HYDROGEOLOGICAL STUDY OF FORMER NORTH YARMOUTH MEMORIAL SCHOOL PROPERTY NORTH YARMOUTH, MAINE

Prepared for

THE TOWN OF NORTH YARMOUTH

August 2015



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HYDROGEOLOGICAL STUDY OF FORMER NORTH YARMOUTH MEMORIAL SCHOOL PROPERTY NORTH YARMOUTH, MAINE

1.0 EXECUTIVE SUMMARY

At the request and authorization of the Town of North Yarmouth (hereafter referred to as the Town), Sevee & Maher Engineers, Inc. (SME) has prepared this report summarizing our hydrogeological investigation of the former North Yarmouth Memorial School property (Site). The purpose of the investigation was to estimate the maximum hydraulic capacity for subsurface wastewater disposal at the Site using leachfields, and to identify the optimum location(s) for leachfields that avoid adverse impacts to off-Site water quality. Our investigation focused on the outwash sand deposit at the Site since it has the hydraulic capacity most practical for disposal of relatively large volumes of domestic (i.e. non-industrial) wastewater.

Our investigation included: (1) subsurface exploration by test pits, soil borings, and groundwater monitoring wells to characterize the hydrogeology of the Site, and to measure the thickness of the sand deposit; (2) test pit observations to determine whether suitable soils exist on-Site for wastewater disposal based on the current Maine Subsurface Wastewater Disposal Rules; (3) analysis of baseline groundwater quality at the Site; (4) measurement of the hydraulic conductivity of the encountered soils; (5) measurement of groundwater levels to estimate the direction(s) of groundwater flow and depth to groundwater; and (6) a survey of existing water supply sources at downgradient abutting properties.

The data collected during the Site investigation were used to perform an analysis of the hydraulic capacity of the Site's sand deposit relative to subsurface wastewater disposal. These analyses include groundwater mounding and groundwater nitrate transport calculations. The data collected, as well as our analyses, can be used to support future wastewater disposal permitting requirements of the Maine Department of Health and Human Services (MEDHHS) and the Maine Department of Environmental Protection (MEDEP).

Our principal findings are:

- The hydraulic capacity for treated wastewater at the Site is calculated to be about 45,000 gallons per day.
- (2) The capacity for untreated wastewater at the Site is currently estimated at about 7,000 gallons per day.
- (3) In either case, additional wastewater can be disposed of at the former school property without having adverse impacts to off-Site groundwater, residential water supply wells, or the Yarmouth Water District's water supply well.
- (4) Wastewater usage should be developed in phases, as needed, to minimize project costs.
- (5) Long-term maintenance of the leachfields will likely be limited based on the soils present but any field that does fail can be replaced within the same footprint.

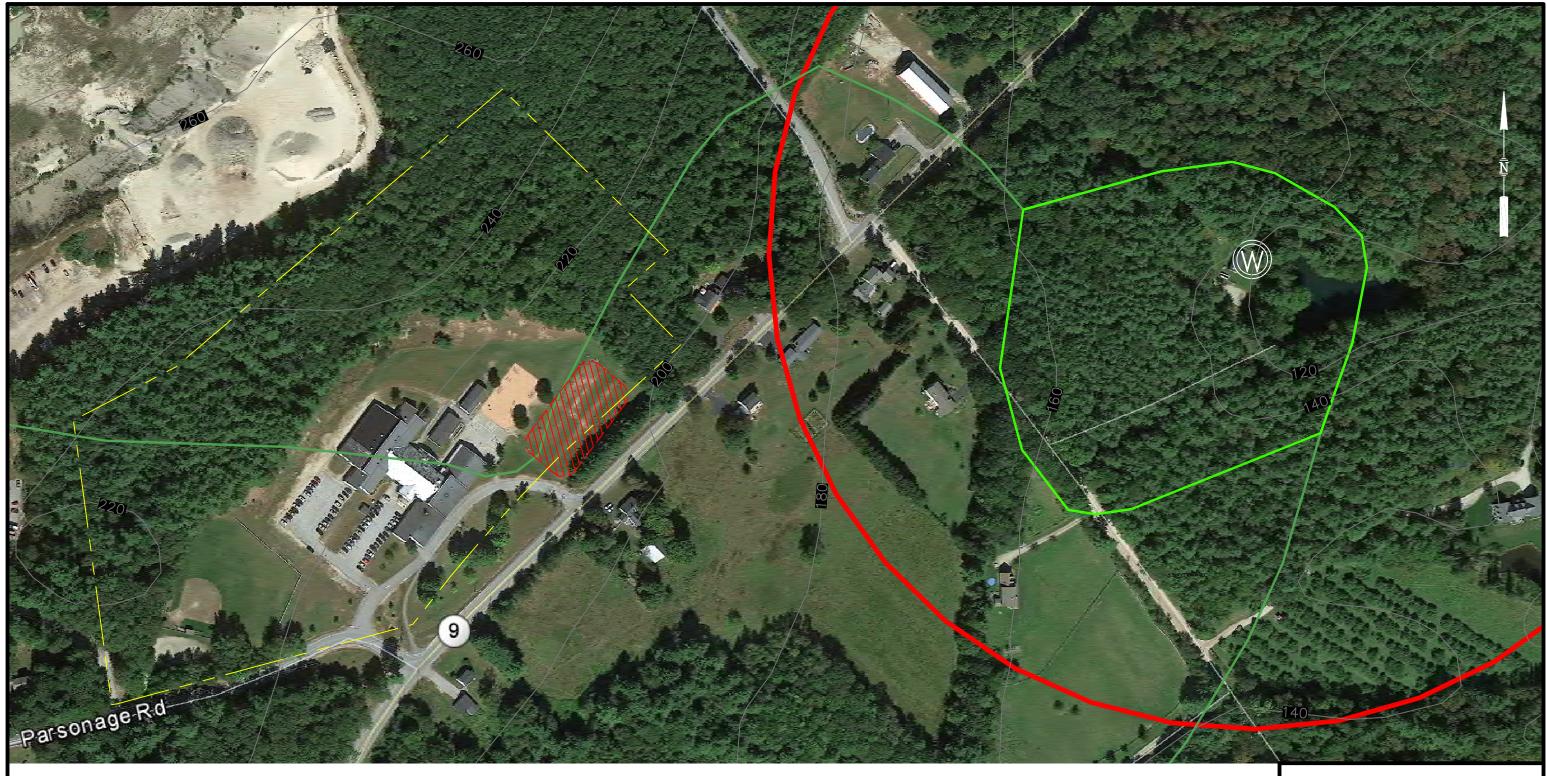
This report documents our investigation and findings, and concludes with our recommendations.

1.1 Site Setting

The former North Yarmouth Memorial School is located at 120 Memorial Highway (Route 9) in North Yarmouth, Maine. The Site location is illustrated on Figure 1. The school closed in 2014. The school property is reportedly approximately 20 acres in size. It is surrounded by residential lots on three sides and by gravel pit operations to the north. Some of the abutting residences are supplied with public water and others obtain their potable water from drilled or dug wells.

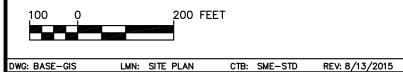
The Yarmouth Water District owns and operates a public drinking water supply well, located approximately 1,200 feet east of the closest Site property boundary. The well is referred to herein as 'Hayes Well, 1954.' The well location is shown on Figure 1, along with a 1,000-foot buffer boundary surrounding the well and the estimated 200-day and 2,500-day groundwater time-of-travel boundaries for the well. While the 'Hayes Well, 1954' is located in an area mapped by the Maine Geological Survey as having silt and clay surficial deposits, the well is understood to pump from underlying sand and gravel deposits.

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<u>NOTES</u>

TAX MAP PROPERTY LINES ARE OFFSET FROM AERIAL PHOTOGRAPHY. ACTUAL SCHOOL PROPERTY LINE IS BELIEVED TO BE DOWN SLOPE FROM EXISTING DISPOSAL FIELDS. THE OFFSET MAY ALSO IMPACT THE POTENTIAL SUITABLE DISPOSAL FIELD AREAS.



LEGEND (MAINE DRINKING WATER PROGRAM GIS DATABASE)

- PUBLIC DRINKING WATER SUPPLY 1000 FOOT BUFFER
- MODEL-BASED SOURCE WATER PROTECTION AREA (200 DAY TRAVEL TIME)
- MODEL-BASED SOURCE WATER PROTECTION AREA (2500 DAY TRAVEL TIME)



HAYES WELL 53, YARMOUTH WATER DISTRICT

APPROXIMATE EXISTING DISPOSAL FIELD AREA

MAINE TAX PARCELS (ME GIS DATA CATALOG)

FIGURE 1 SITE PLAN FORMER NORTH YARMOUTH MEMORIAL SCHOOL HYDROGEOLOGICAL STUDY TOWN OF NORTH YARMOUTH



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An existing disposal field area is located east of the school building at the location shown in Figure 1. The leachfield consists of four 30-foot by 100-foot beds. In April 2014, Sweet Associates of Falmouth, Maine inspected the leachfield and found it to be viable for continued wastewater disposal, although several maintenance issues were identified.¹ Their inspection was done while the system was still in use by the school. Testing of the wastewater influent from a septic tank showed a total nitrogen concentration of about 110 mg N/L based on the total Kjeldahl nitrogen analysis. They also estimated an average wastewater influent flow of about 2,000 gallons per day at the time of their inspection. Although designed in 1976 with an original capacity of 12,000 gallons per day, based on the current Maine Subsurface Wastewater Disposal Rules, we currently calculate its disposal capacity for wastewater as 4,848 gallons per day.

1.2 Geologic Setting

Maine Geological Survey (MGS) mapping indicates that the Site is situated over a glacial outwash sand and gravel deposit.² This deposit is regionally extensive and almost completely surrounds the school. To the south and east, as the land surface drops in elevation, the sand and gravel deposit becomes overlain by clays of the Presumpscot Formation. The sand and gravel outwash deposit has been mapped by MGS as a significant sand and gravel aquifer.³

The MGS mapping is consistent with Soil Conservation Service (SCS) mapping of the surficial soils. SCS classifies the Site soils as Hinckley glacial outwash sands.⁴ This soil is characterized as excessively drained sands with a deep water table.

Bedrock is exposed on the higher hills in the vicinity of the school indicating an absence of the sand and gravel deposit at these higher topographic elevations. Bedrock underlies the sand and gravel outwash deposit. The bedrock has been mapped by MGS as the Hutchins Corner

¹ Sweet Associates, 2014. Letter dated June 2, 2014 concerning Septic System Inspection, North Yarmouth Memorial School.

² Retelle, M.J., 1999. Surficial Geology of the Yarmouth Quadrangle, Maine; Maine Geological Survey; Open-File No. 99-105.

³ Neil, C.D., 1999. Significant Sand and Gravel Aquifers, Yarmouth Quadrangle, Maine; Maine Geological Survey; Open-File No. 99-28.

⁴ Hedstrum, G., 1974. Soil Survey Cumberland County Maine, Soil Conservation Service, USDA.

Formation consisting of metamorphosed sandstone and muds, properly referred to as quartzbiotite-feldspar granofels.⁵ Tolman, 2010 documents a significant number of high-yield bedrock wells in the vicinity of the Site.⁶ This suggests the bedrock is fractured and the fractures allow movement of groundwater.

With the above information in mind, we performed a reconnaissance of the Site and surrounding vicinity. The purposes of the reconnaissance was two-fold: (1) map geologic features as a check against the MGS and SCS mapping information; and (2), map hydrogeologic boundaries such as streams for use in our hydraulic capacity calculations. Exposures of sands were apparent along Toddy Brook and its tributaries, where the streams had eroded into the natural soils. Seeps and springs were observed along the stream bed indicating groundwater discharge. This observation is consistent with Toddy Brook and its tributaries acting as hydrologic boundaries for groundwater migration. Along Sweetser Road, erosion exposed a limited clay deposit overlying the sandy outwash, consistent with the MGS mapping. An ice contact feature, likely a moraine, was observed along Sweetser Road between the Site and Toddy Brook. Bedrock was observed at the higher ground surface elevations along the Oak Hill Road. Glacial till was also exposed along the Oak Hill Road. This is consistent with regional mapping which suggests the higher hill tops are not covered with sand and gravel outwash but have exposures of rock and till. This is also consistent with bedrock outcrop outside the northeast corner of the former school property (see Section 2.2). Glacial till was also observed at the ground surface near the northeast corner of the school property. North of the school Site, gravel pit operations have exposed 70 to 80 feet of the sand and gravel outwash. The water table is exposed in the deeper portion of the pit and has a surface elevation of about 180 feet-NAVD88. The gravel pit exposures are useful for examining the textural characteristics and variability of the outwash deposit. Thus, our reconnaissance confirmed the regional geologic mapping, is consistent with our Site findings as discussed below, and provided useful information on the regional behavior and fate of groundwater.

⁵ Berry IV, H.N. and A.M. Hussey II, 1998, Bedrock Geology of the Portland 1:100,000 Quadrangle, Maine and New Hampshire; Maine Geological Survey; Open-File No. 98-1.

⁶ Tolman, S.S., 2010. Bedrock Well Yield, Portland 30- X 60-Minute Quadrangle, Maine Geological Survey; Open-File No. 10-66.

2.0 SUBSURFACE INVESTIGATION

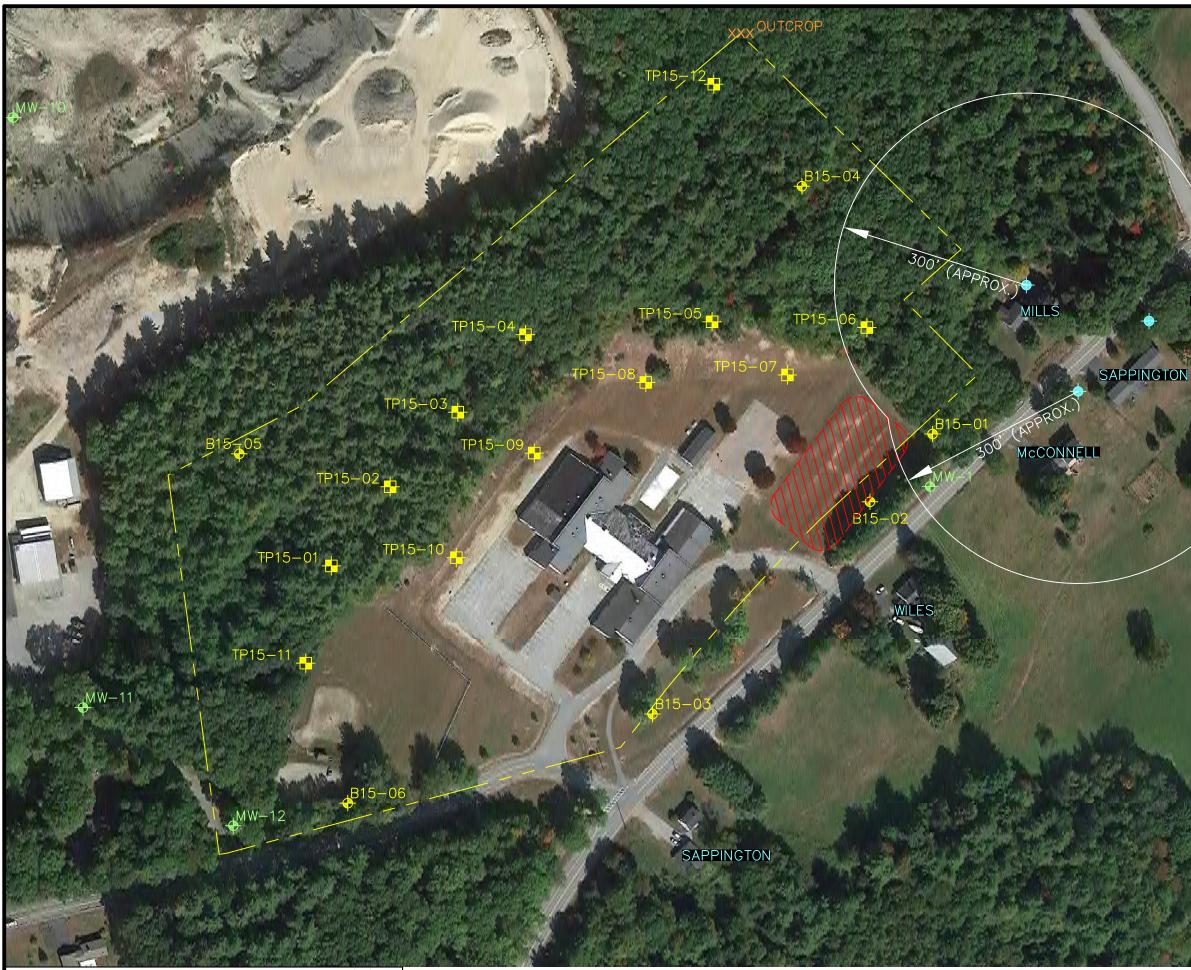
2.1 Summary of Drilling Program

Subsurface geology was investigated using Standard Penetration Test (SPT) soil borings. The borings allowed soils samples to be collected and the installation of groundwater monitoring wells. The borings were completed by New England Boring Contractors of Hampden, Maine between July 13, 2015 and July 23, 2015. Six borings were completed across the school Site; their locations are illustrated on Figure 2. Borings B15-01, B15-02, and B15-03 are located along the downslope portion of the property, while B15-04, B15-05, and B15-06 are positioned along the upslope portions of the property. Monitoring wells were installed at each boring with screens below the groundwater table. The monitoring wells provide groundwater level data and access for collection of groundwater quality samples. The locations and elevations of the six monitoring wells were surveyed by SME.

The retrieved soil samples were classified by an SME geologist. Representative soils samples were selected for grain size analysis and hydraulic conductivity testing. The encountered soils consisted predominantly of stratified sands, which is consistent with the sand and gravel glacial outwash deposit mapped by the MGS. The texture of the samples ranged from very fine silty sand to gravelly medium to coarse sand. At boring B15-06, located along the southwest perimeter of the Site, silt and clay of the Presumpscot Formation was encountered between depths of 10.5 to 24 feet below the existing ground surface (feet-bgs). The clay layer terminated approximately 26 feet above the static groundwater level at this location. Silt or clay soils were not encountered at the other five borings completed within the Site.

Borings B15-01, B15-02, and B15-03 were terminated at drilling refusal, which is likely the bedrock surface. B15-04 was advanced, using a rotary-bit, about 7 feet into what appeared to be competent bedrock. The rotary-bit cuttings were visually consistent with the Hutchins Corner Formation mapped by MGS and bedrock outcrops in this area. The sand deposit at these borings lies directly atop drilling refusal. The refusal surface appears to slope downwards to the south from a high elevation of about 185 feet-NAVD88 at boring B15-04 to a low elevation

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<u>NOTES</u>

THERIAULT

TAX MAP PROPERTY LINES ARE OFFSET FROM AERIAL PHOTOGRAPHY. ACTUAL SCHOOL PROPERTY LINE IS BELIEVED TO BE DOWN SLOPE FROM EXISTING DISPOSAL FIELDS. THE OFFSET MAY ALSO IMPACT THE POTENTIAL SUITABLE DISPOSAL FIELD AREAS.

RESIDENTIAL WELL LOCATIONS ARE APPROXIMATE BASED ON VISUAL OBSERVATIONS IN THE FIELD.

<u>LEGEND</u>



BORING LOCATION

TEST PIT LOCATION

APPROX. RESIDENTIAL WELL LOCATION

MW-1 - APPROX. YARMOUTH WATER DISTRICT MONITORING WELL LOCATION

> APPROXIMATE EXISTING DISPOSAL FIELD AREA

> > 150 FEET

FIGURE 2 SUBSURFACE EXPLORATION LOCATIONS FORMER NORTH YARMOUTH MEMORIAL SCHOOL HYDROGEOLOGICAL STUDY



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of about 112 feet-NAVD88 at B15-03. The direction of the refusal surface slope is also consistent with the bedrock outcrop nearest to the Site, observed during SME's reconnaissance of the area. The approximate location of this observed bedrock outcrop is shown on Figure 2. Borings B15-05 and B15-06 were terminated in the sand deposit at about Elevation 168 feet-NAVD88 and Elevation 159 feet-NAVD88, respectively. Boring and well installation logs were prepared by SME and are included in Appendix A. A summary of the individual boring and monitoring well data is included on Table 1.

TABLE 1

Well Location	Depth of Boring (feet-bgs)	Depth to Refusal (feet-bgs)	Screened Interval (feet-bgs)	Ground Surface Elevation (feet-NAVD88)	Static Groundwater Depth (feet- bgs)	Top of Well Casing Elevation (feet-NAVD88)	Groundwater Elevation (feet-NAVD88)
B15-01	78.5	78.2	61.0 to 46.0	208.1	49.1	210.78	159.0
B15-02	80.5	79.5	55.5 to 40.5	209.1	44.3	212.01	164.8
B15-03	103.5	102.8	49.0 to 34.0	214.5	39.7	217.22	174.8
B15-04	60.0	48.0	60.0 to 50.0	232.7	54.1	235.35	178.6
B15-05	75.0	Not Encountered	73.0 to 58.0	242.9	63.3	245.60	179.6
B15-06	70.0	Not Encountered	70.0 to 55.0	229.3	50.1	231.95	179.2

SUMMARY OF BORINGS

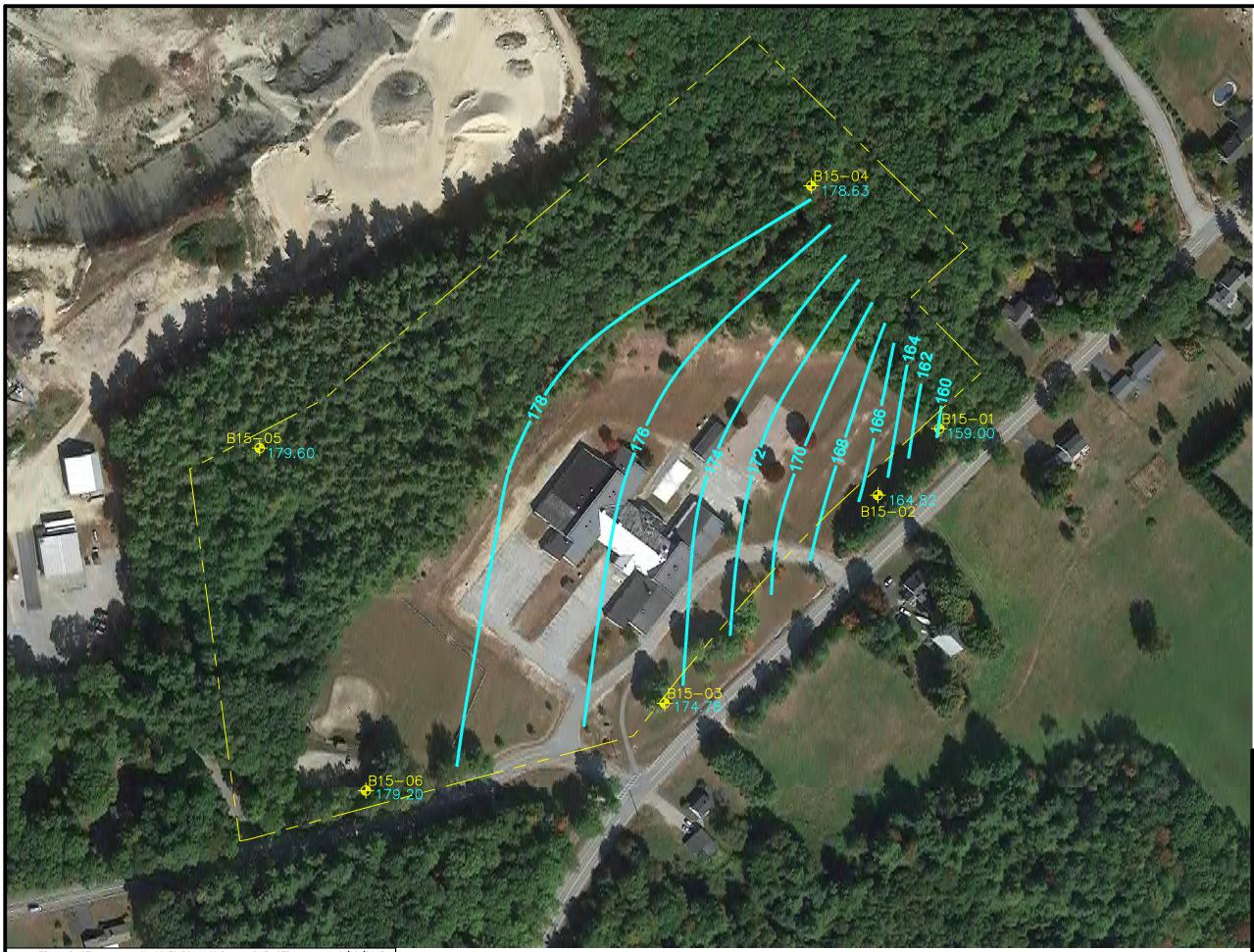
Notes:

1. Depth to water measured July 24, 2015

2. bgs = below ground surface

3. NAVD88 = North American Vertical Datum of 1988

The depth to groundwater was measured in each of the six monitoring wells over the course of several days to confirm that the groundwater levels in the wells had reached equilibrium. These measurements are documented in Appendix B. The groundwater measurements taken on July 24, 2015 were used to interpret a groundwater table (i.e., phreatic surface) contour map for the Site, which is illustrated on Figure 3. Based on the groundwater table map, groundwater is interpreted to flow generally towards the east-southeast. The groundwater table is relatively flat along the upgradient portions of the property with an average horizontal hydraulic gradient of approximately 0.004. The horizontal hydraulic gradient at the downgradient portions of the property near Route 9 (i.e., in the vicinity of B15-01 and B15-02) is steeper and estimated at approximately 0.063. The depth to groundwater (i.e., the unsaturated thicknesses of the sand





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LEGEND



164

B15-04 BORING LOCATION GROUNDWATER ELEVATION IN FEET-NAVD88 (JULY 24, 2015)

INTERPRETED GROUNDWATER SURFACE CONTOUR IN FEET-NAVD88



FIGURE 3 INTERPRETED GROUNDWATER SURFACE FORMER NORTH YARMOUTH MEMORIAL SCHOOL HYDROGEOLOGICAL STUDY



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deposit) at the borings, based on the July 24, 2015 groundwater measurements, ranges from about 40 to 65 feet.

Our interpreted groundwater surface, as shown in Figure 3, is consistent with the water table mapping prepared by Drumlin Environmental, LLC of Portland, Maine (Drumlin) for the Yarmouth Water District.⁷ Although the contours differ slightly, their pattern is the same as ours and shows groundwater flow across the school Site to the east-southeast. Thus, our findings are consistent with the more regional groundwater mapping for the village of North Yarmouth, as presented by Drumlin.

Eight SPT soil samples were selected for laboratory falling-head permeability testing. The samples selected are representative of soils encountered in the borings across the Site. At least one soil sample was selected from each boring. Grain size distributions were also analyzed for three samples and show the sand deposit to consist of coarse to medium sands. The results of the falling-head permeability testing are summarized on Table 2, and all soil laboratory testing results are included in Appendix C.

TABLE 2

Well Location	Depth Below Ground Surface (feet-bgs)	Measured Hydraulic Conductivity (feet/day)	Dry Density of Sample (pounds per cubic foot)
B15-01	50 to 52	0.4	99.4
B15-02	25 to 26.3	1.7	117.9
B15-02	50 to 52	1.9	105.5
B15-03	40 to 42	3.3	104.7
B15-04	40 to 42	5.3	95.4
B15-05	50 to 52	14.2	109.6
B15-05	60 to 62	1.0	103.7
B15-06	40 to 42	1.6	96.1

SUMMARY OF LABORATORY FALLING-HEAD PERMEABILITY TESTS

⁷ Drumlin Environmental, LLC. Letter to Robert MacKinnon, Superintendent of the Yarmouth Water District, dated July 21, 2015, concerning 2015 North Yarmouth monitoring well data.

The results of the laboratory falling-head permeability testing indicate a range in hydraulic conductivities for the sand deposit from 0.4 to 14.2 feet per day. The geometric mean of the eight samples tested is calculated at 2.2 feet per day. Using the dry densities from the permeability tests, along with an assumed specific gravity for the sands of 2.67, total soil porosities ranging from 0.29 to 0.43 were calculated.

2.2 Soil Test Pit Observations

On July 16, 2015, eleven soil test pits (TP15-01 through TP15-11) were dug and the encountered soils were classified by an SME Maine Licensed Site Evaluator. The soil test pits were located in the areas where the greatest hydraulic capacity of the Site was judged to be. In addition, since groundwater moves toward Route 9, the test pits were dug away from the downgradient school property boundary to maximize the potential for untreated wastewater disposal and, simultaneously, avoid adverse impacts to off-Site groundwater quality. Thus, the tests pits were mostly in the northern, undeveloped wooded portions of the property, and in non-wooded grassy areas north of the former school building. The soil test pit locations are illustrated on Figure 2. The soil test pits confirmed that suitable soil conditions exist at the Site for wastewater disposal based on the Maine Subsurface Wastewater Disposal Rules.

The soil test pits were dug using a backhoe with total depths ranging from about 48 inches-bgs to 70 inches-bgs. The soils encountered in the eleven test pits were all classified as Profile 5 soils, which are soils with stratified glacial drift parent materials. There were no observed limiting factors (e.g., bedrock, groundwater, or restrictive layers) encountered in the pits. Based on the soil conditions observed in the test pits, the Maine Subsurface Wastewater Disposal Rules sizing factor is 2.6 square feet per gallon of wastewater per day (e.g., the minimum square feet of bottom and side wall area per gallon of wastewater per day required below the pipe invert for a standard stone-bed disposal field).

On August 14, 2015, one additional test pit (TP15-12) was hand dug in the northeast wooded corner of the Site. This test pit location was selected due to its proximity to the nearby bedrock outcrop observed by SME. The test pit was classified as a Profile 3C soil, which are soils with glacial basal till parent materials. The upper portion of the test pit consisted of a very stony

loamy sand, with a mix of rounded and platy rock fragments. This stony soil overlaid a cemented, very fine sand, restrictive layer at about 34 inches-bgs. While the soils in the vicinity of TP15-12 meet the requirements for subsurface wastewater disposal, the northeast corner of the Site was excluded from SME's hydraulic capacity calculations due its restrictions in comparison to the deeper unsaturated outwash sand deposit at the rest of the Site.

Test pit logs are included in Appendix D.

2.3 Water Quality

Three of the monitoring wells, B15-01, B15-02, and B15-05, were sampled to establish baseline groundwater nitrate levels at the Site. Monitoring wells B15-01 and B15-02 are located hydraulically downgradient from the existing stone-bed disposal fields at the Site, which are assumed to have received limited use since the North Yarmouth Memorial School was closed in July 2014. Monitoring wells B15-01 and B15-02 were sampled on August 3, 2015 and July 17, 2015, respectively. Monitoring well B15-05 is located hydraulically upgradient at the Site and was sampled on July 23, 2015. The groundwater samples were collected from the selected monitoring wells using a submersible pump. Specific conductance, pH, dissolved oxygen, turbidity, and temperature were measured in a flow-through cell at the time of sample collection. Once these parameters stabilized, groundwater samples were collected for nitrate analysis. After collection, the water samples were delivered to Maine Environmental Laboratory in Yarmouth, Maine under Chain-of-Custody protocols. The laboratory analytical data and field sheets from the groundwater sampling at B15-01, B15-02, and B15-05 are included in Appendix E.

The nitrate results for the samples collected from B15-01, B15-02, and B15-05 were 0.8 mg N/L, 0.9 mg N/L, and 1.2 mg N/L, respectively. The results of the sampling by SME are considered representative of background groundwater nitrate concentrations for the school Site.

The results of our groundwater nitrate testing are consistent with previously reported groundwater nitrate testing by Drumlin for three monitoring wells located proximate to the Site. One of the monitoring wells, MW-1, is located hydraulically downgradient from (and proximate

to) the former school's existing disposal field area. Drumlin's historical nitrate data for MW-1 ranges from below detection (i.e. less than 0.1 mg N/L) to 1.0 mg N/L. The other two wells, MW-11 and MW-12, are located hydraulically upgradient from the Site. MW-11 has a historical nitrate concentration range of 0.5 mg N/L to 0.8 mg N/L. MW-12 has a historical nitrate concentration range of 0.6 mg N/L to 0.7 mg N/L.⁸ The locations of these wells are shown on Figure 2.

⁸ Letter report from Drumlin Environmental, LLC to Yarmouth Water District dated July 21, 2015, Subject: North Yarmouth Monitoring Wells – 2015 Data.

3.0 WATER SUPPLY SURVEY FOR DOWNGRADIENT ABUTTING PROPERTIES

The former North Yarmouth Memorial School receives its water supply from the Yarmouth Water District water main located along Route 9. SME performed a door-to-door survey on July 24, 2015 at abutting, hydraulically-downgradient properties to determine whether those properties were connected to the Yarmouth Water District's public water supply, or obtained their water from private wells. Six properties were included in the survey identified by SME as potentially hydraulically downgradient from the Site. Their locations and the results of the survey are summarized on Table 3.

TABLE 3

Property Location	Owner's Name	Water Supply Type	Water Usage	Well Depth	Type of Well	Known Water Quality Problems
99 Memorial Highway	Gertrude Sappington	Yarmouth Water District ¹	Normal Residential	Unknown ¹	Dug Well	Not Applicable
119 Memorial Highway	Peter Wiles	Yarmouth Water District	Normal Residential	No Well	No Well	No Well
133 Memorial Highway	Martha McConnell	Private Well	Normal Residential	Unknown	Unknown ²	Sediment
139 Memorial Highway	Gertrude Sappington	Private Well	Normal Residential	Approximately 120 feet	Bedrock	No Known Problems
147 Memorial Highway	Diana Theriault	Private Well	Normal Residential	Unknown	Unknown ²	Iron and Sediment
140 Memorial Highway	Jason Mills ³	Private Well	Normal Residential	Unknown	Unknown ²	Sulfur ⁴

SUMMARY OF WATER SUPPLY SURVEY FOR DOWNGRADIENT ABUTTING PROPERTIES

Notes:

1. Dug well on property still connected to home for irrigation purposes.

2. Wells at 133, 140, and 147 Memorial Highway are likely bedrock wells based on well casings and covers.

3. SME spoke with Tiffany Mills during survey.

4. Current resident does not drink well water due to known water quality issues.

Residential well locations were shown to SME by the residents that participated in the survey at 133, 139, 140, and 147 Memorial Highway. Their approximate well locations are shown on Figure 2. These locations were approximated visually; they were not surveyed. It should be noted that the McConnell well, and possibly the Mills well, appear to be located within 300 feet of the existing disposal field area at the Site, which is less than the current required setback established by the Maine Subsurface Wastewater Disposal Rules for a leachfield of its rated capacity. The Yarmouth Water District's 'Hayes Well, 1954' is about 1,200 feet downgradient of the school property (see Figure 1).

4.0 EFFLUENT MOUNDING AND TRANSPORT ANALYSES

The principle purpose of our hydrogeologic investigation was to evaluate how and where to maximize the subsurface wastewater disposal capacity of the former school property. The collected Site-specific data, as described above, has allowed us to calculate the capacity consistent with Maine regulations for wastewater disposal and water quality protection, and to determine how that capacity can be maximized. Three features largely control the hydraulic capacity for subsurface wastewater disposal: (1) the Maine Subsurface Wastewater Disposal Rules; (2) the extent of hydraulic mounding; and (3) protection of off-Site water quality. Details on these features are discussed below:

- (1) The Maine Subsurface Wastewater Disposal Rules control the rate of wastewater application based on soil types. The more permeable the soil (e.g., well drained sands), the greater the allowable application rate. Therefore, it is important to characterized the surficial soils so that an application rate can be selected based on these Rules. This is why the test pits were excavated and logged by a Maine Licensed Site Evaluator during our investigation.
- (2) Hydraulic mounding refers to the rise in the water table beneath the leachfields where the wastewater is being applied. The water table rises in response to the need to move the applied wastewater laterally away from the leachfields. The amount of hydraulic mounding allowed is determined by the depth to the groundwater table or, in other words, the thickness of the unsaturated zone above the water table. The greater the unsaturated thickness, the greater the allowable mounding and, therefore, the greater the wastewater application rate (other things being equal). The amount of hydraulic mounding is a function of the soil or bedrock permeability, the distance to groundwater discharge locations, water table configuration, and the rate of wastewater application. Needed data on the unsaturated soil thickness and permeability, the water table, and groundwater boundaries were the object of our borings, permeability testing, and groundwater mapping.

(3) In the case of treated wastewater, the Sites hydraulic capacity is defined by items (1) and (2) above. The degree of treatment must be such that the treated effluent does not adversely impact off-Site groundwater quality and cause the groundwater to become non-potable or unusable. If the wastewater is not treated, at some point, the subsurface soils are no longer capable of filtering and treating the wastewater effluent from the leachfields. The more effluent applied, typically, the greater the travel distance required for the effluent plume to become filtered to below water quality standards (e.g. drinking water standards). On a limited size property, such as the approximately 20-acre former school property, the distances required for large wastewater application rates can extend well beyond the property boundaries. Thus, to maximize the disposal capacity for untreated wastewater, the wastewater disposal travel distance within the Site should be maximized. Also, the application rate may have to be controlled or limited if the desire is to apply untreated wastewater.

This section summarizes our estimates of the Site's hydraulic capacities for treated and untreated wastewater application via subsurface leachfields. We began our analyses by determining the allowable application rate based on the Maine Subsurface Wastewater Disposal Rules and the encountered soil type. The Site essentially consists of Profile 5 soils with an allowable design application rate of 2.6 square feet per gallon per day. Since the depth to the groundwater table is greatest along the north side of the property, and since groundwater moves from north to east-southeast, we examined potential systems along the north side of the Site, in the vicinity of where trees currently are growing, north of the former school building. We assumed that the ballfield, existing building, roadways and parking areas, and areas immediately around the building would not be disturbed. We also avoided the area between the school and Route 9, even for the treated wastewater scenario since the unsaturated soil thickness was decreasing toward the road. The optimum locations identified to maximize wastewater disposal is shown as the cross-hatched area in Figure 4. The optimum area lies outside of the Yarmouth Water District's 1,000-foot buffer zone for its 'Hayes Well, 1954' (see Figure 1). It is important to note that the property boundaries included on Figure 4 are taken from tax maps, which typically have limited accuracy. Thus, it is possible that the actual property boundary position may slightly alter the extent or configuration of the optimum area

identified in Figure 4. A survey of the Site's property boundaries prior to additional planning and design will be required. The following sections present the results of our hydraulic mounding analyses and groundwater quality assessment relating to wastewater disposal at the Site.

4.1 Hydraulic Mounding Analyses

Four different methods were utilized to estimate the hydraulic mounding beneath and surrounding the wastewater disposal fields. The four methods were: (1) a one-dimensional interpretation of Darcy's Law;⁹ (2) flow net analysis;¹⁰ (3) treating the leachfields as equivalent recharge wells, supplemented with image well theory:¹¹ and (4) Hantush's transient mounding solution. The primary input parameter for these calculations was the average soil permeability, which as noted above in Section 2.1 was measured throughout the Site. We attempted to remain conservative in our calculations and assumptions so that mounding would be overestimated. Consistency of the results using multiple methods of estimating mounding provided an assurance that the results were reasonable.

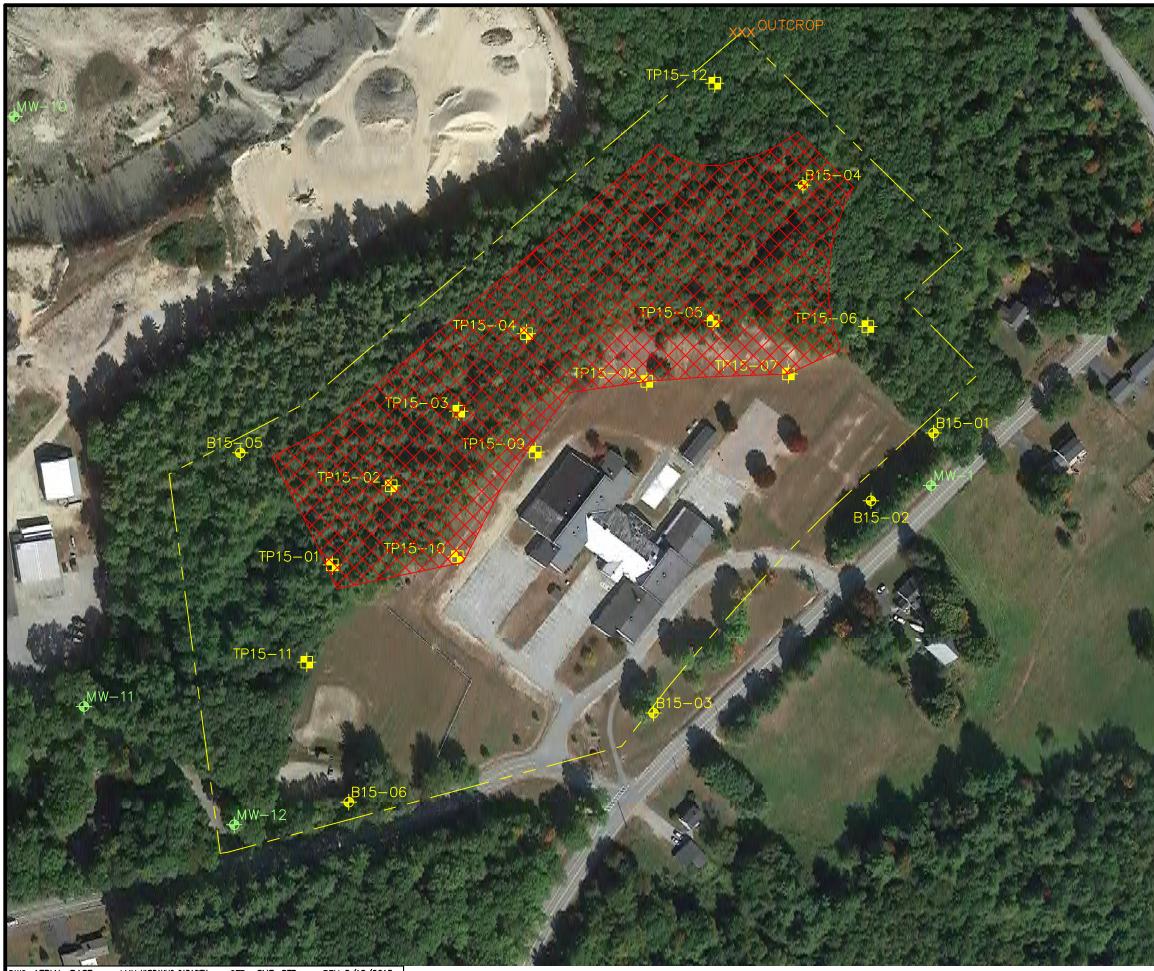
The mounding analysis was performed by first maximizing the wastewater application into leachfields until hydraulic mounding became excessive. In this case, the mounding did not reach the base of the leachfields but became excessive off-Site to the north and south. To the north, the concern was that excessive mounding could lead to seeps developing on the south wall of the sand and gravel pit. Such seepage would tend to potentially destabilize the slopes. To the south, mounding was kept well below building foundations and basements of existing residences.

Further analysis was completed by systematically decreasing the wastewater application into leachfields until the hydraulic mounding in the surrounding areas was no longer of concern. Based on this approach, a maximum capacity of about 40,000 gallons per day of wastewater could be applied to the optimum area shown in Figure 4. During detailed design of the leachfield

⁹ Freeze, R.A. and J.A. Cherry, 1979. Groundwater; Prentice-Hall, Inc.

¹⁰ deMarsily, G., 1966. Quantitative Hydrogeology; Academic Press.

¹¹ Hantush, M.S., 1967. Growth and Decay of Groundwater Mounds in Response to Uniform Percolation; Water Resources Research, Vol. 3.



<u>NOTES</u>

TAX MAP PROPERTY LINES ARE OFFSET FROM AERIAL PHOTOGRAPHY. ACTUAL SCHOOL PROPERTY LINE IS BELIEVED TO BE DOWN SLOPE FROM EXISTING DISPOSAL FIELDS. THE OFFSET MAY ALSO IMPACT THE POTENTIAL SUITABLE DISPOSAL FIELD AREAS.

<u>LEGEND</u>



BORING LOCATION

TEST PIT LOCATION

MW-1 - APPROX. YARMOUTH WATER DISTRICT MONITORING WELL LOCATION

> OPTIMUM SUBSURFACE WASTEWATER DISPOSAL AREA



5 0 150 FEET

FIGURE 4 OPTIMUM SUBSURFACE WASTEWATER DISPOSAL AREA FORMER NORTH YARMOUTH MEMORIAL SCHOOL HYDROGEOLOGICAL STUDY



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locations, along with some encroachment onto the ballfield and/or lawn areas, this capacity could possibly be increased slightly, but likely by no more than ten percent.

Based on the above estimated hydraulic capacity of 40,000 gallons per day for leachfields along the northern side of the former school property, and 4,848 gallons per day for the existing leachfields that served the former school (see Section 1.1 above), the greatest groundwater mounding beneath the proposed leachfields was estimated at about 30 to 35 feet, which leaves about 20 to 30 feet of unsaturated soil thickness beneath the fields. Mounding beneath the existing leachfields was calculated at about 30 feet or slightly less, leaving about 15 feet or more of unsaturated soil beneath the existing leachfields. Off-site mounding was estimated at less than 25 feet next to the Site, decreasing at greater distances. Given the measured depth to groundwater, the estimated amount of mounding will not flood the bases of leachfields placed at or near the ground surface.

4.2 Transport Analyses

Potential groundwater quality impacts from the leachfields were estimated based on nitrate concentrations in groundwater downgradient from the proposed and existing wastewater leachfields. Nitrate is commonly selected because, based on typical residential wastewater quality, other wastewater constituents are typically low enough in concentration not to be of concern or are renovated to applicable groundwater quality standards close to the leachfield. For instance, calculation of viral and bacterial transport in the sandy soils at this Site suggests a travel distance of less than 10 feet from the leachfields.

The analyses utilized a common, and accepted, three-dimensional, steady-state solute transport equation to simulate nitrate movement with distance through the groundwater.¹² The analyses assume that the nitrate does not degrade over distance or time. This is actually not the case but there is limited scientific evidence to reliably calculate the natural, in-situ treatment of nitrate in the subsurface. The analysis does allow for dispersion of the nitrate in the groundwater,

¹² Wexler, E.J., 1992. Analytical Solutions to One-, Two-, and Three-Dimensional Solute Transport in Groundwater Systems with Uniform Flow, USGS, Series No. 03-B7.

thereby, reducing its concentration over increasing travel distances. Therefore, our approach is considered conservative when evaluating groundwater nitrate impacts.

Our analyses of groundwater impacts had two separate approaches. The first was to determine what the required wastewater influent pre-treatment requirements are, with respect to nitrate, to fully maximize the Site's hydraulic capacity of approximately 45,000 gallons per day. The second was to determine the appropriate reduction in the wastewater application rate, assuming that there is no pre-treatment of the wastewater influent that would maintain applicable water quality standards in the off-site groundwater.

Assuming no treatment (neither pre-treatment, nor natural treatment in the unsaturated sands beneath leachfields), nitrate in the wastewater effluent is expected to be about 40 mg N/L below the leachfields.¹³ Our analysis shows that, based on an untreated wastewater effluent application rate of 45,000 gallons per day at the Site, nitrates are reduced to about 30 mg N/L as the effluent plume travels with the groundwater between the north side of the Site and Route 9. Therefore, wastewater treatment is required for a design flow of 45,000 gallons per day in order to meet the nitrate water quality standard of 10 mg N/L. Under this scenario, properly treated wastewater is necessary to maintain off-Site groundwater and surface water quality and protect off-site water supply wells, including the Yarmouth Water District's well. Given the results of the analysis with a wastewater application rate of 45,000 gallons per day, wastewater pre-treatment would essentially need to lower total nitrogen concentrations in the effluent to around 10 mg N/L, when considering a background groundwater nitrate concentration of 1 mg N/L.

A similar nitrate analysis of untreated wastewater suggests that the capacity of a new leachfield system along the northern edge of the school property (positioned to maximize the plume travel distance to off-site groundwater) is about 5,000 gallons per day in order to meet applicable water quality standards at the Site boundaries (e.g. Route 9). This would be accomplished by building five leachfields, each with a capacity of about 1,000 gallons per day. The five leachfields would be uniformly separated along the north edge of the school property. Nitrate-

\\Nserver\cfs\NYarm\2015MemorialHydrogeoStudy\Docs\R\20150821Hydrogeological Study.doc Sevee & Maher Engineers, Inc.

August 26, 2015

¹³ MEDEP, 1989. Hydrogeologic Assessment Guidelines for Determining Adverse Effects on Water Quality from Subsurface Wastewater Disposal Systems Under the Site Location of Development Law.

nitrogen in the groundwater at the property boundary would be 10 mg N/L and, therefore, offsite groundwater would be potable under this scenario. Hydraulic mounding is negligible in this scenario.

The calculated capacity of the Site's existing leachfields, based on nitrate concentrations, is on the order of a few hundred gallons per day under current water quality regulations. This is due to the close proximity of the leachfield to the assumed downgradient property boundary (i.e., Route 9). When this system was designed in the mid-1970s, potential nitrate impact to groundwater was not a consideration. However, it is understood that the existing subsurface wastewater disposal system was operating prior to the school closing in 2014 at about 2,000 gallons per day,¹⁴ and that nitrate concentrations approximately 50 feet downgradient from the leachfields in the monitoring well MW-1 were never detected at more than about 1 mg N/L when sampled by Drumlin in 2007, 2009, 2012, and 2015.¹⁵ This is much less than the water quality criterion of 10 mg N/L, and much less than the nitrate concentrations estimated at the property boundary in SME's nitrate transport analysis. It is possible that the discrepancy between the calculated nitrate concentrations and the measured nitrate concentrations in monitoring well MW-1 is due to the relatively deep separation distance between the bottom of the existing leachfields and the water table at the Site (i.e., about 50 feet or more). Since the unsaturated soils underlying the disposal fields consist of stratified sands, wastewater effluent through these layers of sand may be performing similarly to the treatment of effluent through intermittent sand filter systems, for which studies by U.S.EPA and others have indicated effective removal of total nitrogen and total Kjeldahl nitrogen.¹⁶ Based on the known historical usage of the existing subsurface wastewater disposal system, and the known downgradient water quality (i.e., rather than calculated conditions), it seems reasonable to present to MEDEP that the existing leachfield has a capacity of 2,000 gallons per day without wastewater treatment and maintain nitrate concentrations, and other wastewater constituents, below applicable groundwater quality standards at the Site's downgradient property boundary (i.e. Route 9).

¹⁴ Sweet Associates, Inc. 2014. Septic System Inspection, North Yarmouth Memorial School, dated June 2, 2014; performed at the request of the North Yarmouth Selectmen.

¹⁵ Letter report from Drumlin Environmental, LLC to Yarmouth Water District dated July 21, 2015, Subject: North Yarmouth Monitoring Wells – 2015 Data.

¹⁶ US Environmental Protection Agency, 1999, Wastewater Technology Fact Sheet, Intermittent Sand Filters. Office of Water, Washington, D.C. EPA 932-F-99-067, September 1999.

It is also important to reiterate that the existing leachfield appears to be within 300 feet of the McConnell well across Route 9, and possibly the Mills well. Current Maine Subsurface Wastewater Disposal Rules require a 300-foot setback between water supply wells and subsurface wastewater disposal systems with capacities of 2,000 gallons per day or greater; however, this existing leachfield is likely "grandfathered" since it was built in 1976 and has been in continuous operation. The installation dates of the McConnell and Mills wells are not known by SME. Survey of the Mills and McConnell wells relative to the closest edge of the existing leachfields is required to verify the actual separation distances.

The residential well setbacks and calculated versus actual nitrate concentration below the former school's existing leachfields will require discussions with MEDHHS and MEDEP in order to establish the system's capacity. Monitoring of the water quality downgradient of this leachfield would likely be a part of its continued use at 2,000 gallons per day, which could be conducted at new monitoring wells B15-01 and B15-02.

Based on the nitrate transport calculations for new subsurface wastewater disposal systems along the upgradient property boundary and assuming continued use of the existing subsurface wastewater disposal system at 2,000 gallons per day (pending approval by MEDEP and MEDHHS), the Site's total hydraulic capacity without wastewater treatment is estimated at about 7,000 gallons per day, which is significantly less that with wastewater treatment (i.e. about 45,000 gallons per day). As shown herein, untreated wastewater disposal at 7,000 gallons per day can be done without adversely impacting off-Site groundwater quality, residential water supply wells, or the Yarmouth Water District's 'Hayes Well, 1954'. Depending on the Town's intended use of the former school property for wastewater disposal, it is unlikely that the entire Site's treated wastewater capacity will be needed immediately. Therefore, beginning development of the Site with untreated wastewater, at or near the 7000 gallons per day rate, along with groundwater quality monitoring, may prove to be a cost-effective way of using the Site. Such an approach would allow refining hydraulic mounding estimates and defining any natural, in situ renovation of the wastewater as it migrates to the groundwater table through the unsaturated zone and with the groundwater. Periodic groundwater monitoring of the Site during a phased development of wastewater application at the Site could potentially demonstrate that our estimated pre-treatment requirements are overly conservative. Actual monitoring data of

groundwater quality could potentially result in less aggressive pre-treatment and significant cost savings for later future applications of more wastewater.

As an aside, the calculations provided above support MEDHHS's mounding and transmission analysis requirements and show that the wastewater effluent will remain below ground and not break out on the ground surface prior to renovation. The mounding analysis results show that the rise in water table beneath the leachfields will not reach within 15 feet of the base of the leachfields, which is more than adequate to prevent flooding of the bases of leachfields.

5.0 CONCLUSIONS

Based on our investigation and calculations, we have reached the following conclusions:

- (1) The former school property has favorable hydrogeologic characteristics for wastewater disposal: a deep water table, a thick unsaturated zone, and permeable soils.
- (2) The property's size, nearby abutting residences with wells, and the proximity of the Yarmouth Water District's 'Hayes Well, 1954' restricts the hydraulic capacity of the Site for untreated wastewater.
- (3) The Site's <u>untreated</u> wastewater capacity is about 7,000 gallons per day based on current MEDEP and MEDHHS regulations and rules and requires future leachfields to be placed within the northern side of the Site.
- (4) The Site's <u>treated</u> wastewater capacity is about 45,000 gallons per day but requires placement of future leachfields within the northern side of the Site. Application of wastewater at maximum capacity is estimated to require influent pre-treatment, and must consider background groundwater concentrations of applicable groundwater quality parameters.
- (5) The calculated treated and untreated capacities can be met without adversely impacting off-Site groundwater quality, residential water supply wells, and the Yarmouth Water District's 'Hayes Well, 1954'.
- (6) There appears to be significant natural in situ treatment or renovation of the wastewater applied through the existing leachfield based on groundwater monitoring by Drumlin. This may be due to the deep unsaturated soil zone beneath the existing leachfield.
- (7) The existing leachfield appears to lie within 300 feet of two residential water supply wells.
- (8) Long-term maintenance of properly designed future leachfields would likely be limited based on the soils present at the Site. When a leachfield fails due to clogging, the field can be replaced within the same footprint after removal of the clogged surface layer.

6.0 RECOMMENDATIONS

Based on our conclusions and findings, we make the following recommendations to the Town:

- (1) The first step for future wastewater disposal at the former school Site is to share the findings of this investigation with MEDEP and MEDHHS to discuss and agree on a capacity for the existing leachfield. Survey of the Site's property boundaries, precise location of the existing leachfield, and the McConnell and Mills wells are recommended prior to this meeting to corroborate the findings of this investigation.
- (2) The Town should begin to evaluate how much wastewater may be directed toward the Site and from where. This exercise will help the Town understand how a phased development approach might evolve and also provide information for estimating costs for transportation pipelines, wastewater treatment capital and operating costs, site development costs, and engineering and permitting costs. The Town should identify designated areas at the former school property for future wastewater disposal since that may create some constraints on use of the property.
- (3) Develop the Site for additional wastewater disposal over time, in a phased approach, monitoring each leachfield as it is built. We would recommend beginning with applying untreated wastewater to the Site. By monitoring any untreated wastewater leachfields (such as the existing leachfield) the actual behavior of the leachfields (i.e., rather than the calculated behavior) on the school Site would be determined. Actual mounding can then be used to project future mounding with more reliability and accuracy. Actual water quality downgradient of the leachfields would be used to define the in-situ nitrate removal and renovation, so that the degree of wastewater treatment can be minimized. Monitoring will potentially result in long-term savings as the Site is developed for more wastewater application in the future, assuming the entire Site capacity is not needed immediately. Periodic groundwater monitoring of the Site during a phased development of subsurface wastewater disposal leachfields could potentially demonstrate that our estimated pre-treatment requirements are

overly conservative and monitoring could potentially result in less aggressive pretreatment requirements.

- (4) In a phased development approach, any leachfield used for untreated wastewater can later be used for disposal of treated wastewater.
- (5) All downgradient water supply wells, including the Yarmouth Water District's 'Hayes Well, 1954', should be sampled prior to expanded use of the school property for wastewater disposal. Water samples from the wells should be tested for nitrate, nitrite, total Kjeldahl nitrogen, ammonia, total suspended solids, biochemical oxygen demand (BOD5), chloride, sodium, arsenic, iron, manganese, fecal coliform bacteria, pH, specific conductance, dissolved oxygen, Eh, temperature, turbidity, taste, and odor.
- (6) Regardless of the type and amount of future wastewater use of the property, groundwater monitoring will be required because of the downgradient proximity of residential water supply wells and the Yarmouth Water District's 'Hayes Well, 1954.'
- (7) Any future wastewater expansion of the school property must meet all State and Town permitting requirements, including applicable setbacks and water quality protection.

APPENDIX A

SOIL BORING AND WELL INSTALLATION LOGS

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PROJECT	: North Ya	rmouth Memorial School			JC	B NO.:	15087.00		BORING NO .:	B15-01	
DATE ST/			DATE FINISHED: 7/15/2015						Wash w/4" Dia		
		ELEVATION (FT): 208.10 ft-NAVD88	DRILLING CONTRACTOR: New	England	Boring Contr	actors (Forn Schae		LOGGED BY:		aher (APG)
BOREHO			WELL SCREEN/RISER DIA .: 2-in	nch					SHEET 2 OF 2		
	0111015				Blows per	6" on				WELL	
DEPTH (FT)	SAMPLE NO.	MATERIAL DESCRIPT	ION		Sample	er	Recovery				DEPTH (FT)
:											
	:										
50				0.000				Hollie	ton Sand #2S	ः स्तर	50
	5D	50 to 52 ft-BGS - light olive brown, well sort dense to dense sand	ed, SILTY VERY FINE SAND, medium		12-21-38	-48	13/24 inch		o 43.0 ft-BGS)		
									. Sch. 40 PVC No.10 Slot, L=		
									0 to 46.0 ft-BGS)		
60		00 / 00 // DOD // // / / // // //									60
	6D	60 to 62 ft-BGS - light brownish gray, well s medium dense sand	ORED, SILIY VERY FINE SAND,		12-18-25	5-28	14/24 inch				
								Formet	ion Collapse or		
									ton Sand #2S		
								(78.5	to 61.0 ft-BGS)		
70		Mark Counts at 70 & DCS SILTY FINE S									70
	1	Wash Sample at 70 ft-BGS - SILTY FINE S	AND								
	4										
	1										
	-	Wash Sample at 76 ft-BGS - Cuttings from	possible cobble zone								
	1	Wash Sample at 78.2 ft-BGS - Bedrock (M	apped as Granofels by MGS)	222						-	80
80	-	Bottom of Exploration - 78.5 ft-BGS									
	1										
	-										
L											
]										90
90	-									1	
	1										
	4			ł							
	1										
	-										
					l						
100	1										100
NOTES:	<u> </u>					Soil Key	<u> </u>				
	ig Point Ele	evation = 210.78 ft-NAVD88 (top of PVC	casing)			_			learshore Sand		
		ed on 7/24/2015: 51.78 ft-below monitor		ion					scot Formation	(Silt and Cla	ay)
	\						882	Bedrock			
1											

		rmouth Memorial School					- 0	
	ARTED: 0		DATE FINISHED: 7/14/2015			: Drive & Wash w/4" Di		
			RILLING CONTRACTOR: New Engl	land Boring Contractor	s (Tom Scha			Maher (APG)
BOREHO	LE DIA.: 4	4-inch	VELL SCREEN/RISER DIA.: 2-inch			SHEET 1 OF 2	<u></u>	
	SAMPLE			Blows per 6" or			WELL	
(FT)	NO.	MATERIAL DESCRIPTIO		Sampler	Recovery		LOG	DEPTH (FI
						2.88' PVC Stickup	1	
						w/Protective Casing		
0								0
						Holliston Sand #2S	+	
						(3.0 to 0.0 ft-BGS)		
	-							<u></u>
	ł							
	1D	5 to 7 ft-BGS - pale yellow, well sorted, FINE	TO MEDIUM SAND,	5-6-7-12	18/24 inch	Bentonite Chips		
		loose sand				(5.0 to 3.0 ft-BGS)		:: -
								<u></u>
10	1							10
	2D	10 to 12 ft-BGS - light gray, well sorted, FINE	TO MEDIUM SAND,	12-14-16-24	13/24 inch			
	20	medium dense sand				2" Dia. Sch. 40 🖳		ii
	ł					PVC Riser		()
	1							
		15 to 17 ft-BGS - light gray, moderately sorted	, MEDIUM TO COARSE SAND,	6-15-15-22	12/24 inch			
	3D	trace gravel (≤0.25 inch dia.), medium dense	sand; over FINE SAND	0-13-13-22	12/24 1101			
	4						1331,13	
20		1						20
_20		20 to 22 ft-BGS - light yellowish brown, mode	rately sorted, FINE TO MEDIUM	7-15-20-26	12/24 inch			
	4D	SAND, trace coarse sand and gravel (≤0.25 i		7-15-20-20	12/24 Inch			
	-					Holliston Sand #2S	$\left \right $	[]
	1					(30.0 to 5.0 ft-BGS)		
		25 to 26.3 ft-BGS - light gray, poorly sorted, M	EDIUM TO COARSE SAND AND	44-35-50/0.3R	7/16 inch			
	5D	GRAVEL (≤1 inch dia.), dense sand		44-35-50/0.3K	7/16 Inch			· · · · · · · · · · · · · · · · · · ·
	4							
30	ł							30
		30 to 32 ft-BGS - light yellowish brown, well s	orted, FINE TO MEDIUM SAND,	00 40 00 05	45/04 in ab			
	6D	medium dense sand		20-18-20-35	15/24 inch			
	I							
	ł					Bentonite Chips (37.0 to 30.0 ft-BGS) ~		
		35 to 37 ft-BGS - light brownish gray, well so	ted, MEDIUM TO COARSE SAND,	10.10.15.00	40/04 1	(37.010 30.011-000)		
	- 7D	medium dense sand		12-13-15-30	13/24 inch			
	-							40
40		40 to 42 ft-BGS - light brownish gray, well so				Holliston Sand #2S /	1 🗋	
	- 8D	medium dense sand	ted, T INE TO MEDION SAND,	15-18-20-23	12/24 inch	(55.5 to 37.0 ft-BGS)	3	
]							
	-						「「「「「「」」	<u>i</u>
	<u> </u>			ł‰ ł		2" Dia. Sch. 40 PVC		3
	9D	45 to 47 ft-BGS - light olive gray, well sorted, medium dense sand	SILI AND VERT FINE SAND,	12-15-15-18	15/24 inch	Screen, No.10 Slot, L= 15 ft (55.5 to 40.5 ft-BGS)	/	
						1		
]						目目) <u></u>
50		l				I	<u>1001551</u>	50
NOTES:				Soil K		M - N - 0 -		D
		vation = 212.01 ft-NAVD88 (top of PVC ca				Marine Nearshore Sand		
Water lev	vel measur	ed on 7/24/2015: 47.19 ft-below monitoring	point, 164.82 ft-NAVD88 elevation			Presumpscot Formation	Silt and C	lay)
					888	Bedrock		

ROJECI	F: North Ya	rmouth Memorial School				_	15087.00	BORING NO.:		
ATE ST	ARTED: 0	7/13/2015	DATE FINISHED: 7/14/2015					: Drive & Wash w/4" Dia	a. Casing	
ROUND	SURFAC	E ELEVATION (FT): 209.13 ft-NAVD88	DRILLING CONTRACTOR: New En	gland	Boring Co	ntractors (Tom Schae	efer) LOGGED BY:	Sevee & M	Maher (APG)
	LE DIA.: 4		WELL SCREEN/RISER DIA .: 2-inch					SHEET 2 OF 2	<u> </u>	+
DEPTH	SAMPLE	MATERIAL DESCRIP	ION		Blows p		Recovery		WELL	
<u>(FT)</u>	NO.				Sam	pier			LOG	DEPTH (F1
							.			
									1	
50										50
		50 to 52 ft-BGS - light yellowish brown, well	sorted, FINE SAND, some		16-16-	17.00	13/24 inch	Holliston Sand #2S		
	10D	medium sand, trace silt, medium dense sar				-17-20	13/24 11011	(55.5 to 37.0 ft-BGS)		·
								2" Dia. Sch. 40 PVC	ΠΞ	
		55 to 57 ft-BGS - light yellowish brown, more	lerately sorted FINE SAND some	-88				Screen, No.10 Slot, L= 15 ft (55.5 to 40.5 ft-BGS)	and the second second	
	11D	medium sand and silt, medium dense sand	INITIAL PARTY SUITE		15-18-	20-25	10/24 inch			
				-100			1			
	1									
60									10.14	60
	12D	60 to 62 ft-BGS - light brownish gray, wells			15-23-	27-37	10/24 inch			
		trace silt and medium sand, medium dense	to dense sand	-88						
	•							Formation Collapse or		
								Holliston Sand #2S	4	
	13D	65 to 67 ft-BGS - light brownish gray, well s	orted, FINE SAND, trace		14-20-	-20-22	7/24 inch	(80.5 to 55.5 ft-BGS)	1.19.400	
	130	silt, medium dense sand								
	-									
70	4									70
- 10	1	Wash Sample at 70 ft-BGS - silty FINE SA	ND							
	1								20.35572.27	
										8.
]									
	-									
	4									ő
	1									
]	Wash Sample at 78 to 79 ft-BGS - FINE S.								
80		Wash Sample at 79 to 80 ft-BGS - Bedroch	(Mapped as Granofels by MGS)							80
	-	Bedrock at 79.5 ft-BGS Bottom of Exploration - 80.5 ft-BGS							-	
	1	Education - 60.0 R-BGS								
		1		1						
]									
	4									
	-								1	
	4								1	
90	1									90
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]			1						
	4						1		1	
	-			ł						
	-				1					
	1									
]							1		L
									1	100
100								L		100
NOTES:						Soil Key				Dens-ite
Monitorin	g Point Ele	evation = 212.01 ft-NAVD88 (top of PVC	casing)					Marine Nearshore Sand a		
Water lev	vel measur	red on 7/24/2015: 47.19 ft-below monitor	ing point, 164.82 ft-NAVD88 elevation			ļ		Presumpscot Formation (Silt and Cl	ay)
								Bedrock		
]				
]				

Ν

		rmouth Memorial School			.: 15087.00	BORING NO.		
		7/15/2015	DATE FINISHED: 7/16/2015			: Drive & Wash w/4" D fer) LOGGED BY:		(ABC)
		E ELEVATION (FT): 214.47 ft-NAVD88	DRILLING CONTRACTOR: New England WELL SCREEN/RISER DIA.: 2-inch	Boring Contractors	(Tom Schae	SHEET 1 OF		Aner (APG)
SOREHO	LE DIA.: 4	Hinch	WELL SCREEN/RISER DIA 2-IICI			011211101		
DEPTH (FT)	SAMPLE NO.	MATERIAL DESCRIF	TION	Blows per 6" on Sampier	Recovery		WELL LOG	DEPTH (FT
						2.75' PVC Stickup		
					-	w/Protective Casing		
0						Holliston Sand #2S		0
						(3.0 to 0.0 ft-BGS)		
						, ,		
	1							
						Bentonite Chips / (5.0 to 3.0 ft-BGS)		
						, , , , , , , , , , , , , , , , , , ,		
10	1D	10 to 12 ft-BGS - pale yellow, well sorted,	FINE TO MEDIUM SAND,	13-16-18-16	14/24 inch	2" Dia. Sch. 40 🕓		10
	 	medium dense sand				PVC Riser		
	1							
	1							
	1					Holliston Sand #2S		
20	4					(25.0 to 5.0 ft-BGS)		20
	2D	20 to 22 ft-BGS - light yellow, well sorted, loose to medium dense sand	FINE TO MEDIUM SAND,	7-8-10-13	14/24 inch			
	-							
	-							
						Bentonite Chips		
30	-					(31.0 to 25.0 ft-BGS) ~		30
	- 3D	30 to 32 ft-BGS - pale yellow, well sorted, medium dense sand	FINE TO MEDIUM SAND,	11-13-15-20	11/24 inch			·
	-					Holliston Sand #2S /		:
	-					(49.0 to 31.0 ft-BGS)		
	1					2" Dia. Sch. 40 PVC	日日	
	-					Screen, No.10 Slot, L=		40
40	4D	40 to 42 ft-BGS - light yellowish brown, w	ell sorted, FINE TO MEDIUM SAND,	13-15-16-22	12/24 inch	15 ft (49.0 to 34.0 ft-BGS		40
	40	little silty fine sand, medium dense sand						
	-					Formation Collapse or		
	-					Holliston Sand #2S (103.5 to 49.0 ft-BGS)		50
50			K	Ser 14			The State Sec.	S - 50
NOTES:		avertion = 017 00 8 NAV/D00 /ton of DV/	C casing)	Soil K	2Y 	Marine Nearshore Sand	and Gravel	Deposits
		evation = 217.22 ft-NAVD88 (top of PV red on 7/24/2015: 42 44 ft-below monite	c casing) pring point, 174.78 ft-NAVD88 elevation			Presumpscot Formation		
vvater le	vei measu	160 011 //24/2013, 42.44 IL-DEIOW MONIL	Sing point, 17 th O ICHAY DOD Glevation			Bedrock		

PROJECT	F: North Ya	rmouth Memorial School								RING NO.: B15-03		
		7/15/2015							e & Wash w/4" Dia. Casing			
GROUND	SURFAC	ELEVATION (FT): 214.47 ft-NAVD88	DRILLING CONTRACTOR: New England Boring Contractors (Tom Schaefer					efer)				
BOREHO	LE DIA.: 4	1-inch	WELL SCREEN/RISER DIA.: 2-inch					SHEET 2 OF 3				
DEPTH	SAMPLE				Blows per	r 6" ол	Recovery			WELL		
(FT)	NO.	MATERIAL DESCRIPT			Samp	ler	Recovery			LOG	DEPTH (FT	
											50	
50		50 to 52 ft-BGS - light olive gray, moderatel	v sorted, SILTY FINE SAND,									
	5D	trace silty clay (gray), medium dense sand			10-10-1	5-22	15/24 inch			ar and the		
										1000		
60											60	
	6D	60 to 62 ft-BGS - light gray, well sorted, SIL	TY FINE SAND,		8-10-12	2-18	15/24 inch					
		loose to medium dense sand		-								
- 												
70											70	
		Wash Sample at 70 ft-BGS - SILTY FINE S	AND									
										an a		
										an a		
								Form	ation Collapse or	1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.1.		
									liston Sand #2S			
80		Wash Sample at 80 ft-BGS - SILTY FINE S						(103	.5 to 49.0 ft-BGS)	\mathbf{n}	80	
		Wash Sample at 60 tr-b65 - Sie FFF inte 6	AND, LIACE Incluint Sand									
											*	
										1.1		
90											90	
		Wash Sample at 90 ft-BGS - SILTY FINE S	AND									
	-										(
	1											
	1											
	4											
· · · ·	4									and a second second		
100	<u> </u>										100	
NOTES:						Soil Key						
Monitoring Point Elevation = 217.22 ft-NAVD88 (top of PVC casing)									Nearshore Sand			
Water level measured on 7/24/2015: 42.44 ft-below monitoring point, 174.78 ft-NAVD88 elevation									npscot Formation	n (Silt and Cla	ay)	
								Bedroc	k			
			·····									

		armouth Memorial School	1				15087.00		BORING NO.		
		7/15/2015	DATE FINISHED: 7/16/2015						Wash w/4" D		
		E ELEVATION (FT): 214.47 ft-NAVD88	DRILLING CONTRACTOR: New Er WELL SCREEN/RISER DIA.: 2-inc		Boring Cor	ntractors (Tom Schae	efer)	LOGGED BY: SHEET 3 OF		laher (APG)
BOREHO	LE DIA.: 4	4-Inch	WELL SCREEN/RISER DIA 2-Inc						ONLET O		
DEPTH	SAMPLE	MATERIAL DESCRIPT	110N		Blows pe	er 6" on	Recovery			WELL	
(FT)	NO.				Sam	pler				LOG	DEPTH (FT)
										1	
100				- 127223						and the second design of the	100
		Wash Sample at 100 ft-BGS - FINE TO CO	DARSE SAND					Forma	tion Collapse or	1	
		Wash Sample at 102.8 to 103.5 ft-BGS - Be	edrock (Mapped as Granofels by MGS)						ton Sand #2S		
		Bedrock at 102.8 ft-BGS						(103.5	to 49.0 ft-BGS)		
		Bottom of Exploration - 103.5 ft-BGS									
·····											
110										1	110
120											120
	1										
	1										
									-		
130											130
130	1										
	1									1	
140	-										140
140	1										
	1										
	-										
	1										
	-										
	1										
]										450
150		<u> </u>			l I	0.2117				1	150
NOTES:	- D-1 (C'		anaina)			Soil Key		Marine N	iearshore Sand	and Gravel	Deposits
		evation = 217.22 ft-NAVD88 (top of PVC ed on 7/24/2015: 42.44 ft-below monitori							scot Formation		
vvaler lev	rei medsur	50 01 1124/2010, 42.44 it-Delow Inchiton	ng point, 177.70 it no v Doo elevation					Bedrock			
			<u> </u>								

PROJECT	: North Ya	mouth Memorial School	·			: 15087.00		BORING NO .:			
DATE ST			DATE FINISHED: 7/20/2015		DRILLIN	G METHOD	: Drive &	Wash w/4" Dia	a. Casing		
		ELEVATION (FT): 232.68 ft-NAVD88	DRILLING CONTRACTOR: New Englan	d Boring C				OGGED BY:		Vlahe	r (APG)
BOREHO			WELL SCREEN/RISER DIA .: 2-inch				ę	SHEET 1 OF 2			
			· · · · · · · · · · · · · · · · · · ·			,				1	
DEPTH	SAMPLE	MATERIAL DESCRIPT	10N		per 6" on npler	Recovery			WELL LOG	DEF	PTH (FT)
<u>(FT)</u>	NO.			Sal	npier				100		111 (11)
								VC Stickup ective Casing			
										·	
											•
0		\\	N/				Hollist	on Sand #2S			0
								0.0 ft-BGS)			
							(5.0 %	, 0.0 it D00)			
								onite Chips /			
							(0.0 to			Ľ	
10				<u></u>		ļ				<u> </u>	10
	1D	10 to 12 ft-BGS - pale yellow, well sorted, F	INE SAND,	12-1	6-17-27	15/24 inch		ia Sah 10		:	
		medium dense sand		§				ia. Sch. 40 → VC Riser		-	
								01.00			
	1									-	
]·	
L	1										
20											20
	1			8						-	
	2D	21.5 to 23.5 ft-BGS - pale yellow, well sorte	d, FINE SAND, trace medium to	11-1	2-12-15	12/24 inch				3 	
		coarse sand, medium dense sand		8							
	1										
										3	
]										
30	ł									:	30
		30 to 32 ft-BGS - pale yellow, well sorted, F	INE SAND, trace medium to	10.1	5-17-20	13/24 inch			11 1		
	- 3D	coarse sand, medium dense sand			5-17-20	10/24 1000					
	-						Hollio	ton Sand #2S 🦯]	
	-						1	to 5.0 ft-BGS)			
	4						,				
	1										
]			8						-	
	-			8							40
40		40 to 42 ft-BGS - light yellowish brown, well	sorted FINE TO MEDIUM SAND			40/04	Ben	tonite Chips			
	4D	medium dense to dense sand		10-1	0-12-16	12/24 inch		o 39.0 ft-BGS) 🦯			
						1					
	4	1				1					
	-	1				1					
	1	-					Hollis	ton Sand #2S			
	1			ý.		1	(60.0	to 46.5 ft-BGS) —	\downarrow		
]	Wash Sample at 48 ft-BGS - Cuttings from		X						::	50
50		Wash Sample at 49.5 ft-BGS - Cuttings fro	m dark weathered rock	21		<u> </u>	1		<u> post</u> 1	<u>.</u>	
NOTES:					Soil Key	۲ ۱	Morino N	earshore Sand a	and Grave	Den	osits
		evation = 235.35 ft-NAVD88 (top of PVC			-			scot Formation (
Water lev	vel measur	ed on 7/24/2015: 56.72 ft-below monitor	ing point, 178.63 ft-NAVD88 elevation		-1			scot Formation (oncario		
					-4		Bedrock				
L					-						
			······		1						

PROJECT	F: North Ya	rmouth Memorial School	•••		JOB NO.	15087.00		BORING NO .:	B15-04	
DATE ST			DATE FINISHED: 7/20/2015					Wash w/4" Dia		
			DRILLING CONTRACTOR: New England	Borina Ca				LOGGED BY:		laher (APG)
BOREHO			WELL SCREEN/RISER DIA.: 2-inch					SHEET 2 OF 2		
								· ····		
		MATERIAL DESCRIPT	ION	Blows	ber 6" on	Recovery			WELL	
(FT)	NO.			Sar	npler				LOG	DEP T H (FT)
								:		
									:	
1										
-										50
50		50.5 to 51 ft-BGS - dark reddish brown, WE	ATHERED ROCK				Hollis	ston Sand #2S		
	5D			70/	0.5R	4/6 inch	(60.0	to 46.5 ft-BGS)		
		Wash Sample at 53 ft-BGS - Bedrock (Map	bed as Granofels by MGS)				2" Die	a. Sch. 40 PVC	8	
								n, No.10 Slot, L=	- E	
							10 ft (60	.0 to 50.0 ft-BGS)		
L										
60										60
		Bottom of Exploration - 60.0 ft-BGS	^^^						·····	
									1	
									1	
70										70
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80										80
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90										
									1	
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100				1						100
NOTES:		·	/ / /		Soil Key	<u> </u>				
	a Point Ele	vation = 235.35 ft-NAVD88 (top of PVC	casing)		1		Marine I	Nearshore Sand a	and Gravel [Deposits
		ed on 7/24/2015: 56.72 ft-below monitori			1		Presum	pscot Formation	Silt and Cla	y)
		· · · · · · · · · · · · · · · · · · ·]	8 22	Bedrock	(

		armouth Memorial School					: 15087.00	BORING NO.:		
		07/20/2015	DATE FINISHED: 7/21/2015					: Drive & Wash w/4" Dia		(100)
		E ELEVATION (FT): 242.86 ft-NAVD		land	Boring Co	ntractors	(Tom Schae			viaher (APG)
BOREHO	LE DIA.:	4-inch	WELL SCREEN/RISER DIA.: 2-inch					SHEET 1 OF 2		·
DEPTH	SAMPLE				Blows p	er 6" оп	Deservery		WELL	1
(FT)	NO.	MATERIAL DESCR	IPTION		Sam		Recovery		LOG	DEPTH (FT
								2.74' PVC Stickup		
								w/Protective Casing		
0	-								LU IL	0
								Holliston Sand #2S		
								(3.0 to 0.0 ft-BGS)		
	1							Bentonite Chips		
	-							(6.0 to 3.0 ft-BGS)		:
	{									
10	1									10
	1D	10 to 12 ft-BGS - pale yellow, moderate			18-18-	15-15	11/24 inch			;
		trace coarse sand and gravel, medium of	lense sand				· · · · · · · · · · · · · · · · · · ·	2" Dia. Sch. 40 PVC Riser		
	4							PVC Riser		
	1									
]									
	-									·
	4									
20	4									20
	2D	20 to 22 ft-BGS - light gray, well sorted,	FINE SAND, trace medium sand,		16-20-	28-30	14/24 inch			
		medium dense sand								
	-									
	1									
]									
	-									
	4									
30	-									30
	- 3D		FINE TO MEDIUM SAND to 31.5 ft-BGS,		19-23-	-28-30	15/24 inch			
		FINE TO COARSE SAND and trace gra	avel below, medium dense sand	-			+			
	1							Holliston Sand #2S	1	
]							(48.0 to 6.0 ft-BGS)		
	4									
	-									· · · · · · · · · · · · · · · · · · ·
	1									:
40	1									40
	4D	40 to 42 ft-BGS - light yellowish brown,			23-33	-30-28	15/24 inch			္ <u>ခ</u> ါ
		sandy silt layers, trace gravel, medium	Jense to dense sand	1						1
	1									
]									
	4									
	1						1	Bentonite Chips		
	1							(55.0 to 48.0 ft-BGS) ~		
50	1		· · · · · · · · · · · · · · · · · · ·							50
NOTES:						<u>Şoil Key</u>				
		evation = 245.60 ft-NAVD88 (top of P						Marine Nearshore Sand a		
Water le	vel measu	red on 7/24/2015: 66.00 ft-below mon	toring point, 179.60 ft-NAVD88 elevation					Presumpscot Formation (Silt and C	lay)
								Bedrock		
						1				

PROJECT	: North Ya	rmouth Memorial School					15087.00	BORING NO.		
DATE STA	ARTED: 0	7/20/2015	DATE FINISHED: 7/21/2015					: Drive & Wash w/4" D		
GROUND	SURFACE	ELEVATION (FT): 242.86 ft-NAVD88	DRILLING CONTRACTOR: New		Boring Cont	ractors (Tom Schae			laher (APG)
BOREHO	LE DIA.: 4	-inch	WELL SCREEN/RISER DIA.: 2-	-inch			<u> </u>	SHEET 2 OF	۷	
DEPTH (FT)	SAMPLE NO.	MATERIAL DESCRIPT	rion		Blows per Samp		Recovery		WELL LOG	DEPTH (FT)
50		50 to 52 ft-BGS - light gray, well sorted, FIN	IE TO COARSE SAND.							50
	5D	medium dense sand			16-22-2	8-29	12/24 inch	2" Dia. Sch. 40 PVC Riser		
								Bentonite Chips (55.0 to 48.0 ft-BGS)		60
60	6D	60 to 62 ft-BGS - light gray, well sorted, SIL	TY FINE SAND,		16-22-2	6-28	14/24 inch	2" Dia. Sch. 40 PVC Screen, No.10 Slot, L=		
		medium dense sand	<u> </u>					15 ft (73.0 to 58.0 ft-BGS)		
		Wash Sample at 67 ft-BGS - FINE SAND						Holliston Sand #2S / (73.0 to 55.0 ft-BGS)		70
70		Wash Sample at 70 ft-BGS - MEDIUM TO	COARSE SAND					Formation Collapse or Holliston Sand #2S		
								(75.0 to 73.0 ft-BGS) -		
		Bottom of Exploration - 75 ft-BGS	<u></u>							
	-									
80	4									80
	1						-			
	4									
	-						-		i .	
90	-						1			90
	4									
	-									
	4									
100	-				r					100
NOTES:			······································			Soil Key		Marine Nearshore Sand	and Gravel	Deposits
		evation = 245.60 ft-NAVD88 (top of PVC ed on 7/24/2015: 66.00 ft-below monitor		ation				Presumpscot Formation Bedrock		

ŝ

		armouth Memorial School					15087.00	BORING NO.: Drive & Wash w/4" Di		
		7/22/2015	DATE FINISHED: 7/23/2015							Mahor (ABG)
		E ELEVATION (FT): 229.31 ft-NAVD8			Boring Cor	ntractors (Tom Schae	SHEET 1 OF 2		vianer (APG)
BOREHO	LE DIA.:	4-inch	WELL SCREEN/RISER DIA.: 2	-Incn				SHEETTOT	• 	
DEPTH	SAMPLE			-	Blows pe	er 6" on	Recovery		WELL	
(FT)	NO.	MATERIAL DESCR			Sam	pler	Recovery		LOG	DEPTH (F
								2.64' PVC Stickup		
								w/Protective Casing	\mathbf{k}	
							~			
0				1000						0
								Holliston Sand #2S (3.0 to 0.0 ft-BGS)		
								(3.0 10 0.0 11-003)		
										· .
								Bentonite Chips / (5.0 to 3.0 ft-BGS)		
	4							(3.010 3.011 603)		
10		Wash Sample at 9 to 10 ft-BGS - GRAV								10
		Driller Note: Silty Clay from 10.5 to 24 ft- 11 to 13 ft-BGS - gray, SILTY CLAY, thi		7/				2" Dia. Sch. 40		j
	1D	gravel, soft	ayers of fine to coase sand and		4-4-	4-4	13/24 inch	PVC Riser	<u>+-</u> -	
		graver, sort								
	1									
	1									
	1									
20	1									20
	2D	20 to 22 ft-BGS - gray, SILTY CLAY, thi	n layers of fine to medium sand and		2-2-	1-4	24/24 inch			
		gravel, very soft								
	1									
]									
	ł									
	1									
]									
30										30
	- 3D	30 to 32 ft-BGS - light gray, well sorted, medium dense sand	SILT VERT FINE SAND,		20-25-	25-30	16/24 inch			· · · · · · · · · · · · · · · · · · ·
	1							Holliston Sand #2S		
	-							(45.0 to 5.0 ft-BGS)		
	-									
	1	-								:
]									40
40	-	40 to 40 ft PCC, light grow well ported								
	4D	40 to 42 ft-BGS - light gray, well sorted, medium dense sand to dense sand	FINE SAIND,		16-27	-35-42	13/24 inch			
	1									
	4									
	-									
	1									
	1						1	Bentonite Chips		
	1							- (52.0 to 45.0 ft-BGS) ~		50
50	1			<u>K8888</u>	l	Soil Kou	<u> </u>	1		
NOTES:			/ O and i = 0			<u>Soil Key</u>		Marine Nearshore Sand	and Grave	Deposits
		evation = 231.95 ft-NAVD88 (top of P)		tion				Presumpscot Formation		
	vel measu	red on 7/24/2015: 52.75 ft-below moni	toring point, 179.20 ft-NAVD88 eleva	auon				Bedrock		
Water lev										
Water le							KXXX	Bedruck		

		mouth Memorial School	· · · · · · · · · · · · · · · · · · ·					<u> </u>	
ATE STA	RTED: 0	7/22/2015	DATE FINISHED: 7/23/2015				ive & Wash w/4" Dia		
ROUND	SURFACE		DRILLING CONTRACTOR: New England	Boring Contrac	ctors (Tom	Schaefer	LOGGED BY:		Maher (APG)
	E DIA.: 4		WELL SCREEN/RISER DIA .: 2-inch				SHEET 2 OF 2		
								WELL	1
	SAMPLE	MATERIAL DESCRIPT	TION	Blows per 6' Sampler		overy		LOG	DEPTH (F
<u>(FT)</u>	NO.			Gampier					
]				1	
								1	
50									50
							Bentonite Chips		
							(52.0 to 45.0 ft-BGS)		
								5	:
								- B	
							2" Dia. Sch. 40 PVC		
							Screen, No.10 Slot, L=		
60						15	5 ft (70.0 to 55.0 ft-BGS)		60
		Wash Sample at 60 ft-BGS - MEDIUM TO	COARSE SAND						:]
						1			
					1		Holliston Sand #2S		
							(70.0 to 52.0 ft-BGS)		
						1			70
70		Wash Sample at 70 ft-BGS - FINE TO CO Bottom of Exploration - 70 ft-BGS							
		Bollon of Exploration - 76 h-bee				1			
					1				
					1				
						1			
	1			1					
80	1							1	80
]								
	1								
	4							1	
	ł							1	
	1								
]	-							
					1				
	1	1			ł				90
90	-								
	1					1			
	1							1	
]	ł							
	_				1				
	4				-				
	{	1							
	1				1			1	
100	1								100
NOTES:	<u> </u>			Sc	oil Key				
	a Doint Et	evation = 231.95 ft-NAVD88 (top of PVC	casing)			M	arine Nearshore Sand	and Grave	el Deposits
wonitorin		540001 - 231.33 IL-INAV DOD (LUP OF PVC	ing point 170 20 ft-NAV/D88 elevation				esumpscot Formation		
Water lev	vel measur	ed on 7/24/2015: 52.75 ft-below monitor	ing point, 179.20 it-INAV Doo elevation				drock		
						പപപപ			

APPENDIX B

GROUNDWATER LEVEL MEASUREMENTS IN MONITORING WELLS

GROUNDWATER LEVEL MEASUREMENTS IN MONITORING WELLS HYDROGEOLOGICAL STUDY OF FORMER NORTH YARMOUTH MEMORIAL SCHOOL PROPERTY

Well ID	Date	Time	Depth to Water from TPVC (feet)	TPVC Elevation (feet-NAVD88)	Groundwater Elevation (feet-NAVD88)
	7/23/2015	8:24	51.76		159.02
B15-01	7/23/2015	13:55	51.77	210.78	159.01
	7/24/2015	14:47	51.78		159.00
	7/23/2015	8:27	47.16		164.85
B15-02	7/23/2015	13:51	47.18	212.01	164.83
	7/24/2015	14:45	47.19		164.82
	7/23/2015	8:31	42.41		174.81
B15-03	7/23/2015	13:46	42.42	217.22	174.80
	7/24/2015	14:41	42.44		174.78
	7/23/2015	8:19	56.65		178.70
B15-04	7/23/2015	13:36	56.68	235.35	178.67
	7/24/2015	14:53	56.72		178.63
	7/23/2015	8:12	65.94		179.66
B15-05	7/23/2015	10:56	65.97	245.60	179.63
	7/24/2015	15:01	66.00]	179.60
	7/23/2015	8:06	52.72		179.23
B15-06	7/23/2015	14:01	52.74	231.95	179.21
	7/24/2015	15:08	52.75		179.20

Notes:

TPVC - top of PVC casing

NAVD88 - North Americal Vertical Datum of 1988

APPENDIX C

FALLING-HEAD PERMEABILITY AND GRAIN SIZE ANALYSIS RESULTS

	ME: <u>N. YARMOUT</u> UMBER:		<u>l School</u>		TE: <u> </u>	1
SAMPLE NO	N NO. <u>BIS-DI</u> D-5 PTH <u>50-52</u> -FT.			LE DESCRIPTIO	1	
b WATE SOIL		WT.	DRY SOIL 8	$v_{s} = 0.7854 d^{2}$ (TARE = <u>49</u> /	1,4	
WATER TEN	d = 2033 in	WT. DEN	DRY SOIL =	= 227.67 Ws = 268.7 SOIL = Ws x 3.	' <u>}</u> gm	
<u> </u>	d = <u>2,033</u> in	WT. DEN	DRY SOIL =	$W_{s} = \frac{268.7}{W_{s}}$ SOIL = $\frac{W_{s}}{V_{s}} \times 3$. h = DIFFERENCE	gm 806 = <u>99</u> ,	Pcf
WATER TEN	$d = 2 \underline{2} \underline{3} \overline{3} \text{ in}$ $IPERATURE = \underline{2} \underline{3} \overline{3}$ $WATER LEVEL$ $BELOW TOP$	WT. DEN 2. ° C ELAPSED TIME	DRY SOIL = SITY DRY S h HEAD	$W_{s} = \frac{268.7}{W_{s}}$ SOIL = $\frac{W_{s}}{V_{s}} \times 3$. h = DIFFERENCE	3 gm 806 = <u>99</u>	Pcf
WATER TEN	d = 2 <u>033</u> in IPERATURE = <u>22</u> WATER LEVEL BELOW TOP OF CYLINDER	WT. DEN 2. ° C ELAPSED TIME	DRY SOIL = SITY DRY S HEAD INCHES 6545 5.545	$W_{S} = \frac{268.7}{V_{S}}$ SOIL = $\frac{W_{S}}{V_{S}} \times 3$. h = DIFFERENCEAND TAIL V $K_{T} = \frac{b-a}{A} I T$	3 gm 806 = <u>99</u> BETWEEN H VATER AT TIM	Y pcf HEAD WATE
MATER TEN	d = 2 <u>033</u> in IPERATURE = <u>22</u> , WATER LEVEL BELOW TOP OF CYLINDER 0.5	WT. DEN <u>ک</u> °C ELAPSED TIME (SEC)	DRY SOIL = SITY DRY S HEAD INCHES 6545 5.545	$W_{S} = \frac{268.7}{V_{S}}$ SOIL = $\frac{W_{S}}{V_{S}} \times 3$. h = DIFFERENCEAND TAIL V $K_{T} = \frac{b-a}{A} I T$	3 gm 806 = <u>99</u> BETWEEN H VATER AT TIM	Ypcf HEAD WATE
MATER TEN	d = 2033 in $PERATURE = 2200$ $WATER LEVEL$ $BELOW TOP$ $OF CYLINDER$ 0.5 1.5	WT. DEN <u>ک</u> °C ELAPSED TIME (SEC)	DRY SOIL = SITY DRY S HEAD INCHES 6545 5.545	$W_{S} = \frac{268.7}{V_{S}}$ SOIL = $\frac{W_{S}}{V_{S}} \times 3$. h = DIFFERENCEAND TAIL V $K_{T} = \frac{b-a}{A} I T$	3 gm 806 = <u>99</u> BETWEEN H VATER AT TIM	Ypcf HEAD WATE
WATER TEN <u>TIME</u> 0:0:45 <u>2:12:725</u> <u>0</u>	d = 2033 in $PERATURE = 223$ $WATER LEVEL$ $BELOW TOP$ $OF CYLINDER$ 0.5 1.5 0.5	WT. DEN 2 ° C ELAPSED TIME (SEC) 7900	DRY SOIL = SITY DRY S HEAD INCHES 6545 5.545	$W_{S} = \frac{268.7}{W_{S}}$ SOIL = $\frac{W_{S}}{V_{S}} \times 3$. h = DIFFERENCE AND TAIL V	3 gm 806 = <u>99</u> BETWEEN H VATER AT TIM	Ypcf HEAD WATE
WATER TEN <u>TIME</u> 0:0:45 <u>2:12:725</u> <u>0</u>	d = 2033 in $PERATURE = 223$ $WATER LEVEL$ $BELOW TOP$ $OF CYLINDER$ 0.5 1.5 0.5	WT. DEN 2 ° C ELAPSED TIME (SEC) 7900	DRY SOIL = SITY DRY S HEAD INCHES 6545 5.545	$W_{S} = \frac{268.7}{V_{S}}$ SOIL = $\frac{W_{S}}{V_{S}} \times 3$. $h = DIFFERENCEAND TAIL Vk_{t} = \frac{b-a}{t_{2}-t_{1}} In$ $\int \frac{3.17}{t_{1}} In$	$\frac{h_{1}}{h_{2}} = \frac{qq}{dq}$	4 pcf HEAD WATE ME, 1
WATER TEN <u>TIME</u> 0:0:45 <u>2:12:725</u> <u>0</u>	d = 2033 in $PERATURE = 223$ $WATER LEVEL$ $BELOW TOP$ $OF CYLINDER$ 0.5 1.5 0.5	WT. DEN 2 ° C ELAPSED TIME (SEC) 7900	DRY SOIL = SITY DRY S HEAD INCHES 6545 5.545	$W_{S} = \frac{268.7}{V_{S}}$ SOIL = $\frac{W_{S}}{V_{S}} \times 3$. $h = DIFFERENCEAND TAIL Wk_{t} = \frac{b-a}{t_{2}-t_{1}} M\left(\frac{3.1}{+}\right) / Mk_{t} = \frac{4579}{t_{2}} M$	$\frac{h_{1}}{h_{2}} = \frac{qq}{dq}$	<u>4</u> pcf HEAD WATE ME, 1 1.69×10 1.76×10 <u>9997gm/cm³ 278 gm/cm³</u>

Ĺ	ABORAT	ORY P	ERME	ABILITY TEST
	AME: <u>N. YARMOUR</u> UMBER:15		Subol	DATE: 7 Aug 15 OPERATOR: EJ J JMM
SAMPLE NO	DN NO. <u>BUS-02</u> D. <u>JD</u> PTH <u>25-26,3</u> FT.			PLE DESCRIPTION: Two growely C-f SANSID
water tem		WT. WT. DEN:	TARE (A24 DRY SOIL =	$V_{s} = 0.7854 d^{2} (b-a) = \frac{7.607}{10.7854} in^{3}$ TARE = $\frac{1279.3}{158.7} gm$ = $\frac{223.29}{10.75} gm$ = $\frac{235.41}{10.785} gm$ SOIL = $\frac{W_{s}}{V_{s}} \times 3.806 = \frac{117.8}{117.8} pcf$
TIME	WATER LEVEL BELOW TOP OF CYLINDER	t ELAPSED TIME (h HEAD INCHES	h = DIFFERENCE BETWEEN HEAD WATER AND TAIL WATER AT TIME, t
8:08 40:25 4:25 36:23	0,5 2,0 0,5 2,0	[937 [918		$k_{1} = \frac{b-a}{t_{2}-t_{1}} \ln \frac{h_{1}}{h_{2}} = \frac{8.13 \times 10^{-4} \text{ (m/sec}}{8.21 \times 10^{-4} \text{ (m/sec})}$
	t/day multiply by ft/day multiply b			$\frac{.9579}{k_{10} \cdot c^{2}} \frac{.9579}{1.3077 \text{ centipoise}} \times \frac{0.9997 \text{ gm/cm}^{3}}{.19802} \text{ gm/cm}^{3} \times k_{t}$ $k_{10} \cdot c^{2} = \frac{.5.99 \times 10^{-4}}{.400} \text{ cm/scc}$ $= \frac{1.70 \text{ GH/day}}{.1000}$

PROJECT N	ABURAI	H MEMORIA		DATE: 7 AUG 15 OPERATOR: EJL/JMI
EXPLORATI SAMPLE N	ON NO. <u>BUS- 02</u> O. <u>(JD</u> EPTH <u>SO-SZ</u> FT.		SAMP 	LE DESCRIPTION: where multiplication: where
b wat		WT. WT.	DRY SOIL 8 TARE (४२३)	$V_{s} = 0.7854 d^{2} (b-a) = -\frac{9.479}{611.9} in^{3}$ TARE =
WATER TE	$MPERATURE = \frac{21.6}{2}$	DEN		$W_{s} = \frac{105.5}{V_{s}}$ gm SOIL = $\frac{W_{s}}{V_{s}}$ x 3.806 = <u>105.5</u> pcf
WATER TE	WATER LEVEL BELOW TOP OF CYLINDER	DEN		-
	WATER LEVEL BELOW TOP	DEN: °C 	SITY DRY S	SOIL = $\frac{W_S}{V_S} \times 3.806 = \frac{105.5}{105.5}$ pcf h = DIFFERENCE BETWEEN HEAD WAT
<u>TIME</u> G 36';29 O	WATER LEVEL BELOW TOP OF CYLINDER 0,5 2,0 0,5	DEN: <u>ELAPSED</u> TIME (SEC) 2(87)	h HEAD INCHES G.S45 S.045 G.545	SOIL = $\frac{W_S}{V_S} \times 3.806 = \frac{105.5}{105.5}$ pcf h = DIFFERENCE BETWEEN HEAD WAT AND TAIL WATER AT TIME, t 2.92 k = $\frac{b-a}{b-a}$ in hime

, T

	ABORAT	ORY P	ERME	ABILITY TEST
	ame: <u>N. Yarmout</u> umber:15		<u>: Sutoer</u>	DATE: <u>6 Aug 15</u> OPERATOR: <u>EJL / JMM</u>
SAMPLE NO	DN NO. <u>BUS-03</u> D. <u>D4</u> :PTH <u>40-42</u> FT.		-	PLE DESCRIPTION: own m-f SAND trace sight
WATER TEN		WT. WT. WT. DENS	DRY SOIL & TARE (Aネ) DRY SOIL =	$V_{S} = 0.7854 d^{2} (b-a) = \frac{11.24}{10.24} in^{3}$ $A TARE = 535.7 gm$ $= 226.62 gm$ $= 309.1 gm$ $SOIL = \frac{W_{S}}{V_{S}} \times 3.806 = \frac{104.67}{0.67} pcf$
TIME	WATER LEVEL BELOW TOP OF CYLINDER	ELAPSED TIME (SEC)	h HEAD INCHES	h = DIFFERENCE BETWEEN HEAD WATER AND TAIL WATER AT TIME, t
0	0.5		6.48	
27:04	2.0	1624	4.98	$k_1 = \frac{b-a}{t_2-t_1} \ln \frac{h_1}{h_2} =$
0	0.5		60, 10	3.48 In 6.48 - 5 64x10-4 in/sec
26:14	<u> </u>	1574	Ц.98	$\frac{3.48}{1624} \ln \frac{6.48}{4.98} = 5.64 \times 10^{-4} \ln /sec}{1.43 \times 10^{-5} \text{Cm}/sec}$ $\frac{5.82 \times 10^{-4} \text{ in/sec}}{1.48 \times 10^{-3} \text{ cm/sec}}$
				$\frac{10297}{\text{centipoise}} \times \frac{0.9997 \text{gm/cm}^3}{.3077 \text{ centipoise}} \times \frac{0.9997 \text{gm/cm}^3}{.9993 \text{gm/cm}^3} \times \text{k}_{t}$
	inne ar ar an third an			K10°C = 1.15×10-3 CM/Sec
in∕sec → f cm/sec →	t/day multiply by ft/day multiply b			

L	ABORAT	ORY P	ERME	ABILITY TEST
	JMBER: 15		<u>, Setter</u>	DATE: 4 AUG 15 OPERATOR: EJL JIMM
SAMPLE NO	N NO. <u>В15-04</u> . <u>Ч</u> Д РТН <u>40-42</u> FT.			LE DESCRIPTION:
b water ten		SOIL WT. WT. WT. DEM	DRY SOIL & TARE (A/2) DRY SOIL =	$V_{S} = 0.7854 d^{2} (b-a) = \frac{9.63}{1000} in^{3}$ $TARE = \frac{465.7}{9} gm$ $= \frac{223.87}{9} gm$ $W_{S} = \frac{247.27}{9} gm$ SOIL = $\frac{W_{S}}{V_{S}} \times 3.806 = \frac{95.47}{9} pcf$
TIME	WATER LEVEL BELOW TOP OF CYLINDER	ELAPSED TIME (SEC)	h HEAD INCHES	h = DIFFERENCE BETWEEN HEAD WATER AND TAIL WATER AT TIME, †
0 12:51 16:00 29:07	0.5 2.0 0.5 2.0	0 771 781	6.48 <u>9.98</u> 6.48 4.98	$k_{1} = \frac{b-a}{t_{2}-t_{1}} \ln \frac{h_{1}}{h_{2}} = \frac{b-a}{(1-2)^{2} \times (1-3)^{2} \times (1-3)^{2}$
				2.57×10 ⁻³ 2.59×10 ⁻³ 2.59×10 ⁻³ k _{10°c} = <u>7379</u> cèntipoise × <u>0.9997gm/cm³</u> ×k _t
				K10°C = 1.88×103 CM/sec
in/sec	ft/day multiply by ft/day multiply b			= <u>S. S. ft/day</u>

PROJECT N	ABORAT	h Memoria	بعن	DATE: 5 Aug 15 OPERATOR: EJL/JMM
SAMPLE NO	on no. <u>BUS-OS</u> D. <u>5-D</u> PTH <u>So-S2</u> FT.			PLE DESCRIPTION: r m-f SAND, tr s'H.
b Sould d		WT. WT. WT. DENS	DRY SOIL (TARE (4/5 DRY SOIL :	$V_{s} = 0.7854 d^{2} (b-a) = \frac{10.03}{10.03} in^{3}$ B TARE = <u>\$15.2</u> gm $f = \frac{226.48}{10.72} gm$ SOIL = <u>W_{s}</u> x 3.806 = <u>107.6</u> pcf
<u>TIME</u> [`}7:05	WATER LEVEL BELOW TOP OF CYLINDER	ELAPSED TIME (SEC)	h HEAD INCHES 6.48	h = DIFFERENCE BETWEEN HEAD WATER AND TAIL WATER AT TIME, t
1:32:122 :34:01 :39:38	2,0. 0,5 2,0	317	4.98 6.48 4.98	$k_{t} = \frac{b-a}{t_{2}-t_{1}} \ln \frac{h_{1}}{h_{2}} = \frac{1}{(3.105)} \ln \frac{6.47}{498} + 2.54 + 6.55 \times 10^{-3} + 6.16 \times 10^{-3}$
	t/day multiply by ft/day multiply by			$\frac{1.0299}{\text{centipoise}} \times \frac{0.9997 \text{gm/cm}^3}{.99842} \text{gm/cm}^3 \times \text{K}_{t}$ $k_{10^{\circ}\text{C}} = \frac{5.01 \times 10^{-3}}{.91842} \text{gm/cm}^3 \times \text{K}_{t}$ $\frac{1.00}{10^{\circ}} = \frac{5.01 \times 10^{-3}}{.900} \text{cm/sec}$

PROJECT N	AME: N. YARMOUT	H MEMORIAN		DATE: 5 Aug 15
PROJECT N	UMBER:15	087		OPERATOR: EJL JMM
SAMPLE NO	DN NO. $B(5-0)^{S}$ D. 6^{D} CPTH 6^{0-62} FT.		- .	PLE DESCRIPTION: - fine Stand, It silt.
WATER TEN		WT. WT. WT. DEN	DRY SOIL & TARE (A-2)) DRY SOIL =	$V_{S} = 0.7854 d^{2} (b-a) = 9.63 in^{3}$ $TARE = 486.7 gm$ $= 224.28 gm$ $= W_{S} = 262.42 gm$ $SOIL = W_{S} \times 3.806 = 103.7 pcf$
TIME	WATER LEVEL BELOW TOP OF CYLINDER	ELAPSED TIME (SEC)	h HEAD INCHES	h = DIFFERENCE BETWEEN HEAD WATER AND TAIL WATER AT TIME, t
8:45	0.5		6,48	
1:30:11 0 24:37	2,0 0,5 1,0	4986	4,48 6,48 5.98	$k_{1} = \frac{b-a}{t_{2}-t_{1}} \ln \frac{h_{1}}{h_{2}} = \frac{5.72 \times 10^{-4} \text{ cm}}{\left(\frac{2.98}{4} \ln \frac{6.48}{h}\right)^{2.54}} \frac{5.72 \times 10^{-4} \text{ cm}}{4.12 \times 10^{-4}}$
in/sec> f				$\frac{.1579 \text{ centipoise}}{k_{10^{\circ}C} = 1.3077 \text{ centipolse}} \times \frac{0.9997 \text{ gm/cm}^3}{.9978 \text{ gm/cm}^3} \times k_{1}$ $k_{10^{\circ}C} = \frac{3.61 \text{ k}_{10} - 4}{1.02} \text{ cm}_{Sec}$ $= \frac{1.02 \text{ ft/day}}{1.02 \text{ ft/day}}$

PROJECT	ABORAT	TH MEMORIA	ياستى.	DATE: 5 Aug 15 OPERATOR: EJL/JMM
EXPLORATIO	on no. <u>B15-0%</u> 0. <u>4D</u> EPTH <u>40-42</u> FT.			PLE DESCRIPTION: Brown fine SAND, 4- silt
b wat		wт. wт. wт.	DRY SOIL & TARE (れつ) DRY SOIL =	$V_{s} = 0.7854 d^{2} (b-a) = 10.27 in^{3}$ TARE = 487.5 gm f = 227.57 gm = 8s = 259.93 gm
WATER TE	MPERATURE = 21.9		SITY DRY	SOIL = $\frac{W_s}{V_s} \times 3.806 = \frac{96}{1000000000000000000000000000000000000$
WATER TE	WPERATURE = <u>21.9</u> WATER LEVEL BELOW TOP OF CYLINDER	L • C ELAPSED TIME	SITY DRY h HEAD INCHES	SOIL = $\frac{W_S}{V_S} \times 3.806 = \frac{96.1}{pcf}$ pcf h = DIFFERENCE BETWEEN HEAD WATER AND TAIL WATER AT TIME, t
ari en an	WATER LEVEL BELOW TOP OF CYLINDER	L•C ELAPSED	h HEAD INCHES	h = DIFFERENCE BETWEEN HEAD WATER
anitan sa ang kanang sa	WATER LEVEL BELOW TOP	L • C ELAPSED TIME	h HEAD INCHES G, S4S S. 04S	$h = DiFFERENCE BETWEEN HEAD WATERAND TAIL WATER AT TIME, tk. = \frac{b-a}{a} in \frac{h_1}{a} =$
<u>time</u> O	WATER LEVEL BELOW TOP OF CYLINDER	ELAPSED TIME (SEC)	h HEAD INCHES G, S4S S. 04S	$h = DiFFERENCE BETWEEN HEAD WATERAND TAIL WATER AT TIME, tk. = \frac{b-a}{a} in \frac{h_1}{a} =$
<u>TIME</u> 0 44:59	WATER LEVEL BELOW TOP OF CYLINDER 0,5 2,0	ELAPSED TIME (SEC)	h HEAD INCHES G, S4S S. 04S	h = DIFFERENCE BETWEEN HEAD WATER AND TAIL WATER AT TIME, t
<u>TIME</u> 0 44:59 49:2 3	WATER LEVEL BELOW TOP OF CYLINDER 0,5 2,0 0,5	ELAPSED TIME (SEC) 2699	h HEAD INCHES G, S4S S. 04S	h = DIFFERENCE BETWEEN HEAD WATER AND TAIL WATER AT TIME, t $k_{t} = \frac{b-a}{t_{2}-t_{1}} \ln \frac{h_{1}}{h_{2}} = \frac{1}{(\frac{3.17}{4} \ln \frac{6.545}{5.045})^{2.54}} \frac{7.77 \times 10^{-4}}{7.43 \times 10^{-4}}$
<u>TIME</u> 0 44:59 49:2 3	WATER LEVEL BELOW TOP OF CYLINDER 0,5 2,0 0,5	ELAPSED TIME (SEC) 2699	h HEAD INCHES G, S4S S. 04S	$h = DiFFERENCE BETWEEN HEAD WATERAND TAIL WATER AT TIME, t$ $k_{t} = \frac{b-a}{t_{2}-t_{1}} ln \frac{h_{1}}{h_{2}} = \frac{1571}{(\frac{3.17}{4} ln \frac{6.545}{5.045})^{2.54}} r_{1.777x10} r_{1.43x10} $
<u>TIME</u> 0 44:59 49:23 1:36:22	WATER LEVEL BELOW TOP OF CYLINDER 0,5 2,0 0,5	L • C ELAPSED TIME (3EC) 2699 28/9	h HEAD INCHES G, S4S S. 04S	h = DIFFERENCE BETWEEN HEAD WATER AND TAIL WATER AT TIME, t $k_{t} = \frac{b-a}{t_{2}-t_{1}} \ln \frac{h_{1}}{h_{2}} = \frac{1}{(\frac{3.17}{4} \ln \frac{6.545}{5.045})^{2}.54} = \frac{7.77 \times 10^{-4}}{7.43 \times 10^{-4}}$

SEVEE & MAHER ENGINEERS 4 BLANCHARD ROAD CUMBERLAND CTR., MAINE 04021 (207) 829-5016

GRAIN SIZE ANALYSIS - ASTM D422

PROJECT N	IAME:	North Yarn			PF	ROJECT No:	15087		
		HydroGeo		ion			DATE:	6-Aug-15	
SAMPLE SOU		Boring Sampl					BORING No:	B15-02	
SAMPLE DESC	CRIP:	Brown gravell	y c-f SAND			5	SAMPLE No: DEPTH (ft):	5D	
							25-26.3		
			DATA						
						SPECIF	ICATION		
U.S Std SIE	/E (in.)	PARTICLE	SIZE (mm)	<u>% by WT. I</u>	INER	Min	Max	<u>P/F</u>	
3		76.	2	100.0					
2		50.	8	100.0					
1.5		37.		100.0					
1		25.		100.0					
3/4		19.		100.0					
1/2		12.		80.4					
3/8		9.		72.4					
#4		4.7		60.1					
#10 #20		2.0		47.3 32.4					
#20		0.8		32.4					
#40		0.4		19.0					
#100		1		7.3					
#200			3.9						
	··· ·								_
100 90 80 80 40 50 40 50 40 20 10 0		-1.5" 	3/8"	#10	#40	##60 ##100	#200		
1	00	1	0	1 Inticle Sine	(0	.1	0.01	
			Pa	rticle Size	(mm)	,			
		,				1	1		

SEVEE & MAHER ENGINEERS 4 BLANCHARD ROAD CUMBERLAND CTR., MAINE 04021 (207) 829-5016

GRAIN SIZE ANALYSIS - ASTM D422

	NAME:	· · · · · · · · · · · · · · · · · · ·		norial School	P	PROJECT No:		
		HydroGe	eo Investigat	ion		DATE:	6-Aug-15	
SAMPLE SOU	RCE:	Boring Sa	mples			BORING No:	B15-02	
SAMPLE DES	CRIP:	Brown m-f	SAND, trace si	lt		SAMPLE No:	10D	
						DEPTH (ft):	50-52	
				DATA				
					SPECIF	ICATION		
U.S Std SIE	VE (in.)	PARTICI	LE SIZE (mm)	% by WT. FINER	Min	Max	<u>P/F</u>	
3			76.2	100.0				
2			50.8	100.0				
1.5			37.5	100.0				
1			25.4	100.0				
3/4			19.1	100.0				
1/2 3/8			12.7 9.5	100.0 100.0				
			9.5 4.76	99.9	+			
#10			2.0	99.3				
#20			0.84	93.1				
#40			0.42	78.2				
#60			0.25	56.8				
#100		1	0.149	29.7				
#200)		0.074	8.7				
		-1.5" -1.5" -3/4"						
30 30 30 30 30 30 20								
Barcent px 70 Comparison 70 Dercent px 60 Dercent px 40 Dercent px 30 Dercent px 10								
08 08 08 09 00 01 02 03 04 05 06 07 08 09 00 01 02 03 04 05 06 07 08 09 00 01 02 03 04 05 06 07 08 09 01 02 03 04 05 06 07 08 09 00 01 02 03 04 05 05 06 07 08 100 100 <td></td> <td></td> <td>10</td> <td></td> <td></td> <td></td> <td>0.01</td>			10				0.01	
08 08 08 09 00 01 02 03 04 05 06 07 08 09 00 01 02 03 04 05 06 07 08 09 00 01 02 03 04 05 06 07 08 09 01 02 03 04 05 06 07 08 09 00 01 02 03 04 05 05 06 07 08 100 100 <td>100</td> <td></td> <td>10</td> <td></td> <td></td> <td>.1</td> <td>0.01</td>	100		10			.1	0.01	
08 08 08 09 00 01 02 03 04 05 06 07 08 09 00 01 02 03 04 05 06 07 08 09 00 01 02 03 04 05 06 07 08 09 01 02 03 04 05 06 07 08 09 00 01 02 03 04 05 05 06 07 08 100 100 <td>100</td> <td></td> <td></td> <td>1 rtiçle Size (mm</td> <td></td> <td>.1</td> <td>0.01</td>	100			1 rtiçle Size (mm		.1	0.01	
08 08 08 09 00 01 02 03 04 05 06 07 08 09 00 01 02 03 04 05 06 07 08 09 00 01 02 03 04 05 06 07 08 09 01 02 03 04 05 06 07 08 09 00 01 02 03 04 05 05 06 07 08 100 100 <td>100</td> <td></td> <td></td> <td></td> <td></td> <td>.1</td> <td>0.01</td>	100					.1	0.01	
08 08 07 08 09 00 01 02 03 04 05 06 07 08	100					.1	0.01	
08 07 08 09 00 01 02 03 04 05 06 07 08 09 00 01 02 03 04 05 06 07 08 09 00 01 02 03 04 05 06 07 08 09 00 01 02 03 04 05 06 07 08 09 09 01 02 03 04 05 06 07 08 100 100 <td>100</td> <td></td> <td></td> <td></td> <td></td> <td>.1</td> <td>0.01</td>	100					.1	0.01	
08 70 60 60 70	100					0.1	0.01	

SEVEE & MAHER ENGINEERS 4 BLANCHARD ROAD CUMBERLAND CTR., MAINE 04021 (207) 829-5016

GRAIN SIZE ANALYSIS - ASTM D422

PR	OJECTN	AME:							P	ROJE	CT No:	15	087		
			HydroGeo Investigation									DATE:	6-Au	ıg-15	
SAM	IPLE SOU	RCE:	Borinç	Boring Samples BORING No:						NG No:	B1	5-03			
SAM	IPLE DESC	CRIP:	Brown	n m-f SA	AND,	trace s	ilt				:	SAMP	LE No:	4	D
										DEPTH		PTH (ft): 40-42			
							DAT	Α							
										S	PECIF	ICATI	ON		
U.	S Std SIE	/E (in.)	PARTICLE SIZE (mm)			% by WT. FINER		Min		Max		Р	<u>/ F</u>		
	3			76				100.0							
	2			50	.8	-		100.0							
	1.5			37				100.0							
	1			25				100.0							_
	3/4			19				100.0							
_	1/2		<u> </u>	12			1	100.0							
	3/8		ļ	9.			-1	100.0				ļ			
	#4		ļ	4.7				100.0							
	#10			2.				99.1							
	#20		0.84 0.42 0.25			95.1									
	#40 #60				75.7 46.4										
	#100							22.0							
	#200		0.149		7.7										
			1	0.0											
	100 90 80 70 60 50 40 20 10 0 1			3/4"				#50	#40	09#	#100	#500			
	ľ			I	U	Pa	article	' Size (ı	mm))	U			0	
						. •	······	(•		1		1			
		• • • • • • • • • • • • • • • • • • • •	t · · · ·												
										1		-			

APPENDIX D

SOIL TEST PIT LOGS

SUBSURFACE WASTEWATER DISPOSAL SYSTEM	APPLICATION Maine Dept.Health & Human Services Division of Environmental Health (207) 287-5672 Fax: (207) 287-3165
Town, City, Plantation Street, Road	I, Subdivision Owner's Name
North Yarmouth 120 Memo	orial Highway Town of North Yarmouth
	,
SOIL DESCRIPTION AND CLASSIFICATION	ON (Location of Observation Holes Shown Above)
Observation Hole <u>TP15-01</u> X Test Pit Depth of Organic Horizon Above Mineral Soil	Observation Hole TP15-02 X Test Pit Depth of Organic Horizon Above Mineral Soil
Texture Consistency Color Mottling	Texture Consistency Color Mottling
Eine Sandy Loam Friable Very Dark Grav Fine Loamy Sand to Loose Yellowish Brown	Fine Sandy Dark Gravish Friable Brown
2 10 Fine to	
Brownish Bedium Loose Yellow	Image: Second
g 20 - Sand	
	Brownish
	Image: Second
iiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiiii	Image: second
Coarse Sand Yellow	Image: Second
6 w/ Cobbles 1 to >48 .	Sand Sand
	and Cobbles to >57"
50 to >48"	$\begin{array}{c} \bullet \\ \bullet \\ 50 \end{array} \qquad $
Factor [] Restrictive Layer	Factor [] Restrictive Layer
5 B 0-3 % [] Bedrock Profile Condition >48 " [X] Pit Depth	5 B 0-3 % Factor [] Restrictive Layer Profile Condition
5 B 0-3 >48 I Bedrock Profile Condition	5 B 0-3 % ≥57 [] Bedrock Profile Condition
5 B 0-3 % >48 " [] Bedrock Profile Condition	5 B 0-3 % ≥57 [] Bedrock Profile Condition
5 B 0-3 % >48 " [] Bedrock Profile Condition	5 B 0-3 % ≥57 " [] Bedrock Profile Condition
5 B 0-3 % >48 " [] Bedrock Profile Condition	5 B 0-3 % ≥57 " [] Bedrock Profile Condition
5 B 0-3 % >48 " [] Bedrock Profile Condition	5 B 0-3 % ≥57 " [] Bedrock Profile Condition
5 B 0-3 % >48 " [] Bedrock Profile Condition	5 B 0-3 % ≥57 " [] Bedrock Profile Condition
5 B 0-3 % >48 " [] Bedrock Profile Condition	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $
5 B 0-3 % >48 " [] Bedrock Profile Condition	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $
5 B 0-3 % >48 " [] Bedrock Profile Condition	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $
5 B 0-3 % >48 " [] Bedrock Profile Condition	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $
5 B 0-3 % >48 " [] Bedrock Profile Condition	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $
5 B 0-3 % >48 " [] Bedrock Profile Condition	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $
5 B 0-3 >48 I Bedrock Profile Condition	5 B O-3 % ≥57 i j Bedrock M Pit Depth DN (Location of Observation Holes Shown Above) Observation Hole TP15-04 Xi Test Pit Boring 1 " Depth of Organic Horizon Above Mineral Soil Texture Consistency Color 0 Sandy boan Friable 9 Sand to Loose 9 Brownish Sand 10 Image: Sandy boan Sand 10 Fine Loamy Friable 9 Sand to Loose Brownish 9 Sand Loose Pale 9 Garse Sand Yellow Mone 9 M Gravel None to >59"
5 B 0-3 % >48 " [] Bedrock Profile Condition	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $
5 B O-3 % >48 * [X] Pit Depth SOIL DESCRIPTION AND CLASSIFICATION Observation Hole TP15-03 X Test Pit Boring 3 " Depth of Organic Horizon Above Mineral Soil Texture Consistency Color Mottling 0 Fine Sandy Loam Yellowish Brown Fine Sandy Loam Yellowish Brown - 6 Fine Sandy Loam Yellowish - 6 Fine Sandy Loam Yellowish - 6 Fine Sandy Loam Yellowish - 7 Fine Sandy Loam Yellowish - 6 Fine Sandy Loam Yellowish - 6 Fine Sandy Loam - - - 7 Fine Sandy Loam - - - 7 Fine Sandy Loam - - - 8 Coarse Sand Loose Yellow - 9 40 and Cobbles - - - 50 - - - - - 50	$ \frac{5}{\text{Profile}} \frac{B}{\text{Condition}} \frac{0.3}{2} \% \xrightarrow{>57}{\text{[j] Bedrock}} \frac{57}{\text{[M] Pit Depth}} $ DN (Location of Observation Holes Shown Above) $ \frac{5}{\text{Observation Hole TP15-04}} \xrightarrow{\text{Consistency}} \text{Test Pit} \xrightarrow{\text{Boring}} \text{Boring} \\ 1 & \text{"Depth of Organic Horizon Above Mineral Soil} \\ \hline \frac{1}{\text{Cexture}} \xrightarrow{\text{Consistency}} \text{Color} \xrightarrow{\text{Mottling}} \\ \frac{1}{\text{Very Fine}} \xrightarrow{\text{Crable}} \text{Crab$
5B $0-3$ >48 [] BedrockSOIL DESCRIPTION AND CLASSIFICATIONObservation Hole TP15-03XTest PitBoring3" Depth of Organic Horizon Above Mineral SoilTexture Consistency Color Mottling0Fine Sandy LoamYellowish Brown610FineFriableYellowish Brown910CaravellyBrownHorizon92099992099920999209992099920999209992099920999209992099940and Cobbles9940and Cobbles99401010910101091010910109101091010910109101091010910109101091010910109101091010910109101091010 <td>5 B 0-3 >57 [] Bedrock Profile Condition 0 >57 [] Bedrock DN (Location of Observation Holes Shown Above) Observation HoleTP15-04 X Test Pit Boring 1 "Depth of Organic Horizon Above Mineral Soil Texture Consistency Color Mottling Very Fine Consistency Color Mottling 0 Sendy Loam Friable Yellowish 10 Fine Loamy Friable Yellowish 20 Sand to Loose Brown 21 Medium to Loose Pale 20 Medium to Loose Pale 30 Medium to Loose Pale 40 and Cobbles None to >59" 50 Soil Classification Slope Limiting [] Ground Water 50 B 0-3 % Factor [] Bedrock</td>	5 B 0-3 >57 [] Bedrock Profile Condition 0 >57 [] Bedrock DN (Location of Observation Holes Shown Above) Observation HoleTP15-04 X Test Pit Boring 1 "Depth of Organic Horizon Above Mineral Soil Texture Consistency Color Mottling Very Fine Consistency Color Mottling 0 Sendy Loam Friable Yellowish 10 Fine Loamy Friable Yellowish 20 Sand to Loose Brown 21 Medium to Loose Pale 20 Medium to Loose Pale 30 Medium to Loose Pale 40 and Cobbles None to >59" 50 Soil Classification Slope Limiting [] Ground Water 50 B 0-3 % Factor [] Bedrock

SUBSURFACE WASTEWATER DISPOSAL SYSTE	EM APPLICATION Maine Dept.Health & Human Services Division of Environmental Health (207) 287-5672 Fax: (207) 287-3165						
Town, City, Plantation Street,	Road, Subdivision Owner's Name						
North Yarmouth 120 M	emorial Highway Town of North Yarmouth						
SOIL DESCRIPTION AND CLASSIFICA	N (Location of Observation Holes Shown Above)						
Observation Hole TP15-05 X Test Pit Doring	Observation Hole TP15-06 X Test Pit Doring						
2 "Depth of Organic Horizon Above Mineral S	oil " Depth of Organic Horizon Above Mineral Soil						
Texture Consistency Color Mottling	Texture Consistency Color Mottling						
Friable Friable Brown	Fine Friable Light Brownish Gray						
	ELoamy to Loose Yellowish Sand Brown						
Image: Second	Sand Brown						
Coarse Sand Yellow Yellow							
bi 20 w/ Gravel							
	Coarse Sand Loose - Vollow -						
B 30 Sand							
	and Cobbles						
Medium Pale 30 Sand Sand Pale Yellow Pale Yellow </td <td>w/ Gravel and Cobbles to >58" 40 40 40 50 0 0 0 0 0 0 0 0 0 0 0 0 0 0</td>	w/ Gravel and Cobbles to >58" 40 40 40 50 0 0 0 0 0 0 0 0 0 0 0 0 0 0						
A 40 Fine Sand None							
Image: Second Image: Second Image: Second None Second to >62" to >62" to >62"							
Soil Classification Slope Limiting [] Ground Water 5 B 0-3 % [] Restrictive Layer Profile Condition [] Bedrock [] Bedrock	Soil Classification Slope Limiting [] Ground Water 5 B 0-3 % Factor [] Restrictive Layer Profile Condition 0-3 % [] Bedrock >58 [] With Depth [] Depth						
SOIL DESCRIPTION AND CLASSIFICA	TION (Location of Observation Holes Shown Above)						
SOIL DESCRIPTION AND CLASSIFICA Observation Hole <u>TP15-07</u> Test Pit Doring 0 "Depth of Organic Horizon Above Mineral So	TION (Location of Observation Holes Shown Above) Observation Hole TP15-08 Image: Distribution of Organic Horizon Above Mineral Soil						
Observation Hole TP15-07 X Test Pit Depth of Organic Horizon Above Mineral So	Observation Hole TP15-08 X Test Pit Doring						
Observation Hole TP15-07 X Test Pit Doring	Observation Hole TP15-08 Test Pit Boring 0 "Depth of Organic Horizon Above Mineral Soil Texture Consistency Color Mottling 0 Silt Loam Friable Olive Brown Olive Brown						
Observation Hole TP15-07 Test Pit Boring 0 "Depth of Organic Horizon Above Mineral So Texture Consistency Color 0 Silt Loam Friable Pale Olive	Observation Hole TP15-08 Test Pit Boring 0 "Depth of Organic Horizon Above Mineral Soil Texture Consistency Color Mottling 0 Silt Loam Friable Olive Brown Olive Brown						
Observation Hole TP15-07 Test Pit Boring 0 "Depth of Organic Horizon Above Mineral So Texture Consistency Color 0 Silt Loam Friable Pale Olive	Observation Hole TP15-08 Test Pit Boring 0 "Depth of Organic Horizon Above Mineral Soil Texture Consistency Color Mottling 0 Silt Loam Friable Olive Brown Olive Brown						
Observation Hole TP15-07 Test Pit Boring 0 "Depth of Organic Horizon Above Mineral So Texture Consistency Color 0 Silt Loam Friable Pale Olive	Observation Hole TP15-08 Test Pit Boring 0 "Depth of Organic Horizon Above Mineral Soil Texture Consistency Color Mottling 0 Silt Loam Friable Olive Brown Olive Brown						
Observation Hole TP15-07 Test Pit Boring 0 "Depth of Organic Horizon Above Mineral So Texture Consistency Color 0 Silt Loam Friable Pale Olive	Observation Hole TP15-08 Test Pit Boring 0 "Depth of Organic Horizon Above Mineral Soil Texture Consistency Color Mottling 0 Silt Loam Friable 0 Silt Loam Friable 0 Gravelly Yellowish 0 Fine to Brown 0 Fine Sand Brown						
Observation Hole TP15-07 Test Pit Boring 0 "Depth of Organic Horizon Above Mineral So Texture Consistency Color 0 Silt Loam Friable Pale Olive	Observation Hole TP15-08 Test Pit Boring 0 "Depth of Organic Horizon Above Mineral Soil Texture Consistency Color Mottling 0 Silt Loam Friable 0 Silt Loam Friable 0 Gravelly Yellowish 0 Fine to Brown 0 Fine Sand Brown						
Observation Hole TP15-07 Test Pit Boring 0 "Depth of Organic Horizon Above Mineral So Texture Consistency Color 0 Silt Loam Friable Pale Olive	Observation Hole TP15-08 Test Pit Boring 0 "Depth of Organic Horizon Above Mineral Soil Texture Consistency Color Mottling 0 Silt Loam Friable 0 Silt Loam Friable 0 Gravelly Yellowish 0 Fine to Brown 0 Fine Sand Brown						
Observation Hole TP15-07 Test Pit Boring 0 "Depth of Organic Horizon Above Mineral So Texture Consistency Color 0 Silt Loam Friable Pale Olive	Observation Hole TP15-08 Test Pit Boring 0 "Depth of Organic Horizon Above Mineral Soil Texture Consistency Color Mottling 0 Silt Loam Friable 0 Silt Loam Friable 0 Gravelly Yellowish 0 Fine to Brown 0 Fine Sand Brown						
Observation Hole TP15-07 Test Pit Boring 0 "Depth of Organic Horizon Above Mineral So Texture Consistency Color 0 Silt Loam Friable Pale Olive	Observation Hole TP15-08 Test Pit Boring 0 "Depth of Organic Horizon Above Mineral Soil Texture Consistency Color Mottling 0 Silt Loam Friable 0 Silt Loam Friable 0 Gravelly Yellowish 0 Fine to Brown 0 Fine Sand Brown						
Observation Hole TP15-07 Test Pit Boring 0 "Depth of Organic Horizon Above Mineral So Texture Consistency Color 0 Silt Loam Friable Pale Olive	Observation Hole TP15-08 Test Pit Boring 0 "Depth of Organic Horizon Above Mineral Soil Texture Consistency Color Mottling 0 Silt Loam Friable 0 Silt Loam Friable 0 Gravelly Yellowish 0 Fine to Brown 0 Fine Sand Brown						
Observation Hole TP15-07 Test Pit Boring 0 "Depth of Organic Horizon Above Mineral So Texture Consistency Color Mottling 0 Silt Loam Friable Pale Olive 10 Yellowish 10 Medium to Brown 20 Medium to Loose Pale 6 Coarse Sand Loose Yellow w/ Gravel and Cobbles 40 Fine Sand None Fine Sand to 259"	Observation Hole TP15-08 Test Pit Boring 0 "Depth of Organic Horizon Above Mineral Soil Texture Consistency Color Mottling 0 Silt Loam Friable 0 Silt Loam Friable 0 Gravelly Yellowish 0 Fine to Brown 0 Fine Sand Brown						
Observation Hole TP15-07 Test Pit Boring 0 "Depth of Organic Horizon Above Mineral So Texture Consistency Color Mottling 0 Silt Loam Friable Pale Olive 10 Yellowish 10 Medium to Brown 20 Medium to Loose Pale Coarse Sand Loose Yellow w/ Gravel and Cobbles	Observation Hole TP15-08 Test Pit Boring 0 "Depth of Organic Horizon Above Mineral Soil Texture Consistency Color Mottling 0 Silt Loam Friable Olive Brown 0 Silt Loam Friable Olive Brown 0 Gravelly Yellowish Medium Sand Brown 0 Fine to Pale Pale Coarse Sand Yellow 0 Gravel Yellow None None						
Observation Hole TP15-07 Test Pit Boring 0 "Depth of Organic Horizon Above Mineral So Texture Consistency Color Mottling 0 Silt Loam Friable Pale Olive 10 Yellowish 10 Yellowish 20 Medium to Brown 30 Medium to Loose Pale Coarse Sand Loose Yellow w/ Gravel 30 and Cobbles Fine Sand to >59"	Observation Hole TP15-08 Test Pit Boring 0 "Depth of Organic Horizon Above Mineral Soil Texture Consistency Color Mottling 0 Silt Loam Friable 0 Silt Loam Friable Olive Brown 0 Gravelly Yellowish Fine to 0 Fine to Brown Brown 0 Fine to Pale Coarse Sand 0 Fine to Yellow Yellow 0 Fine to Pale None 0 and Cobbles None to >61"						
Observation Hole TP15-07 Test Pit Boring 0 "Depth of Organic Horizon Above Mineral So Texture Consistency Color Mottling 0 Silt Loam Friable Pale Olive Pale Olive 10 Silt Loam Friable Pale Olive Pale Olive 10 Silt Loam Friable Pale Olive Pale Olive 20 Medium to Brown Brown Pale Pale Olive 20 Medium to Loose Pale Pale <t< td=""><td>Observation Hole TP15-08 X Test Pit Boring 0 "Depth of Organic Horizon Above Mineral Soil Texture Consistency Color Mottling 0 Silt Loam Friable Uight I 0 Silt Loam Friable Olive Brown Olive Brown 0 Gravelly Fine to Brown Brown 0 Fine Sand Loose Pale I 0 Fine to Pale Olive Brown I 0 Fine Sand Vellowish I I 0 Fine Sand I I I I 0 Fine to Pale I I I 0 Fine to Pale I I I 0 Gravel I I I I I 0 Soil Classification Slope I I I I I 0 Soil Classification I I I I I I I I I 0 Soil Classificatio</td></t<>	Observation Hole TP15-08 X Test Pit Boring 0 "Depth of Organic Horizon Above Mineral Soil Texture Consistency Color Mottling 0 Silt Loam Friable Uight I 0 Silt Loam Friable Olive Brown Olive Brown 0 Gravelly Fine to Brown Brown 0 Fine Sand Loose Pale I 0 Fine to Pale Olive Brown I 0 Fine Sand Vellowish I I 0 Fine Sand I I I I 0 Fine to Pale I I I 0 Fine to Pale I I I 0 Gravel I I I I I 0 Soil Classification Slope I I I I I 0 Soil Classification I I I I I I I I I 0 Soil Classificatio						
Observation Hole TP15-07 Test Pit Boring 0 "Depth of Organic Horizon Above Mineral So Texture Consistency Color Mottling 0 Silt Loam Friable Pale Olive Pale 10 Silt Loam Friable Pale Olive Pale 10 Silt Loam Friable Pale Pale 20 Medium to Loose Pale Pale 30 W/ Gravel and Cobbles Pale Soil Classification 5 B 0-3 % Limiting [] Ground Water	Observation Hole TP15-08 Test Pit Boring 0 "Depth of Organic Horizon Above Mineral Soil Texture Consistency Color Mottling 0 Silt Loam Friable Light 0 Silt Loam Friable Olive Brown 9 Gravely Yellowish 9 Fine to Brown 9 Fine to Brown 9 Fine Sand Brown 9 Fine to Pale 10 Fine to Pale 10 Fine to Pale 10 Fine to Pale 10 To >61" Ito >61" 10 Soil Classification Slope 10 Soil Classification						

SUBSURFACE WASTEWATER DISPOSAL SYSTEM A	APPLICATION Maine Dept.Health & Human Services Division of Environmental Health (207) 287-5672 Fax: (207) 287-3165
Town, City, Plantation Street, Road	I, Subdivision Owner's Name
-	rial Highway Town of North Yarmouth
SOIL DESCRIPTION AND CLASSIFICATIO	ON (Location of Observation Holes Shown Above)
Observation Hole TP15-09 X Test Pit D Boring	Observation Hole TP15-10 X Test Pit Doring
0 " Depth of Organic Horizon Above Mineral Soil	0 " Depth of Organic Horizon Above Mineral Soil
Texture Consistency Color Mottling	
	Very Fine Friable Yellowish
Sandy Loam Fnable Brown	Brown Brown
	Sandy Loam Brown Brownish Brownish Yellow Yellow
2 20	
	$\overline{\mathbf{z}}^{-}$ Fine to $\overline{\mathbf{z}}^{-}$
Coarse Sand Loose Yellow	Medium Sand Loose
and Cobbles	
Series 10 Image: Series	Fine to Medium Sand Loose W/ Trace W/ Trace Gravel Pale and Cobbles Yellow to >62" None to >62" to >62"
	and Cobbles Yellow
Hat Image: Constraint of the second sec	
5 B 0-3 % I] Bedrock Profile Condition -70 N Pit Depth SOIL DESCRIPTION AND CLASSIFICATION	$\frac{5}{\text{Profile}} \xrightarrow{\text{B}}_{\text{Condition}} \xrightarrow{0-3} \% \xrightarrow{\text{I}}_{\text{E}} \xrightarrow{\text{I}}_{\text{I}} \xrightarrow{\text{B}}_{\text{Condition}} \xrightarrow{1}_{\text{E}} \xrightarrow{\text{I}}_{\text{E}} \xrightarrow{\text{I}}_{\text{I}} \xrightarrow{\text{B}}_{\text{Condition}} \xrightarrow{1}_{\text{E}} \xrightarrow{1}_$
Observation Hole TP15-11 X Test Pit Doring 0 Depth of Organic Horizon Above Mineral Soil	Observation Hole <u>TP15-12</u> X Test Pit Depth of Organic Horizon Above Mineral Soil
Texture Consistency Color Mottling	Texture Consistency Color Mottling
	0 Dark Yellowish
	Very Stony Friable Brown
	Image: Sand to Loose Image: Sand to Loose Image: Sand to Loose Ima
Signature Coarse Sand Loose Brownish Yellow Yellow	
¹ ²⁰ w/ Gravel	3 20
	Limit of Pit
and Cobbles Vellow	
	Very File Saud Eith
	[™] Uimit of Pit [™] 40 - 36"
50 Sand to >58"	
Soil Classification Slope Limiting [] Ground Water	Soil Classification Slope Limiting [] Ground Water
5 B 0-3 % Factor [] Bedrock Profile Condition	3 C 0-3 % Factor X Restrictive Layer Profile Condition % 34 " [] Pit Depth
	Luke 16, 2015 and August 14, 2015 Page 3 of 3
_ Cludren Dhy #370	July 10, 2015 and August 14, 2015 HHE-200 Rev. 05/08
Site Evaluator Signature SE #	Date

APPENDIX E

GROUNDWATER QUALITY SAMPLING LABORATORY ANALYTICAL RESULTS AND FIELD SHEETS



Jackie Villinski Maine Environmental Laboratory One Main Street Yarmouth, ME 04096



Subject: Laboratory Report

Eastern Analytical, Inc. ID: 146403 Client Identification: SAM1933-15 Date Received: 8/4/2015

Dear Ms. Villinski:

Enclosed please find the laboratory report for the above identified project. All analyses were performed in accordance with our QA/QC Program. Unless otherwise stated, holding times, preservation techniques, container types, and sample conditions adhered to EPA Protocol. Samples which were collected by Eastern Analytical, Inc. (EAI) were collected in accordance with approved EPA procedures. Eastern Analytical, Inc. certifies that the enclosed test results meet all requirements of NELAP and other applicable state certifications. Please refer to our website at www.eailabs.com for a copy of our NELAP certificate and accredited parameters.

The following standard abbreviations and conventions apply to all EAI reports:

- Solid samples are reported on a dry weight basis, unless otherwise noted
- < : "less than" followed by the reporting limit
- > : "greater than" followed by the reporting limit
- %R:% Recovery

Eastern Analytical Inc. maintains certification in the following states: Connecticut (PH-0492), Maine (NH005), Massachusetts (M-NH005), New Hampshire/NELAP (1012), Rhode Island (269) and Vermont (VT1012).

The following information is contained within this report: Sample Conditions summary, Analytical Results/Data, Quality Control data (if requested) and copies of the Chain of Custody. This report may not be reproduced except in full, without the the written approval of the laboratory.

If you have any questions regarding the results contained within, please feel free to directly contact me or the chemist(s) who performed the testing in question. Unless otherwise requested, we will dispose of the sample(s) 30 days from the sample receipt date.

We appreciate this opportunity to be of service and look forward to your continued patronage.

Sincerely,

ounie Undraw

8.10.15

Date

of pages (excluding cover letter)

Lorraine Olashaw, Lab Director

25 Chenell Drive | Concord, NH 03301 | 800.287.0525 | www.eailabs.com



EAI ID#: 146403

Client: Maine Environmental Laboratory

Client Designation: SAM1933-15

Temperature upon receipt (°C): 3.1 Acceptable temperature range (°C): 0-6				Received on ice or cold packs (Yes/No): Υ						
Lab ID	Sample ID	Date Received	Date Sampled	Sample % Dry Matrix Weight	Exceptions/Comments (other than thermal preservation)					
146403.01	B15-01	8/4/15	8/3/15	aqueous	Adheres to Sample Acceptance Policy					

Samples were properly preserved and the pH measured when applicable unless otherwise noted. Analysis of solids for pH, Flashpoint, Ignitibility, Paint Filter, Corrosivity, Conductivity and Specific Gravity are reported on an "as received" basis.

Immediate analyses, pH, Total Residual Chlorine, Dissolved Oxygen and Sulfite, performed at the laboratory were run outside of the recommended 15 minute hold time.

All results contained in this report relate only to the above listed samples.

References include:

1) EPA 600/4-79-020, 1983

2) Standard Methods for Examination of Water and Wastewater, 20th Edition, 1998 and 22nd Edition, 2012

3) Test Methods for Evaluating Solid Waste SW 846 3rd Edition including updates IVA and IVB

4) Hach Water Analysis Handbook, 2nd edition, 1992

Eastern Analytical, Inc.

www.eailabs.com | 800.287.0525 | customerservice@eailabs.com

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LABORATORY REPORT

M

EAI ID#: 146403

Client: Maine Environmental Laboratory Client Designation: SAM1933-15

······									
Client Sample ID:	B15-01								
Lab Sample ID:	146403.01								
Matrix:	aqueous								
Date Sampled:	8/3/15								
Date Received:	8/4/15		Dilution		Date /	Time	Date		
	Result	RL	Factor		Analy		Prepared	Method	Analyst
Nitrate-N	0.8	0.5	1	mg/L	8/4/15	15:33	8/4/15	300.0	KD

Eastern Analytical, Inc.

2

146403		Within Hold Time? Types DNo DN/A Good Condition?	Treserved?	Custody Seal?	Del. by:	Temp. °C	LAB ID/SUBCONTRACTOR									•						
(Specify Method: RCRA, NPDES DW		· · · · ·																	3.16		alleng 75	BORATORX
					1-3t	ъці	γ	× ×										300.0 method		RECEIVED BY:	RECENTED BY:	IRECEIVED OF UK
tin of Custody Fax: (207) 846-9066	ry.com					SAMPLING	DATE TIME	01:315 13:20						•				EPA 300.)	TIME	S TIME S	TIME
AL LABORATORY- Cha 96-6716 Tel: (207) 846-6569		EMAIL	BILL TO / PURCHASE ORDER #			METHOD	PRESERVED	≤4°C 8												DATE	BATE-IS	LIATE ,
	Inviront		ILL TO / PUF			AA MA II II BA	COI ଅତ	X X X X									 	COMMENTS				
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	com W				σ	FIELD	YES NO							REMENTS?	ent to State)			10				
	mel-lab.					NEHS E	CONTAI	2		 							 	REQUIRE	EDD bliance (s			66
	Email: melab@mel-lab.com						SR∃NIA	4 COML	/										REPORTING REQUIREMENTS?	CI ME DEP EDD. CI DW Compliance (sent to State) CI CC Results to		Land
MAINE E	Emai	REPORT TO	COMPANY	ADDRESS	PROJECT NAME	SAMPLE	IDENTIFICATION	B15-01											Priority (SURCHARGE)	RELINQUISHED BY SAMPLER:	RELINQUISHED BY: $\mathcal{TB}_{m{\mu}}$	BELINDI LISHED BY.

(Specify Method: RCRA, NPDES, DW, (Specify Method: RCRA, NPDES, DW, Miltrace on traceled to EPII. due to Beceived BY: RECEIVED BY:	(Specify Method: RCRA, NPDES, DW, (Specify Method: RCRA, NPDES, DW, Miltrace on traceled to EPII. due to RECEIVED BY: RECEIVED BY:	ain of Custody AMALYSES Far: (207) 846-9066 (Boothy Method: RORA, NPDES, DW. boratory.com AMALYSES mm. AMALYSES	LABORATORY REPORT # CAMP233-15 SAMPLE RECEIVING	Within Hold Time?	Custody Seal? Custody Seal? MYas DNo DN/A	Temp. °C 44 O	HE -	2789X2			equipuent mathemation.	
			ANALYSES pecify Method: RCRA, NPDES, DW, etc.)								to EA1 due to	IVED BY: IVED BY:
	CABORATTORY CABORATTORY I (5 Tel: (207) 846 Stanse Feronnest EFHONE Stanse Stanse Comments Comments Comments Comments	RONMENTAL LABORATORY mouth, ME 04096-6716 Tel: (207) 846 th@mel-lab.com Web: MaineEnvironme Telephone Telephone Le-luel ME a yae I Awdeu (SamPler Name samPler Name sampler Reg R R P P C G V I I P P C G V I P P C G V I P P C G V C C MMENTS Tripe R R R P C C V I P P C G V C C C C C C C C C C C C C C C C C		5 Juenaine. Lenn		SAMPLING DATE TIME	8/3/15 13:20					/// TWAE 12

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One Main Street Yarmouth, Maine 04096

Tel.: (207) 846-6569 Fax: (207) 846-9066

66 Email: melab@mel-lab.com

Report of Analyses

Andrew Gobeil Sevee & Maher Engineers 4 Blanchard Road Cumberland, Maine 04021

July 20, 2015 Page 1 of 2

Report No.: SAM1929-15

Enclosed are the results of the analyses requested for your samples as received by the laboratory. Samples were received in acceptable condition and analyzed within method holding times. All quality control data was within laboratory acceptance limits unless noted. The Limit of Quantitation (LOQ) is the minimum level for reporting quantitative data. The Limit of Detection (LOD) is the minimum level for reporting estimated data. Data reported between the Limit of Quantitation and Limit of Detection are J flagged as estimated. Maine Environmental Laboratory is certified by Maine (cert. #2015007) and New Hampshire NELAP (NH ELAP) (cert. #2031). A list of certified parameters is available on request. The results reported herein conform to the most current NELAP standards where applicable unless otherwise narrated in this report. This report shall not be reproduced except in full without the written consent of the laboratory.

The complete report consists of the following sections:

Maine Environmental Laboratory report Chain of Custody form

References

EPA - EPA600/4-79-020, Methods for Chemical Analysis of Water and Wastes, USEPA, Cincinnati, Ohio, March 1983.
EPA1 - EPA/600/R-93/100 Methods for the Determination of Inorganic Substances in Environmental Samples, Aug. 1993.
EPA2 - EPA/600R-94/111, Methods for the Determination of Metals in Environmental Samples, Supplement 1, May, 1994.
EPA3-EPA/600/R-06/115, Determination of Trace Elements in DW by Axially Viewed ICP-Atomic Emission Spectrometry, Rev 4.2 Oct. 2003
STM - Standard Methods for the Examination of Water and Wastewater, 18th edition, APHA, AWWA, WPCF, 1992.
SW8- SW846, Test Methods for Evaluating Solid Waste, Physical/Chemical Methods, USEPA, third edition. Updates I-IV, 2007.
CLP - USEPA CLP Statement of Work for Inorganic Superfund Methods, ISM01.2, Exh. D, Sec. 1.6, Jan. 2010.
AST - ASTM D2974-87 Standard Test Methods for Moisture, Ash, and Organic Matter of Peat and Organic Soils.
HACH - Chemical Oxygen Demand, Method 8000, Hach Handbook of Water Analysis, Hach Chemical Company, 1979.
HEX - EPA-821-R-98-002, Method 1664, Rev. A: N-Hexane Extractable Material by Extraction and Gravimetry, Feb. 1999.
AOA - Official Methods of Analysis of the Association of Official Analytical Chemists, 14th edition, 1984.

Jacquelyn R. Vilinski

Authorized signature

Jacquelyn R. Villinski, Laboratory Director

One Main Street Yarmouth, Maine 04096

Andrew Gobeil

Sevee & Maher Engineers 4 Blanchard Road Cumberland, Maine 04021

Sampler: A. Gobeil Report No: SAM1929-15 Sampling date & time: 07/17/15 - 1015 Date received: 07/17/15 Project ID: Sample matrix: GW - Grab North Yarmouth Memorial School Sample ID: B-15-02 Laboratory ID: SAM192915-01

			Date-Time				
Parameter	Results	units	Analyzed	LOD	LOQ	Method	Reference
Nitrate-N	0.9	mg/L	07/17/15-1128	0.1	0.3	300.0	EPA1

S = DLs increased due to sample matrix ND = not detected B = detected in blank J = estimated

Report of Analyses

Email: melab@mel-lab.com

Page 2 of 2

July 20, 2015

Tel.:(207) 846-6569 Fax: (207) 846-9066

Cone Main Street Yarmouth, ME 04096-6716 Tel: (207) 846-6569 Fax: (207) 846-6569 REDORTIO Tensil: melab@mel-lab.com Wein: MaineEnvironmentalLaboratorycom REDORTIO Tensil: melab@mel-lab.com Wein: MaineEnvironmentalLaboratorycom REDORTIO Tensil: melab@mel-lab.com Wein: MaineEnvironmentalLaboratorycom COMMN Scuect & Maker Tensil: melab@mel-lab.com Wein COMMN Scuect & Maker Tensil: melab@mel-lab.com MaineEnviron Reserved Madrue Code Zan auger Reserved Martue Madrue Code Reserved Martue Samelia Madrue Reserved Reserved Martue Samelia Reserved Reserved Martue Code Reserved Reserved Martue Code Reserved Reserved Reserved Martue Reserved Reserved Note Samelia Reserved Reserved Note Samelia Reserved Reserved Note Note Reserved Reserved Note Note Reserved Reserved Note Note Reserved Reserved Note Note Restr	Wei: MaineEnvironmentalLaboratory.com TELEPLONE EMAL AUDICU SAMPLE SAMPLE Main SAMPLE Main SAMPLING SAMPLE Main SAMPLE Main SAMPLE Main Main SAMPLE Main Main SAMPLE Main Main SAMPLE Main Main SAMPLE Main	Image: Second	SAMPLE RECEIVING Within Hold Time? Within Hold Time? Goog Condition? Preserved? Dives Divo Divia Del. by:
Definition (SURCHARGE) D DW Compliance (sent to State)			
SAMPLER	SILCI	TIME	
RELINQUISHED BY:	DATE		
RELINQUISHED BY:	DATE IN	TIME 4-7 RECEIVED BY LABORATORY:	

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One Main Street Yarmouth, Maine 04096

Tel.: (207) 846-6569 Fax:

Fax: (207) 846-9066 Email: melab@mel-lab.com

Andrew Gobeil Sevee & Maher Engineers 4 Blanchard Road Cumberland, Maine 04021

Enclosed are the results of the analyses requested for your samples as received by the laboratory. Samples were received in acceptable condition and analyzed within method holding times. All quality control data was within laboratory acceptance limits unless noted. The Limit of Quantitation (LOQ) is the minimum level for reporting quantitative data. The Limit of Detection (LOD) is the minimum level for reporting estimated data. Data reported between the Limit of Quantitation and Limit of Detection are J flagged as estimated. Maine Environmental Laboratory is certified by Maine (cert. #2015007) and New Hampshire NELAP (NH ELAP) (cert. #2031). A list of certified parameters is available on request. The results reported herein conform to the most current NELAP standards where applicable unless otherwise narrated in this report. This report shall not be reproduced except in full without the written consent of the laboratory.

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EPA3-EPA/600/R-06/115, Determination of Trace Elements in DW by Axially Viewed ICP-Atomic Emission Spectrometry, Rev 4.2 Oct. 2003
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AOA - Official Methods of Analysis of the Association of Official Analytical Chemists, 14th edition, 1984.

Jacquelyn R. Vilinski

Authorized signature

Jacquelyn R. Villinski, Laboratory Director

July 27, 2015

Report of Analyses

Page 1 of 2

Report No.: SAM1932-15

One Main Street Yarmouth, Maine 04096

-

Andrew Gobeil Sevee & Maher Engineers 4 Blanchard Road Cumberland, Maine 04021 Tel.:(207) 846-6569 Fax: (207) 846-9066

Report of Analyses

Email: melab@mel-lab.com

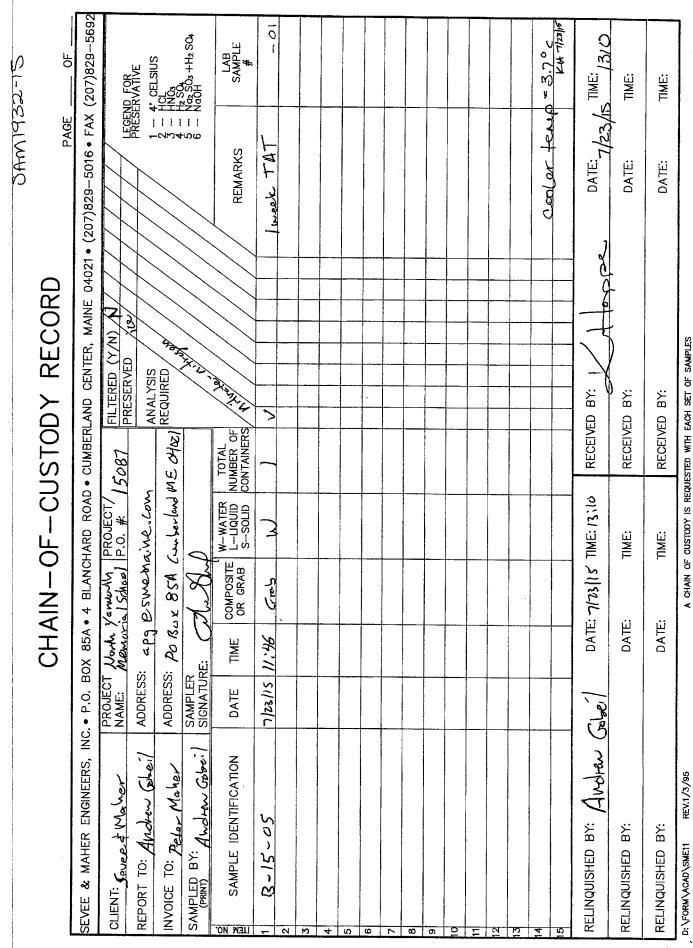
Page 2 of 2

July 27, 2015

Report No:	SAM1932-15	Sampler:	A. Gobeil
Date received:	07/23/15	Sampling date & time:	07/23/15-1146
Project ID:	North Yarmouth Memorial School #	15087 Sample matrix:	GW - Grab
Laboratory ID:	SAM193215-01	Sample ID:	B-15-05

			Date-Time				
Parameter	Results	units	Analyzed	LOD	LOQ	Method	Reference
Nitrate-N	1.2	mg/L	07/24/15-0759	0.1	0.3	300.0	EPA1

ND = not detected J = estimated B = detected in blank S = DLs increased due to sample matrix



MONITORING WELL SAMPLE PURGING FORM

SITE: North Yarmouth Memorial PROJECT NO: 15087 DATE: 8/3/2015 WELL DEPTH: <u>63.6</u> FT CONDITION OF WELL: () TOP OF WELL PVC () TOP OF CASING () MEASURED () HISTORICAL CONDITION OF WELL: SURFACE SEAL: () GOOD () CRACKED () OTHER: PROTECTIVE CASING: () LOCKED () NO LOCK () NO LOCK () SECURE () NEEDS REPAIR MOVE ()NEEDS REPAIR (ABLE TO TUBING INLET (TPVC)60 f+
3/8"WELL: (\checkmark) CAP () NO CAPTUBING DIAMETER3/8"
63.64 TO(ID) WELL MATL: (\checkmark) PVC () SS () OTHER:SCREENED INTERVAL (TPVC)63.64 TO48.6 f PUMPING START TIME: 12:40 PUMPING END TIME: 13:20 EQUIPMENT DECONTAMINATION PURGING SAMPLING () () PERISTALTIC PUMP ISCO
() PERISTALTIC PUMP GEOTECH
(✓) SUBMERSIBLE PUMP
() BLADDER PUMP
() AIR LIFT PUMP
() BAILER I.D.
() DEPRESTICE
() DEPRESTICE () PERISTALTIC PUMP ISCO $\begin{pmatrix} & \\ & \end{pmatrix}$ (🗸) DISTILLED/DEIONIZED WATER () NON-PHOSPHATE DETERGENT () 10% NITRIC ACID () HIGH-PRESSURE STEAM CLEAN () LDPE/SILICON TUBING () TEFLON/SILICON TUBING () IN-LINE FILTER () () DEDICATED SIL. TUBING () DEDICATED POLY. TUBING AMOUNT OF WATER CONTAINED IN DEDICATED SYSTEM: AMOUNT OF WATER PURGED PRIOR TO GRAB SAMPLE COLLECTION: NOTES: Instruments calibrated by TEW SAMPLED BY: Andrew Gobeil

SME008.DOC October 24, 1996

(page 1 of 2)

(page <u>2</u> of <u>2</u>)

SITE: North Varmouth Memorial

SAMPLE LOCATION: BIS-01

ORP OFFSET: NA mV

DATE: 8/3/15

Elapsed Time (min)	Liters Pumped	Flow Rate (ml/min)	WL TPVC (ft)	WL Top of Casing (ft)		рН (2)	Spec Cond MS/CM Q (3)75%	Temp °C (4)	DO Mgl L (5)	0RP (6)	Comments
Unit ID N	umber:										· · · · · · · · · · · · · · · · · · ·
Model ID	:				lamotte	pakton phil Scrics	con 6 Alorn	oakton phil series	Chemets R-7512		
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Zo			53.83		6.33	5.58	212	12.2	6	·	<u>.</u>
25			53.58		4.94	5.58	211	12.3	6	·····	
30	•	1,100	53.12		5. 5 9	5.62	211	13.3	6	·	flow reduced
35			53.12		5.11	5.64	212	13.4	6		
40			53.12		5.72	5.64	211	13,4	6		
		······									
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Part 2 of 2

SME009.DOC June 21, 2000

MONITORING WELL SAMPLE PURGING FORM

SAMPLE LOCATION: $B15-02$ WEATHER: $60s$, $50mm$ SAMPLE ID: NA START TIME: 0930 END: $10:15$ (DUPS) VA TRIP BLANK ID: VA TRIP BLANK ID: VA WELL DEPTH: 55.4 FT CONDITION OF WELL: () TOP OF WELL Pt () TOP OF CASING () MEASURED () HISTORICAL PROTECTIVE CASING: () OTHER: () MEASURED Pt () HISTORICAL PROTECTIVE CASING: () DOLCKED () MEASURED Pt () HISTORICAL (I) WELL: $(V CAP () NO CAP$ TUBING DIAMETER $SCREENED INTERVAL (TPVC)$ $S.44t TO$ $4044C$ PUMPING START TIME: 09337 FUMPING END TIME: $10:15$ EQUIPMENT DECONTAMINATION PURGING SAMPLING () () ELADDER PUMP () () () BAILER I.D. $1000000000000000000000000000000000000$	
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AMOUNT OF WATER CONTAINED IN DEDICATED SYSTEM:	
AMOUNT OF WATER PURGED PRIOR TO GRAB SAMPLE COLLECTION:	
NOTES :	

SME008.DOC October 24, 1996

(page _____ of 2___)

MONITORING WELL SAMPLE PURGING FORM - PART II

(page <u>2</u> of ²)

SITE:	Marille	Varmuth	Memorial	
SITE:	North	YOUNN TA	Momorial	

SAMPLE LOCATION: 315-02

ORP OFFSET: NA mV

DATE: 7/17/15

Elapsed Liters Flow. WL WL Turb Temp °C ORP DO рН Spec Top of Cond MS/cm R TPVC Time Pumped Rate NTU mall (ml/min) (ft) Casing (min) (3) 25 (4) (ft) (1) (2)(5) (6) Comments Unit ID Number: lamitte Ysi pro ysi pro ysi pro ysi pro Model ID : plus plus plus 21-5 4.80 47.56 11.77 7.34 233.2 11.5 13 2500 47.56 18 5.94 6.83 232.9 11.6 4.69 23 4.65 47.56 3.43 6.71 233.7 11.3 2.73 11.5 28 47.56 6.68 233.6 4.63 4.61 47.56 2.63 6.66 234.2 114 32 6.64 234.0 11.5 47.56 J 37 3.00 4.61

NOTES :

(1)TURBIDITY (NTU)

(2) pH (STD UNITS) (3)

SPECIFIC CONDUCTANCE (umhos/cm @25C)

TEMPERATURE (C) DISSOLVED OXYGEN (ppm)

(5)

(4)

(6) UNADJUSTED OXIDATION REDUCTION POTENTIAL (+- mV)

Part 2 of 2

SME009.DOC June 21, 2000

MONITORING WELL SAMPLE PURGING FORM

	$(page _ 1 of \boxed{2})$
SAMPLE LOCATION: <u>B15-05</u> WEAT SAMPLE ID: <u>NA</u> STAF	Ther: 603 date: $7/23/15$ Ther: 603 survey RT TIME: $10:50$ end: $11:46$ P BLANK ID: NA
() MEASURED () HISTORICAL	()NO LOCKED ()NO LOCK ()SECURE ()NEEDS REPAIR (ABLE TO MOVE)
PUMPING START TIME: PUMP	PING END TIME: 11:46
EQUIPMENT DECONTAMINATION	
PURGING SAMPLING () () PERISTALTIC PUMP ISCO () () PERISTALTIC PUMP GEOTECH () () SUBMERSIBLE PUMP () () BLADDER PUMP () () BLADDER PUMP () () BAILER I.D. () () LDPE/SILICON TUBING () () TEFLON/SILICON TUBING () () DEDICATED SIL. TUBING () () DEDICATED POLY. TUBING	DECONTAMINATION FLUIDS USED () DISTILLED/DEIONIZED WATER () TAP WATER () NON-PHOSPHATE DETERGENT () 10% NITRIC ACID () HIGH-PRESSURE STEAM CLEAN ()
AMOUNT OF WATER CONTAINED IN DEDICATED SYSTEM:	
AMOUNT OF WATER PURGED PRIOR TO GRAB SAMPLE CO)LLECTION:
NOTES:	
SAMPLED BY: Andrew Gobeil	

Part 1 of 2

SME008.DOC October 24, 1996 MONITORING WELL SAMPLE PURGING FORM - PART II

(page <u>2</u> of <u>2</u>)

S	Ι	ΤI	Ξ:

North Yarmouth Memorial

SAMPLE LOCATION: <u>BIS-05</u>

DATE: **7/23/15**

ORP OFFSET: MA mV

Elapsed Time	Liters Pumped	Flow Rate	WL TPVC	WL Top of	Turb	PH	Spec	Temp °C	DO	ORP	
(mín)		(ml/min)	(ft)	Casing (ft)	NTU (1)	(2)	Spec Cond AS/Can E (3) ²⁵⁰	(4)	mg12 (5)	(6)	Cormonto
				(+c)				(4)	(3)		Comments
Unit ID N	lumber:										
		₩.ET.,			Jamette	ysipro	ysi pro	Ysi pro	ysipm		
Model ID	•					plus	plus	plus	plus		
2		1500	·		1919	8.06	2.83.5	13.1	10.88		
5					121	7.47	281.8	13./	10.06		· · · · · · · · · · · · · · · · · · ·
10					22.4	6.97	278.2	12.9	9.78		
15					16.4	6.88	274.5	12.9	9.78		
20					4.43	6.88	272.5	12.9	9.59		. <u></u>
25					1.89	6.86	270.1	12.9	9.49		
30		Ţ			3.07	6.84	267.8	12.8	9.4Z		
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NOTES:										a de la star es avaira à filma	
	RBIDITY (NTU)		i.	4) TEN	1PERATURE	(C)				
(2) pH	ECIFIC CC	TS)		(:	5) DIS	SSOLVED O	XYGEN (pr	m)			
	mhos/cm @			()	6) UN <i>I</i>	ADJUSTED	OXIDATION	N REDUCTI	ON POTEN	WTIAL (+-	· mv)

Part 2 of 2

SME009.DOC June 21, 2000

				FIELD INSTRUMENT CALIBRATION DAILY OPERATING LOG	LIBRATION LOG				
CLIENT:	5222					DATE/TIME:	TIME: 7-16-1	1000	0
PROJECT SITE:	ITE:						JOB NUMBER		
		MODELID		STANDARD(S) USED	WAS CAI SUCCESSFULL (IF YES, F	WAS CALIBRATION SUCCESSFULLY COMPLETED? (IF YES, PLACE / IN	MIDDAY STANDARD(S) CHECK* ¹ (Check off Appropriate Standard if Meter is in Calibration	(S) CHECK* ¹ e Standard if oration	OPERATOR
Meter Set	INSTRUMENT	NUMBER	UNIT ID NUMBER	FUR CALIBRATION	APPROPR (For ORP, Pl Calibration In /	APPROPRIATE AREA) (For ORP, Place Results Of Calibration In Appropriate Box)	Standard	Reading	INITIALS
				4.01	4 🗸 read	reading 4,04			<u> </u>
	Hd	YSI PRO PLUS	SME001	л о С	7 <reading< td=""><td>ing (0,99</td><td></td><td></td><td>S E</td></reading<>	ing (0,99			S E
					10 reading	ing			
	Specific Conductivity	YSI PRO PLUS	SME001	HUS Microsiemens	Lea	reading <u>445.3</u>	Microsiemens		
۷	Q	YSI PRO PLUS	SME001	<u> /</u> 100% ZERO	<u> </u>	reading 0.05	100%		
	ORP	YSI PRO PLUS	SME001	240 Mv ORP Solution	<u> </u>	Reading 240.1	240 Mv ORP		
	Turbidity	LaMotte 2020we	Box:	<u> </u>	1,0 reading	reading	1 NTU10 NTU	1 NTU 10 NTU	\mathbf{i}
					4reac	reading			
	Hd	YSI PRO PLUS	SME002		7 reading_	buj			
					10reading_	ing	And Andrews		
C	Specific Conductivity	YSI PRO PLUS	SME002	Microsiemens	reac	reading	Microsiemens		
۵	OQ	YSI PRO PLUS	SME002	100% ZERO	100% n	reading	100%		
	ORP	YSI PRO PLUS	SME002	240 Mv ORP Solution	240 Mv	Reading	240 Mv ORP		
	Turbidity	LaMotte 2020we	Box	1.0 NTU 10 NTU	reading	reading	1 NTU10 NTU	1 NTU 10 NTU	
* ¹ Calibrati field value	* ¹ Calibration of meters is completed once field value falls outside of historic ranges.	ompleted once c istoric ranges.	Calibration of meters is completed once daily before work starts – a si ald value falls outside of historic ranges.	a standards check for pH, conductivity and turbidity should be	nductivity and tu	bidity should be o	completed midway through each day or if	gh each day or	if a particular
ADDITIONAL NOTES:	AL NOTES:								
					v				

Sevee & Maher Engineers, Inc.

January 28, 2015 \\nserver\CFS\SME\C\erica\\FORMS\Sampling\Daily Operating Log revised 2015.docx

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		NYWS				3	DATE	DATE/TIME: 7/23//5		
	PROJECT SI	ITE:					JOB	JOB NUMBER:		
	Meter Set	INSTRUMENT	Model ID Nimber	UNIT ID NUMBER	STANDARD(S) USED FOR CALIBRATION* ¹	WAS CAL SUCCESSFULL (IF YES, P	IBRATION Y COMPLETED? LACE ✓IN	MIDDAY STANDARD(S) CHECK ⁴¹ (Check off Appropriate Standard if Meter is in Calibration	(S) CHECK* ¹ e Standard if rration	OPERATOR
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		ОЯР	YSI PRO PLUS	SME001	240 Mv ORP Solution		Reading	240 Mv ORP		
		Turbidity	LaMotte 2020we	Box:		reading	reading	1 NTU10 NTU	1 NTU 10 NTU	
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		Hď	YSI PRO PLUS	SME002	7.00	ł	$\left(\right)$			¥. ۍ.
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	1	8	YSI PRO PLUS	SME002			ading <u>/04*//</u> ading	100%		
	1	ORP	YSI PRO PLUS	SME002	240 Mv ORP Solution		Reading	240 Mv ORP		-
		Turbidity	LaMotte 2020we	Box: G		1.0 reading	reading	1 NTU10 NTU	10 NTU	5
ADDITIONAL NOTES:	* ¹ Calibration field value fa	n of meters is co Ills outside of his	impleted once d storic ranges.		andards check for pH, con	ductivity and turb	idity should be c	ompleted midway throug	jh each day or i	f a particular
	ADDITIONAL	NOTES:								
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