1	1/22/2009
C19-C36 Aliphatics	*136*	11.1		mg/Kg-dry	1	1/22/2009
Unadjusted C11-C22 Aromatics	*137*	11.1		mg/Kg-dry	1	1/22/2009
Surr: 1-Chlorooctadecane	86.0	40-140		%REC	1	1/22/2009
Surr: o-Terphenyl	78.0	40-140		%REC	1	1/22/2009
POLYCHLORINATED BIPHENYLS - SW8082						Analyst: **GP**
Aroclor 1016/1242	ND	55.6		µg/Kg-dry	1	1/22/2009
Aroclor 1221	ND	55.6		µg/Kg-dry	1	1/22/2009
Aroclor 1232	ND	55.6		µg/Kg-dry	1	1/22/2009
Aroclor 1248	ND	55.6		µg/Kg-dry	1	1/22/2009
Aroclor 1254	ND	55.6		µg/Kg-dry	1	1/22/2009
Aroclor 1260	ND	55.6		µg/Kg-dry	1	1/22/2009
Aroclor 1262	ND	55.6		µg/Kg-dry	1	1/22/2009
Aroclor 1268	ND	55.6		µg/Kg-dry	1	1/22/2009
Surr: Decachlorobiphenyl Sig 1	78.0	30-150		%REC	1	1/22/2009
Surr: Decachlorobiphenyl Sig 2	44.0	30-150		%REC	1	1/22/2009
Surr: Tetrachloro-m-Xylene Sig 1	76.0	30-150		%REC	1	1/22/2009
Surr: Tetrachloro-m-Xylene Sig 2	66.0	30-150		%REC	1	1/22/2009
TOTAL METALS BY ICP - SW6010B						Analyst: **ZYZ**
Arsenic	*27.4*	5.27		mg/Kg-dry	1	1/22/2009
Cadmium	ND	5.27		mg/Kg-dry	1	1/22/2009
Chromium	*9.70*	5.27		mg/Kg-dry	1	1/22/2009
Copper	*40.9*	5.27		mg/Kg-dry	1	1/22/2009
Lead	*66.2*	5.27		mg/Kg-dry	1	1/22/2009
Nickel	*6.26*	5.27		mg/Kg-dry	1	1/22/2009
Zinc	*11.0*	5.27		mg/Kg-dry	1	1/22/2009
MERCURY - SW7471A						Analyst: **EC**

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT: ESS - Group **Lab Order:** 0901214
Project: Hopedale

MERCURY - SW7471A

Analyst: **EC**

Mercury	*0.128*	0.111	mg/Kg-dry	1	1/22/2009

PAH - SW8270C

Analyst: **MR**

2-Methylnaphthalene	ND	1110	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Acenaphthene	ND	1110	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Acenaphthylene	ND	1110	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Anthracene	*1400*	1110	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Benz(a)Anthracene	*2170*	111	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Benzo(a)Pyrene	*3050*	111	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Benzo(b)Fluoranthene	*4220*	1110	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Benzo(g,h,i)Perylene	*2410*	1110	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Benzo(k)Fluoranthene	*2330*	1110	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Chrysene	*4110*	1110	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Dibenz(a,h)Anthracene	ND	111	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Fluoranthene	*9410*	1110	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Fluorene	ND	1110	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Indeno(1,2,3-cd)Pyrene	*2300*	111	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Naphthalene	ND	1110	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Phenanthrene	*4410*	1110	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Pyrene	*6060*	1110	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Surr: 2-Fluorobiphenyl	52.1	30-130	%REC	10	1/22/2009 1:14:00 PM
Surr: Nitrobenzene-d5	32.5	30-130	%REC	10	1/22/2009 1:14:00 PM
Surr: Terphenyl-d14	65.6	30-130	%REC	10	1/22/2009 1:14:00 PM

EPH TARGET ANALYTES - MADEP EPH

Analyst: **MR**

Naphthalene	ND	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
2-Methylnaphthalene	ND	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Acenaphthene	ND	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Phenanthrene	*3.19*	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Acenaphthylene	*0.147*	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Fluorene	ND	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Anthracene	ND	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Fluoranthene	*7.90*	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Pyrene	*6.41*	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Benzo(a)Anthracene	*2.75*	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Chrysene	*3.55*	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Benzo(b)Fluoranthene	*2.14*	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Benzo(k)Fluoranthene	*2.79*	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Benzo(a)Pyrene	*2.83*	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Indeno(1,2,3-cd)Pyrene	*0.478*	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Dibenz(a,h)Anthracene	ND	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Benzo(g,h,i)Perylene	*0.483*	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Total PAH Target Concentration	*32.7*	0	mg/Kg-dry	1	1/22/2009 12:44:00 PM

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT: ESS - Group
Project: Hopedale

Lab Order: 0901214

EPH TARGET ANALYTES - MADEP EPH					Analyst: **MR**
Surr: 2,2'-Difluorobiphenyl	101	40-140	%REC	1	1/22/2009 12:44:00 PM
Surr: 2-Fluorobiphenyl	80.6	40-140	%REC	1	1/22/2009 12:44:00 PM
TOTAL ORGANIC CARBON- SW 9060					Analyst: **RP**
Total Organic Carbon	*60300*	444	mg/Kg-dry	1	1/27/2009

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT: ESS - Group
Project: Hopedale

Lab Order: 0901214

Lab ID: 0901214-002
Client Sample ID: SC 2

Collection Date: 1/19/2009 3:15:00 PM
Matrix: SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
ASH - ASTM D-482-87						Analyst: **FC**
Ash	*50.8*	1.00		%	1	1/22/2009
PERCENT MOISTURE - 209A						Analyst: **FC**
Percent Moisture	*15.0*	0		wt%	1	1/21/2009
EPH RANGES - MADEP EPH						Analyst: **RuP**
Adjusted C11-C22 Aromatics	*85.8*	10.0		mg/Kg-dry	1	1/22/2009
C09-C18 Aliphatics	ND	10.0		mg/Kg-dry	1	1/22/2009
C19-C36 Aliphatics	*122*	10.0		mg/Kg-dry	1	1/22/2009
Unadjusted C11-C22 Aromatics	*93.9*	10.0		mg/Kg-dry	1	1/22/2009
Surr: 1-Chlorooctadecane	63.0	40-140		%REC	1	1/22/2009
Surr: o-Terphenyl	70.0	40-140		%REC	1	1/22/2009
POLYCHLORINATED BIPHENYLS - SW8082						Analyst: **GP**
Aroclor 1016/1242	ND	50.0		µg/Kg-dry	1	1/22/2009
Aroclor 1221	ND	50.0		µg/Kg-dry	1	1/22/2009
Aroclor 1232	ND	50.0		µg/Kg-dry	1	1/22/2009
Aroclor 1248	ND	50.0		µg/Kg-dry	1	1/22/2009
Aroclor 1254	ND	50.0		µg/Kg-dry	1	1/22/2009
Aroclor 1260	ND	50.0		µg/Kg-dry	1	1/22/2009
Aroclor 1262	ND	50.0		µg/Kg-dry	1	1/22/2009
Aroclor 1268	ND	50.0		µg/Kg-dry	1	1/22/2009
Surr: Decachlorobiphenyl Sig 1	98.0	30-150		%REC	1	1/22/2009
Surr: Decachlorobiphenyl Sig 2	70.0	30-150		%REC	1	1/22/2009
Surr: Tetrachloro-m-Xylene Sig 1	88.0	30-150		%REC	1	1/22/2009
Surr: Tetrachloro-m-Xylene Sig 2	82.0	30-150		%REC	1	1/22/2009
TOTAL METALS BY ICP - SW6010B						Analyst: **ZYZ**
Arsenic	ND	4.90		mg/Kg-dry	1	1/22/2009
Cadmium	ND	4.90		mg/Kg-dry	1	1/22/2009
Chromium	ND	4.90		mg/Kg-dry	1	1/22/2009
Copper	*18.8*	4.90		mg/Kg-dry	1	1/22/2009
Lead	*6.99*	4.90		mg/Kg-dry	1	1/22/2009
Nickel	ND	4.90		mg/Kg-dry	1	1/22/2009
Zinc	ND	4.90		mg/Kg-dry	1	1/22/2009
MERCURY - SW7471A						Analyst: **EC**

CLIENT: ESS - Group **Lab Order:** 0901214
Project: Hopedale

MERCURY - SW7471A

Analyst: **EC**

Mercury	ND	0.100	mg/Kg-dry	1	1/22/2009

PAH - SW8270C

Analyst: **MR**

2-Methylnaphthalene	ND	100	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Acenaphthene	ND	100	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Acenaphthylene	ND	100	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Anthracene	ND	100	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Benz(a)Anthracene	ND	10.0	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Benzo(a)Pyrene	ND	10.0	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Benzo(b)Fluoranthene	ND	100	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Benzo(g,h,i)Perylene	ND	100	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Benzo(k)Fluoranthene	ND	100	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Chrysene	ND	100	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Dibenz(a,h)Anthracene	ND	10.0	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Fluoranthene	ND	100	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Fluorene	ND	100	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Indeno(1,2,3-cd)Pyrene	ND	10.0	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Naphthalene	ND	100	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Phenanthrene	ND	100	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Pyrene	ND	100	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Surr: 2-Fluorobiphenyl	31.7	30-130	%REC	1	1/22/2009 5:41:00 PM
Surr: Nitrobenzene-d5	30.1	30-130	%REC	1	1/22/2009 5:41:00 PM
Surr: Terphenyl-d14	31.5	30-130	%REC	1	1/22/2009 5:41:00 PM

EPH TARGET ANALYTES - MADEP EPH

Analyst: **MR**

Naphthalene	ND	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
2-Methylnaphthalene	ND	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Acenaphthene	ND	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Phenanthrene	*0.724*	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Acenaphthylene	ND	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Fluorene	ND	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Anthracene	*0.123*	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Fluoranthene	*1.70*	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Pyrene	*1.69*	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Benzo(a)Anthracene	*0.604*	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Chrysene	*0.918*	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Benzo(b)Fluoranthene	*0.736*	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Benzo(k)Fluoranthene	*0.443*	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Benzo(a)Pyrene	*0.650*	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Indeno(1,2,3-cd)Pyrene	*0.111*	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Dibenz(a,h)Anthracene	ND	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Benzo(g,h,i)Perylene	*0.370*	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Total PAH Target Concentration	*8.06*	0	mg/Kg-dry	1	1/22/2009 1:23:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

EPH TARGET ANALYTES - MADEP EPH					Analyst: **MR**
Surr: 2,2'-Difluorobiphenyl	97.9	40-140	%REC	1	1/22/2009 1:23:00 PM
Surr: 2-Fluorobiphenyl	74.4	40-140	%REC	1	1/22/2009 1:23:00 PM
TOTAL ORGANIC CARBON- SW 9060					Analyst: **RP**
Total Organic Carbon	*100000*	400	mg/Kg-dry	1	1/27/2009

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT: ESS - Group
Project: Hopedale
Lab Order: 0901214

Lab ID: 0901214-003
Client Sample ID: SC 1B
Collection Date: 1/19/2009 11:30:00 AM
Matrix: SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS - 8260B						Analyst: **ZYZ**
1,1,1,2-Tetrachloroethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,1,1-Trichloroethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,1,2,2-Tetrachloroethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,1,2-Trichloroethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,1-Dichloroethane	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
1,1-Dichloroethene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,1-Dichloropropene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2,3-Trichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2,3-Trichloropropane	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
1,2,4-Trichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2,4-Trimethylbenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2-Dibromo-3-Chloropropane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2-Dibromoethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2-Dichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2-Dichloroethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2-Dichloropropane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,3,5-Trimethylbenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,3-Dichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,3-Dichloropropane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,4-Dichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
2,2-Dichloropropane	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
2-Butanone	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
2-Chloroethyl Vinyl Ether	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
2-Chlorotoluene	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
2-Hexanone	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
4-Chlorotoluene	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
4-Isopropyltoluene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
4-Methyl-2-Pentanone	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Acetone	ND	500		µg/Kg	1	1/22/2009 9:56:00 PM
Acrylonitrile	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Benzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Bromobenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Bromochloromethane	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
Bromodichloromethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Bromoform	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Bromomethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Carbon Disulfide	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Carbon Tetrachloride	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Chlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

CLIENT: ESS - Group
Project: Hopedale

Lab Order: 0901214

VOLATILE ORGANIC COMPOUNDS - 8260B

Analyst: **ZYZ**

Chloroethane	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Chloroform	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Chloromethane	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
cis-1,2-Dichloroethene	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
cis-1,3-Dichloropropene	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Dibromochloromethane	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Dibromomethane	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Dichlorodifluoromethane	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Ethylbenzene	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Hexachlorobutadiene	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Isopropylbenzene	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Methyl Tert-Butyl Ether	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Methylene Chloride	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Naphthalene	ND	125	µg/Kg	1	1/22/2009 9:56:00 PM
n-Butylbenzene	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
n-Propylbenzene	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
sec-Butylbenzene	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Styrene	ND	125	µg/Kg	1	1/22/2009 9:56:00 PM
tert-Butylbenzene	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Tetrachloroethene	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Toluene	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
trans-1,2-Dichloroethene	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
trans-1,3-Dichloropropene	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Trichloroethene	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Trichlorofluoromethane	ND	125	µg/Kg	1	1/22/2009 9:56:00 PM
Vinyl Chloride	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Xylenes, Total	ND	125	µg/Kg	1	1/22/2009 9:56:00 PM
Surr: 1,2-Dichloroethane-d4	102	70-130	%REC	1	1/22/2009 9:56:00 PM
Surr: 4-Bromofluorobenzene	91.1	70-130	%REC	1	1/22/2009 9:56:00 PM
Surr: Dibromofluoromethane	95.4	70-130	%REC	1	1/22/2009 9:56:00 PM
Surr: Toluene-d8	97.5	70-130	%REC	1	1/22/2009 9:56:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

GeoLabs, Inc.

Reissue Date: *11-Feb-09*
Original Reported Date: 30-Jan-09

CLIENT: ESS - Group
Project: Hopedale

Lab Order: 0901214

Lab ID: 0901214-004
Client Sample ID: SC 2C

Collection Date: 1/19/2009 3:10:00 PM
Matrix: SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS - 8260B						Analyst: **ZYZ**
1,1,1,2-Tetrachloroethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,1,1-Trichloroethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,1,2,2-Tetrachloroethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,1,2-Trichloroethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,1-Dichloroethane	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
1,1-Dichloroethene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,1-Dichloropropene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2,3-Trichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2,3-Trichloropropane	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
1,2,4-Trichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2,4-Trimethylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2-Dibromo-3-Chloropropane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2-Dibromoethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2-Dichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2-Dichloroethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2-Dichloropropane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,3,5-Trimethylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,3-Dichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,3-Dichloropropane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,4-Dichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
2,2-Dichloropropane	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
2-Butanone	836	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
2-Chloroethyl Vinyl Ether	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
2-Chlorotoluene	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
2-Hexanone	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
4-Chlorotoluene	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
4-Isopropyltoluene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
4-Methyl-2-Pentanone	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Acetone	ND	500		µg/Kg	1	1/22/2009 10:33:00 PM
Acrylonitrile	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Benzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Bromobenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Bromochloromethane	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
Bromodichloromethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Bromoform	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Bromomethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Carbon Disulfide	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Carbon Tetrachloride	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Chlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

VOLATILE ORGANIC COMPOUNDS - 8260B Analyst: **ZYZ**

Chloroethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Chloroform	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Chloromethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
cis-1,2-Dichloroethene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
cis-1,3-Dichloropropene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Dibromochloromethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Dibromomethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Dichlorodifluoromethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Ethylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Hexachlorobutadiene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Isopropylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Methyl Tert-Butyl Ether	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Methylene Chloride	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Naphthalene	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
n-Butylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
n-Propylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
sec-Butylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Styrene	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
tert-Butylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Tetrachloroethene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Toluene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
trans-1,2-Dichloroethene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
trans-1,3-Dichloropropene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Trichloroethene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Trichlorofluoromethane	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
Vinyl Chloride	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Xylenes, Total	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
Surr: 1,2-Dichloroethane-d4	101	70-130		%REC	1	1/22/2009 10:33:00 PM
Surr: 4-Bromofluorobenzene	97.0	70-130		%REC	1	1/22/2009 10:33:00 PM
Surr: Dibromofluoromethane	92.7	70-130		%REC	1	1/22/2009 10:33:00 PM
Surr: Toluene-d8	99.9	70-130		%REC	1	1/22/2009 10:33:00 PM

Lab ID: 0901214-005 **Collection Date:** 1/19/2009 12:00:00 PM
Client Sample ID: N 1 **Matrix:** SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL NITROGEN IN SOIL						Analyst: **RP**
Total Nitrogen	*4600*	4.2		mg/Kg-dry	1	1/27/2009
TOTAL PHOSPHOROUS - L10-115-01-1-E						Analyst: **RP**
Total Phosphorous	*229*	2.93		mg/Kg-dry	2	1/29/2009

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

CLIENT: ESS - Group
Project: Hopedale

Lab Order: 0901214

Lab ID: 0901214-006
Collection Date: 1/19/2009 3:45:00 PM
Client Sample ID: N 2
Matrix: SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL NITROGEN IN SOIL						Analyst: **RP**
Total Nitrogen	*3500*	3.8		mg/Kg-dry	1	1/27/2009
TOTAL PHOSPHOROUS - L10-115-01-1-E						Analyst: **RP**
Total Phosphorous	*66.0*	1.32		mg/Kg-dry	1	1/29/2009

Lab ID: 0901214-007
Collection Date: 1/19/2009 3:15:00 PM
Client Sample ID: N 3
Matrix: SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL NITROGEN IN SOIL						Analyst: **RP**
Total Nitrogen	*6300*	4.5		mg/Kg-dry	1	1/27/2009
TOTAL PHOSPHOROUS - L10-115-01-1-E						Analyst: **RP**
Total Phosphorous	*53.9*	1.58		mg/Kg-dry	1	1/29/2009

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

GeoLabs, Inc.
Environmental Laboratories

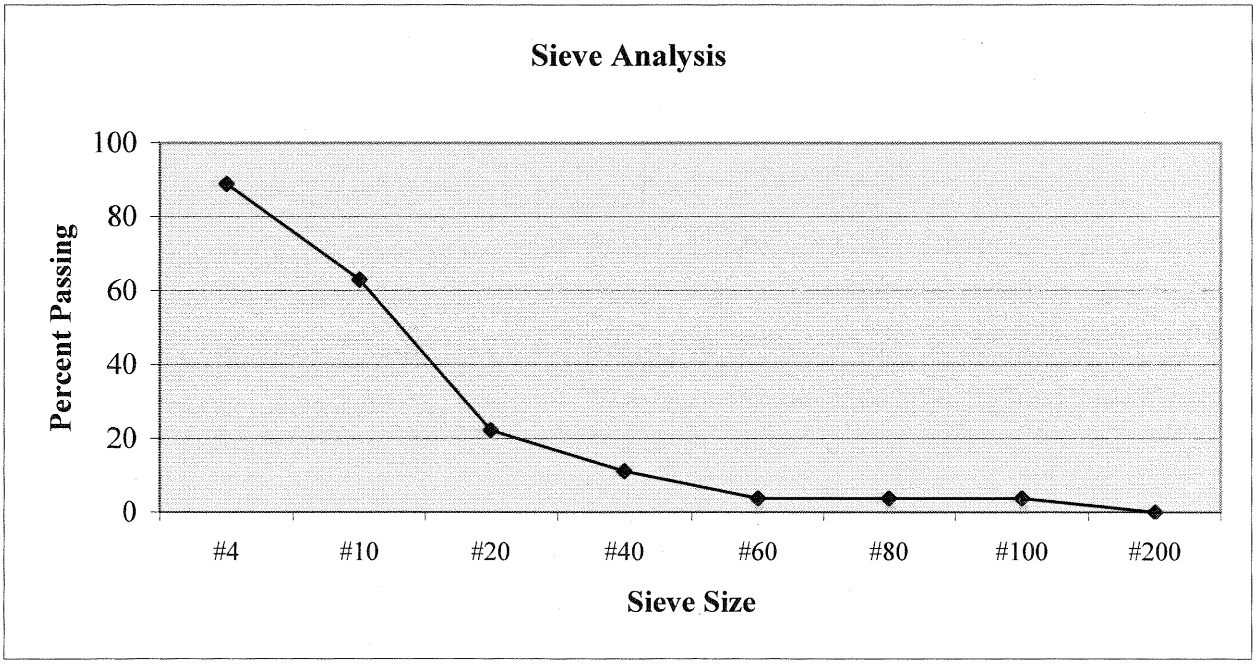
CLIENT NAME:	**ESS GROUP**	PROJECT ID:	HOPEDALE
SAMPLE TYPE:	SOIL	REPORT DATE:	02/10/09
COLLECTION DATE:	01/19/09	ANALYZED BY:	BP
REC'D BY LAB:	01/20/09	ANALYSIS DATE:	02/09/09
COLLECTED BY:	CLIENT	DIGESTION DATE:	N/A

SIEVE ANALYSIS

SAMPLE NUMBER: 0901214-001
SAMPLE LOCATION: SC-1

SIEVE SIZE	#4	#10	#20	#40	#60	#80	#100
RESULTS (% Passing by Wt.)	88.9	63.0	22.2	11.1	3.70	3.70	3.70

SIEVE SIZE	#200
RESULTS (% Passing by Wt.)	0.00



ASTM C 136, ASTM C117

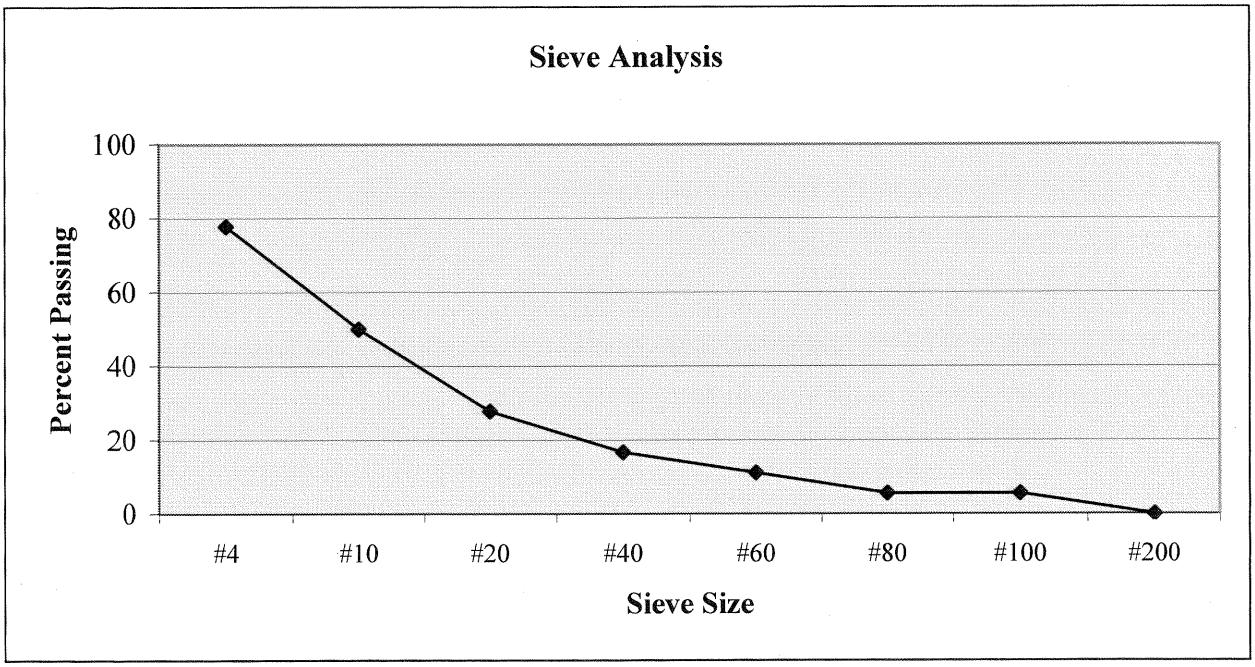
CLIENT NAME:	**ESS GROUP**	PROJECT ID:	HOPEDALE
SAMPLE TYPE:	SOIL	REPORT DATE:	02/10/09
COLLECTION DATE:	01/19/09	ANALYZED BY:	BP
REC'D BY LAB:	01/20/09	ANALYSIS DATE:	02/09/09
COLLECTED BY:	CLIENT	DIGESTION DATE:	N/A

SIEVE ANALYSIS

SAMPLE NUMBER: 0901214-002
SAMPLE LOCATION: SC-2

SIEVE SIZE	#4	#10	#20	#40	#60	#80	#100
RESULTS **(% Passing by Wt.)**	77.8	50.0	27.8	16.7	11.1	5.56	5.56

SIEVE SIZE	#200
RESULTS **(% Passing by Wt.)**	0.00

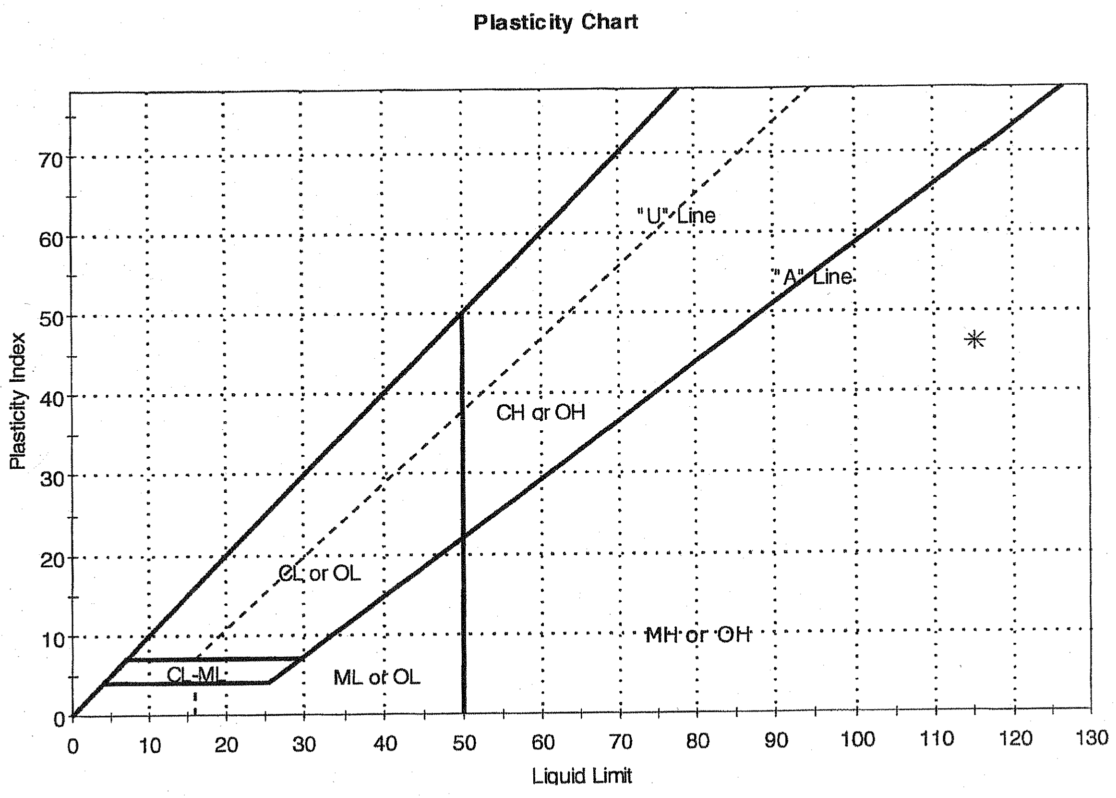


ASTM C 136, ASTM C117

GeoTesting express
a subsidiary of Geocomp Corporation

Client: GeoLabs, Inc.
Project: 0901214
Location: ---
Project No: GTX-8819
Boring ID: ---
Sample Type: jar
Tested By: ap
Sample ID: 0901214-001A
Test Date: 01/27/09
Checked By: jdt
Depth : ---
Test Id: 145690
Test Comment: ---
Sample Description: Moist, gray silt with organics
Sample Comment: ---

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
✳	0901214-001A	---	---	9	115	69	46	-1	

Sample Prepared using the WET method

Dry Strength: HIGH
Dilentancy: SLOW
Toughness: LOW

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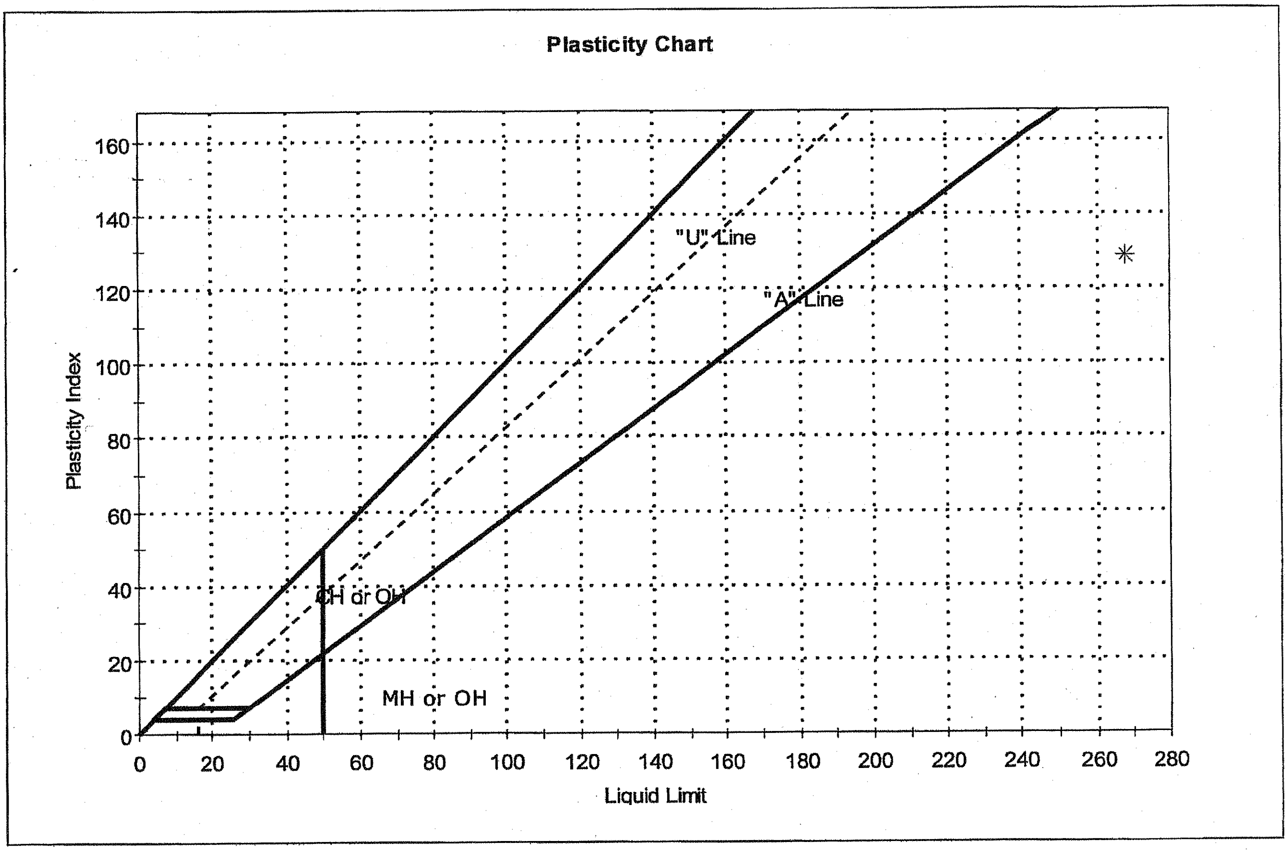
GeoTesting express
a subsidiary of Geocomp Corporation

Client: GeoLabs, Inc.
Project: 0901214
Location: ---
Project No: GTX-8819

Boring ID: ---
Sample Type: jar
Tested By: ap
Sample ID:0901214-002A
Test Date: 01/29/09
Checked By: jdt
Depth : ---
Test Id: 145691

Test Comment: ---
Sample Description: Moist, brown silt with organics
Sample Comment: ---

Atterberg Limits - ASTM D 4318-05



Symbol	Sample ID	Boring	Depth	Natural Moisture Content,%	Liquid Limit	Plastic Limit	Plasticity Index	Liquidity Index	Soil Classification
✳	0901214-002A	---	---	15	268	139	129	-1	

Sample Prepared using the WET method

Dry Strength: HIGH
Dilentancy: SLOW
Toughness: LOW

printed 1/29/2009 8:36:58 AM

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010b_S

Sample ID: **MBLK-12422** SampType: **MBLK** TestCode: **6010b_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28312**
Client ID: **ZZZZZ** Batch ID: **12422** TestNo: **SW6010B** **(SW3050B)** Analysis Date: **1/22/2009** SeqNo: **297946**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	5.00									
Cadmium	ND	5.00									
Chromium	ND	5.00									
Copper	ND	5.00									
Lead	ND	5.00									
Nickel	ND	5.00									
Zinc	ND	5.00									

Sample ID: **LCS-12422** SampType: **LCS** TestCode: **6010b_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28312**
Client ID: **ZZZZZ** Batch ID: **12422** TestNo: **SW6010B** **(SW3050B)** Analysis Date: **1/22/2009** SeqNo: **297947**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	126.4	5.00	133.3	0.06667	94.8	80	120				
Cadmium	125.0	5.00	133.3	1	93.0	80	120				
Chromium	133.1	5.00	133.3	0.1333	99.8	80	120				
Copper	152.9	5.00	133.3	0	115	80	120				
Lead	127.7	5.00	133.3	0.06667	95.7	80	120				
Nickel	127.3	5.00	133.3	0	95.5	80	120				
Zinc	134.6	5.00	133.3	0	101	80	120				

Sample ID: **LCSD-12422** SampType: **LCSD** TestCode: **6010B_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28312**
Client ID: **ZZZZZ** Batch ID: **12422** TestNo: **SW6010B** **(SW3050B)** Analysis Date: **1/22/2009** SeqNo: **298064**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	126.9	5.00	133.3	0	95.2	80	120	126.4	0.421	30	
Cadmium	124.1	5.00	133.3	0	93.1	80	120	125	0.749	30	
Chromium	131.7	5.00	133.3	0	98.8	80	120	133.1	1.11	30	
Copper	153.9	5.00	133.3	0	115	80	120	152.9	0.652	30	
Lead	126.7	5.00	133.3	0	95.0	80	120	127.7	0.786	30	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010b_S

Sample ID: **LCSD-12422** SampType: **LCSD** TestCode: **6010B_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28312**
Client ID: **ZZZZZ** Batch ID: **12422** TestNo: **SW6010B** **(SW3050B)** Analysis Date: **1/22/2009** SeqNo: **298064**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nickel	126.6	5.00	133.3	0	95.0	80	120	127.3	0.578	30	
Zinc	134.1	5.00	133.3	0	101	80	120	134.6	0.397	30	

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: **8082_s_ase**

Sample ID: **MBLK-12417** SampType: **MBLK** TestCode: **8082_s_ase** Units: **µg/Kg** Prep Date: **1/22/2009** RunNo: **28313**
Client ID: **ZZZZZ** Batch ID: **12417** TestNo: **SW8082** **(SW3545A)** Analysis Date: **1/22/2009** SeqNo: **297971**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016/1242	ND	50.0									
Aroclor 1221	ND	50.0									
Aroclor 1232	ND	50.0									
Aroclor 1248	ND	50.0									
Aroclor 1254	ND	50.0									
Aroclor 1260	ND	50.0									
Aroclor 1262	ND	50.0									
Aroclor 1268	ND	50.0									
Surr: Decachlorobiphenyl Sig 1	80.00	0	100	0	80.0	30	150				
Surr: Decachlorobiphenyl Sig 2	58.00	0	100	0	58.0	30	150				
Surr: Tetrachloro-m-Xylene Sig 1	64.00	0	100	0	64.0	30	150				
Surr: Tetrachloro-m-Xylene Sig 2	66.00	0	100	0	66.0	30	150				

Sample ID: **LCS-12417** SampType: **LCS** TestCode: **8082_s_ase** Units: **µg/Kg** Prep Date: **1/22/2009** RunNo: **28313**
Client ID: **ZZZZZ** Batch ID: **12417** TestNo: **SW8082** **(SW3545A)** Analysis Date: **1/22/2009** SeqNo: **297965**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016/1242	72.00	50.0	100	0	72.0	30	150				
Aroclor 1221	ND	50.0									
Aroclor 1232	ND	50.0									
Aroclor 1248	ND	50.0									
Aroclor 1254	ND	50.0									
Aroclor 1260	75.00	50.0	100	0	75.0	30	150				
Aroclor 1262	ND	50.0									
Aroclor 1268	ND	50.0									
Surr: Decachlorobiphenyl Sig 1	82.00	0	100	0	82.0	30	150				
Surr: Decachlorobiphenyl Sig 2	58.00	0	100	0	58.0	30	150				
Surr: Tetrachloro-m-Xylene Sig 1	70.00	0	100	0	70.0	30	150				
Surr: Tetrachloro-m-Xylene Sig 2	74.00	0	100	0	74.0	30	150				

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: **8082_s_ase**

Sample ID: **LCSD-12417** SampType: **LCSD** TestCode: **8082_s_ase** Units: **µg/Kg** Prep Date: **1/22/2009** RunNo: **28313**
Client ID: **ZZZZZ** Batch ID: **12417** TestNo: **SW8082** **(SW3545A)** Analysis Date: **1/22/2009** SeqNo: **297970**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016/1242	61.00	50.0	100	0	61.0	30	150	72	16.5	30	
Aroclor 1221	ND	50.0						0	0	0	
Aroclor 1232	ND	50.0						0	0	0	
Aroclor 1248	ND	50.0						0	0	0	
Aroclor 1254	ND	50.0						0	0	0	
Aroclor 1260	67.00	50.0	100	0	67.0	30	150	75	11.3	30	
Aroclor 1262	ND	50.0						0	0	0	
Aroclor 1268	ND	50.0						0	0	0	
Surr: Decachlorobiphenyl Sig 1	74.00	0	100	0	74.0	30	150	0	0	0	
Surr: Decachlorobiphenyl Sig 2	64.00	0	100	0	64.0	30	150	0	0	0	
Surr: Tetrachloro-m-Xylene Sig 1	62.00	0	100	0	62.0	30	150	0	0	0	
Surr: Tetrachloro-m-Xylene Sig 2	72.00	0	100	0	72.0	30	150	0	0	0	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **SB** SampType: **MBLK** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297974**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1,2-Tetrachloroethane	ND	50.0									
1,1,1-Trichloroethane	ND	50.0									
1,1,2,2-Tetrachloroethane	ND	50.0									
1,1,2-Trichloroethane	ND	50.0									
1,1-Dichloroethane	ND	125									
1,1-Dichloroethene	ND	50.0									
1,1-Dichloropropene	ND	50.0									
1,2,3-Trichlorobenzene	ND	50.0									
1,2,3-Trichloropropane	ND	125									
1,2,4-Trichlorobenzene	ND	50.0									
1,2,4-Trimethylbenzene	ND	50.0									
1,2-Dibromo-3-Chloropropane	ND	50.0									
1,2-Dibromoethane	ND	50.0									
1,2-Dichlorobenzene	ND	50.0									
1,2-Dichloroethane	ND	50.0									
1,2-Dichloropropane	ND	50.0									
1,3,5-Trimethylbenzene	ND	50.0									
1,3-Dichlorobenzene	ND	50.0									
1,3-Dichloropropane	ND	50.0									
1,4-Dichlorobenzene	ND	50.0									
2,2-Dichloropropane	ND	125									
2-Butanone	ND	50.0									
2-Chloroethyl Vinyl Ether	ND	50.0									
2-Chlorotoluene	ND	125									
2-Hexanone	ND	125									
4-Chlorotoluene	ND	125									
4-Isopropyltoluene	ND	50.0									
4-Methyl-2-Pentanone	ND	50.0									
Acetone	ND	500									
Acrylonitrile	ND	50.0									
Benzene	ND	50.0									

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **SB** SampType: **MBLK** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297974**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromobenzene	ND	50.0									
Bromochloromethane	ND	125									
Bromodichloromethane	ND	50.0									
Bromoform	ND	50.0									
Bromomethane	ND	50.0									
Carbon Disulfide	ND	50.0									
Carbon Tetrachloride	ND	50.0									
Chlorobenzene	ND	50.0									
Chloroethane	ND	50.0									
Chloroform	ND	50.0									
Chloromethane	ND	50.0									
cis-1,2-Dichloroethene	ND	50.0									
cis-1,3-Dichloropropene	ND	50.0									
Dibromochloromethane	ND	50.0									
Dibromomethane	ND	50.0									
Dichlorodifluoromethane	ND	50.0									
Ethylbenzene	ND	50.0									
Hexachlorobutadiene	ND	50.0									
Isopropylbenzene	ND	50.0									
Methyl Tert-Butyl Ether	ND	50.0									
Methylene Chloride	ND	50.0									
Naphthalene	ND	125									
n-Butylbenzene	ND	50.0									
n-Propylbenzene	ND	50.0									
sec-Butylbenzene	ND	50.0									
Styrene	ND	125									
tert-Butylbenzene	ND	50.0									
Tetrachloroethene	ND	50.0									
Toluene	ND	50.0									
trans-1,2-Dichloroethene	ND	50.0									
trans-1,3-Dichloropropene	ND	50.0									

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **SB** SampType: **MBLK** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297974**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Trichloroethene	ND	50.0									
Trichlorofluoromethane	ND	125									
Vinyl Chloride	ND	50.0									
Xylenes, Total	ND	125									
Surr: 1,2-Dichloroethane-d4	746.0	0	750	0	99.5	70	130				
Surr: 4-Bromofluorobenzene	750.5	0	750	0	100	70	130				
Surr: Dibromofluoromethane	708.0	0	750	0	94.4	70	130				
Surr: Toluene-d8	736.8	0	750	0	98.2	70	130				

Sample ID: **LCS** SampType: **LCS** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297972**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1,2-Tetrachloroethane	1276	50.0	1250	0	102	70	130				
1,1,1-Trichloroethane	1190	50.0	1250	0	95.2	70	130				
1,1,2,2-Tetrachloroethane	1248	50.0	1250	0	99.8	70	130				
1,1,2-Trichloroethane	1257	50.0	1250	0	101	70	130				
1,1-Dichloroethane	1287	125	1250	0	103	70	130				
1,1-Dichloroethene	1238	50.0	1250	0	99.0	70	130				
1,1-Dichloropropene	1271	50.0	1250	0	102	70	130				
1,2,3-Trichlorobenzene	1144	50.0	1250	0	91.5	70	130				
1,2,3-Trichloropropane	1227	125	1250	0	98.1	70	130				
1,2,4-Trichlorobenzene	1179	50.0	1250	0	94.3	70	130				
1,2,4-Trimethylbenzene	1430	50.0	1250	0	114	70	130				
1,2-Dibromo-3-Chloropropane	1189	50.0	1250	0	95.1	70	130				
1,2-Dibromoethane	1236	50.0	1250	0	98.9	70	130				
1,2-Dichlorobenzene	1238	50.0	1250	0	99.0	70	130				
1,2-Dichloroethane	1279	50.0	1250	0	102	70	130				
1,2-Dichloropropane	1257	50.0	1250	0	101	70	130				
1,3,5-Trimethylbenzene	1343	50.0	1250	0	107	70	130				

Qualifiers:	BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
	S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **LCS** SampType: **LCS** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297972**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,3-Dichlorobenzene	1270	50.0	1250	0	102	70	130				
1,3-Dichloropropane	1262	50.0	1250	0	101	70	130				
1,4-Dichlorobenzene	1285	50.0	1250	0	103	70	130				
2,2-Dichloropropane	1095	125	1250	0	87.6	70	130				
2-Butanone	1288	50.0	1250	0	103	70	130				
2-Chloroethyl Vinyl Ether	1208	50.0	1250	0	96.6	70	130				
2-Chlorotoluene	1339	125	1250	0	107	70	130				
2-Hexanone	1337	125	1250	0	107	70	130				
4-Chlorotoluene	1319	125	1250	0	106	70	130				
4-Isopropyltoluene	1324	50.0	1250	0	106	70	130				
4-Methyl-2-Pentanone	1256	50.0	1250	0	100	70	130				
Acetone	1316	500	1250	0	105	70	130				
Acrylonitrile	2604	50.0	2500	0	104	70	130				
Benzene	1268	50.0	1250	0	101	70	130				
Bromobenzene	1288	50.0	1250	0	103	70	130				
Bromochloromethane	1274	125	1250	0	102	70	130				
Bromodichloromethane	1268	50.0	1250	0	101	70	130				
Bromoform	1308	50.0	1250	0	105	70	130				
Bromomethane	1369	50.0	1250	0	110	70	130				
Carbon Disulfide	1222	50.0	1250	0	97.8	70	130				
Carbon Tetrachloride	1012	50.0	1250	0	81.0	70	130				
Chlorobenzene	1269	50.0	1250	0	102	70	130				
Chloroethane	1464	50.0	1250	0	117	70	130				
Chloroform	1284	50.0	1250	0	103	70	130				
Chloromethane	1377	50.0	1250	0	110	70	130				
cis-1,2-Dichloroethene	1287	50.0	1250	0	103	70	130				
cis-1,3-Dichloropropene	1249	50.0	1250	0	99.9	70	130				
Dibromochloromethane	1259	50.0	1250	0	101	70	130				
Dibromomethane	1272	50.0	1250	0	102	70	130				
Dichlorodifluoromethane	1172	50.0	1250	0	93.8	70	130				
Ethylbenzene	1369	50.0	1250	0	110	70	130				

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **LCS** SampType: **LCS** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297972**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Hexachlorobutadiene	1271	50.0	1250	0	102	70	130				
Isopropylbenzene	1340	50.0	1250	0	107	70	130				
Methyl Tert-Butyl Ether	1283	50.0	1250	0	103	70	130				
Methylene Chloride	1298	50.0	1250	0	104	70	130				
Naphthalene	1131	125	1250	0	90.5	70	130				
n-Butylbenzene	1315	50.0	1250	0	105	70	130				
n-Propylbenzene	1252	50.0	1250	0	100	70	130				
sec-Butylbenzene	1348	50.0	1250	0	108	70	130				
Styrene	1313	125	1250	0	105	70	130				
tert-Butylbenzene	1325	50.0	1250	0	106	70	130				
Tetrachloroethene	1262	50.0	1250	0	101	70	130				
Toluene	1307	50.0	1250	0	105	70	130				
trans-1,2-Dichloroethene	1307	50.0	1250	0	105	70	130				
trans-1,3-Dichloropropene	1191	50.0	1250	0	95.3	70	130				
Trichloroethene	1264	50.0	1250	0	101	70	130				
Trichlorofluoromethane	1333	125	1250	0	107	70	130				
Vinyl Chloride	1306	50.0	1250	0	105	70	130				
Xylenes, Total	4304	125	3750	0	115	70	130				
Surr: 1,2-Dichloroethane-d4	739.2	0	750	0	98.6	70	130				
Surr: 4-Bromofluorobenzene	741.5	0	750	0	98.9	70	130				
Surr: Dibromofluoromethane	783.2	0	750	0	104	70	130				
Surr: Toluene-d8	756.0	0	750	0	101	70	130				

Sample ID: **LCSD** SampType: **LCSD** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297973**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1,2-Tetrachloroethane	1280	50.0	1250	0	102	70	130	1276	0.352	25	
1,1,1-Trichloroethane	1262	50.0	1250	0	101	70	130	1190	5.91	25	
1,1,2,2-Tetrachloroethane	1265	50.0	1250	0	101	70	130	1248	1.33	25	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **LCSD** SampType: **LCSD** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297973**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,2-Trichloroethane	1286	50.0	1250	0	103	70	130	1257	2.36	25	
1,1-Dichloroethane	1194	125	1250	0	95.6	70	130	1287	7.47	25	
1,1-Dichloroethene	1223	50.0	1250	0	97.9	70	130	1238	1.20	25	
1,1-Dichloropropene	1242	50.0	1250	0	99.4	70	130	1271	2.27	25	
1,2,3-Trichlorobenzene	1286	50.0	1250	0	103	70	130	1144	11.7	25	
1,2,3-Trichloropropane	1241	125	1250	0	99.3	70	130	1227	1.13	25	
1,2,4-Trichlorobenzene	1265	50.0	1250	0	101	70	130	1179	7.08	25	
1,2,4-Trimethylbenzene	1474	50.0	1250	0	118	70	130	1430	2.96	25	
1,2-Dibromo-3-Chloropropane	1234	50.0	1250	0	98.7	70	130	1189	3.73	25	
1,2-Dibromoethane	1288	50.0	1250	0	103	70	130	1236	4.16	25	
1,2-Dichlorobenzene	1286	50.0	1250	0	103	70	130	1238	3.88	25	
1,2-Dichloroethane	1249	50.0	1250	0	99.9	70	130	1279	2.37	25	
1,2-Dichloropropane	1257	50.0	1250	0	101	70	130	1257	0	25	
1,3,5-Trimethylbenzene	1389	50.0	1250	0	111	70	130	1343	3.40	25	
1,3-Dichlorobenzene	1310	50.0	1250	0	105	70	130	1270	3.12	25	
1,3-Dichloropropane	1290	50.0	1250	0	103	70	130	1262	2.17	25	
1,4-Dichlorobenzene	1327	50.0	1250	0	106	70	130	1285	3.25	25	
2,2-Dichloropropane	1351	125	1250	0	108	70	130	1095	20.9	25	
2-Butanone	1293	50.0	1250	0	103	70	130	1288	0.407	25	
2-Chloroethyl Vinyl Ether	1216	50.0	1250	0	97.3	70	130	1208	0.722	25	
2-Chlorotoluene	1368	125	1250	0	109	70	130	1339	2.14	25	
2-Hexanone	1346	125	1250	0	108	70	130	1337	0.671	25	
4-Chlorotoluene	1371	125	1250	0	110	70	130	1319	3.89	25	
4-Isopropyltoluene	1369	50.0	1250	0	110	70	130	1324	3.40	25	
4-Methyl-2-Pentanone	1246	50.0	1250	0	99.7	70	130	1256	0.779	25	
Acetone	1228	500	1250	0	98.2	70	130	1316	6.88	25	
Acrylonitrile	2410	50.0	2500	0	96.4	70	130	2604	7.74	25	
Benzene	1285	50.0	1250	0	103	70	130	1268	1.27	25	
Bromobenzene	1326	50.0	1250	0	106	70	130	1288	2.91	25	
Bromochloromethane	1262	125	1250	0	101	70	130	1274	0.966	25	
Bromodichloromethane	1282	50.0	1250	0	103	70	130	1268	1.06	25	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **LCSD** SampType: **LCSD** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297973**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromoform	1336	50.0	1250	0	107	70	130	1308	2.10	25	
Bromomethane	1464	50.0	1250	0	117	70	130	1369	6.74	25	
Carbon Disulfide	1228	50.0	1250	0	98.2	70	130	1222	0.469	25	
Carbon Tetrachloride	1111	50.0	1250	0	88.9	70	130	1012	9.30	25	
Chlorobenzene	1315	50.0	1250	0	105	70	130	1269	3.58	25	
Chloroethane	1409	50.0	1250	0	113	70	130	1464	3.86	25	
Chloroform	1278	50.0	1250	0	102	70	130	1284	0.527	25	
Chloromethane	1336	50.0	1250	0	107	70	130	1377	3.02	25	
cis-1,2-Dichloroethene	1275	50.0	1250	0	102	70	130	1287	0.956	25	
cis-1,3-Dichloropropene	1277	50.0	1250	0	102	70	130	1249	2.22	25	
Dibromochloromethane	1268	50.0	1250	0	101	70	130	1259	0.732	25	
Dibromomethane	1282	50.0	1250	0	103	70	130	1272	0.705	25	
Dichlorodifluoromethane	1162	50.0	1250	0	92.9	70	130	1172	0.878	25	
Ethylbenzene	1406	50.0	1250	0	112	70	130	1369	2.63	25	
Hexachlorobutadiene	1332	50.0	1250	0	107	70	130	1271	4.67	25	
Isopropylbenzene	1385	50.0	1250	0	111	70	130	1340	3.32	25	
Methyl Tert-Butyl Ether	1235	50.0	1250	0	98.8	70	130	1283	3.81	25	
Methylene Chloride	1242	50.0	1250	0	99.4	70	130	1298	4.43	25	
Naphthalene	1262	125	1250	0	101	70	130	1131	10.9	25	
n-Butylbenzene	1364	50.0	1250	0	109	70	130	1315	3.70	25	
n-Propylbenzene	1290	50.0	1250	0	103	70	130	1252	2.95	25	
sec-Butylbenzene	1391	50.0	1250	0	111	70	130	1348	3.14	25	
Styrene	1342	125	1250	0	107	70	130	1313	2.20	25	
tert-Butylbenzene	1371	50.0	1250	0	110	70	130	1325	3.45	25	
Tetrachloroethene	1323	50.0	1250	0	106	70	130	1262	4.68	25	
Toluene	1356	50.0	1250	0	108	70	130	1307	3.66	25	
trans-1,2-Dichloroethene	1234	50.0	1250	0	98.8	70	130	1307	5.71	25	
trans-1,3-Dichloropropene	1306	50.0	1250	0	104	70	130	1191	9.15	25	
Trichloroethene	1283	50.0	1250	0	103	70	130	1264	1.43	25	
Trichlorofluoromethane	1383	125	1250	0	111	70	130	1333	3.65	25	
Vinyl Chloride	1285	50.0	1250	0	103	70	130	1306	1.68	25	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

Sample ID: **LCSD** SampType: **LCSD** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297973**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Xylenes, Total	4364	125	3750	0	116	70	130	4304	1.40	25	
Surr: 1,2-Dichloroethane-d4	724.5	0	750	0	96.6	70	130	0	0	25	
Surr: 4-Bromofluorobenzene	745.0	0	750	0	99.3	70	130	0	0	25	
Surr: Dibromofluoromethane	732.0	0	750	0	97.6	70	130	0	0	25	
Surr: Toluene-d8	756.5	0	750	0	101	70	130	0	0	25	

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_PAHASE

Sample ID: **MB-12414** SampType: **MBLK** TestCode: **8270_S_PAH** Units: **µg/Kg** Prep Date: **1/22/2009** RunNo: **28307**
Client ID: **ZZZZZ** Batch ID: **12414** TestNo: **SW8270C** **(SW3545A)** Analysis Date: **1/22/2009** SeqNo: **299285**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
2-Methylnaphthalene	ND	100									
Acenaphthene	ND	100									
Acenaphthylene	ND	100									
Anthracene	ND	100									
Benz(a)Anthracene	ND	10.0									
Benzo(a)Pyrene	ND	10.0									
Benzo(b)Fluoranthene	ND	100									
Benzo(g,h,i)Perylene	ND	100									
Benzo(k)Fluoranthene	ND	100									
Chrysene	ND	100									
Dibenz(a,h)Anthracene	ND	10.0									
Fluoranthene	ND	100									
Fluorene	ND	100									
Indeno(1,2,3-cd)Pyrene	ND	10.0									
Naphthalene	ND	100									
Phenanthrene	ND	100									
Pyrene	ND	100									
Surr: 2-Fluorobiphenyl	3696	0	5000	0	73.9	30	130				
Surr: Nitrobenzene-d5	2883	0	5000	0	57.7	30	130				
Surr: Terphenyl-d14	3740	0	5000	0	74.8	30	130				

Sample ID: **LCS-12414** SampType: **LCS** TestCode: **8270_S_PAH** Units: **µg/Kg** Prep Date: **1/22/2009** RunNo: **28307**
Client ID: **ZZZZZ** Batch ID: **12414** TestNo: **SW8270C** **(SW3545A)** Analysis Date: **1/22/2009** SeqNo: **299286**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
2-Methylnaphthalene	2202	100	2500	0	88.1	40	140				
Acenaphthene	2000	100	2500	0	80.0	40	140				
Acenaphthylene	2212	100	2500	0	88.5	40	140				
Anthracene	2407	100	2500	0	96.3	40	140				
Benz(a)Anthracene	1258	10.0	2500	0	50.3	40	140				

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits	H	Holding times for preparation or analysis exceeded
		R	RPD outside recovery limits

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_PAHASE

Sample ID: **LCS-12414** SampType: **LCS** TestCode: **8270_S_PAH** Units: **µg/Kg** Prep Date: **1/22/2009** RunNo: **28307**
Client ID: **ZZZZZ** Batch ID: **12414** TestNo: **SW8270C** **(SW3545A)** Analysis Date: **1/22/2009** SeqNo: **299286**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzo(a)Pyrene	2148	10.0	2500	0	85.9	40	140				
Benzo(b)Fluoranthene	2207	100	2500	0	88.3	40	140				
Benzo(g,h,i)Perylene	1918	100	2500	0	76.7	40	140				
Benzo(k)Fluoranthene	2272	100	2500	0	90.9	40	140				
Chrysene	1277	100	2500	0	51.1	40	140				
Dibenz(a,h)Anthracene	1981	10.0	2500	0	79.2	40	140				
Fluoranthene	2339	100	2500	0	93.6	40	140				
Fluorene	2166	100	2500	0	86.6	40	140				
Indeno(1,2,3-cd)Pyrene	2026	10.0	2500	0	81.0	40	140				
Naphthalene	2211	100	2500	0	88.4	40	140				
Phenanthrene	1840	100	2500	0	73.6	40	140				
Pyrene	1592	100	2500	0	63.7	40	140				
Surr: 2-Fluorobiphenyl	3632	0	5000	0	72.6	30	130				
Surr: Nitrobenzene-d5	3072	0	5000	0	61.4	30	130				
Surr: Terphenyl-d14	3422	0	5000	0	68.4	30	130				

Sample ID: **LCSD-12414** SampType: **LCSD** TestCode: **8270_S_PAH** Units: **µg/Kg** Prep Date: **1/22/2009** RunNo: **28307**
Client ID: **ZZZZZ** Batch ID: **12414** TestNo: **SW8270C** **(SW3545A)** Analysis Date: **1/22/2009** SeqNo: **299287**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
2-Methylnaphthalene	2329	100	2500	0	93.2	40	140	2202	5.61	30	
Acenaphthene	2182	100	2500	0	87.3	40	140	2000	8.66	30	
Acenaphthylene	2413	100	2500	0	96.5	40	140	2212	8.69	30	
Anthracene	2567	100	2500	0	103	40	140	2407	6.43	30	
Benz(a)Anthracene	1350	10.0	2500	0	54.0	40	140	1258	7.06	30	
Benzo(a)Pyrene	2178	10.0	2500	0	87.1	40	140	2148	1.36	30	
Benzo(b)Fluoranthene	2176	100	2500	0	87.0	40	140	2207	1.44	30	
Benzo(g,h,i)Perylene	1984	100	2500	0	79.3	40	140	1918	3.36	30	
Benzo(k)Fluoranthene	2312	100	2500	0	92.5	40	140	2272	1.77	30	
Chrysene	2198	100	2500	0	87.9	40	140	1277	53.0	30	R

Qualifiers:

BRL	Below Reporting Limit
J	Analyte detected below quantitation limits
S	Spike Recovery outside recovery limits
E	Value above quantitation range
ND	Not Detected at the Reporting Limit
H	Holding times for preparation or analysis exceeded
R	RPD outside recovery limits

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_PAHASE

Sample ID: **LCSD-12414** SampType: **LCSD** TestCode: **8270_S_PAH** Units: **µg/Kg** Prep Date: **1/22/2009** RunNo: **28307**
Client ID: **ZZZZZ** Batch ID: **12414** TestNo: **SW8270C** **(SW3545A)** Analysis Date: **1/22/2009** SeqNo: **299287**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dibenz(a,h)Anthracene	2009	10.0	2500	0	80.4	40	140	1981	1.40	30	
Fluoranthene	2424	100	2500	0	97.0	40	140	2339	3.59	30	
Fluorene	2292	100	2500	0	91.7	40	140	2166	5.65	30	
Indeno(1,2,3-cd)Pyrene	2082	10.0	2500	0	83.3	40	140	2026	2.78	30	
Naphthalene	2386	100	2500	0	95.5	40	140	2211	7.63	30	
Phenanthrene	1814	100	2500	0	72.5	40	140	1840	1.42	30	
Pyrene	1749	100	2500	0	70.0	40	140	1592	9.37	30	
Surr: 2-Fluorobiphenyl	3975	0	5000	0	79.5	30	130	0	0	0	
Surr: Nitrobenzene-d5	3413	0	5000	0	68.3	30	130	0	0	0	
Surr: Terphenyl-d14	3694	0	5000	0	73.9	30	130	0	0	0	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: EPHP_S

Sample ID: **MBLK-12412** SampType: **MBLK** TestCode: **EPHP_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28297**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH_ (eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **297821**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	ND	0.100									
2-Methylnaphthalene	ND	0.100									
Acenaphthene	ND	0.100									
Phenanthrene	ND	0.100									
Acenaphthylene	ND	0.100									
Fluorene	ND	0.100									
Anthracene	ND	0.100									
Fluoranthene	ND	0.100									
Pyrene	ND	0.100									
Benzo(a)Anthracene	ND	0.100									
Chrysene	ND	0.100									
Benzo(b)Fluoranthene	ND	0.100									
Benzo(k)Fluoranthene	ND	0.100									
Benzo(a)Pyrene	ND	0.100									
Indeno(1,2,3-cd)Pyrene	ND	0.100									
Dibenz(a,h)Anthracene	ND	0.100									
Benzo(g,h,i)Perylene	ND	0.100									
Total PAH Target Concentration	ND	0									
Surr: 2,2'-Difluorobiphenyl	2.003	0	2.5	0	80.1	40	140				
Surr: 2-Fluorobiphenyl	1.867	0	2.5	0	74.7	40	140				

Sample ID: **LCS1-12412** SampType: **LCS** TestCode: **EPHP_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28297**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH_ (eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **297822**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	3.209	0.100	5	0	64.2	40	140				
2-Methylnaphthalene	3.331	0.100	5	0	66.6	40	140				
Acenaphthene	2.360	0.100	5	0	47.2	40	140				
Phenanthrene	3.437	0.100	5	0	68.7	40	140				
Acenaphthylene	2.364	0.100	5	0	47.3	40	140				

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits	H	Holding times for preparation or analysis exceeded
		R	RPD outside recovery limits

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: EPHP_S

Sample ID: **LCS1-12412** SampType: **LCS** TestCode: **EPHP_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28297**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH_ (eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **297822**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluorene	2.637	0.100	5	0	52.7	40	140				
Anthracene	3.560	0.100	5	0	71.2	40	140				
Fluoranthene	3.485	0.100	5	0	69.7	40	140				
Pyrene	4.005	0.100	5	0	80.1	40	140				
Benzo(a)Anthracene	4.082	0.100	5	0	81.6	40	140				
Chrysene	4.437	0.100	5	0	88.7	40	140				
Benzo(b)Fluoranthene	4.379	0.100	5	0	87.6	40	140				
Benzo(k)Fluoranthene	2.748	0.100	5	0	55.0	40	140				
Benzo(a)Pyrene	3.270	0.100	5	0	65.4	40	140				
Indeno(1,2,3-cd)Pyrene	2.931	0.100	5	0	58.6	40	140				
Dibenz(a,h)Anthracene	2.715	0.100	5	0	54.3	40	140				
Benzo(g,h,i)Perylene	3.064	0.100	5	0	61.3	40	140				
Total PAH Target Concentration	56.01	0									
Surr: 2,2'-Difluorobiphenyl	2.380	0	2.5	0	95.2	40	140				
Surr: 2-Fluorobiphenyl	1.651	0	2.5	0	66.0	40	140				

Sample ID: **LCSD-12412** SampType: **LCSD** TestCode: **EPHP_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28297**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH_ (eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **297823**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	2.952	0.100	5	0	59.0	40	140	3.209	8.34	50	
2-Methylnaphthalene	3.676	0.100	5	0	73.5	40	140	3.331	9.85	50	
Acenaphthene	2.375	0.100	5	0	47.5	40	140	2.36	0.634	50	
Phenanthrene	3.239	0.100	5	0	64.8	40	140	3.437	5.93	50	
Acenaphthylene	2.372	0.100	5	0	47.4	40	140	2.364	0.338	50	
Fluorene	2.371	0.100	5	0	47.4	40	140	2.637	10.6	50	
Anthracene	3.120	0.100	5	0	62.4	40	140	3.56	13.2	50	
Fluoranthene	3.505	0.100	5	0	70.1	40	140	3.485	0.572	50	
Pyrene	3.743	0.100	5	0	74.9	40	140	4.005	6.76	50	
Benzo(a)Anthracene	3.509	0.100	5	0	70.2	40	140	4.082	15.1	50	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		
H	Holding times for preparation or analysis exceeded	R	RPD outside recovery limits

ANALYTICAL QC SUMMARY REPORT

Sample ID: **LCSD-12412** SampType: **LCSD** TestCode: **EPHP_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28297**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH_ (eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **297823**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chrysene	3.858	0.100	5	0	77.2	40	140	4.437	14.0	50	
Benzo(b)Fluoranthene	3.777	0.100	5	0	75.5	40	140	4.379	14.8	50	
Benzo(k)Fluoranthene	3.295	0.100	5	0	65.9	40	140	2.748	18.1	50	
Benzo(a)Pyrene	3.015	0.100	5	0	60.3	40	140	3.27	8.11	50	
Indeno(1,2,3-cd)Pyrene	2.691	0.100	5	0	53.8	40	140	2.931	8.54	50	
Dibenz(a,h)Anthracene	2.676	0.100	5	0	53.5	40	140	2.715	1.45	50	
Benzo(g,h,i)Perylene	3.069	0.100	5	0	61.4	40	140	3.064	0.163	50	
Total PAH Target Concentration	53.24	0						56.01	5.07	0	
Surr: 2,2'-Difluorobiphenyl	2.584	0	2.5	0	103	40	140	0	0	0	
Surr: 2-Fluorobiphenyl	1.603	0	2.5	0	64.1	40	140	0	0	0	

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: **epht_s**

Sample ID: **MBLK-12412** SampType: **MBLK** TestCode: **epht_s** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28319**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH (eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **298039**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Adjusted C11-C22 Aromatics	ND	10.0									
C09-C18 Aliphatics	ND	10.0									
C19-C36 Aliphatics	ND	10.0									
Unadjusted C11-C22 Aromatics	ND	10.0									
Surr: 1-Chlorooctadecane	5.400	0	10	0	54.0	40	140				
Surr: o-Terphenyl	7.700	0	10	0	77.0	40	140				

Sample ID: **LCS-12412** SampType: **LCS** TestCode: **epht_s** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28319**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH (eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **298023**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
C09-C18 Aliphatics	ND	10.0	10	0	57.0	40	140				
C19-C36 Aliphatics	ND	10.0	10	0	81.0	40	140				
Unadjusted C11-C22 Aromatics	ND	10.0	10	0	57.0	40	140				
Surr: 1-Chlorooctadecane	6.900	0	10	0	69.0	40	140				
Surr: o-Terphenyl	7.500	0	10	0	75.0	40	140				

Sample ID: **LCSD-12412** SampType: **LCSD** TestCode: **epht_s** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28319**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH (eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **298038**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
C09-C18 Aliphatics	ND	10.0	10	0	62.0	40	140	5.7	0	50	
C19-C36 Aliphatics	ND	10.0	10	0	82.0	40	140	8.1	0	50	
Unadjusted C11-C22 Aromatics	ND	10.0	10	0	74.0	40	140	5.7	0	50	
Surr: 1-Chlorooctadecane	5.700	0	10	0	57.0	40	140	0	0		
Surr: o-Terphenyl	8.600	0	10	0	86.0	40	140	0	0	0	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: hg_7471a_s

Sample ID: **MBLK-12426**	SampType: **MBLK**	TestCode: **hg_7471a_s**	Units: **mg/Kg**		Prep Date:	**1/23/2009**			RunNo: **28315**			
Client ID: **ZZZZZ**	Batch ID: **12426**	TestNo: **SW 7471A**	**(SW7471A)**		Analysis Date:	**1/22/2009**			SeqNo: **298000**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Mercury	ND	0.100										

Sample ID: **LCS-12426**	SampType: **LCS**	TestCode: **hg_7471a_s**	Units: **mg/Kg**		Prep Date:	**1/23/2009**			RunNo: **28315**			
Client ID: **ZZZZZ**	Batch ID: **12426**	TestNo: **SW 7471A**	**(SW7471A)**		Analysis Date:	**1/22/2009**			SeqNo: **297984**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Mercury	2.645	0.100	2.5	0	106	80	120					

Sample ID: **LCSD-12426**	SampType: **LCSD**	TestCode: **hg_7471a_s**	Units: **mg/Kg**		Prep Date:	**1/23/2009**			RunNo: **28315**			
Client ID: **ZZZZZ**	Batch ID: **12426**	TestNo: **SW 7471A**	**(SW7471A)**		Analysis Date:	**1/22/2009**			SeqNo: **297999**			
Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Mercury	2.650	0.100	2.5	0	106	80	120	2.645	0.189	30		

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

Page 1 of 1

CHAIN OF CUSTODY RECORD

GeoLabs, Inc. *Environmental Laboratories*
45 Johnson Lane, Braintree, MA 02184
p 781.848.7844 • f 781.848.7811
www.geolabs.com

Sample Handling: circle choice
Filtration: Done / Not Needed / Lab to do
Preservation: Lab to do Y / N

Special Instructions
*As, Cd, Cr, Cu, Hg, Pb, Ni, Zn

Turnaround: circle one
1-day 3-day
2-day [✓ 5 / 7-days]

Data Delivery: circle choice (s)
Fax [✓ email]
Format:
Excel PDF

Requirements: circle choice (s) 0901214
GW-1 MCP Methods CT RCP (Reasonable Confidence Protocols)
S-1 ~~DEP~~ State / Fed Program - Criteria
QC Other

Client: ESS GROUP, INC
Address: 401 WAMPANOAG TRAIL, SUITE 400
EAST PROVIDENCE, RI 02915
Contact: MATT LADEWIG

Phone: 401-330-1204
Fax: 401-434-8158
email: mladewig@essgroup.com

Project: HOPEDALE
Project PO: H153-000
Invoice to *: CARL NIELSEN

DATE	TIME	SAMPLED BY	SAMPLE LOCATION / ID	TYPE	QUANITY	MATRIX	COMP	GRAB	GeoLabs SAMPLE NUMBER	METALS*	VOCS	PAHS	EPH	PCBs	TOC	% WATER	% ASH	ASTM GRAIN SIZE	ATTERBERG LIMITS	TOTAL N	TEMPERATURE TOTAL P	LAB pH	TEMP
									Preservative:		6												
1/19/09	~~1130~~ 1200 MDL	SL/MZ	SC1	A	2	S	X		1214-001	X		X	X	X	X	X	X	X	X				4°C
↓	1515	↓	SC2	A	3	↓	X		002	X		X	X	X	X	X	X	X	X				↓
↓	1130	↓	SC1~~A~~B MDL	V	1	↓		X	003		X												↓
↓	1516	↓	SC2~~A~~C MDL	~~A~~V	1	↓		X	004		X												↓
↓	1200	↓	N1	G	2	↓	X		005											X	X		↓
↓	1545	↓	N2	G	~~2~~ 1 MDL	↓	X		006											X	X		↓
↓	1515	↓	N3	G	2	↓	X		007											X	X		↓

Matrix Codes:
GW = Ground Water DW = Drinking Water S = Soil A = Air
WW = Waste Water SL = Sludge O = Oil OT = Other

Received on Ice ☑

Preservatives
1 = Hcl 3 = H2SO4 5 = NaOH 7 = Other
2 = HNO3 4 = Na2S2O3 6 = MEOH

Containers:
A = Amber B = Bag O = Other
G = Glass P = Plastic
S = Summa V = Voa

Relinquished by:	Date / Time	Received by:	Date / Time
	1/20/09 11:00	M.	1/20/09 11:00
	1/20/09 1:50	KC	1/20/09 3:00

270675.J&P.C of CR.07/09/07

Terms: Payment due within 30 days unless other arrangements are made. Past due balances subject to interest and collection cost.
Note: Homeowners and Law Firms must pay when dropping off samples. We accept cash, check and credit cards.

CT (PH-0148) MA (MA - 015) NH (2508) NJ (MA-009)
NY(11796) PA (68-03417) RI (LA000252)

Monday, February 23, 2009

GeoLabs, Inc.
45 Johnson Lane
Braintree MA 02184
Tele: 781 848 7844
Fax: 781 848 7811

Matt Ladewig
ESS - Group
401 Wampanoag Trail Suite #400
E. Providence, RI 02915

TEL: 401-330-1200
FAX:

Project: Hopedale
Location: H153-000

Order No.: 0901214

Dear Matt Ladewig:

GeoLabs, Inc. received 7 sample(s) on 1/20/2009 for the analyses presented in the following report.

This report is being re-issued with rerun results for Sieve Analysis on sample 002. There were no problems with the analyses and all data for associated QC met EPA or laboratory specifications.

Analytical methods and results meet requirements of 310CMR 40.1056(J) as per MADEP Compendium of Analytical Methods (CAM).

If you have any questions regarding these tests results, please feel free to call.

Sincerely,

Jim Chen
Laboratory Director

For current certifications, please visit our website at www.geolabs.com

Certifications:

CT (PH-0148) - MA (M-MA015) - NH (2508) - NJ (MA009) - NY (11796) - RI (LA000252)

CLIENT: ESS - Group
Project: Hopedale
Lab Order: 0901214

CASE NARRATIVE

MADEP MCP Response Action Analytical Report Certification Form

Laboratory Name: GeoLabs, Inc. Project # H153-000
Project Location: Hopedale MADEP RTN #:

This form provides certification for the following data set: 0901214 (001-007)

Sample Matrix: Soil

MCP Methods Used: 6010B, 7471A, 8260B, 8270C, EPH, 8082

An affirmative answer to questions A, B, C and D are required for "Presumptive Certainty" status

A. Were all samples received by the laboratory in a condition consistent with that described on the Chain of custody documentation for the data set? YES

B. Were all QA/QC procedures required for the specified method(s) included in this report followed, including the requirement to note and discuss in a narrative QC data that did not meet appropriate standards or guidelines? YES

C. Does the analytical data included in this report meet all the requirements for "Presumptive Certainty" as described in Section 2.0 of the MADEP documents CAM VII A "Quality Assurance and Quality Control Guidelines for the Acquisition and Reporting of Analytical Data"? YES

D. VPH and EPH Methods only: Was the VPH or EPH Method conducted without significant modifications (see Section 11.3 of respective Methods) YES

A response to questions E and F are required for "Presumptive Certainty" status

E. Were all QC performance standards and recommendations for the specified methods achieved? NO
F. Were results for all analyte-list compounds/elements for the specified method(s) reported? NO

All NO answers need to be addressed in an attached Environmental Laboratory case narrative.

CLIENT: ESS - Group
Project: Hopedale
Lab Order: 0901214

CASE NARRATIVE

CASE NARRATIVE

Physical Condition of Samples

The project was received by the laboratory in satisfactory condition. The sample(s) were received undamaged, in appropriate containers with the correct preservation.

Project Documentation

The project was accompanied by satisfactory Chain of Custody documentation.

Analysis of Sample(s)

PAH compounds only analyzed by 8270C per client request.

Selected metals analyzed by 6010B per client request.

The following analytical anomalies or non-conformances were noted by the laboratory during the processing of these samples:

8270 RPD for Chrysene is outside the limit.

I, the undersigned, attest under the pains and penalties of perjury that, based upon my personal inquiry of those responsible for obtaining the information, the material contained in this analytical report is, to the best of my knowledge and belief, accurate and complete.

Signature: Jim Chen Position: Lab Director

Printed Name: Jim Chen Date: February 23, 2009

EPH Methods

Method for Ranges: MADEP EPH 04-1.1
Method for Target Analytes: 8270 GC/MS

Carbon Range data exclude concentrations of any surrogate(s) and/or internal standards eluting in that range
C11-C22 Aromatic Hydrocarbons exclude concentrations of Target PAH Analytes

CERTIFICATION:
Were all QA/QC procedures REQUIRED by the EPH Method followed? YES
Were all performance/acceptance standards achieved? YES
Were any significant modifications made to the EPH method? NO

I attest under the pains and penalties of perjury that, based upon my inquiry of those individuals immediately responsible for obtaining the information, the material contained in this report is, to the best of my knowledge and belief, accurate and complete.

SIGNATURE: LAB DIRECTOR

PRINTED NAME: Jim Chen

DATE: February 23, 2009

GeoLabs, Inc.
Environmental Laboratories

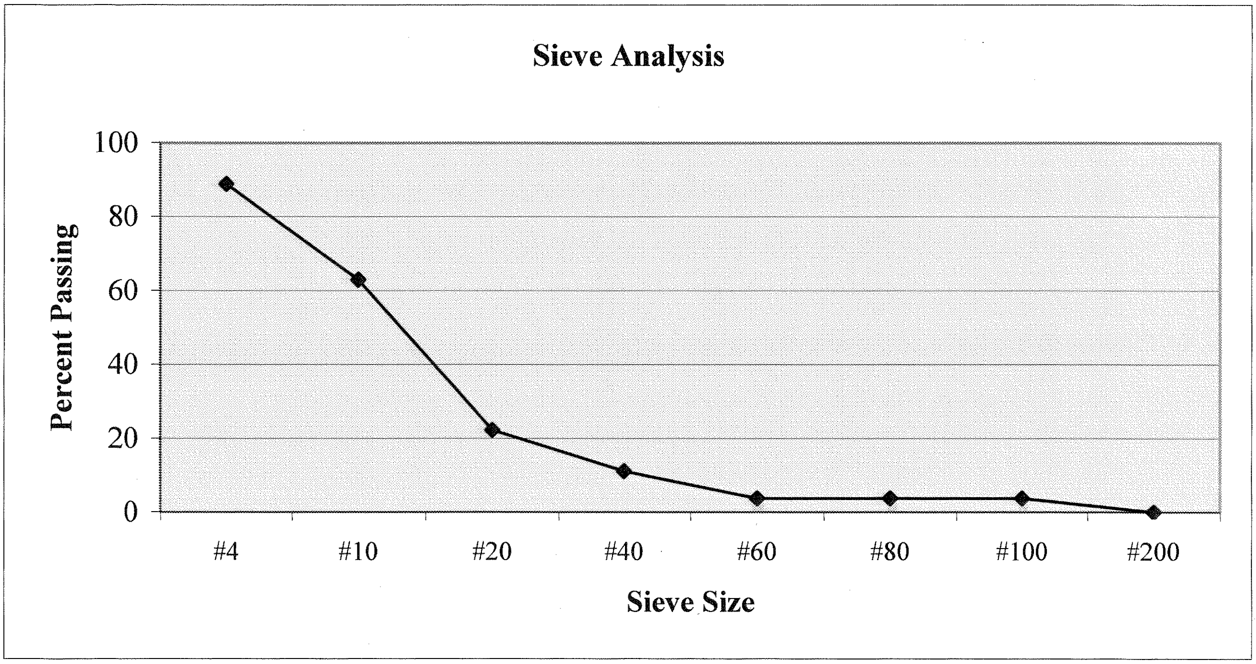
CLIENT NAME:	**ESS GROUP**	PROJECT ID:	HOPEDALE
SAMPLE TYPE:	SOIL	REPORT DATE:	02/10/09
COLLECTION DATE:	01/19/09	ANALYZED BY:	BP
REC'D BY LAB:	01/20/09	ANALYSIS DATE:	02/09/09
COLLECTED BY:	CLIENT	DIGESTION DATE:	N/A

SIEVE ANALYSIS

SAMPLE NUMBER: 0901214-001
SAMPLE LOCATION: SC-1

SIEVE SIZE	#4	#10	#20	#40	#60	#80	#100
RESULTS **(% Passing by Wt.)**	88.9	63.0	22.2	11.1	3.70	3.70	3.70

SIEVE SIZE	#200
RESULTS **(% Passing by Wt.)**	0.00



ASTM C 136, ASTM C117

GeoLabs, Inc.
Environmental Laboratories

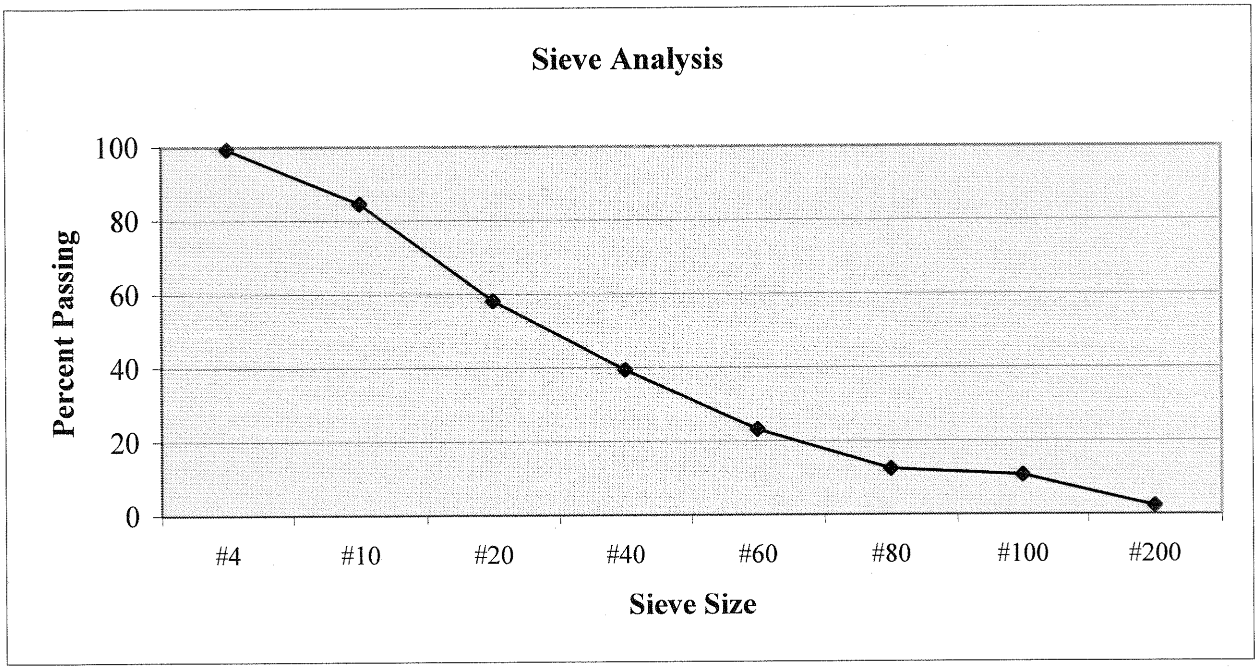
CLIENT NAME:	**ESS GROUP**	PROJECT ID:	HOPEDALE
SAMPLE TYPE:	SOIL	REPORT DATE:	02/23/09
COLLECTION DATE:	01/19/09	ANALYZED BY:	BP / WFR
REC'D BY LAB:	01/20/09	ANALYSIS DATE:	02/23/09
COLLECTED BY:	CLIENT	DIGESTION DATE:	N/A

SIEVE ANALYSIS

SAMPLE NUMBER: 0901214-002
SAMPLE LOCATION: SC-2

SIEVE SIZE	#4	#10	#20	#40	#60	#80	#100
RESULTS (% Passing by Wt.)	99.3	84.5	58.1	39.4	23.2	12.4	10.6

SIEVE SIZE	#200
RESULTS (% Passing by Wt.)	2.28



ASTM C 136, ASTM C117

GeoLabs, Inc.

Reissue Date: *23-Feb-09*
Original Reported Date: 30-Jan-09

CLIENT: ESS - Group
Project: Hopedale
Lab Order: 0901214

Lab ID: 0901214-001
Client Sample ID: SC 1
Collection Date: 1/19/2009 12:00:00 PM
Matrix: SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
ASH - ASTM D-482-87						Analyst: **FC**
Ash	*81.4*	1.00		%	1	1/22/2009
PERCENT MOISTURE - 209A						Analyst: **FC**
Percent Moisture	*10*	1.0		wt%	1	1/21/2009
EPH RANGES - MADEP EPH						Analyst: **RuP**
Adjusted C11-C22 Aromatics	*104*	11.1		mg/Kg-dry	1	1/22/2009
C09-C18 Aliphatics	ND	11.1		mg/Kg-dry	1	1/22/2009
C19-C36 Aliphatics	*136*	11.1		mg/Kg-dry	1	1/22/2009
Unadjusted C11-C22 Aromatics	*137*	11.1		mg/Kg-dry	1	1/22/2009
Surr: 1-Chlorooctadecane	86.0	40-140		%REC	1	1/22/2009
Surr: o-Terphenyl	78.0	40-140		%REC	1	1/22/2009
POLYCHLORINATED BIPHENYLS - SW8082						Analyst: **GP**
Aroclor 1016/1242	ND	55.6		µg/Kg-dry	1	1/22/2009
Aroclor 1221	ND	55.6		µg/Kg-dry	1	1/22/2009
Aroclor 1232	ND	55.6		µg/Kg-dry	1	1/22/2009
Aroclor 1248	ND	55.6		µg/Kg-dry	1	1/22/2009
Aroclor 1254	ND	55.6		µg/Kg-dry	1	1/22/2009
Aroclor 1260	ND	55.6		µg/Kg-dry	1	1/22/2009
Aroclor 1262	ND	55.6		µg/Kg-dry	1	1/22/2009
Aroclor 1268	ND	55.6		µg/Kg-dry	1	1/22/2009
Surr: Decachlorobiphenyl Sig 1	78.0	30-150		%REC	1	1/22/2009
Surr: Decachlorobiphenyl Sig 2	44.0	30-150		%REC	1	1/22/2009
Surr: Tetrachloro-m-Xylene Sig 1	76.0	30-150		%REC	1	1/22/2009
Surr: Tetrachloro-m-Xylene Sig 2	66.0	30-150		%REC	1	1/22/2009
TOTAL METALS BY ICP - SW6010B						Analyst: **ZYZ**
Arsenic	*27.4*	5.27		mg/Kg-dry	1	1/22/2009
Cadmium	ND	5.27		mg/Kg-dry	1	1/22/2009
Chromium	*9.70*	5.27		mg/Kg-dry	1	1/22/2009
Copper	*40.9*	5.27		mg/Kg-dry	1	1/22/2009
Lead	*66.2*	5.27		mg/Kg-dry	1	1/22/2009
Nickel	*6.26*	5.27		mg/Kg-dry	1	1/22/2009
Zinc	*11.0*	5.27		mg/Kg-dry	1	1/22/2009
MERCURY - SW7471A						Analyst: **EC**

Qualifiers:				
	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

Reissue Date: *23-Feb-09*
Original Reported Date: 30-Jan-09

CLIENT: ESS - Group
Project: Hopedale
Lab Order: 0901214

MERCURY - SW7471A

Analyst: **EC**

Mercury	*0.128*	0.111	mg/Kg-dry	1	1/22/2009

PAH - SW8270C

Analyst: **MR**

2-Methylnaphthalene	ND	1110	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Acenaphthene	ND	1110	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Acenaphthylene	ND	1110	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Anthracene	*1400*	1110	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Benz(a)Anthracene	*2170*	111	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Benzo(a)Pyrene	*3050*	111	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Benzo(b)Fluoranthene	*4220*	1110	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Benzo(g,h,i)Perylene	*2410*	1110	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Benzo(k)Fluoranthene	*2330*	1110	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Chrysene	*4110*	1110	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Dibenz(a,h)Anthracene	ND	111	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Fluoranthene	*9410*	1110	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Fluorene	ND	1110	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Indeno(1,2,3-cd)Pyrene	*2300*	111	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Naphthalene	ND	1110	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Phenanthrene	*4410*	1110	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Pyrene	*6060*	1110	µg/Kg-dry	10	1/22/2009 1:14:00 PM
Surr: 2-Fluorobiphenyl	52.1	30-130	%REC	10	1/22/2009 1:14:00 PM
Surr: Nitrobenzene-d5	32.5	30-130	%REC	10	1/22/2009 1:14:00 PM
Surr: Terphenyl-d14	65.6	30-130	%REC	10	1/22/2009 1:14:00 PM

EPH TARGET ANALYTES - MADEP EPH

Analyst: **MR**

Naphthalene	ND	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
2-Methylnaphthalene	ND	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Acenaphthene	ND	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Phenanthrene	*3.19*	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Acenaphthylene	*0.147*	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Fluorene	ND	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Anthracene	ND	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Fluoranthene	*7.90*	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Pyrene	*6.41*	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Benzo(a)Anthracene	*2.75*	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Chrysene	*3.55*	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Benzo(b)Fluoranthene	*2.14*	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Benzo(k)Fluoranthene	*2.79*	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Benzo(a)Pyrene	*2.83*	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Indeno(1,2,3-cd)Pyrene	*0.478*	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Dibenz(a,h)Anthracene	ND	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Benzo(g,h,i)Perylene	*0.483*	0.111	mg/Kg-dry	1	1/22/2009 12:44:00 PM
Total PAH Target Concentration	*32.7*	0	mg/Kg-dry	1	1/22/2009 12:44:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

EPH TARGET ANALYTES - MADEP EPH Analyst: **MR**

Surr: 2,2'-Difluorobiphenyl	101	40-140	%REC	1	1/22/2009 12:44:00 PM
Surr: 2-Fluorobiphenyl	80.6	40-140	%REC	1	1/22/2009 12:44:00 PM

TOTAL ORGANIC CARBON- SW 9060 Analyst: **RP**

Total Organic Carbon	*60300*	444	mg/Kg-dry	1	1/27/2009

CLIENT: ESS - Group **Lab Order:** 0901214
Project: Hopedale

Lab ID: 0901214-002 **Collection Date:** 1/19/2009 3:15:00 PM
Client Sample ID: SC 2 **Matrix:** SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
ASH - ASTM D-482-87						Analyst: **FC**
Ash	*50.8*	1.00		%	1	1/22/2009
PERCENT MOISTURE - 209A						Analyst: **FC**
Percent Moisture	*15.0*	0		wt%	1	1/21/2009
EPH RANGES - MADEP EPH						Analyst: **RuP**
Adjusted C11-C22 Aromatics	*85.8*	10.0		mg/Kg-dry	1	1/22/2009
C09-C18 Aliphatics	ND	10.0		mg/Kg-dry	1	1/22/2009
C19-C36 Aliphatics	*122*	10.0		mg/Kg-dry	1	1/22/2009
Unadjusted C11-C22 Aromatics	*93.9*	10.0		mg/Kg-dry	1	1/22/2009
Surr: 1-Chlorooctadecane	63.0	40-140		%REC	1	1/22/2009
Surr: o-Terphenyl	70.0	40-140		%REC	1	1/22/2009
POLYCHLORINATED BIPHENYLS - SW8082						Analyst: **GP**
Aroclor 1016/1242	ND	50.0		µg/Kg-dry	1	1/22/2009
Aroclor 1221	ND	50.0		µg/Kg-dry	1	1/22/2009
Aroclor 1232	ND	50.0		µg/Kg-dry	1	1/22/2009
Aroclor 1248	ND	50.0		µg/Kg-dry	1	1/22/2009
Aroclor 1254	ND	50.0		µg/Kg-dry	1	1/22/2009
Aroclor 1260	ND	50.0		µg/Kg-dry	1	1/22/2009
Aroclor 1262	ND	50.0		µg/Kg-dry	1	1/22/2009
Aroclor 1268	ND	50.0		µg/Kg-dry	1	1/22/2009
Surr: Decachlorobiphenyl Sig 1	98.0	30-150		%REC	1	1/22/2009
Surr: Decachlorobiphenyl Sig 2	70.0	30-150		%REC	1	1/22/2009
Surr: Tetrachloro-m-Xylene Sig 1	88.0	30-150		%REC	1	1/22/2009
Surr: Tetrachloro-m-Xylene Sig 2	82.0	30-150		%REC	1	1/22/2009
TOTAL METALS BY ICP - SW6010B						Analyst: **ZYZ**
Arsenic	ND	4.90		mg/Kg-dry	1	1/22/2009
Cadmium	ND	4.90		mg/Kg-dry	1	1/22/2009
Chromium	ND	4.90		mg/Kg-dry	1	1/22/2009
Copper	*18.8*	4.90		mg/Kg-dry	1	1/22/2009
Lead	*6.99*	4.90		mg/Kg-dry	1	1/22/2009
Nickel	ND	4.90		mg/Kg-dry	1	1/22/2009
Zinc	ND	4.90		mg/Kg-dry	1	1/22/2009
MERCURY - SW7471A						Analyst: **EC**

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

CLIENT: ESS - Group
Project: Hopedale
Lab Order: 0901214

MERCURY - SW7471A

Analyst: **EC**

Mercury	ND	0.100	mg/Kg-dry	1	1/22/2009

PAH - SW8270C

Analyst: **MR**

2-Methylnaphthalene	ND	100	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Acenaphthene	ND	100	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Acenaphthylene	ND	100	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Anthracene	ND	100	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Benz(a)Anthracene	ND	10.0	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Benzo(a)Pyrene	ND	10.0	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Benzo(b)Fluoranthene	ND	100	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Benzo(g,h,i)Perylene	ND	100	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Benzo(k)Fluoranthene	ND	100	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Chrysene	ND	100	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Dibenz(a,h)Anthracene	ND	10.0	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Fluoranthene	ND	100	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Fluorene	ND	100	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Indeno(1,2,3-cd)Pyrene	ND	10.0	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Naphthalene	ND	100	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Phenanthrene	ND	100	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Pyrene	ND	100	µg/Kg-dry	1	1/22/2009 5:41:00 PM
Surr: 2-Fluorobiphenyl	31.7	30-130	%REC	1	1/22/2009 5:41:00 PM
Surr: Nitrobenzene-d5	30.1	30-130	%REC	1	1/22/2009 5:41:00 PM
Surr: Terphenyl-d14	31.5	30-130	%REC	1	1/22/2009 5:41:00 PM

EPH TARGET ANALYTES - MADEP EPH

Analyst: **MR**

Naphthalene	ND	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
2-Methylnaphthalene	ND	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Acenaphthene	ND	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Phenanthrene	*0.724*	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Acenaphthylene	ND	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Fluorene	ND	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Anthracene	*0.123*	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Fluoranthene	*1.70*	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Pyrene	*1.69*	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Benzo(a)Anthracene	*0.604*	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Chrysene	*0.918*	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Benzo(b)Fluoranthene	*0.736*	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Benzo(k)Fluoranthene	*0.443*	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Benzo(a)Pyrene	*0.650*	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Indeno(1,2,3-cd)Pyrene	*0.111*	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Dibenz(a,h)Anthracene	ND	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Benzo(g,h,i)Perylene	*0.370*	0.100	mg/Kg-dry	1	1/22/2009 1:23:00 PM
Total PAH Target Concentration	*8.06*	0	mg/Kg-dry	1	1/22/2009 1:23:00 PM

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT: ESS - Group
Project: Hopedale
Lab Order: 0901214

EPH TARGET ANALYTES - MADEP EPH					Analyst: **MR**
Surr: 2,2'-Difluorobiphenyl	97.9	40-140	%REC	1	1/22/2009 1:23:00 PM
Surr: 2-Fluorobiphenyl	74.4	40-140	%REC	1	1/22/2009 1:23:00 PM
TOTAL ORGANIC CARBON- SW 9060					Analyst: **RP**
Total Organic Carbon	100000	400	mg/Kg-dry	1	1/27/2009

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

Reissue Date: *23-Feb-09*
Original Reported Date: 30-Jan-09

CLIENT: ESS - Group
Project: Hopedale
Lab Order: 0901214

Lab ID: 0901214-003
Client Sample ID: SC 1B
Collection Date: 1/19/2009 11:30:00 AM
Matrix: SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS - 8260B						Analyst: **ZYZ**
1,1,1,2-Tetrachloroethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,1,1-Trichloroethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,1,2,2-Tetrachloroethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,1,2-Trichloroethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,1-Dichloroethane	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
1,1-Dichloroethene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,1-Dichloropropene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2,3-Trichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2,3-Trichloropropane	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
1,2,4-Trichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2,4-Trimethylbenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2-Dibromo-3-Chloropropane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2-Dibromoethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2-Dichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2-Dichloroethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,2-Dichloropropane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,3,5-Trimethylbenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,3-Dichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,3-Dichloropropane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
1,4-Dichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
2,2-Dichloropropane	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
2-Butanone	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
2-Chloroethyl Vinyl Ether	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
2-Chlorotoluene	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
2-Hexanone	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
4-Chlorotoluene	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
4-Isopropyltoluene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
4-Methyl-2-Pentanone	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Acetone	ND	500		µg/Kg	1	1/22/2009 9:56:00 PM
Acrylonitrile	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Benzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Bromobenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Bromochloromethane	ND	125		µg/Kg	1	1/22/2009 9:56:00 PM
Bromodichloromethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Bromoform	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Bromomethane	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Carbon Disulfide	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Carbon Tetrachloride	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM
Chlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 9:56:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

CLIENT: ESS - Group **Lab Order:** 0901214
Project: Hopedale

VOLATILE ORGANIC COMPOUNDS - 8260B Analyst: **ZYZ**

Chloroethane	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Chloroform	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Chloromethane	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
cis-1,2-Dichloroethene	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
cis-1,3-Dichloropropene	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Dibromochloromethane	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Dibromomethane	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Dichlorodifluoromethane	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Ethylbenzene	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Hexachlorobutadiene	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Isopropylbenzene	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Methyl Tert-Butyl Ether	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Methylene Chloride	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Naphthalene	ND	125	µg/Kg	1	1/22/2009 9:56:00 PM
n-Butylbenzene	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
n-Propylbenzene	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
sec-Butylbenzene	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Styrene	ND	125	µg/Kg	1	1/22/2009 9:56:00 PM
tert-Butylbenzene	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Tetrachloroethene	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Toluene	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
trans-1,2-Dichloroethene	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
trans-1,3-Dichloropropene	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Trichloroethene	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Trichlorofluoromethane	ND	125	µg/Kg	1	1/22/2009 9:56:00 PM
Vinyl Chloride	ND	50.0	µg/Kg	1	1/22/2009 9:56:00 PM
Xylenes, Total	ND	125	µg/Kg	1	1/22/2009 9:56:00 PM
Surr: 1,2-Dichloroethane-d4	102	70-130	%REC	1	1/22/2009 9:56:00 PM
Surr: 4-Bromofluorobenzene	91.1	70-130	%REC	1	1/22/2009 9:56:00 PM
Surr: Dibromofluoromethane	95.4	70-130	%REC	1	1/22/2009 9:56:00 PM
Surr: Toluene-d8	97.5	70-130	%REC	1	1/22/2009 9:56:00 PM

Qualifiers:	B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
	S	Spike Recovery outside recovery limits		

CLIENT: ESS - Group
Project: Hopedale
Lab Order: 0901214

Lab ID: 0901214-004
Client Sample ID: SC 2C
Collection Date: 1/19/2009 3:10:00 PM
Matrix: SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
VOLATILE ORGANIC COMPOUNDS - 8260B						Analyst: **ZYZ**
1,1,1,2-Tetrachloroethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,1,1-Trichloroethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,1,2,2-Tetrachloroethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,1,2-Trichloroethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,1-Dichloroethane	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
1,1-Dichloroethene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,1-Dichloropropene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2,3-Trichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2,3-Trichloropropane	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
1,2,4-Trichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2,4-Trimethylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2-Dibromo-3-Chloropropane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2-Dibromoethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2-Dichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2-Dichloroethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,2-Dichloropropane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,3,5-Trimethylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,3-Dichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,3-Dichloropropane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
1,4-Dichlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
2,2-Dichloropropane	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
2-Butanone	836	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
2-Chloroethyl Vinyl Ether	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
2-Chlorotoluene	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
2-Hexanone	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
4-Chlorotoluene	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
4-Isopropyltoluene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
4-Methyl-2-Pentanone	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Acetone	ND	500		µg/Kg	1	1/22/2009 10:33:00 PM
Acrylonitrile	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Benzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Bromobenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Bromochloromethane	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
Bromodichloromethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Bromoform	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Bromomethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Carbon Disulfide	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Carbon Tetrachloride	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Chlorobenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

CLIENT: ESS - Group **Lab Order:** 0901214
Project: Hopedale

VOLATILE ORGANIC COMPOUNDS - 8260B Analyst: **ZYZ**

Chloroethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Chloroform	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Chloromethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
cis-1,2-Dichloroethene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
cis-1,3-Dichloropropene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Dibromochloromethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Dibromomethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Dichlorodifluoromethane	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Ethylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Hexachlorobutadiene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Isopropylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Methyl Tert-Butyl Ether	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Methylene Chloride	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Naphthalene	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
n-Butylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
n-Propylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
sec-Butylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Styrene	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
tert-Butylbenzene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Tetrachloroethene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Toluene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
trans-1,2-Dichloroethene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
trans-1,3-Dichloropropene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Trichloroethene	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Trichlorofluoromethane	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
Vinyl Chloride	ND	50.0		µg/Kg	1	1/22/2009 10:33:00 PM
Xylenes, Total	ND	125		µg/Kg	1	1/22/2009 10:33:00 PM
Surr: 1,2-Dichloroethane-d4	101	70-130		%REC	1	1/22/2009 10:33:00 PM
Surr: 4-Bromofluorobenzene	97.0	70-130		%REC	1	1/22/2009 10:33:00 PM
Surr: Dibromofluoromethane	92.7	70-130		%REC	1	1/22/2009 10:33:00 PM
Surr: Toluene-d8	99.9	70-130		%REC	1	1/22/2009 10:33:00 PM

Lab ID: 0901214-005 **Collection Date:** 1/19/2009 12:00:00 PM
Client Sample ID: N 1 **Matrix:** SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL NITROGEN IN SOIL						Analyst: **RP**
Total Nitrogen	*4600*	4.2		mg/Kg-dry	1	1/27/2009
TOTAL PHOSPHOROUS - L10-115-01-1-E						Analyst: **RP**
Total Phosphorous	*229*	2.93		mg/Kg-dry	2	1/29/2009

Qualifiers:

B	Analyte detected in the associated Method Blank	BRL	Below Reporting Limit
E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit
S	Spike Recovery outside recovery limits		

CLIENT: ESS - Group
Project: Hopedale

Lab Order: 0901214

Lab ID: 0901214-006
Client Sample ID: N 2

Collection Date: 1/19/2009 3:45:00 PM
Matrix: SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL NITROGEN IN SOIL						Analyst: **RP**
Total Nitrogen	*3500*	3.8		mg/Kg-dry	1	1/27/2009
TOTAL PHOSPHOROUS - L10-115-01-1-E						Analyst: **RP**
Total Phosphorous	*66.0*	1.32		mg/Kg-dry	1	1/29/2009

Lab ID: 0901214-007
Client Sample ID: N 3

Collection Date: 1/19/2009 3:15:00 PM
Matrix: SOIL

Analyses	Result	Det. Limit	Qual	Units	DF	Date Analyzed
TOTAL NITROGEN IN SOIL						Analyst: **RP**
Total Nitrogen	*6300*	4.5		mg/Kg-dry	1	1/27/2009
TOTAL PHOSPHOROUS - L10-115-01-1-E						Analyst: **RP**
Total Phosphorous	*53.9*	1.58		mg/Kg-dry	1	1/29/2009

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010b_S

Sample ID: **MBLK-12422** SampType: **MBLK** TestCode: **6010b_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28312**
Client ID: **ZZZZZ** Batch ID: **12422** TestNo: **SW6010B** **(SW3050B)** Analysis Date: **1/22/2009** SeqNo: **297946**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	ND	5.00									
Cadmium	ND	5.00									
Chromium	ND	5.00									
Copper	ND	5.00									
Lead	ND	5.00									
Nickel	ND	5.00									
Zinc	ND	5.00									

Sample ID: **LCS-12422** SampType: **LCS** TestCode: **6010b_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28312**
Client ID: **ZZZZZ** Batch ID: **12422** TestNo: **SW6010B** **(SW3050B)** Analysis Date: **1/22/2009** SeqNo: **297947**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	126.4	5.00	133.3	0.06667	94.8	80	120				
Cadmium	125.0	5.00	133.3	1	93.0	80	120				
Chromium	133.1	5.00	133.3	0.1333	99.8	80	120				
Copper	152.9	5.00	133.3	0	115	80	120				
Lead	127.7	5.00	133.3	0.06667	95.7	80	120				
Nickel	127.3	5.00	133.3	0	95.5	80	120				
Zinc	134.6	5.00	133.3	0	101	80	120				

Sample ID: **LCSD-12422** SampType: **LCSD** TestCode: **6010B_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28312**
Client ID: **ZZZZZ** Batch ID: **12422** TestNo: **SW6010B** **(SW3050B)** Analysis Date: **1/22/2009** SeqNo: **298064**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Arsenic	126.9	5.00	133.3	0	95.2	80	120	126.4	0.421	30	
Cadmium	124.1	5.00	133.3	0	93.1	80	120	125	0.749	30	
Chromium	131.7	5.00	133.3	0	98.8	80	120	133.1	1.11	30	
Copper	153.9	5.00	133.3	0	115	80	120	152.9	0.652	30	
Lead	126.7	5.00	133.3	0	95.0	80	120	127.7	0.786	30	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 6010b_S

Sample ID: **LCSD-12422** SampType: **LCSD** TestCode: **6010B_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28312**
Client ID: **ZZZZZ** Batch ID: **12422** TestNo: **SW6010B** **(SW3050B)** Analysis Date: **1/22/2009** SeqNo: **298064**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Nickel	126.6	5.00	133.3	0	95.0	80	120	127.3	0.578	30	
Zinc	134.1	5.00	133.3	0	101	80	120	134.6	0.397	30	

Qualifiers:						
	BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
	S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8082_s_ase

Sample ID: **MBLK-12417** SampType: **MBLK** TestCode: **8082_s_ase** Units: **µg/Kg** Prep Date: **1/22/2009** RunNo: **28313**
Client ID: **ZZZZZ** Batch ID: **12417** TestNo: **SW8082** **(SW3545A)** Analysis Date: **1/22/2009** SeqNo: **297971**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016/1242	ND	50.0									
Aroclor 1221	ND	50.0									
Aroclor 1232	ND	50.0									
Aroclor 1248	ND	50.0									
Aroclor 1254	ND	50.0									
Aroclor 1260	ND	50.0									
Aroclor 1262	ND	50.0									
Aroclor 1268	ND	50.0									
Surr: Decachlorobiphenyl Sig 1	80.00	0	100	0	80.0	30	150				
Surr: Decachlorobiphenyl Sig 2	58.00	0	100	0	58.0	30	150				
Surr: Tetrachloro-m-Xylene Sig 1	64.00	0	100	0	64.0	30	150				
Surr: Tetrachloro-m-Xylene Sig 2	66.00	0	100	0	66.0	30	150				

Sample ID: **LCS-12417** SampType: **LCS** TestCode: **8082_s_ase** Units: **µg/Kg** Prep Date: **1/22/2009** RunNo: **28313**
Client ID: **ZZZZZ** Batch ID: **12417** TestNo: **SW8082** **(SW3545A)** Analysis Date: **1/22/2009** SeqNo: **297965**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016/1242	72.00	50.0	100	0	72.0	30	150				
Aroclor 1221	ND	50.0									
Aroclor 1232	ND	50.0									
Aroclor 1248	ND	50.0									
Aroclor 1254	ND	50.0									
Aroclor 1260	75.00	50.0	100	0	75.0	30	150				
Aroclor 1262	ND	50.0									
Aroclor 1268	ND	50.0									
Surr: Decachlorobiphenyl Sig 1	82.00	0	100	0	82.0	30	150				
Surr: Decachlorobiphenyl Sig 2	58.00	0	100	0	58.0	30	150				
Surr: Tetrachloro-m-Xylene Sig 1	70.00	0	100	0	70.0	30	150				
Surr: Tetrachloro-m-Xylene Sig 2	74.00	0	100	0	74.0	30	150				

Qualifiers:	BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
	S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8082_s_ase

Sample ID: **LCSD-12417** SampType: **LCSD** TestCode: **8082_s_ase** Units: **µg/Kg** Prep Date: **1/22/2009** RunNo: **28313**
Client ID: **ZZZZZ** Batch ID: **12417** TestNo: **SW8082** **(SW3545A)** Analysis Date: **1/22/2009** SeqNo: **297970**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Aroclor 1016/1242	61.00	50.0	100	0	61.0	30	150	72	16.5	30	
Aroclor 1221	ND	50.0						0	0	0	
Aroclor 1232	ND	50.0						0	0	0	
Aroclor 1248	ND	50.0						0	0	0	
Aroclor 1254	ND	50.0						0	0	0	
Aroclor 1260	67.00	50.0	100	0	67.0	30	150	75	11.3	30	
Aroclor 1262	ND	50.0						0	0	0	
Aroclor 1268	ND	50.0						0	0	0	
Surr: Decachlorobiphenyl Sig 1	74.00	0	100	0	74.0	30	150	0	0	0	
Surr: Decachlorobiphenyl Sig 2	64.00	0	100	0	64.0	30	150	0	0	0	
Surr: Tetrachloro-m-Xylene Sig 1	62.00	0	100	0	62.0	30	150	0	0	0	
Surr: Tetrachloro-m-Xylene Sig 2	72.00	0	100	0	72.0	30	150	0	0	0	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **SB** SampType: **MBLK** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297974**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1,2-Tetrachloroethane	ND	50.0									
1,1,1-Trichloroethane	ND	50.0									
1,1,2,2-Tetrachloroethane	ND	50.0									
1,1,2-Trichloroethane	ND	50.0									
1,1-Dichloroethane	ND	125									
1,1-Dichloroethene	ND	50.0									
1,1-Dichloropropene	ND	50.0									
1,2,3-Trichlorobenzene	ND	50.0									
1,2,3-Trichloropropane	ND	125									
1,2,4-Trichlorobenzene	ND	50.0									
1,2,4-Trimethylbenzene	ND	50.0									
1,2-Dibromo-3-Chloropropane	ND	50.0									
1,2-Dibromoethane	ND	50.0									
1,2-Dichlorobenzene	ND	50.0									
1,2-Dichloroethane	ND	50.0									
1,2-Dichloropropane	ND	50.0									
1,3,5-Trimethylbenzene	ND	50.0									
1,3-Dichlorobenzene	ND	50.0									
1,3-Dichloropropane	ND	50.0									
1,4-Dichlorobenzene	ND	50.0									
2,2-Dichloropropane	ND	125									
2-Butanone	ND	50.0									
2-Chloroethyl Vinyl Ether	ND	50.0									
2-Chlorotoluene	ND	125									
2-Hexanone	ND	125									
4-Chlorotoluene	ND	125									
4-Isopropyltoluene	ND	50.0									
4-Methyl-2-Pentanone	ND	50.0									
Acetone	ND	500									
Acrylonitrile	ND	50.0									
Benzene	ND	50.0									

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT:	ESS - Group
Work Order:	0901214
Project:	Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **SB** SampType: **MBLK** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**

Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297974**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromobenzene	ND	50.0									
Bromochloromethane	ND	125									
Bromodichloromethane	ND	50.0									
Bromoform	ND	50.0									
Bromomethane	ND	50.0									
Carbon Disulfide	ND	50.0									
Carbon Tetrachloride	ND	50.0									
Chlorobenzene	ND	50.0									
Chloroethane	ND	50.0									
Chloroform	ND	50.0									
Chloromethane	ND	50.0									
cis-1,2-Dichloroethene	ND	50.0									
cis-1,3-Dichloropropene	ND	50.0									
Dibromochloromethane	ND	50.0									
Dibromomethane	ND	50.0									
Dichlorodifluoromethane	ND	50.0									
Ethylbenzene	ND	50.0									
Hexachlorobutadiene	ND	50.0									
Isopropylbenzene	ND	50.0									
Methyl Tert-Butyl Ether	ND	50.0									
Methylene Chloride	ND	50.0									
Naphthalene	ND	125									
n-Butylbenzene	ND	50.0									
n-Propylbenzene	ND	50.0									
sec-Butylbenzene	ND	50.0									
Styrene	ND	125									
tert-Butylbenzene	ND	50.0									
Tetrachloroethene	ND	50.0									
Toluene	ND	50.0									
trans-1,2-Dichloroethene	ND	50.0									
trans-1,3-Dichloropropene	ND	50.0									

Qualifiers:					
BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **SB** SampType: **MBLK** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297974**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Trichloroethene	ND	50.0									
Trichlorofluoromethane	ND	125									
Vinyl Chloride	ND	50.0									
Xylenes, Total	ND	125									
Surr: 1,2-Dichloroethane-d4	746.0	0	750	0	99.5	70	130				
Surr: 4-Bromofluorobenzene	750.5	0	750	0	100	70	130				
Surr: Dibromofluoromethane	708.0	0	750	0	94.4	70	130				
Surr: Toluene-d8	736.8	0	750	0	98.2	70	130				

Sample ID: **LCS** SampType: **LCS** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297972**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1,2-Tetrachloroethane	1276	50.0	1250	0	102	70	130				
1,1,1-Trichloroethane	1190	50.0	1250	0	95.2	70	130				
1,1,2,2-Tetrachloroethane	1248	50.0	1250	0	99.8	70	130				
1,1,2-Trichloroethane	1257	50.0	1250	0	101	70	130				
1,1-Dichloroethane	1287	125	1250	0	103	70	130				
1,1-Dichloroethene	1238	50.0	1250	0	99.0	70	130				
1,1-Dichloropropene	1271	50.0	1250	0	102	70	130				
1,2,3-Trichlorobenzene	1144	50.0	1250	0	91.5	70	130				
1,2,3-Trichloropropane	1227	125	1250	0	98.1	70	130				
1,2,4-Trichlorobenzene	1179	50.0	1250	0	94.3	70	130				
1,2,4-Trimethylbenzene	1430	50.0	1250	0	114	70	130				
1,2-Dibromo-3-Chloropropane	1189	50.0	1250	0	95.1	70	130				
1,2-Dibromoethane	1236	50.0	1250	0	98.9	70	130				
1,2-Dichlorobenzene	1238	50.0	1250	0	99.0	70	130				
1,2-Dichloroethane	1279	50.0	1250	0	102	70	130				
1,2-Dichloropropane	1257	50.0	1250	0	101	70	130				
1,3,5-Trimethylbenzene	1343	50.0	1250	0	107	70	130				

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **LCS** SampType: **LCS** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297972**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,3-Dichlorobenzene	1270	50.0	1250	0	102	70	130				
1,3-Dichloropropane	1262	50.0	1250	0	101	70	130				
1,4-Dichlorobenzene	1285	50.0	1250	0	103	70	130				
2,2-Dichloropropane	1095	125	1250	0	87.6	70	130				
2-Butanone	1288	50.0	1250	0	103	70	130				
2-Chloroethyl Vinyl Ether	1208	50.0	1250	0	96.6	70	130				
2-Chlorotoluene	1339	125	1250	0	107	70	130				
2-Hexanone	1337	125	1250	0	107	70	130				
4-Chlorotoluene	1319	125	1250	0	106	70	130				
4-Isopropyltoluene	1324	50.0	1250	0	106	70	130				
4-Methyl-2-Pentanone	1256	50.0	1250	0	100	70	130				
Acetone	1316	500	1250	0	105	70	130				
Acrylonitrile	2604	50.0	2500	0	104	70	130				
Benzene	1268	50.0	1250	0	101	70	130				
Bromobenzene	1288	50.0	1250	0	103	70	130				
Bromochloromethane	1274	125	1250	0	102	70	130				
Bromodichloromethane	1268	50.0	1250	0	101	70	130				
Bromoform	1308	50.0	1250	0	105	70	130				
Bromomethane	1369	50.0	1250	0	110	70	130				
Carbon Disulfide	1222	50.0	1250	0	97.8	70	130				
Carbon Tetrachloride	1012	50.0	1250	0	81.0	70	130				
Chlorobenzene	1269	50.0	1250	0	102	70	130				
Chloroethane	1464	50.0	1250	0	117	70	130				
Chloroform	1284	50.0	1250	0	103	70	130				
Chloromethane	1377	50.0	1250	0	110	70	130				
cis-1,2-Dichloroethene	1287	50.0	1250	0	103	70	130				
cis-1,3-Dichloropropene	1249	50.0	1250	0	99.9	70	130				
Dibromochloromethane	1259	50.0	1250	0	101	70	130				
Dibromomethane	1272	50.0	1250	0	102	70	130				
Dichlorodifluoromethane	1172	50.0	1250	0	93.8	70	130				
Ethylbenzene	1369	50.0	1250	0	110	70	130				

Qualifiers:
BRL Below Reporting Limit
J Analyte detected below quantitation limits
S Spike Recovery outside recovery limits
E Value above quantitation range
ND Not Detected at the Reporting Limit
H Holding times for preparation or analysis exceeded
R RPD outside recovery limits

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **LCS** SampType: **LCS** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297972**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Hexachlorobutadiene	1271	50.0	1250	0	102	70	130				
Isopropylbenzene	1340	50.0	1250	0	107	70	130				
Methyl Tert-Butyl Ether	1283	50.0	1250	0	103	70	130				
Methylene Chloride	1298	50.0	1250	0	104	70	130				
Naphthalene	1131	125	1250	0	90.5	70	130				
n-Butylbenzene	1315	50.0	1250	0	105	70	130				
n-Propylbenzene	1252	50.0	1250	0	100	70	130				
sec-Butylbenzene	1348	50.0	1250	0	108	70	130				
Styrene	1313	125	1250	0	105	70	130				
tert-Butylbenzene	1325	50.0	1250	0	106	70	130				
Tetrachloroethene	1262	50.0	1250	0	101	70	130				
Toluene	1307	50.0	1250	0	105	70	130				
trans-1,2-Dichloroethene	1307	50.0	1250	0	105	70	130				
trans-1,3-Dichloropropene	1191	50.0	1250	0	95.3	70	130				
Trichloroethene	1264	50.0	1250	0	101	70	130				
Trichlorofluoromethane	1333	125	1250	0	107	70	130				
Vinyl Chloride	1306	50.0	1250	0	105	70	130				
Xylenes, Total	4304	125	3750	0	115	70	130				
Surr: 1,2-Dichloroethane-d4	739.2	0	750	0	98.6	70	130				
Surr: 4-Bromofluorobenzene	741.5	0	750	0	98.9	70	130				
Surr: Dibromofluoromethane	783.2	0	750	0	104	70	130				
Surr: Toluene-d8	756.0	0	750	0	101	70	130				

Sample ID: **LCSD** SampType: **LCSD** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297973**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,1,2-Tetrachloroethane	1280	50.0	1250	0	102	70	130	1276	0.352	25	
1,1,1-Trichloroethane	1262	50.0	1250	0	101	70	130	1190	5.91	25	
1,1,2,2-Tetrachloroethane	1265	50.0	1250	0	101	70	130	1248	1.33	25	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **LCSD** SampType: **LCSD** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297973**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
1,1,2-Trichloroethane	1286	50.0	1250	0	103	70	130	1257	2.36	25	
1,1-Dichloroethane	1194	125	1250	0	95.6	70	130	1287	7.47	25	
1,1-Dichloroethene	1223	50.0	1250	0	97.9	70	130	1238	1.20	25	
1,1-Dichloropropene	1242	50.0	1250	0	99.4	70	130	1271	2.27	25	
1,2,3-Trichlorobenzene	1286	50.0	1250	0	103	70	130	1144	11.7	25	
1,2,3-Trichloropropane	1241	125	1250	0	99.3	70	130	1227	1.13	25	
1,2,4-Trichlorobenzene	1265	50.0	1250	0	101	70	130	1179	7.08	25	
1,2,4-Trimethylbenzene	1474	50.0	1250	0	118	70	130	1430	2.96	25	
1,2-Dibromo-3-Chloropropane	1234	50.0	1250	0	98.7	70	130	1189	3.73	25	
1,2-Dibromoethane	1288	50.0	1250	0	103	70	130	1236	4.16	25	
1,2-Dichlorobenzene	1286	50.0	1250	0	103	70	130	1238	3.88	25	
1,2-Dichloroethane	1249	50.0	1250	0	99.9	70	130	1279	2.37	25	
1,2-Dichloropropane	1257	50.0	1250	0	101	70	130	1257	0	25	
1,3,5-Trimethylbenzene	1389	50.0	1250	0	111	70	130	1343	3.40	25	
1,3-Dichlorobenzene	1310	50.0	1250	0	105	70	130	1270	3.12	25	
1,3-Dichloropropane	1290	50.0	1250	0	103	70	130	1262	2.17	25	
1,4-Dichlorobenzene	1327	50.0	1250	0	106	70	130	1285	3.25	25	
2,2-Dichloropropane	1351	125	1250	0	108	70	130	1095	20.9	25	
2-Butanone	1293	50.0	1250	0	103	70	130	1288	0.407	25	
2-Chloroethyl Vinyl Ether	1216	50.0	1250	0	97.3	70	130	1208	0.722	25	
2-Chlorotoluene	1368	125	1250	0	109	70	130	1339	2.14	25	
2-Hexanone	1346	125	1250	0	108	70	130	1337	0.671	25	
4-Chlorotoluene	1371	125	1250	0	110	70	130	1319	3.89	25	
4-Isopropyltoluene	1369	50.0	1250	0	110	70	130	1324	3.40	25	
4-Methyl-2-Pentanone	1246	50.0	1250	0	99.7	70	130	1256	0.779	25	
Acetone	1228	500	1250	0	98.2	70	130	1316	6.88	25	
Acrylonitrile	2410	50.0	2500	0	96.4	70	130	2604	7.74	25	
Benzene	1285	50.0	1250	0	103	70	130	1268	1.27	25	
Bromobenzene	1326	50.0	1250	0	106	70	130	1288	2.91	25	
Bromochloromethane	1262	125	1250	0	101	70	130	1274	0.966	25	
Bromodichloromethane	1282	50.0	1250	0	103	70	130	1268	1.06	25	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **LCSD** SampType: **LCSD** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297973**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Bromoform	1336	50.0	1250	0	107	70	130	1308	2.10	25	
Bromomethane	1464	50.0	1250	0	117	70	130	1369	6.74	25	
Carbon Disulfide	1228	50.0	1250	0	98.2	70	130	1222	0.469	25	
Carbon Tetrachloride	1111	50.0	1250	0	88.9	70	130	1012	9.30	25	
Chlorobenzene	1315	50.0	1250	0	105	70	130	1269	3.58	25	
Chloroethane	1409	50.0	1250	0	113	70	130	1464	3.86	25	
Chloroform	1278	50.0	1250	0	102	70	130	1284	0.527	25	
Chloromethane	1336	50.0	1250	0	107	70	130	1377	3.02	25	
cis-1,2-Dichloroethene	1275	50.0	1250	0	102	70	130	1287	0.956	25	
cis-1,3-Dichloropropene	1277	50.0	1250	0	102	70	130	1249	2.22	25	
Dibromochloromethane	1268	50.0	1250	0	101	70	130	1259	0.732	25	
Dibromomethane	1282	50.0	1250	0	103	70	130	1272	0.705	25	
Dichlorodifluoromethane	1162	50.0	1250	0	92.9	70	130	1172	0.878	25	
Ethylbenzene	1406	50.0	1250	0	112	70	130	1369	2.63	25	
Hexachlorobutadiene	1332	50.0	1250	0	107	70	130	1271	4.67	25	
Isopropylbenzene	1385	50.0	1250	0	111	70	130	1340	3.32	25	
Methyl Tert-Butyl Ether	1235	50.0	1250	0	98.8	70	130	1283	3.81	25	
Methylene Chloride	1242	50.0	1250	0	99.4	70	130	1298	4.43	25	
Naphthalene	1262	125	1250	0	101	70	130	1131	10.9	25	
n-Butylbenzene	1364	50.0	1250	0	109	70	130	1315	3.70	25	
n-Propylbenzene	1290	50.0	1250	0	103	70	130	1252	2.95	25	
sec-Butylbenzene	1391	50.0	1250	0	111	70	130	1348	3.14	25	
Styrene	1342	125	1250	0	107	70	130	1313	2.20	25	
tert-Butylbenzene	1371	50.0	1250	0	110	70	130	1325	3.45	25	
Tetrachloroethene	1323	50.0	1250	0	106	70	130	1262	4.68	25	
Toluene	1356	50.0	1250	0	108	70	130	1307	3.66	25	
trans-1,2-Dichloroethene	1234	50.0	1250	0	98.8	70	130	1307	5.71	25	
trans-1,3-Dichloropropene	1306	50.0	1250	0	104	70	130	1191	9.15	25	
Trichloroethene	1283	50.0	1250	0	103	70	130	1264	1.43	25	
Trichlorofluoromethane	1383	125	1250	0	111	70	130	1333	3.65	25	
Vinyl Chloride	1285	50.0	1250	0	103	70	130	1306	1.68	25	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8260B_S

Sample ID: **LCSD** SampType: **LCSD** TestCode: **8260B_S** Units: **µg/Kg** Prep Date: RunNo: **28314**
Client ID: **ZZZZZ** Batch ID: **R28314** TestNo: **SW8260B** Analysis Date: **1/22/2009** SeqNo: **297973**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Xylenes, Total	4364	125	3750	0	116	70	130	4304	1.40	25	
Surr: 1,2-Dichloroethane-d4	724.5	0	750	0	96.6	70	130	0	0	25	
Surr: 4-Bromofluorobenzene	745.0	0	750	0	99.3	70	130	0	0	25	
Surr: Dibromofluoromethane	732.0	0	750	0	97.6	70	130	0	0	25	
Surr: Toluene-d8	756.5	0	750	0	101	70	130	0	0	25	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_PAHASE

Sample ID: **MB-12414** SampType: **MBLK** TestCode: **8270_S_PAH** Units: **µg/Kg** Prep Date: **1/22/2009** RunNo: **28307**
Client ID: **ZZZZZ** Batch ID: **12414** TestNo: **SW8270C** **(SW3545A)** Analysis Date: **1/22/2009** SeqNo: **299285**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
2-Methylnaphthalene	ND	100									
Acenaphthene	ND	100									
Acenaphthylene	ND	100									
Anthracene	ND	100									
Benz(a)Anthracene	ND	10.0									
Benzo(a)Pyrene	ND	10.0									
Benzo(b)Fluoranthene	ND	100									
Benzo(g,h,i)Perylene	ND	100									
Benzo(k)Fluoranthene	ND	100									
Chrysene	ND	100									
Dibenz(a,h)Anthracene	ND	10.0									
Fluoranthene	ND	100									
Fluorene	ND	100									
Indeno(1,2,3-cd)Pyrene	ND	10.0									
Naphthalene	ND	100									
Phenanthrene	ND	100									
Pyrene	ND	100									
Surr: 2-Fluorobiphenyl	3696	0	5000	0	73.9	30	130				
Surr: Nitrobenzene-d5	2883	0	5000	0	57.7	30	130				
Surr: Terphenyl-d14	3740	0	5000	0	74.8	30	130				

Sample ID: **LCS-12414** SampType: **LCS** TestCode: **8270_S_PAH** Units: **µg/Kg** Prep Date: **1/22/2009** RunNo: **28307**
Client ID: **ZZZZZ** Batch ID: **12414** TestNo: **SW8270C** **(SW3545A)** Analysis Date: **1/22/2009** SeqNo: **299286**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
2-Methylnaphthalene	2202	100	2500	0	88.1	40	140				
Acenaphthene	2000	100	2500	0	80.0	40	140				
Acenaphthylene	2212	100	2500	0	88.5	40	140				
Anthracene	2407	100	2500	0	96.3	40	140				
Benz(a)Anthracene	1258	10.0	2500	0	50.3	40	140				

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_PAHASE

Sample ID: **LCS-12414** SampType: **LCS** TestCode: **8270_S_PAH** Units: **µg/Kg** Prep Date: **1/22/2009** RunNo: **28307**
Client ID: **ZZZZZ** Batch ID: **12414** TestNo: **SW8270C** **(SW3545A)** Analysis Date: **1/22/2009** SeqNo: **299286**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Benzo(a)Pyrene	2148	10.0	2500	0	85.9	40	140				
Benzo(b)Fluoranthene	2207	100	2500	0	88.3	40	140				
Benzo(g,h,i)Perylene	1918	100	2500	0	76.7	40	140				
Benzo(k)Fluoranthene	2272	100	2500	0	90.9	40	140				
Chrysene	1277	100	2500	0	51.1	40	140				
Dibenz(a,h)Anthracene	1981	10.0	2500	0	79.2	40	140				
Fluoranthene	2339	100	2500	0	93.6	40	140				
Fluorene	2166	100	2500	0	86.6	40	140				
Indeno(1,2,3-cd)Pyrene	2026	10.0	2500	0	81.0	40	140				
Naphthalene	2211	100	2500	0	88.4	40	140				
Phenanthrene	1840	100	2500	0	73.6	40	140				
Pyrene	1592	100	2500	0	63.7	40	140				
Surr: 2-Fluorobiphenyl	3632	0	5000	0	72.6	30	130				
Surr: Nitrobenzene-d5	3072	0	5000	0	61.4	30	130				
Surr: Terphenyl-d14	3422	0	5000	0	68.4	30	130				

Sample ID: **LCSD-12414** SampType: **LCSD** TestCode: **8270_S_PAH** Units: **µg/Kg** Prep Date: **1/22/2009** RunNo: **28307**
Client ID: **ZZZZZ** Batch ID: **12414** TestNo: **SW8270C** **(SW3545A)** Analysis Date: **1/22/2009** SeqNo: **299287**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
2-Methylnaphthalene	2329	100	2500	0	93.2	40	140	2202	5.61	30	
Acenaphthene	2182	100	2500	0	87.3	40	140	2000	8.66	30	
Acenaphthylene	2413	100	2500	0	96.5	40	140	2212	8.69	30	
Anthracene	2567	100	2500	0	103	40	140	2407	6.43	30	
Benz(a)Anthracene	1350	10.0	2500	0	54.0	40	140	1258	7.06	30	
Benzo(a)Pyrene	2178	10.0	2500	0	87.1	40	140	2148	1.36	30	
Benzo(b)Fluoranthene	2176	100	2500	0	87.0	40	140	2207	1.44	30	
Benzo(g,h,i)Perylene	1984	100	2500	0	79.3	40	140	1918	3.36	30	
Benzo(k)Fluoranthene	2312	100	2500	0	92.5	40	140	2272	1.77	30	
Chrysene	2198	100	2500	0	87.9	40	140	1277	53.0	30	R

Qualifiers:						
	BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
	S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: 8270_S_PAHASE

Sample ID: **LCSD-12414** SampType: **LCSD** TestCode: **8270_S_PAH** Units: **µg/Kg** Prep Date: **1/22/2009** RunNo: **28307**
Client ID: **ZZZZZ** Batch ID: **12414** TestNo: **SW8270C** **(SW3545A)** Analysis Date: **1/22/2009** SeqNo: **299287**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Dibenz(a,h)Anthracene	2009	10.0	2500	0	80.4	40	140	1981	1.40	30	
Fluoranthene	2424	100	2500	0	97.0	40	140	2339	3.59	30	
Fluorene	2292	100	2500	0	91.7	40	140	2166	5.65	30	
Indeno(1,2,3-cd)Pyrene	2082	10.0	2500	0	83.3	40	140	2026	2.78	30	
Naphthalene	2386	100	2500	0	95.5	40	140	2211	7.63	30	
Phenanthrene	1814	100	2500	0	72.5	40	140	1840	1.42	30	
Pyrene	1749	100	2500	0	70.0	40	140	1592	9.37	30	
Surr: 2-Fluorobiphenyl	3975	0	5000	0	79.5	30	130	0	0	0	
Surr: Nitrobenzene-d5	3413	0	5000	0	68.3	30	130	0	0	0	
Surr: Terphenyl-d14	3694	0	5000	0	73.9	30	130	0	0	0	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: EPHP_S

Sample ID: **MBLK-12412** SampType: **MBLK** TestCode: **EPHP_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28297**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH_ (eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **297821**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	ND	0.100									
2-Methylnaphthalene	ND	0.100									
Acenaphthene	ND	0.100									
Phenanthrene	ND	0.100									
Acenaphthylene	ND	0.100									
Fluorene	ND	0.100									
Anthracene	ND	0.100									
Fluoranthene	ND	0.100									
Pyrene	ND	0.100									
Benzo(a)Anthracene	ND	0.100									
Chrysene	ND	0.100									
Benzo(b)Fluoranthene	ND	0.100									
Benzo(k)Fluoranthene	ND	0.100									
Benzo(a)Pyrene	ND	0.100									
Indeno(1,2,3-cd)Pyrene	ND	0.100									
Dibenz(a,h)Anthracene	ND	0.100									
Benzo(g,h,i)Perylene	ND	0.100									
Total PAH Target Concentration	ND	0									
Surr: 2,2'-Difluorobiphenyl	2.003	0	2.5	0	80.1	40	140				
Surr: 2-Fluorobiphenyl	1.867	0	2.5	0	74.7	40	140				

Sample ID: **LCS1-12412** SampType: **LCS** TestCode: **EPHP_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28297**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH_ (eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **297822**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	3.209	0.100	5	0	64.2	40	140				
2-Methylnaphthalene	3.331	0.100	5	0	66.6	40	140				
Acenaphthene	2.360	0.100	5	0	47.2	40	140				
Phenanthrene	3.437	0.100	5	0	68.7	40	140				
Acenaphthylene	2.364	0.100	5	0	47.3	40	140				

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: EPHP_S

Sample ID: **LCS1-12412** SampType: **LCS** TestCode: **EPHP_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28297**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH_ (eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **297822**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Fluorene	2.637	0.100	5	0	52.7	40	140				
Anthracene	3.560	0.100	5	0	71.2	40	140				
Fluoranthene	3.485	0.100	5	0	69.7	40	140				
Pyrene	4.005	0.100	5	0	80.1	40	140				
Benzo(a)Anthracene	4.082	0.100	5	0	81.6	40	140				
Chrysene	4.437	0.100	5	0	88.7	40	140				
Benzo(b)Fluoranthene	4.379	0.100	5	0	87.6	40	140				
Benzo(k)Fluoranthene	2.748	0.100	5	0	55.0	40	140				
Benzo(a)Pyrene	3.270	0.100	5	0	65.4	40	140				
Indeno(1,2,3-cd)Pyrene	2.931	0.100	5	0	58.6	40	140				
Dibenz(a,h)Anthracene	2.715	0.100	5	0	54.3	40	140				
Benzo(g,h,i)Perylene	3.064	0.100	5	0	61.3	40	140				
Total PAH Target Concentration	56.01	0									
Surr: 2,2'-Difluorobiphenyl	2.380	0	2.5	0	95.2	40	140				
Surr: 2-Fluorobiphenyl	1.651	0	2.5	0	66.0	40	140				

Sample ID: **LCSD-12412** SampType: **LCSD** TestCode: **EPHP_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28297**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH_ (eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **297823**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Naphthalene	2.952	0.100	5	0	59.0	40	140	3.209	8.34	50	
2-Methylnaphthalene	3.676	0.100	5	0	73.5	40	140	3.331	9.85	50	
Acenaphthene	2.375	0.100	5	0	47.5	40	140	2.36	0.634	50	
Phenanthrene	3.239	0.100	5	0	64.8	40	140	3.437	5.93	50	
Acenaphthylene	2.372	0.100	5	0	47.4	40	140	2.364	0.338	50	
Fluorene	2.371	0.100	5	0	47.4	40	140	2.637	10.6	50	
Anthracene	3.120	0.100	5	0	62.4	40	140	3.56	13.2	50	
Fluoranthene	3.505	0.100	5	0	70.1	40	140	3.485	0.572	50	
Pyrene	3.743	0.100	5	0	74.9	40	140	4.005	6.76	50	
Benzo(a)Anthracene	3.509	0.100	5	0	70.2	40	140	4.082	15.1	50	

Qualifiers:

BRL Below Reporting Limit
J Analyte detected below quantitation limits
S Spike Recovery outside recovery limits
E Value above quantitation range
ND Not Detected at the Reporting Limit
H Holding times for preparation or analysis exceeded
R RPD outside recovery limits

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: EPHP_S

Sample ID: **LCSD-12412** SampType: **LCSD** TestCode: **EPHP_S** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28297**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH_ (eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **297823**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Chrysene	3.858	0.100	5	0	77.2	40	140	4.437	14.0	50	
Benzo(b)Fluoranthene	3.777	0.100	5	0	75.5	40	140	4.379	14.8	50	
Benzo(k)Fluoranthene	3.295	0.100	5	0	65.9	40	140	2.748	18.1	50	
Benzo(a)Pyrene	3.015	0.100	5	0	60.3	40	140	3.27	8.11	50	
Indeno(1,2,3-cd)Pyrene	2.691	0.100	5	0	53.8	40	140	2.931	8.54	50	
Dibenz(a,h)Anthracene	2.676	0.100	5	0	53.5	40	140	2.715	1.45	50	
Benzo(g,h,i)Perylene	3.069	0.100	5	0	61.4	40	140	3.064	0.163	50	
Total PAH Target Concentration	53.24	0						56.01	5.07	0	
Surr: 2,2'-Difluorobiphenyl	2.584	0	2.5	0	103	40	140	0	0	0	
Surr: 2-Fluorobiphenyl	1.603	0	2.5	0	64.1	40	140	0	0	0	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: **epht_s**

Sample ID: **MBLK-12412** SampType: **MBLK** TestCode: **epht_s** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28319**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH (eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **298039**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Adjusted C11-C22 Aromatics	ND	10.0									
C09-C18 Aliphatics	ND	10.0									
C19-C36 Aliphatics	ND	10.0									
Unadjusted C11-C22 Aromatics	ND	10.0									
Surr: 1-Chlorooctadecane	5.400	0	10	0	54.0	40	140				
Surr: o-Terphenyl	7.700	0	10	0	77.0	40	140				

Sample ID: **LCS-12412** SampType: **LCS** TestCode: **epht_s** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28319**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH (eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **298023**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
C09-C18 Aliphatics	ND	10.0	10	0	57.0	40	140				
C19-C36 Aliphatics	ND	10.0	10	0	81.0	40	140				
Unadjusted C11-C22 Aromatics	ND	10.0	10	0	57.0	40	140				
Surr: 1-Chlorooctadecane	6.900	0	10	0	69.0	40	140				
Surr: o-Terphenyl	7.500	0	10	0	75.0	40	140				

Sample ID: **LCSD-12412** SampType: **LCSD** TestCode: **epht_s** Units: **mg/Kg** Prep Date: **1/22/2009** RunNo: **28319**
Client ID: **ZZZZZ** Batch ID: **12412** TestNo: **MADEP EPH (eph_Spr)** Analysis Date: **1/22/2009** SeqNo: **298038**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
C09-C18 Aliphatics	ND	10.0	10	0	62.0	40	140	5.7	0	50	
C19-C36 Aliphatics	ND	10.0	10	0	82.0	40	140	8.1	0	50	
Unadjusted C11-C22 Aromatics	ND	10.0	10	0	74.0	40	140	5.7	0	50	
Surr: 1-Chlorooctadecane	5.700	0	10	0	57.0	40	140	0	0		
Surr: o-Terphenyl	8.600	0	10	0	86.0	40	140	0	0	0	

Qualifiers:	BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
	J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
	S	Spike Recovery outside recovery limits				

CLIENT: ESS - Group
Work Order: 0901214
Project: Hopedale

ANALYTICAL QC SUMMARY REPORT

TestCode: **hg_7471a_s**

Sample ID: **MBLK-12426** SampType: **MBLK** TestCode: **hg_7471a_s** Units: **mg/Kg** Prep Date: **1/23/2009** RunNo: **28315**
Client ID: **ZZZZZ** Batch ID: **12426** TestNo: **SW 7471A** **(SW7471A)** Analysis Date: **1/22/2009** SeqNo: **298000**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	ND	0.100									

Sample ID: **LCS-12426** SampType: **LCS** TestCode: **hg_7471a_s** Units: **mg/Kg** Prep Date: **1/23/2009** RunNo: **28315**
Client ID: **ZZZZZ** Batch ID: **12426** TestNo: **SW 7471A** **(SW7471A)** Analysis Date: **1/22/2009** SeqNo: **297984**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	2.645	0.100	2.5	0	106	80	120				

Sample ID: **LCSD-12426** SampType: **LCSD** TestCode: **hg_7471a_s** Units: **mg/Kg** Prep Date: **1/23/2009** RunNo: **28315**
Client ID: **ZZZZZ** Batch ID: **12426** TestNo: **SW 7471A** **(SW7471A)** Analysis Date: **1/22/2009** SeqNo: **297999**

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Mercury	2.650	0.100	2.5	0	106	80	120	2.645	0.189	30	

Qualifiers:

BRL	Below Reporting Limit	E	Value above quantitation range	H	Holding times for preparation or analysis exceeded
J	Analyte detected below quantitation limits	ND	Not Detected at the Reporting Limit	R	RPD outside recovery limits
S	Spike Recovery outside recovery limits				

Page 1 of 1

CHAIN OF CUSTODY RECORD

GeoLabs, Inc. *Environmental Laboratories*
45 Johnson Lane, Braintree, MA 02184
p 781.848.7844 • f 781.848.7811
www.geolabs.com

Sample Handling: circle choice
Filtration: Done / Not Needed / Lab to do
Preservation: Lab to do Y / N

Special Instructions

*As, Cd, Cr, Cu, Hg, Pb, Ni, Zn

Turnaround: circle one
1-day 3-day
2-day [✓ 5 / 7-days]

Data Delivery: circle choice (s)
Fax [✓ email]
Format:
Excel PDF

Requirements: circle choice (s) 0901214
GW-1 MCP Methods CT RCP (Reasonable Confidence Protocols)
S-1 DEP State / Fed Program - Criteria ____
QC Other ____

Client: ESS GROUP, INC
Address: 401 WAMPANOAG TRAIL, SUITE 400
EAST PROVIDENCE, RI 02915
Contact: ~~MAT~~ LADEWIG

Phone: 401-330-1204
Fax: 401-434-8158
email: mladewig@essgroup.com

Project: HOPEDALE
Project PO: H153-000
Invoice to *: CARL NIELSEN

Preservative: VOCs 6

COLLECTION DATE	COLLECTION TIME	SAMPLED BY	SAMPLE LOCATION / ID	CONTAINER TYPE	CONTAINER QUANITY	MATRIX	COMP	GRAB	GeoLabs SAMPLE NUMBER	METALS*	VOCs	PAHs	EPH	PCBs	TOC	% WATER	% ASH	ASTM GRAIN SIZE	ATTERBERG LIMITS	TOTAL N	~~TEMPERATURE~~ TOTAL P	LAB pH
1/19/09	~~1130~~ 1200 MDL	SL/ML	SC1	A	2	S	X		1214-001	X		X	X	X	X	X	X	X	X			
	1515		SC2	A	3		X		002	X		X	X	X	X	X	X	X	X			
	1130		SC1~~A~~B MDL	V	1			X	003		X											
	1510		SC2~~A~~C MDL	~~A~~V	1			X	004		X											
	1200		N1	G	2		X		005											X	X	
	1545		N2	G	~~2~~ 1 MDL		X		006											X	X	
	1515		N3	G	2		X		007											X	X	

Temp 4°c

Matrix Codes:
GW = Ground Water DW = Drinking Water S = Soil A = Air
WW = Waste Water SL = Sludge 0 = Oil OT = Other

Received on Ice ☑

Preservatives
1 = Hcl 3 = H2S04 5 = NaOH 7 = Other
2 = HN03 4 = Na2S203 6 = MEOH

Containers:
A = Amber B = Bag 0 = Other
G = Glass P = Plastic
S = Summa V = Voa

Relinquished by:	Date / Time	Received by:	Date / Time
	1/20/09 11:00		1/20/09 11:00
	1/20/09 1:50	KC	1/20/09 3:00

270675.J&P.C of CR.07/09/07

Terms: Payment due within 30 days unless other arrangements are made. Past due balances subject to interest and collection cost.
Note: Homeowners and Law Firms must pay when dropping off samples. We accept cash, check and credit cards.

CT (PH-0148) MA (MA - 015) NH (2508) NJ (MA-009)
NY(11796) PA (68-03417) RI (LA000252)

Appendix H

Modeling Calculations and Results

Hopedale Pond - HYDROLOGIC ASSESSMENT

Watershed for Hopedale Pond=		6284	acres		273731040	SF	9.81875	sq mi
Pond Area		76.7	acres		3341052	SF	310393.89	meters2
Area of Watershed - Lake Area		6286	acres		273818160	SF		
Lake Circumference		22441	feet		(20.6 inches x 639ft/in)			
Lake Volume		14,887,773	cubic feet				421574.83	meters3
Area influenced by seepage		453024	ft2	=	42087.28867	m2		
Groundwater (data)		0.38	l/m2/day=		0.013	cf/m2/day		
				=	564.559	cf/day		
				=	0.007	cfs		
Annual PPT/yr		47.68	inches					
Annual PPT - ET	31.95	2.66	ft/yr		0.282	cfs		
Runoff (watershed)	20	1.67	ft/yr		14.471	cfs		
Base Flow (Streams) as measured during dry weather					6.620	cfs		

	Ground	PPT	Surfacewater	Total	
Dry	0.007	0.000	6.620	6.627	
Wet	0.000	0.282	14.471	14.753	
Total	**0.007**	**0.282**	**21.091**	**21.380**	cfs
				19092135	m3/yr
				674232310	CubicFt/Yr
				19092135184	L/yr

Estimated range of total input into lake:

(1.5 to 2 cfs/sq mi of watershed) =

14.73 to 19.64 cfs

Hopedale Pond - Nutrient Loading - Existing Conditions

IN-LAKE MODELS FOR PREDICTING PHOSPHORUS LOADS AND CONCENTRATIONS (Based on Data from 2009)

THE TERMS

SYMBOL	PARAMETER	UNITS	DERIVATION	VALUE	
TP	Lake Total Phosphorus Conc.	ppb	From data or model	15.1	Enter Value
L	Phosphorus Load to Lake	g P/m2/yr	From model	0.93	Enter Value
TPin	Influent (Inflow) Total Phosphorus	ppb	From data (weighted av.)	34.4	Enter Value
TPout	Effluent (Outlet) Total Phosphorus	ppb	From data (outlet)	12	Enter Value
I	Inflow	m3/yr	From data	19092135	Enter Value
A	Lake Area	m2	From data	310393.89	Enter Value
V	Lake Volume	m3	From data	421574.83	Enter Value
Z	Mean Depth	m	Volume/area	1.3581931	
F	Flushing Rate	flushings/yr	Inflow/volume	45.287653	
S	Suspended Fraction	no units	Effluent TP/Influent TP	0.3488372	
Qs	Areal Water Load	m/yr	Z(F)	61.509378	
Vs	Settling Velocity	m	Z(S)	0.4737883	
R	Retention Coefficient (from TP)	no units	(TPin-TPout)/TPin	0.6511628	
Rp	Retention Coefficient (settling rate)	no units	((Vs+13.2)/2)/(((Vs+13.2)/2)+Qs)	0.1000332	
Rlm	Retention Coefficient (flushing rate)	no units	1/(1+F^0.5)	0.1293726	
				0.0220324	8.041829
				0.0220811	8.059592

THE MODELS

NAME	FORMULA	PREDICTION CONC. (ppb)	LOAD (g/m2/yr)
Mass Balance	TP=L/(Z(F))*1000	15	
(minimum load)	L=TP(Z)(F)/1000		0.93
Kirchner-Dillon 1975	TP=L(1-Rp)/(Z(F))*1000	14	
(K-D)	L=TP(Z)(F)/(1-Rp)/1000		1.03
Vollenweider 1975	TP=L/(Z(S+F))*1000	15	
(V)	L=TP(Z)(S+F)/1000		0.94
Reckhow 1977 (General)	TP=L/(11.6+1.2(Z(F)))*1000	5	
(Rg)	L=TP(11.6+1.2(Z(F)))/1000		1.29
Larsen-Mercier 1976	TP=L(1-Rlm)/(Z(F))*1000	13	
(L-M)	L=TP(Z)(F)/(1-Rlm)/1000		1.07
Jones-Bachmann 1976	TP=0.84(L)/(Z(0.65+F))*1000	13	
(J-B)	L=TP(Z)(0.65+F)/0.84/1000		1.12
Average of Model Values		12	
(without mass balance)			1.09
Reckhow 1977 (Anoxic)	TP=L/(0.17(Z)+1.13(Z(F)))*1000	13	
(Ra)	L=TP(0.17(Z)+1.13(Z(F)))/1000		1.05
From Vollenweider 1968			
Permissible Load	Lp=10^(0.501503(log(Z(F)))-1.0018)		0.79
Critical Load	Lc=2(Lp)		1.57

LOAD ANALYSIS

MODEL	ESTIMATED LOAD (kg/yr)	ESTIMATED LOAD (mg/L)	
Phosphorus			
Mass Balance (no loss)	288		
Kirchner-Dillon 1975	320		
Vollenweider 1975	291		
Reckhow 1977 (General)	400		
Larsen-Mercier 1976	331		
Jones-Bachmann 1976	348		
Model Average (without mass balance)	338	0.0177	
Reckhow 1977 (Anoxic)	327		
Permissible Load	244	0.0128	Permissible Conc.
Critical Load	488	0.0256	Critical Conc.

PREDICTED WATER CLARITY

PREDICTED CHL AND WATER CLARITY

MODEL	Value
Mean Chlorophyll (ug/L)	
Dillon and Rigler 1974	2.6
Jones and Bachmann 1976	3.0
Oglesby and Schaffner 1978	3.9
Modified Vollenweider 1982	6.0
"Maximum" Chlorophyll (ug/L)	
Modified Vollenweider (TP) 1982	17.3
Vollenweider (CHL) 1982	11.0
Mod. Jones, Rast and Lee 1979	13.5
Secchi Transparency (M)	
Oglesby and Schaffner 1978 **(Avg)**	3.5
Modified Vollenweider 1982 **(Max)**	4.9

ADDENDUM FOR NITROGEN (Based on data from 2009)

TN	Lake Total Nitrogen Conc.	ppb	From data or model	766.4	Enter Value
L	Nitrogen Load to Lake	g N/m2/yr	From data or model	47.14	Enter Value
C	Coefficient of Attenuation	fraction/yr	2.7183^(0.5541(ln(F))-0.367)	5.7305646	

NAME	FORMULA	CONC. (ppb)	LOAD (g/m2/yr)
Mass Balance	TN=L/(Z(F))*1000	766	
(minimum load)	L=TN(Z)(F)/1000		47.14
Bachmann 1980	TN=L/(Z(C+F))*1000	680	
	L=TN(Z)(C+F)/1000		53.11

MODEL	ESTIMATED LOAD (kg/yr)	ESTIMATED LOAD (mg/L)	
Nitrogen			
Mass Balance (no loss)	14632		
Bachmann 1980	16484	0.86	(check - av in pond nitrogen concentration - mg/L)

Appendix I

Phytoplankton Analysis Report