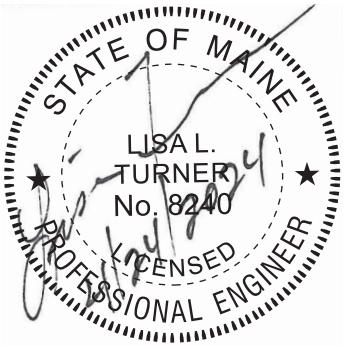
# ENVIRONMENTAL MONITORING PLAN
# JUNIPER RIDGE LANDFILL
# OLD TOWN, MAINE

Prepared for

## NEWSME LANDFILL OPERATIONS LLC




April 2024

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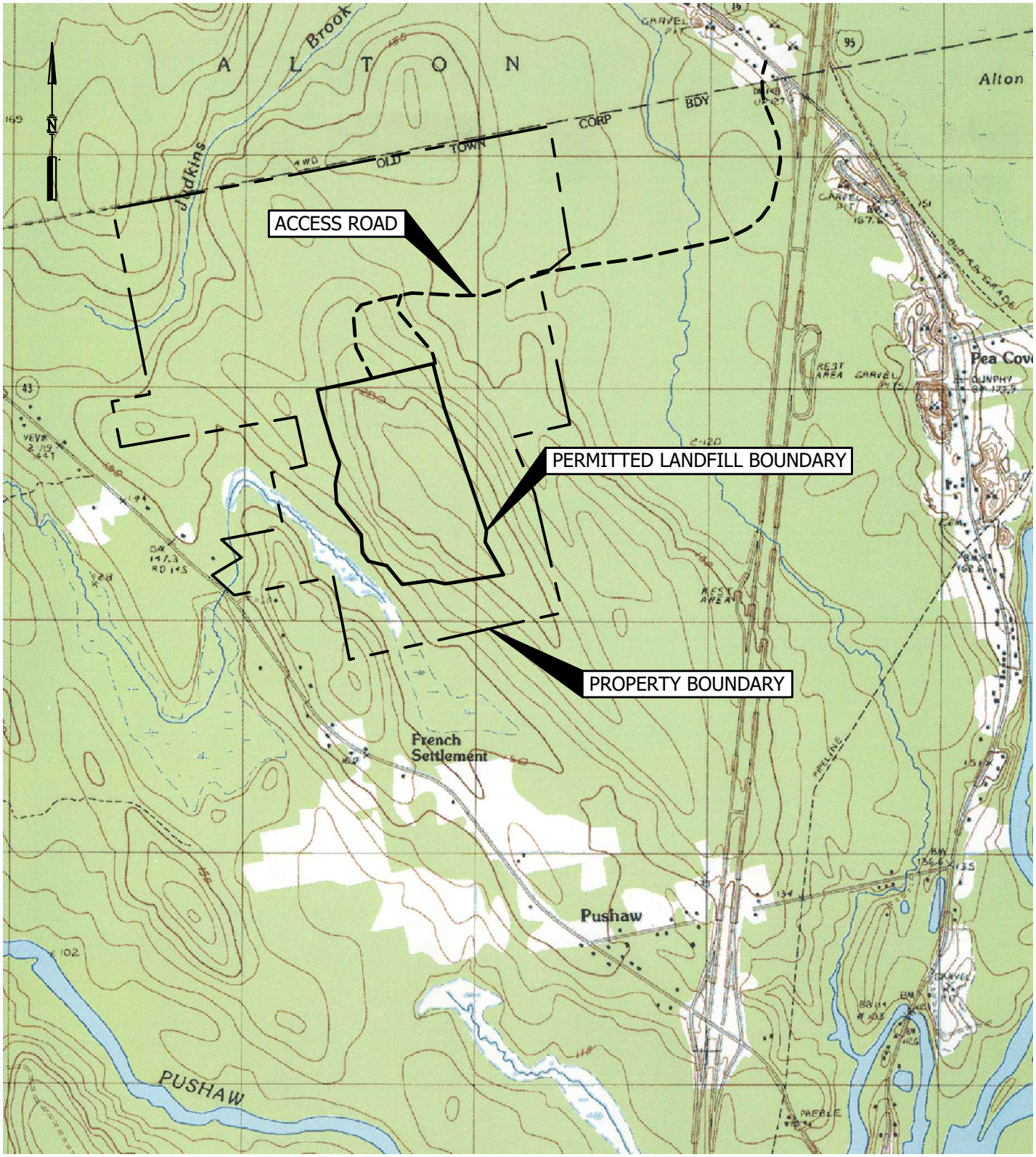
**JUNIPER RIDGE LANDFILL**
**OLD TOWN, MAINE**

## 1.0 INTRODUCTION

The Environmental Monitoring Plan (EMP) summarizes the sampling procedures and analytical techniques that will be used to monitor groundwater, surface water, pore-water, leachate, and landfill gas around the Juniper Ridge Landfill (JRL) site (see Figure 1-1), which is operated by New England Waste Services of Maine Landfill Operations, LLC (NEWSME) on behalf of the state of Maine and the Maine Bureau of General Services (BGS). The EMP has been revised as necessary to address changes in site conditions; historical monitoring changes are summarized in Appendix A. This EMP combines the EMP approved for Cell 1 through Cell 10 and the EMP approved for the permitted expansion (Cell 11 through Cell 17). As of April 2024, Cells 1 through 15 have been constructed, Cell 16 construction is planned for the summer of 2024, and Cell 17 construction is planned for 2026.




BASE MAP ADAPTED FROM 7.5 MIN
USGS TOPOGRAPHIC QUADRANGLE
OLD TOWN, MAINE-1988

1000 0 2000 FEET

DWG: SITELOC LMN: FIG 1 CTB: SME-STD REV: 4/5/2022

FIGURE 1-1
SITE LOCATION MAP
JUNIPER RIDGE LANDFILL
OLD TOWN, MAINE

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\\Nserver\cfs\Casella\OldTownLandfill\GeneralSiteInfo\Usgs\SITELOC.dwg, FIGURE 1-1, 4/5/2022 6:35:05 AM, sjm

## 2.0 OBJECTIVES OF THE ENVIRONMENTAL MONITORING PLAN

The purposes of the JRL monitoring plan are to routinely:

- Evaluate the quality of groundwater, stormwater, pore-water, and surface water in the vicinity of the JRL;
- Evaluate the performance of the primary liner systems, including routine characterization of the liquid in the underdrain layer beneath Cells 1 through 10, the underdrain beneath Cells 12 through 14, the former leachate pond, and the leak detection layer beneath Cells 11 through 17; and
- Evaluate the quality and quantity of leachate generated at the site.

## 3.0 MONITORING LOCATIONS AND FREQUENCY

The EMP includes monitoring at fifty groundwater monitoring wells, five surface water monitoring locations, five pore-water monitoring locations, two stormwater monitoring locations, thirteen underdrain monitoring locations, seven leak detection monitoring locations, and one leachate monitoring location. Monitoring locations are summarized in Tables 3-1 and 3-2 and shown on Figures 3-1 and 3-2.

### 3.1 Groundwater Monitoring Wells

The JRL groundwater monitoring well locations are described in Table 3-1 and are shown on Figures 3-1 and 3-2. Groundwater monitoring well locations are sampled during the spring, summer, and fall as shown on Table 3-3 for the monitoring parameter list established for the site as described in the site's 2017 license and in Section 4.0.

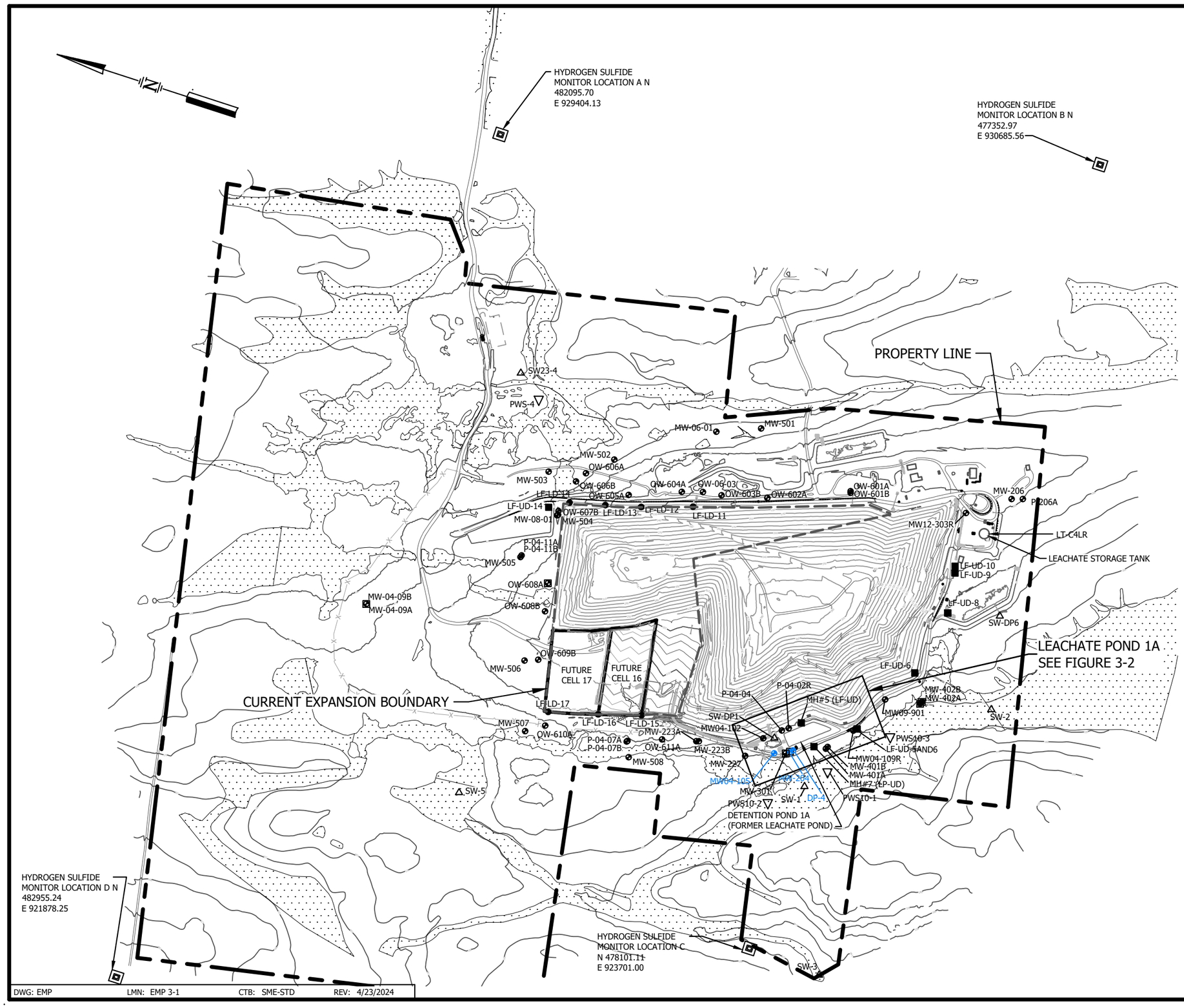
The JRL groundwater monitoring locations include piezometers that are typically one-inch-diameter wells (designated as P-XXX), observation wells that are typically two-inch-diameter wells (designated as OW-XXX) and monitoring wells that are also typically two-inch-diameter wells (designated as MW-XXX). The piezometers were typically installed during the site investigation phase, as were many of the monitoring wells, particularly near Cells 1 through 10. For Cells 11 through 17, the wells referred to as observation wells are located immediately adjacent to the Expansion boundary and are closely spaced, and the wells referred to as monitoring wells are located further from the landfill boundary between the Expansion boundary and the sensitive receptors. The groundwater monitoring locations have been located based upon the hydrogeologic site characterization work.

The groundwater elevations will be analyzed on an annual basis in accordance with the site's MEDEP license.

### 3.2 Surface Water, Stormwater, and Pore-Water Monitoring

The JRL surface water, stormwater, and pore-water monitoring locations are described in Table 3-2 and shown on Figures 3-1 and 3-2. As of April 2024, there are:

- Four surface water monitoring locations along the unnamed tributary of Pushaw Stream (located west of the landfill);
- Four pore-water monitoring locations located in the soils along the east side of the unnamed tributary to Pushaw Stream; and
- Two stormwater monitoring locations in facility stormwater detention ponds.




LEGEND

- GROUNDWATER SAMPLING AND GAS MONITORING LOCATION
- DECOMMISSIONED WELL
- SURFACE WATER SAMPLING LOCATION
- HYDROGEN SULFIDE MONITORING LOCATION
- PORE WATER SAMPLING LOCATION
- FALL FIELD PARAMETER AND GAS MONITORING LOCATION
- LF-UD-6 ■ UNDERDRAIN SAMPLING AND GAS MONITORING LOCATION
- LF-LD-11 LEAK DETECTION SAMPLING AND GAS MONITORING LOCATION

NOTES:

1. TOPOGRAPHY FROM AERIAL SURVEY PERFORMED BY AERIAL SURVEY & PHOTO INC., NORRIDGEWOCK, MAINE. PHOTO DATE 6/23/2023. VERTICAL DATUM: BRASS PLUG AT FORMER LEACHATE POND PUMP STATION. HORIZONTAL DATUM: MAINE STATE COORDINATES EAST ZONE NAD 83. GROUND CONTROL BY SEVEE & MAHER ENGINEERS, INC, CUMBERLAND, MAINE.
2. TOPOGRAPHY CONTOURS INCLUDE PROPOSED TOPOGRAPHY FOR CELL 16 BASE GRADES.

400 0 800 1600 FEET

FIGURE 3-1
SITE LAYOUT AND ENVIRONMENTAL MONITORING LOCATIONS
JUNIPER RIDGE LANDFILL
OLD TOWN, MAINE

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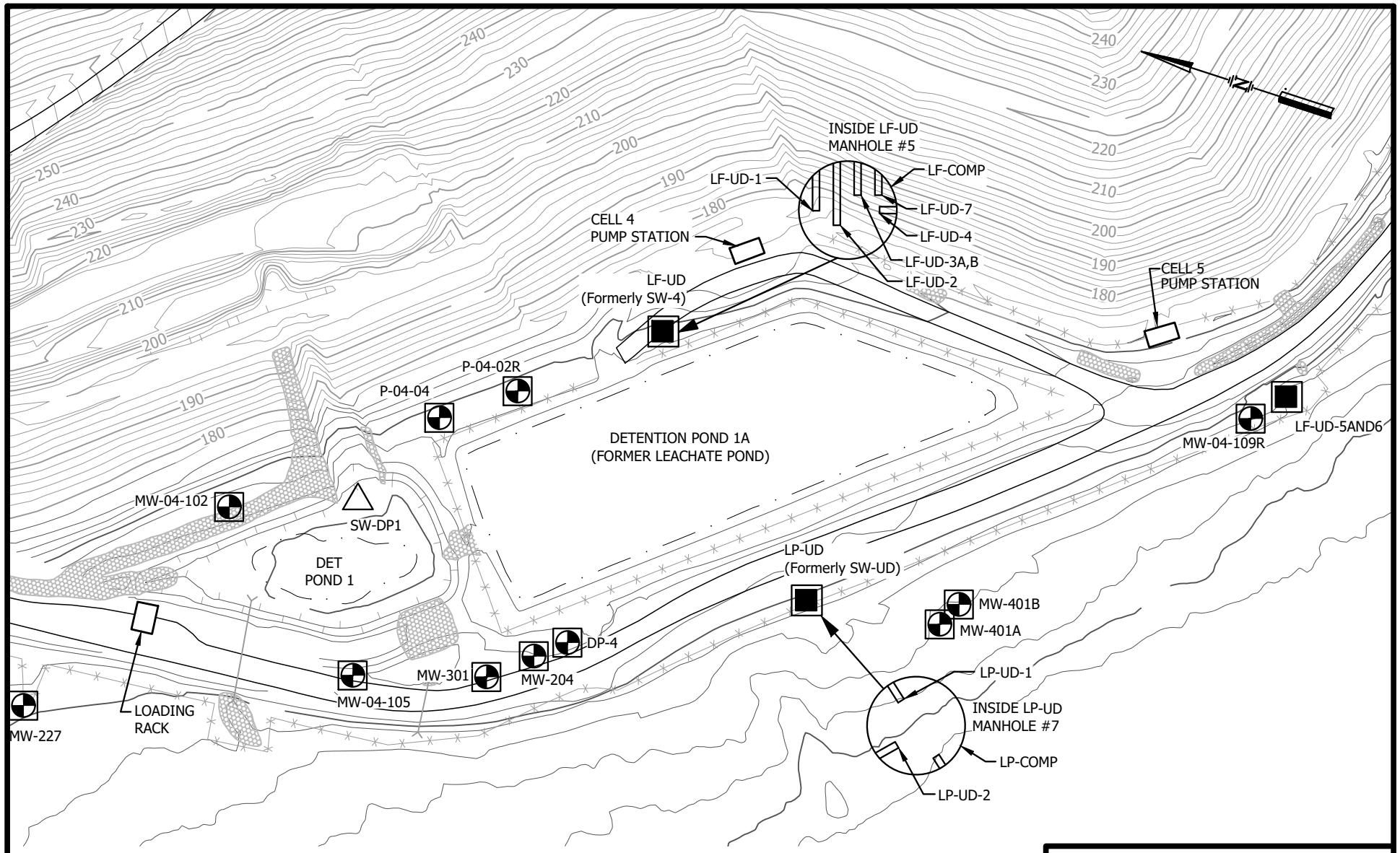
DWG: EMP LMN: EMP 3-1 CTB: SME-STD REV: 4/23/2024

\\Server\cfs\Casella\OldTownLandfill\GeneralSiteInfo\Acad\EMP.dwg, EMP FIG 3-1, 4/23/2024 9:58:57 AM, bwb




LEGEND

- GROUNDWATER MONITORING LOCATION
- SURFACE WATER MONITORING LOCATION
- UNDERDRAIN MONITORING LOCATION
- GAS MONITORING LOCATION
- LEACHATE PUMP STATION

FIGURE 3-2
ENVIRONMENTAL MONITORING LOCATIONS
ADJACENT TO
DETENTION POND 1A
JUNIPER RIDGE LANDFILL
OLD TOWN, MAINE

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DWG: EMP LMN: EMP 3-2 CTB: EML REV: 4/23/2024

**TABLE 3-1**

**GROUNDWATER MONITORING LOCATIONS**
**ENVIRONMENTAL MONITORING PROGRAM**

| Monitoring Wells | Location (Upgradient or Downgradient) | Screen Interval (ft below ground surface) | Well Type | Installation Year |
|---|---|---|---|---|
| MW-204 | Downgradient | 13.8 – 18.8 | Overburden | 1990 |
| MW-206 | Upgradient | 15.0 – 20.0 | Overburden | 1990 |
| P-206A | Upgradient | 85.5 – 90.5 | Bedrock | 1990 |
| MW-223A | Downgradient | 28.0 – 33.0 | Bedrock | 1990 |
| MW-223B | Downgradient | 12.6 – 17.6 | Overburden | 1990 |
| MW-227 | Downgradient | 15.0 – 20.0 | Overburden | 1990 |
| MW-301 | Downgradient | 162.7 – 182.7 | Bedrock | 1996 |
| MW12-303R | Upgradient | 30.4 – 40.4 | Overburden | 2012 |
| MW-401A | Downgradient | 98.8 – 108.8 | Bedrock | 2004 |
| MW-401B | Downgradient | 10.0 – 20.0 | Overburden | 2004 |
| MW-402A | Downgradient | 95.5 – 105.5 | Bedrock | 2004 |
| MW-402B | Downgradient | 12.0 – 22.0 | Overburden | 2004 |
| DP-4 | Downgradient of former leachate pond | 18.5 – 24.5 | Overburden | 2004 |
| P-04-02R | Downgradient of former leachate pond | 30.0 – 35.0 | Overburden | 2015 |
| P-04-04 | Downgradient of former leachate pond | 25.0 – 30.0 | Overburden | 2004 |
| P-04-11A | Downgradient | 48.0 – 49.0 | Overburden | 2004 |
| P-04-11B | Downgradient | 9.0 – 10.0 | Overburden | 2004 |
| MW-04-09A | Downgradient | 38.0 – 39.0 | Bedrock | 2004 |
| MW-04-09B | Downgradient | 14.0 – 15.0 | Overburden | 2004 |
| MW04-102 | Downgradient of former leachate pond | 10.0 – 15.0 | Overburden | 2004 |
| MW04-105 | Downgradient of former leachate pond | 14.8 – 19.8 | Overburden | 2004 |
| MW04-109R | Downgradient | 15.0 – 20.0 | Overburden | 2009 |
| P-04-07A | Downgradient | 19.7 – 24.7 | Bedrock | 2004 |
| P-04-07B | Downgradient | 12.0 - 13.0 | Bedrock | 2004 |
| MW-501 | Downgradient | 35.0 – 45.0 | Bedrock | 2018 |
| MW-502 | Downgradient | 38.0 – 43.0 | Bedrock | 2019 |
| MW-503 | Downgradient | 60.0 – 70.0 | Bedrock | 2020 |
| MW-504 | Downgradient | 71.5 – 81.5 | Bedrock | 2020 |
| MW-505 | Downgradient | 72.2-82.2 | Bedrock | 2020 |
| MW-506 | Downgradient | 50.0-60.0 | Bedrock | 2020 |
| MW-507 | Downgradient | 22.5 – 220.0 | Bedrock (Open Borehole) | 2017 |
| MW-508 | Downgradient | 26.0 – 36.0 | Bedrock | 2022 |
| MW06-01 | Downgradient | 10.0 – 20.0 | Overburden | 2006 |
| MW09-901 | Downgradient | 15.0 – 20.0 | Overburden | 2009 |
| OW-601A | Downgradient | 66.6 – 76.6 | Bedrock | 2018 |
| OW-601B | Downgradient | 46.2 – 56.2 | Overburden | 2018 |
| OW-602A | Downgradient | 22.5 – 240.0 | Bedrock (Open Borehole) | 2017 |
| OW-603B | Downgradient | 16.2 – 26.2 | Overburden/Bedrock | 2018 |
| OW-604A | Downgradient | 22.5 – 32.5 | Bedrock | 2018 |
| OW-605A | Downgradient | 62.5 – 260.0 | Bedrock (Open Borehole) | 2017 |
| OW-606A | Downgradient | 42.5 – 240.0 | Bedrock (Open Borehole) | 2017 |
| OW-606B | Downgradient | 7.0-12.7 | Overburden/Bedrock | 2020 |
| OW-607B | Downgradient | 41.0 – 51.0 | Overburden | 2020 |

**TABLE 3-1 (cont'd)**
**GROUNDWATER MONITORING LOCATIONS**
**ENVIRONMENTAL MONITORING PROGRAM**

| Monitoring Wells | Location (Upgradient or Downgradient) | Screen Interval (ft below ground surface) | Well Type | Installation Year |
|---|---|---|---|---|
| OW-608A | Downgradient | 62.5 – 260.0 | Bedrock (Open Borehole) | 2017 |
| OW-608B | Downgradient | 33.5 – 43.5 | Overburden | 2020 |
| OW-609B | Downgradient | 39.0 – 49.0 | Overburden | 2020 |
| OW-610A | Downgradient | 26.7 – 36.7 | Bedrock | 2022 |
| OW-611A | Downgradient | 12.5 – 220.0 | Bedrock (Open Borehole) | 2017 |
| OW-06-03 | Downgradient | 13.0 – 23.0 | Overburden | 2018 |
| MW-08-01 | Downgradient | 117.0-127.0 | Bedrock | 2020 |

**TABLE 3-2**

**SURFACE WATER, PORE-WATER, STORMWATER, LEACHATE, LEAK DETECTION, AND UNDERDRAIN MONITORING LOCATIONS**

| Location Designation | Location Description | Collection Method | Position Relative To Landfill | First Recorded | Current Status |
|---|---|---|---|---|---|
| **Surface Water** | | | | | |
| SW-1 | Unnamed tributary of Pushaw Stream | Grab | Downgradient | November 1990 | Active |
| SW-2 | Unnamed tributary of Pushaw Stream | Grab | Upgradient | November 1990 | Active |
| SW-3 | Unnamed tributary of Pushaw Stream | Grab | Downgradient | May 1994 | Active |
| SW 23-4 | Surface water feature which drains to unnamed tributary to Judkins Brook East | Grab | Downgradient | March 2023 | Active |
| SW-5 | Surface water feature which drains to unnamed tributary of Pushaw Stream West | Grab | Downgradient | To Be Established | To be established upon completion of Cell 17 |
| **Pore-Water** | | | | | |
| PWS10-1 | Pore-water sample east of unnamed tributary of Pushaw Stream | Std | Downgradient | April 2010 | Active |
| PWS10-2 | Pore-water sample east of unnamed tributary of Pushaw Stream | Std | Downgradient | April 2010 | Active |
| PWS10-3 | Pore-water sample east of unnamed tributary of Pushaw Stream | Std | Downgradient | April 2010 | Active |
| PWS-4 | Pore-water sample near surface water feature which drains to unnamed tributary to Judkins Brook East | Std | Downgradient/Northeast of Landfill | March 2023 | Active |
| PWS-5 | Pore-water sample near surface water feature which drains to unnamed tributary of Pushaw Stream West | Std | Downgradient/Northwest of Landfill | To Be Established | To be established upon completion of Cell 17 |

**TABLE 3-2 (cont'd)**
**SURFACE WATER, PORE-WATER, STORMWATER, LEACHATE, LEAK DETECTION, AND UNDERDRAIN MONITORING LOCATIONS**

| Location Designation | Location Description | Collection Method | Position Relative To Landfill | First Recorded | Current Status |
|---|---|---|---|---|---|
| **Stormwater** | | | | | |
| SW-DP1 | Detention pond #1 | Grab | Downgradient | May 2004 | Active |
| SW-DP6 | Detention pond #6 | Grab | Downgradient | October 2009 | Active |
| **Leachate** | | | | | |
| LT-C4LR | Leachate storage tank | Grab | Upgradient/South | July 2013 | Active |
| **Underdrains and Leak Detection** | | | | | |
| LF-UD-1 | Cell 1 underdrain at manhole #5 | Grab | Underdrain | July 2004 | Active |
| LF-UD-2 | Cell 2 underdrain at manhole #5 | Grab | Underdrain | July 2004 | Active |
| LF-UD-3A,B | Cell 3A, 3B underdrain at manhole #5 | Grab | Underdrain | July 2011 | Active |
| LF-UD-4 | Cell 4 underdrain at manhole #5 | Grab | Underdrain | March 2009 | Active |
| LF-UD-5 and 6 | Outfall pipe | Grab | Underdrain | July 2011 | Active |
| LF-UD-6 | Cell 6 underdrain | Grab | Underdrain | February 2011 | Active |
| LF-UD-7 | Cell 7 underdrain at manhole #5 | Grab | Underdrain | November 2011 | Active |
| LF-UD-8 | Cell 8 underdrain | Grab | Underdrain | April 2013 | Active |
| LF-UD-9 | Cell 9 underdrain | Grab | Underdrain | April 2016 | Active |
| LF-UD-10 | Cell 10 underdrain | Grab | Underdrain | October 2017 | Active |
| LF-UD-12+13+14 | Cell 11, 12, 13, and 14 underdrain | Grab | Underdrain discharge on Eastern side of Cell 14 | August 2022 | Active |
| LF-LD-11 | Cell 11 Leak Detection System | Grab | Eastern Perimeter Dike Leak Detection | October 2019 | Active |
| LF-LD-12 | Cell 12 Leak Detection System | Grab | Eastern Perimeter Dike Leak Detection | October 2020 | Active |
| LF-LD-13 | Cell 13 Leak Detection System | Grab | Eastern Perimeter Dike Leak Detection | April 2022 | Active |
| LF-LD-14 | Cell 14 Leak Detection System | Grab | Eastern Perimeter Dike Leak Detection | July 2022 | Active |
| LF-LD-15 | Cell 15 Leak Detection System | Grab | Western Perimeter Dike Leak Detection | July 2023 | Active |
| LF-LD-16 | Cell 16 Leak Detection System | Grab | Western Perimeter Dike Leak Detection | To Be Established | Upon completion of Cell 16 |
| LF-LD-17 | Cell 17 Leak Detection System | Grab | Western Perimeter Dike Leak Detection | To Be Established | Upon completion of Cell 17 |
| LP-UD-1 | Former Leachate Pond underdrain south end at manhole #7 | Grab | Leachate pond underdrain | July 2004 | Active |
| LP-UD-2 | Former Leachate Pond underdrain north end at MH #7 | Grab | Leachate pond underdrain | July 2004 | Active |
| LF-COMP | Composite sample of LF-UD-1, LF-UD-2, LF-UD-3A,B, LF-UD-4, and LF-UD-7 when water level in manhole #5 covers all of the inlet pipes | Grab | Underdrain | August 2004 | Active |
| LP-COMP | Composite sample of LP-UD-1 and LP-UD-2 when water level in manhole #7 covers both inlet pipes | Grab | Underdrain | May/October 2004 | Active |

Acronyms:
SW-X – Surface Water Location
SW-DPX – Stormwater Detention Pond Location
LT-C4LR – Leachate Sample Location
PWS-X – Pore-Water Sample Location
LF-UD-X – Landfill Underdrain Sample Location
LF-LD-X – Landfill Leak Detection System Sample Location
LP-UD-X –Former Leachate Pond Underdrain Sample Location

**TABLE 3-3**

**SAMPLING FREQUENCY**
**ENVIRONMENTAL MONITORING PROGRAM**

| Sample Type | Monitoring - Detection (D)/Expansion Landfill Detection (D(E))/Field Parameters Only (FP) | | | | | Field Parameters Monthly[1] |
|---|---|---|---|---|---|---|
| | Monitoring Location | Characterization Monitoring | Spring | Summer | Fall | |
| Groundwater | MW-204 | N/A | - | - | FP[2] | - |
| | MW-206 | N/A | D(E) | D(E) | D(E) | - |
| | P-206A | N/A | D(E) | D(E) | D(E) | - |
| | MW-223A | N/A | D | D | D | - |
| | MW-223B | N/A | D | D | D | - |
| | MW-227 | N/A | D | D | D | - |
| | MW-301 | N/A | D | D | D | - |
| | MW12-303R | N/A | D | D | D | - |
| | MW-401A | N/A | D | D | D | - |
| | MW-401B | N/A | D | D | D | - |
| | MW-402A | N/A | D | D | D | - |
| | MW-402B | N/A | D, VOC | D | D | - |
| | DP-4 | N/A | - | - | FP[2] | - |
| | P-04-02R | N/A | D | D | D | - |
| | P-04-04 | N/A | D | D | D | - |
| | P-04-11A | 2021 | FP | D(E) | FP | - |
| | P-04-11B | 2021 | FP | D(E) | FP | - |
| | MW-04-09A | 2020 | D(E) | D(E) | D(E) | - |
| | MW-04-09B | 2020 | D(E) | D(E) | D(E) | - |
| | MW04-102 | N/A | D | D | D | - |
| | MW04-105 | N/A | - | - | FP[2] | - |
| | MW04-109R | N/A | D | D | D | - |
| | P-04-07A | 2022 - 2023 | FP | D(E) | FP | - |
| | P-04-07B | 2022 - 2023 | FP | D(E) | FP | - |
| | MW-501 | 2018 | D(E) | D(E) | D(E) | - |
| | MW-502 | 2020 | D(E) | D(E) | D(E) | - |
| | MW-503 | 2021 | D(E) | D(E) | D(E) | - |
| | MW-504 | 2021 | D(E) | D(E) | D(E) | - |
| | MW-505 | 2021 | D(E) | D(E) | D(E) | - |
| | MW-506 | 2021 | D(E) | D(E) | D(E) | - |
| | MW-507 | 2018 | D(E) | D(E) | D(E) | - |
| | MW-508 | 2022 - 2023 | D(E) | D(E) | D(E) | - |
| | MW06-01 | 2018 | D(E) | D(E) | D(E) | - |
| | MW09-901 | N/A | D | D | D | - |
| | OW-601A | 2018 | FP | D(E) | FP | - |
| | OW-601B | 2018 | FP | D(E) | FP | - |
| | OW-602A | 2018 | FP | D(E) | FP | - |
| | OW-603B | 2018 | FP | D(E) | FP | - |
| | OW-604A | 2018 | FP | D(E) | FP | - |
| | OW-605A | 2018 | FP | D(E) | FP | - |
| | OW-606A | 2018 | FP | D(E) | FP | - |
| | OW-606B | 2021 | FP | D(E) | FP | - |
| | OW-607B | 2021 | FP | D(E) | FP | - |
| | OW-608A | 2018 | FP | D(E) | FP | - |
| | OW-608B | 2021 | FP | D(E) | FP | - |
| | OW-609B | 2021 | FP | D(E) | FP | - |
| | OW-610A | 2022 - 2023 | FP | D(E) | FP | - |
| | OW-611A | 2018 | FP | D(E) | FP | - |
| | OW-06-03 | 2018 | FP | D(E) | FP | - |
| | MW-08-01 | 2021 | D(E) | D(E) | D(E) | - |

**TABLE 3-3 (cont'd)**
**SAMPLING FREQUENCY**
**ENVIRONMENTAL MONITORING PROGRAM**

| Sample Type | Monitoring - Detection (D)/Expansion Landfill Detection (D(E))/ Field Parameters Only (FP)/Volatile Organic Compounds (VOC)/ DISSOLVED METHANE (M) | | | | | Field Parameters Monthly[1] |
|---|---|---|---|---|---|---|
| | Monitoring Location | Characterization Monitoring | Spring | Summer | Fall | |
| Surface Water[3] | SW-1 | N/A | D | D | D | - |
| | SW-2 | N/A | D | D | D | - |
| | SW-3 | N/A | D | D | D | - |
| | SW 23-4 | 2023 | D(E) | D(E) | D(E) | - |
| | SW-5[4] | TBD[5] | D(E) | D(E) | D(E) | - |
| Pore-Water | PWS10-1 | N/A | D, M | D | D | - |
| | PWS10-2 | N/A | D, M | D | D | - |
| | PWS10-3 | N/A | D, M | D | D | - |
| | PWS-4 | 2023 | D(E) | D(E) | D(E) | - |
| | PWS-5[4] | TBD[5] | D(E) | D(E) | D(E) | - |
| Stormwater | SW-DP1 | N/A | D | D | D | - |
| | SW-DP6 | N/A | D | D | D | - |
| Leachate | LT-C4LR | N/A | D[6], VOC | D, VOC | D, VOC | - |
| Leak Detection | LF-LD-11[7] | N/A | - | D€ | - | X |
| | LF-LD-12[7] | N/A | - | D(E) | - | X |
| | LF-LD-13[7] | N/A | - | D(E) | - | X |
| | LF-LD-14[7] | N/A | - | D(E) | - | X |
| | LF-LD-15[7] | N/A | - | D(E) | - | X |
| | LF-LD-16[4,7] | N/A | - | D(E) | - | X |
| | LF-LD-17[4,7] | N/A | - | D(E) | - | X |
| Underdrain | LF-UD-1 | N/A | D, VOC | D | D | X |
| | LF-UD-2 | N/A | D, VOC | D | D | X |
| | LF-UD-3A,B | N/A | D, VOC | D | D | X |
| | LF-UD-4 | N/A | D, VOC | D | D | X |
| | LF-UD-5 and 6 | N/A | D, VOC | D | D | X |
| | LF-UD-6 | N/A | D, VOC | D | D | X |
| | LF-UD-7 | N/A | D, VOC | D | D | X |
| | LF-UD-8 | N/A | D, VOC | D | D | X |
| | LF-UD-9 | N/A | D, VOC | D | D | X |
| | LF-UD-10 | N/A | D, VOC | D | D | X |
| | LF-UD-12+13+14 | N/A | D, VOC | D(E) | - | X |
| | LP-UD-1 | N/A | D, VOC | D | D | X |
| | LP-UD-2 | N/A | D, VOC | D | D | X |
| | LF-COMP | N/A | D | D | D | |
| | LP-COMP | N/A | D | D | D | |

Notes:
1. JRL personnel will complete monthly underdrain and leak detection monitoring during the nine months that water quality sampling is not conducted. Monthly parameters include flow and specific conductance.
2. Only field parameters will be collected at monitoring wells DP-4, MW04-105, and MW-204 during the fall round; no samples will be collected.
3. Landfill gas monitoring does not include surface water, pore-water, or stormwater locations.
4. Monitoring location to be established; see Table 3-2 for the installation schedule.
5. Characterization monitoring (four rounds) as summarized in Table 4-2 will be completed prior to waste placement of expansion cells Cell 16 and Cell 17.
6. Analyzed for MEDEP Rules Chapter 405 Appendix A Column 3 parameters.
7. Discharge from pump stations will be measured monthly for specific conductance and flow as noted in the Liner Action Plan (See Appendix B).

Appendix A contains details of historical monitoring program changes.

- = not sampled
N/A = Not Applicable

Surface water, stormwater, and pore-water monitoring locations are sampled during the spring, summer, and fall seasons for the monitoring parameters summarized in Section 4.0.

Surface water monitoring location SW-5 and pore-water monitoring location, PWS-5, will be established and monitoring will begin once Cell 17 has been constructed.

## 3.3 Leachate Monitoring

The leachate sampling occurs at the on-site leachate storage tank shown on Figure 3-1. The leachate is sampled during the spring, summer, and fall seasons. During the spring monitoring event, the leachate sample is analyzed for the MEDEP Rules Chapter 405 Appendix A Column 3 parameters as described in Section 4.0.

## 3.4 Underdrain Monitoring

The JRL underdrain system consists of sand, stone, and perforated collection piping installed beneath the liner systems of the leachate pond and Cells 1 through 10 and portions of Cells 12 through 14 of the landfill and the former leachate pond. The underdrain pipe sampling locations are shown on Figures 3-1 and 3-2. The underdrain location designations and descriptions are included in Table 3-2 and the sampling frequency is noted in Table 3-3. The samples are analyzed for the monitoring parameters summarized in Section 4.0.

## 3.5 Leak Detection Monitoring

The leak detection monitoring for expansion cells (Cells 11 through 17) consists of sampling ports on the discharge lines at each expansion cell leak detection pump station. The leak detection locations are sampled during the spring, summer, and fall seasons for the monitoring parameters summarized in Section 4.0. The results of the monthly monitoring of the leak detection system will be compared to Action Levels defined in the expansion's Liner Action Plan (LAP) provided in Appendix B. The LAP outlines the procedures to evaluate the data collected from the leak detection systems, and actions that will be implemented if the water quality data suggest the primary liner is not performing as designed. If action levels are exceeded, the monitoring parameters may be expanded as described in the LAP.

## 3.6 Landfill Gas Monitoring

Landfill gas monitoring for methane equivalent, hydrogen sulfide, and carbon dioxide at the JRL will be performed during the spring, summer, and fall seasons at the groundwater monitoring locations and the manhole locations shown on Figures 3-1 and 3-2. Landfill gas monitoring will follow the procedures described in Section 5.5.

Landfill gas monitoring for hydrogen sulfide is monitored continuously at four stations located beyond the facility's property boundary shown on Figure 3-1.

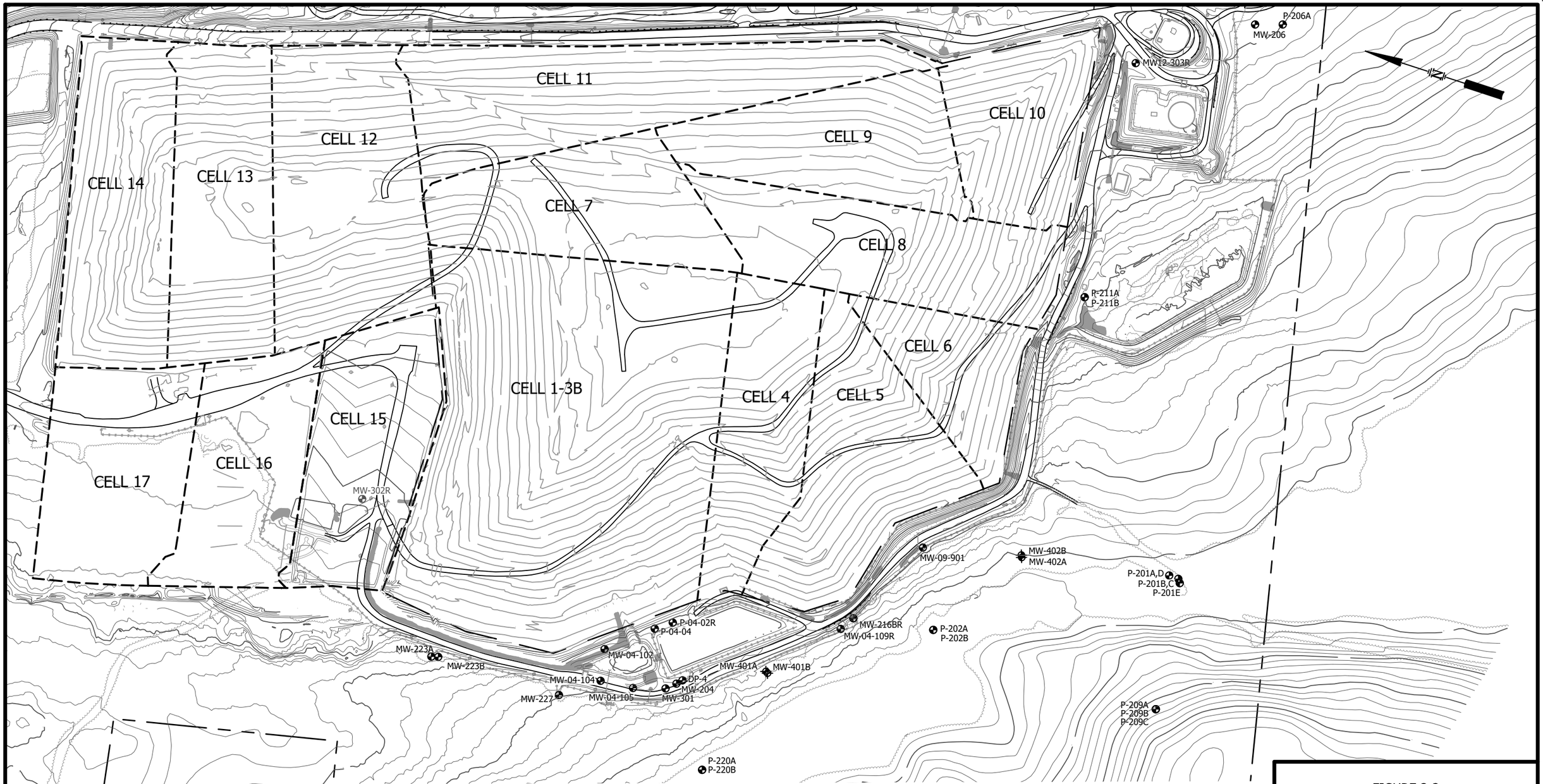
## 3.7 Annual Monitoring Well Specific Conductance Measurements

Specific conductance measurements are measured annually from an expanded list of monitoring wells surrounding the existing landfill operations at JRL during the October monitoring event based on the MEDEP's request in 2008. Locations measured annually for specific conductance are listed in Table 3-4 and shown on Figure 3-3.

**TABLE 3-4**

**2023 MONITORING WELL AND PIEZOMETER LOCATIONS USED FOR ANNUAL SPECIFIC CONDUCTANCE MEASUREMENTS**

| Location Designation | |
|---|---|
| DP-4 | P-04-02R |
| MW04-102 | P-04-04 |
| MW04-104 | P-201A |
| MW04-105 | P-201B |
| MW04-109R | P-201C |
| MW09-901 | P-201D |
| MW12-303R | P-201E |
| MW-204 | P-202A |
| MW-206 | P-202B |
| MW-216BR | P-206A |
| MW-223A | P-209A |
| MW-223B | P-209B |
| MW-227 | P-209C |
| MW-301 | P-211A |
| MW-401A | P-211B |
| MW-401B | P-220A |
| MW-402A | P-220B |
| MW-402B | |




NOTES

1. TOPOGRAPHY FROM AERIAL SURVEY PERFORMED BY AERIAL SURVEY & PHOTO INC., NORRIDGEWOCK, MAINE. PHOTO DATE 6/23/2023. VERTICAL DATUM: BRASS PLUG AT FORMER LEACHATE POND PUMP STATION. HORIZONTAL DATUM: MAINE STATE COORDINATES EAST ZONE NAD 83. GROUND CONTROL BY SEVEE & MAHER ENGINEERS, INC, CUMBERLAND, MAINE.
2. REMAINDER OF BASE MAP PREPARED BY AERIAL SURVEY & PHOTO INC., NORRIDGEWOCK, MAINE. PHOTO DATE 6/24/21. VERTICAL DATUM: BRASS PLUG AT PUMP STATION AND AT THE ADMINISTRATION BUILDING. HORIZONTAL DATUM: MAINE STATE COORDINATES EAST ZONE NAD 83. GROUND CONTROL BY SEVEE & MAHER ENGINEERS, INC, CUMBERLAND, MAINE.
3. PROPERTY LINE LOCATIONS ARE A RESULT OF FIELD SURVEY PERFORMED BY HERRICK AND SALSBURY, INC. LAND SURVEYORS, ELLSWORTH, MAINE FOR TRYTON TREE FARM PROJECT, PATTEN CORPORATION-DOWNEAST, OLD TOWN, MAINE, FEBRUARY 23, 1988, REVISED APRIL 7, 1988.
4. LOCATIONS OF EXPLORATIONS ARE APPROXIMATE.

LEGEND

MW-402B — GROUNDWATER SAMPLING LOCATION

MW-302R — DECOMMISSIONED GROUNDWATER SAMPLING LOCATION

150 0 300 FEET

FIGURE 3-3
MONITORING WELL LOCATIONS USED FOR ANNUAL CONDUCTIVITY MEASUREMENTS
JUNIPER RIDGE LANDFILL
OLD TOWN, MAINE

SME
SEVEE & MAHER ENGINEERS

DWG: GW LMN: FIG3-3 CONDUCTIVITY CTB: CONDUCTIVITY REV: 4/18/2023

\\Server\ds\Casella\OldTownLandfill\GeneralSiteInfo\Acad\GW.dwg, FIG 3-3 ANNUAL CONDUCTIVITY, 4/1/2024 7:39:45 AM, sjm

## 4.0 SELECTION OF MONITORING PARAMETERS

The environmental monitoring program of the JRL was initiated in March 1990 as part of the landfill site search study performed by Sevee & Maher Engineers, Inc. (SME) for Fort James Paper Company of Old Town, Maine. A selection of parameters of interest was made after a thorough review of the site characterization monitoring performed in the early 1990s and the chemical characterization of the JRL leachate. Subsequent changes have been made to the facility's monitoring program based upon MEDEP and SME recommendations. Water quality and leachate parameters, analytical method references, and practical quantitation limits s are presented in Table 4-1.

The analytical laboratory will utilize the practices and procedures described in Test Methods for Evaluating Solid Waste (OSWER, SW-846, Third Edition, as revised); Methods for Chemical Analysis of Water and Wastes (EMSL, U.S.EPA 600/4-79/020, revised March 1983); and Standard Methods for the Examination of Water and Wastewater (22nd Edition, 2012).

**TABLE 4-1**

**DETECTION MONITORING ANALYTICAL PROGRAM**

| Water Quality Parameter | Method | PQL[1] (mg/l)[2] |
|---|---|---|
| Total Dissolved Solids | SM 2540C | 10 |
| Total Suspended Solids | SM 2540D | 2.5 |
| Total Organic Carbon (TOC) | SW9060A | 2.0 |
| BOD5[3] | SM 5210B | 2 |
| Arsenic (As) | SW6010C/3010A | 0.005 |
| Calcium (Ca) | SW6010C/3010A | 0.3 |
| Iron (Fe) | SW6010C/3010A | 0.05 |
| Magnesium (Mg) | SW6010C/3010A | 0.3 |
| Manganese (Mn) | SW6010C/3010A | 0.05 |
| Potassium (K) | SW6010C/3010A | 0.3 |
| Sodium (Na) | SW6010C/3010A | 0.3 |
| Chloride ($Cl^-$) | SWE300/9056A | 1.0 |
| Copper (Cu)[9] | SW6010C/3010A | 0.003 |
| Sulfate ($SO_4$) | SWE300/9056A | 2.0 |
| Sulfide[4,9] | HACH 8131 | 0.1[1] |
| Volatile Organic Compounds (VOCs)[5,6] | U.S.EPA 8260C | 0.005-0.02 |
| Ammonia (NH3-N)[9] | SM 4500 NH3 B/ SM4500 NH3 C | 0.5 |
| Total Alkalinity[9] | SM 2320B | 1.5 |
| Nitrate + Nitrite | U.S.EPA 353.2 | 0.05 |
| Total Kjeldahl Nitrogen (TKN)[7] | SM 4500 NorC/NH3D-11 | 0.2[1] |
| Total Phosphorous[8] | U.S.EPA 365.3 | 0.04 |
| Boron[9] | SW6010C/3010A | 0.05 |
| Bromide | SW9056A | 0.1 |
| Methane[9,10] | U.S.EPA 8015B(MOD RSK-175) | 0.02 |
| **FIELD PARAMETERS** | | |
| Groundwater Elevation | Field Measurement | NA |
| Specific Conductance | Field Measurement | NA |
| Dissolved Oxygen | Field Measurement | NA |
| pH | Field Measurement | NA |
| Temperature | Field Measurement | NA |
| Turbidity | Field Measurement (APHA 2130) | NA |
| Eh | Field Measurement | NA |
| Monitoring Well Pumping Rate | Field Measurement | NA |
| Water Flow Rate[11] | Field Measurement | NA |
| Field Observations | Field Observations | NA |

Notes:

1 Practical Quantitation Limits (PQLs) have been defined by U.S.EPA as up to 10 times the method or instrument detection limit and therefore may vary between laboratories.

2 Abbreviations: mg/l = milligrams per liter; NA = Not Applicable.

3 Surface water locations only.

4 Sulfide is analyzed on the spring leachate sample.

5 VOCs are the 47 organic constituents listed in Appendix I of 40 CFR Part 258. PQLs for VOCs are the lab method detection limits which are reported as micrograms per liter (µg/l). Also, diethyl ether and tetrahydrofuran will be included in the reported compounds. After two rounds of Characterization monitoring these compounds will only be sampled in the landfill leachate on a routine basis.

6 During spring sample event, MW-401B, LF-UD-1, LF-UD-2, LF-UD-3A,B, LF-UD-4, LF-UD-5and6, LF-UD-6, LF-UD-7, LF-UD-8, LF-UD-9, LF-UD-10, LF-UD-12+13+14, LP-UD-1, and LP-UD-2 are analyzed for VOC compounds. Leachate is analyzed for VOC compounds during all three monitoring events.

7 Monitoring wells and leachate only.

8 Pore-water, surface waters, stormwater, and underdrain only.

9 Cells 11 through 17 monitoring wells. Cells 11 through 17 Leak Detection and Underdrain locations (summer only).

10 Pore-water, P-04-07A&B, MW-04-09A&B, P-04-11A&B, MW-206, P-206A, and MW-223B.

11 Surface water, leak detection, and underdrain samples only.

Method Reference: The analytical methods selected are presented in Test Methods for Evaluating Solid Waste, OSWER, SW-846, Third Edition, as revised; Methods for Chemical Analysis of Water and Wastes, EMSL, EPA-600/4-79-020, revised March 1983; and Standard Methods for the Examination of Water and Wastewater, APHA, 22nd Edition, 2012. Equivalent and appropriate analytical methods may be substituted with Juniper Ridge Landfill approval, e.g., manual for automated and vice versa.

## 5.0 SAMPLING PROCEDURES

This section describes the protocols involved in sampling groundwater, surface water, leachate, leak detection, underdrains, and pore-water at the JRL.

### 5.1 Groundwater Sampling

Appropriately prepared sample containers will be procured prior to each sampling episode. Participating laboratories will provide these bottles upon request to the sampling personnel.

Upon arrival at each sampling location, the sampling personnel will observe the physical condition of the monitoring wells. The inspection will include checking the condition of the ground surface seal and the well guard pipe to ascertain any evidence of frost-heaving, cracks, or vandalism. The condition of the monitoring well will be recorded on the field data records. Periodically, the area around the well may need to be cleared of weeds or other materials prior to beginning the sampling activity.

Following inspection of the sampling location, the water level in the well casing will be measured by lowering a clean electronic sounding probe into the well until contact is made with the water surface. The distance from the reference elevation to the water contact will be entered in the field records. Depth to water in the monitoring wells will be determined to the nearest 0.01 feet, referenced to the top of the polyvinyl chloride (PVC) well casing (i.e., permanently marked measurement reference point). In cases where water is flowing from the well casing, the water level will be noted as such. Upon removal of the water level probe, it will be decontaminated as described in Section 6.1.

#### 5.1.1 Low-flow Sampling Procedure

The low-flow sampling procedure, which uses flow rates of 100 to 200 milliliters per minute (mL/min), will be used to collect the water quality samples from monitoring wells at the site. The objective of the sampling is to minimize the drawdown and disturbance in the well in order to obtain a sample that is representative of the in-situ water chemistry. Low-flow groundwater sampling assessments have previously been completed for existing groundwater monitoring wells and, as groundwater monitoring wells are added to the monitoring program, a low-flow sampling assessment will be completed at each new location. The low-flow sampling procedure for each monitoring well was determined by implementing the assessment procedure summarized in Appendix C of this EMP. The facility's current sampling procedure is summarized in Table 5-1.

**TABLE 5-1**

**LOW-FLOW SAMPLING PROCEDURES**

| Monitoring Well | Sampling Equipment | Well Diameter (in.) | Recommended Flow Rate (ml/min) | Results of Low-Flow Rate Sampling Assessment | Recommended Sample Collection Procedure |
|---|---|---|---|---|---|
| MW-204 | peristaltic pump w/ dedicated tubing | 2 | 100 | Grab | 1TV, MFP |
| MW-206 | peristaltic pump w/ dedicated tubing | 2 | 100 | Grab | 1TV, CS, MFP |
| P-206A | peristaltic pump w/ dedicated tubing | ¾ | 100 | Grab | 1TV, CS, MFP |
| MW-223A | peristaltic pump w/ dedicated tubing | 2 | 200 | Std | 5MR, 3MR, CS |
| MW-223B | peristaltic pump w/ dedicated tubing | 2 | 100 | Grab | 1TV, CS, MFP |
| MW-227 | peristaltic pump w/ dedicated tubing | 2 | 100 | Grab | 1TV, CS, MFP |
| MW-301 | peristaltic pump w/ dedicated tubing | 2 | 100 | Grab | 1TV, CS, MFP |
| MW12-303R | peristaltic pump w/ dedicated tubing | 2 | 200 | Std | 5MR, 3MR, CS |
| MW-401A | peristaltic pump w/ dedicated tubing | 2 | 200 | Std | 5MR, 3MR, CS |
| MW-401B | peristaltic pump w/ dedicated tubing | 2 | 200 | Std | 5MR, 3MR, CS |
| MW-402A | peristaltic pump w/ dedicated tubing | 2 | 100 | Grab | 1TV, CS, MFP |
| MW-402B | peristaltic pump w/ dedicated tubing | 2 | 200 | Std | 5MR, 3MR, CS |
| DP-4[1] | peristaltic pump w/ dedicated tubing | 2 | 100 | Grab | 1TV, MFP |
| P-04-02R | peristaltic pump w/ dedicated tubing | 2 | 100 | Grab | 1TV, CS, MFP |
| P-04-04[2] | peristaltic pump w/ dedicated tubing | 2 | 100 | Grab | 1TV, CS, MFP |
| P-04-11A | peristaltic pump w/ dedicated tubing | ¾ | 100 | Std | 5MR, 3MR, CS |
| P-04-11B | peristaltic pump w/ dedicated tubing | ¾ | 100 | Std | 5MR, 3MR, CS |
| MW-04-09A | peristaltic pump w/ dedicated tubing | ¾ | 100 | Grab | 1TV, CS, MFP |
| MW-04-09B | peristaltic pump w/ dedicated tubing | ¾ | 100 | Std | 5MR, 3MR, CS |
| MW04-102 | peristaltic pump w/ dedicated tubing | 2 | 100 | Grab | 1TV, CS, MFP |
| MW04-105 | peristaltic pump w/ dedicated tubing | 2 | 100 | Grab | 1TV, MFP |
| MW04-109R[1] | peristaltic pump w/ dedicated tubing | 2 | 200 | Std | 5MR, 3MR, CS |
| OW-04-07A | peristaltic pump w/ dedicated tubing | ¾ | 200 | Std | 5MR, 3MR, CS |
| OW-04-07B | peristaltic pump w/ dedicated tubing | ¾ | 100 | Std | 5MR, 3MR, CS |
| MW-501 | peristaltic pump w/ dedicated tubing | 2 | 200 | Std | 5MR, 3MR, CS |
| MW-502 | peristaltic pump w/ dedicated tubing | 2 | 200 | Std | 5MR, 3MR, CS |
| MW-503 | peristaltic pump w/ dedicated tubing | 1 | 200 | Std | 5MR, 3MR, CS |
| MW-504 | peristaltic pump w/ dedicated tubing | 1 | 200 | Std | 5MR, 3MR, CS |
| MW-505 | peristaltic pump w/ dedicated tubing | 1 | 100 | Grab | 1TV, CS, MFP |
| MW-506 | bladder pump w/ dedicated tubing | ¾ | 100 | Grab | 1TV, CS, MFP |
| MW-507 | peristaltic pump w/ dedicated tubing | 6 (Open Borehole) | 200 | Std | 5MR, 3MR, CS |
| MW-508[1] | peristaltic pump w/ dedicated tubing | 2 | 100 | Std | 5MR, 3MR, CS |
| MW06-01 | peristaltic pump w/ dedicated tubing | 2 | 200 | Std | 5MR, 3MR, CS |
| MW09-901 | peristaltic pump w/ dedicated tubing | 2 | 100 | Grab | 1TV, CS, MFP |
| OW-601A | bladder pump w/ dedicated tubing | 1 | 100 | Std | 5MR, 3MR, CS |
| OW-601B | bladder pump w/ dedicated tubing | 1 | 100 | Std | 5MR, 3MR, CS |
| OW-602A[3] | bladder pump w/ dedicated tubing | 6 (Open Borehole) | 200 | Std | 5MR, 3MR, CS |
| OW-603B | peristaltic pump w/ dedicated tubing | 1 | 200 | Std | 5MR, 3MR, CS |
| OW-604A | peristaltic pump w/ dedicated tubing | 1 | 200 | Std | 5MR, 3MR, CS |
| OW-605A[3] | peristaltic pump w/ dedicated tubing | 6 (Open Borehole) | 100 | Std | 5MR, 3MR, CS |
| OW-606A | peristaltic pump w/ dedicated tubing | 6 (Open Borehole) | 200 | Std | 5MR, 3MR, CS |
| OW-606B[3] | peristaltic pump w/ dedicated tubing | 2 | 200 | Std | 5MR, 3MR, CS |
| OW-607B | peristaltic pump w/ dedicated tubing | 2 | 100 | Std | 5MR, 3MR, CS |
| OW-608A[3] | bladder pump w/ dedicated tubing | 6 (Open Borehole) | 200 | Std | 5MR, 3MR, CS |
| OW-608B | peristaltic pump w/ dedicated tubing | 6 (Open Borehole) | 100 | Std | 5MR, 3MR, CS |

**TABLE 5-1 (cont'd)**

**LOW-FLOW SAMPLING PROCEDURES**

| Monitoring Well | Sampling Equipment | Well Diameter (in.) | Recommended Flow Rate (ml/min) | Results of Low-Flow Rate Sampling Assessment | Recommended Sample Collection Procedure |
|---|---|---|---|---|---|
| OW-609B | peristaltic pump w/ dedicated tubing | 2 | 100 | Grab | 1TV, CS, MFP |
| OW-610A[1] | peristaltic pump w/ dedicated tubing | 2 | 100 | Std | 5MR, 3MR, CS |
| OW-611A[3] | peristaltic pump w/ dedicated tubing | 6 (Open Borehole) | 200 | Std | 5MR, 3MR, CS |
| OW-06-03 | peristaltic pump w/ dedicated tubing | 2 | 100 | Grab | 1TV, CS, MFP |
| MW-08-01 | peristaltic pump w/ dedicated tubing | 2 | 200 | Std | 5MR, 3MR, CS |

Note:
[1] Boring Log not provided in Appendix D.
[2] Screen length on P-04-04 is measured from top of PVC.
[3] Screen depths not labeled on log and based on visual observations.

Sample collection criteria designations:
5MR: 5-Minute interval field parameter readings to verify field parameter stabilization.
3MR: 3-Minute interval field parameter readings to verify field parameter stabilization.
1TV: Purge 1 tubing volume at low flow rate.
CS: Collect sample.
MFP: Measure field parameters.

Copies of well installation diagrams for the groundwater monitoring wells are provided in Appendix D for reference. As new monitoring wells are installed, the associated well installation diagrams will be incorporated into Appendix D.

Where possible, sampling equipment for each monitoring location will consist of a peristaltic pump with dedicated tubing in each monitoring well. Monitoring wells with static water levels greater than 25 feet below ground surface will be sampled using a dedicated bladder pump. Equipment used to measure field parameters must be calibrated on a daily basis.

Placement or replacement of dedicated sampling tubing in any well will be done a minimum of 24 hours before sampling. The bottom of the tubing or pump inlet will be positioned at the middle of the screened interval, or in the middle of the water column if the water table is in the well screen. Tubing, pumps, or measuring devices will not be placed into the water column within 24 hours of sampling or during sampling of the well.

During initial well installation and development, it will be determined if the drawdown will stabilize in a reasonable amount of time for sampling purposes for each well. Separate procedures are included below for wells that will stabilize and wells that will not stabilize.

Procedure for Wells Where Drawdown Stabilizes

1. Low flow rates will be used for purging, as specified in Table 5-1.

2. Water level measurements must be recorded at three- or five-minute intervals as described in Table 5-1 until drawdown stabilization has been achieved. The static water level and the pumping start time must be recorded as the first reading on the second page of the Monitoring Well Sample Purging Form (Appendix E). All subsequent field measurements will also be recorded on the Monitoring Well Sample Purging Form.

3. Until drawdown stabilizes, field parameters (i.e., pH, specific conductance, and turbidity) must be monitored and recorded at 5-minute intervals.

4. Once drawdown stabilization is achieved and three successive 5-minute interval field parameter measurements meet the conditions listed below, complete stabilization will be verified by three successive field parameter measurements at 3-minute intervals, which also meet the conditions listed below:

| | |
|---|---|
| pH: | ± 0.1 standard pH unit with respect to previous pH measurement |
| Specific conductance: | ± 5% of previous measurement |
| Turbidity: | ± 10% of previous measurement when turbidity is above 10 nephelometer turbidity units (NTU)<br>±1 NTU with respect to previous measurement when turbidity is below 10 NTU |
| Dissolved oxygen: | ±1 mg/L when dissolved oxygen is greater than 1 mg/L;<br>±0.1 mg/L when dissolved oxygen is less than 1 mg/L |

   Note: It is possible for the field parameters to stabilize prior to or at the same time as the drawdown.

5. Once complete stabilization has been achieved and a complete set of field readings has been measured (i.e., temperature, pH, specific conductance, turbidity, Eh, and dissolved oxygen), groundwater samples will be collected in appropriately preserved containers. The sampling personnel will complete and attach labels to each sample container for the location of interest. Table 5-2 presents the minimum information to be supplied on each container. Samples will be obtained directly from the pump discharge line. The sample labeling procedures described above will be used for all water quality samples collected at the JRL.

**TABLE 5-2**

**SAMPLE LABEL INFORMATION**

| |
|---|
| Site Name |
| Sample Location |
| Sampler Name/Company |
| Sample Collection Date |
| Sample Collection Time |
| Analyses to be Performed |
| Preservative Used |

6. Following completion of sampling, the monitoring well will be secured with protective devices and the field instrumentation will be decontaminated as described in Section 6.1.

Procedure for Wells Where Drawdown Does Not Stabilize

1. Purge one tubing volume at the flow rate specified in Table 5-1.
2. Collect samples in appropriately preserved and labeled containers as previously described.
3. Measure field parameters (i.e., temperature, pH, specific conductance, turbidity, Eh, and dissolved oxygen) as soon as possible after sample collection.
4. Following completion of sampling, secure the monitoring well with protective devices and decontaminate the field instrumentation as described in Section 6.1.

The chain-of-custody (COC) procedures will be initiated following sample collection.

## 5.2 Surface Water Sampling Procedure

Surface water will be collected in the following manner:

1. Collect the sample by immersing the sample bottle not more than 1 foot below the water surface. If a stream is being sampled, the sample will be upstream of the sampler with the opening of the sampling device oriented upstream but avoiding floating debris.
2. Directly fill the appropriate sample containers from the sampling device if needed.
3. If possible, measure the following parameters in the water body, not the sample:
    - Temperature;
    - pH;
    - Specific Conductance;
    - Dissolved Oxygen;

- Eh; and
- Turbidity.

If direct measurement is not possible, these parameters will be measured from water remaining in the sampling device or another sample bottle. This information will be recorded in the sample data record, sample labels will be completed, and the COC procedures will be initiated.

4. Observe the surface water flow rate (i.e., still, slow, etc.).
5. Complete the Surface Water/Leachate Sample Data Record (Appendix E).

## 5.3 Leachate, Leak Detection, and Underdrain Sampling Procedure

Leachate, leak detection, and underdrain samples will be obtained in the following manner:

- Sample Collection from Pumping Station Manholes and Underdrain Pipes: A peristaltic pump will be used to collect samples from manholes and underdrains. Dedicated polyethylene and silicone pump tubing will be used at each location. If the underdrain is directly accessible, a sample can be collected directly from the discharge end of the underdrain pipe.
- Sample Collection from a Pump Station: Leachate and leak detection samples will be obtained from the sampling ports installed at the pump station for each cell.

For all leachate and underdrain samples, measure the following parameters in a separate sample bottle:

- Temperature;
- pH;
- Specific Conductance;
- Dissolved Oxygen;
- Eh; and
- Turbidity.

The flow rate for the leachate and leak detection systems and underdrain pipes will be measured by timing the filling of a container of known volume, if possible.

This information will be recorded in the Surface Water/Leachate Sample Data Record (see Appendix E), sample labels will be completed, and the COC procedures will be initiated.

The discharge from the pump stations and flow from underdrain monitoring locations will be measured monthly for specific conductance and flow.

## 5.4 Procedure for Pore-Water Sampling

The pore-water samples will be collected in the following manner:

1. Decontaminate the pore-water sampler with an Alconox® and deionized water solution followed by several deionized water rinses.
2. Enter from an area downstream of the sample point and approach the sample point with caution so as not disrupt the area where pore-water sampler will be installed.
3. Gently push the pore-water sampler approximately two feet into the soil surface in the desired location. The inner rod should be present in the sampler at the time of installation in order to maintain the integrity of the pore-water sampler.
4. Remove the inner rod from the sampler and connect a new piece of polyethylene tubing to the top of the sampler with a small new piece of silicone tubing.
5. With a peristaltic pump, remove water from the sampler at a rate of 100 to 200 ml/min.
6. Monitor field parameters (temperature, conductivity, pH, turbidity, Eh, and dissolved oxygen) every three minutes until the stabilization criteria listed in Section 5.1.1 is met or the pore-water sampler runs out of water. If the pore-water sampler runs out of water, allow sufficient time for recharge and collect samples. If the stabilization criteria are met, collect samples. For a sample with turbidities over 20 NTU, the metals sample will be filtered through a 0.45-micron high-capacity filler.
7. Install a grade stake with the sample location identification clearly marked on the grade stake to allow for future sample collection from the same general location.
8. Initiate COC procedures as described in Section 7.0.

## 5.5 Standard Gas Monitoring Procedure

The landfill gas monitoring procedures described in this section are only related to the locations where water quality samples are collected. The procedures do not describe landfill gas monitoring done as part of the operations of the active gas collection system, or the facility's air permit monitoring program.

Landfill gas and ambient methane will be monitored three times per year at all monitoring well, underdrain, leak detection, and leachate collection locations. Additionally, four locations just beyond the property boundary will be monitored for hydrogen sulfide. Gas monitoring is conducted using a hand-held

meter such as a GEM 2000 Combustible Gas Indicator, or similar equipment. Figure 3-1 shows each monitoring location and the hydrogen sulfide monitoring locations The meter will be calibrated to a methane standard in accordance with the manufacturer's instructions. The monitoring procedure is as follows:

1. Note the weather conditions at the time of sampling.
2. Remove the protective cap from the monitoring well.
3. Insert the meter's inlet tube approximately two inches into the top of the monitoring well. Set the operation mode of the meter to measure percent gas (methane equivalent) by volume. Measure the percent methane equivalent by volume and record the measurement on the Gas Monitoring Form (see Appendix E) Measure and record the hydrogen sulfide in parts per million (ppm) and the oxygen content in percent.
4. If the meter indicates less than 5 percent methane equivalent by volume, set the operation mode of the meter so that it measures in percent Lower Explosive Limit (LEL). Measure the percentage of the LEL for methane, and record the measurement on the Gas Monitoring Form. Note the LEL for methane is 5 percent by volume or 50,000 parts per million.
5. Measurements recorded as the percentage of the LEL for methane will be converted to percent methane equivalent by volume using the following calculation:

   LEL Conversion: (%LEL/100) x 5 = % Volume.
6. Purge the instrument with fresh air in accordance with the manufacturer's instructions.
7. Proceed with the well purging and sampling procedures specified in Section 5.0.

## 5.6 Sample Volume, Preservation, and Holding Times

Obtaining required sample volumes and observation of procedures for sample preservation and allowable holding times are necessary to yield test results that will be representative of site conditions. Table 5-3 summarizes the volume, preservation, and holding time requirements for the samples to be collected.

**TABLE 5-3**

**SAMPLE HANDLING, PRESERVATION, AND HOLDING TIME**

| Parameter Group[1] | Container | Preservation | Holding Time (days) |
|---|---|---|---|
| As, Ca, Fe, Mg, Mn, K, Na, Cu, B | 250 ml (P) | 4°C, $HNO_3$ to pH <2 | 180 |
| TDS, TSS, $SO_4$, $Cl^-$, Bromide, Total Alkalinity, Bicarbonate Alkalinity | 1,000 ml (P) | 4°C | 7 |
| TOC | 40 ml (G) | 4°C, $H_2SO_4$ to pH <2 | 28 |
| $NO_2$-N + $NO_3$-N | 125 ml (P) | 4°C, $H_2SO_4$ to pH <2 | 28 |
| Ammonia, Total Phosphorous | 250 ml (P) | 4°C, $H_2SO_4$ to pH <2 | 28 |
| Total Kjeldahl Nitrogen | 125 ml (P) | 4°C, $H_2SO_4$ to pH <2 | 28 |
| BOD | 500 ml (P) | 4°C | 1 |
| Sulfide | 250 ml (P) | 4°C, NaOH, ZNAC to pH >12 | 7 |
| VOCs | 40 ml (G)x3 | 4°C, HCL, pH <2 | 14 |
| Methane | 20 ml (G)x2 | 4°C, $H_2SO_4$ to pH <2 | 14 |

Notes:

[1] Parameter combinations and sample volume requirements may vary between laboratories.

[2] Holding times are calculated from the time of sample collection. The most restrictive holding time is presented for each parameter group.

[3] G = Glass
P = Plastic

### 5.6.1 Sample Volume

A minimum sample volume must be obtained from each monitoring location to allow the laboratory to perform the required testing. Table 5-3 presents the minimum sample volumes and container composition required for the monitoring program.

### 5.6.2 Sample Preservation

Preservation of collected samples is accomplished by refrigerating samples at 4 degrees Celsius (°C) and, in some cases, by adding acids or bases. Aqueous samples scheduled for metals analyses need not be refrigerated.

Table 5-3 summarizes preservation requirements for each sample. In most cases bottles will arrive from the laboratory with the necessary preservative. When acidification is required, disposable pipettes will be used to introduce the preservative into the sample container. After adding the appropriate amount of preservative to the sample container, the container will be capped and gently inverted several times to mix the preservative and the sample. Samples will be spot-checked with a pH meter or pH paper to confirm that the preservation procedure is adequate. In no case will the pH meter be introduced into the sample bottle. A portion of the bottle contents will be poured into a separate clean container and the pH will be verified.

Physical preservation of the samples will be accomplished by storing the filled sample bottles in covered insulated coolers constructed of impact resistant plastic. Efforts will be made to pack the coolers so that sample bottles are not subject to movement or breakage (see Section 7.2).

### 5.6.3 Holding Times

Analytical testing of samples must be completed within specified holding times to yield representative results. Table 5-3 summarizes the maximum allowable holding time for each sample type. In preparing for each sampling episode, the sampling personnel will prepare schedules that will permit adequate laboratory notification and sample delivery to allow laboratory analysis within the allowable holding times.

## 5.7 Sampling Quality Control

Sampling quality control (QC) will include the proper decontamination of sampling equipment prior to use; regular calibration of field equipment to measure temperature, pH, dissolved oxygen, Eh, turbidity, and specific conductance; collection of duplicate samples for laboratory testing; and analysis of trip blanks when sampling for volatile organic compounds (VOCs).

### 5.7.1 Equipment Blanks

Dedicated tubing will be used at the monitoring well locations, thereby eliminating the need for equipment blanks.

### 5.7.2 Duplicate Samples

Duplicate samples will be collected at a rate of 10 percent during each sampling event. The duplicate sample identification will be such that the sampling location is unknown to the laboratory. The duplicate will be analyzed for the same parameters as its companion sample.

### 5.7.3 Trip Blanks

Trip blanks are required to detect additional sources of contamination that might potentially influence VOC concentrations reported in actual samples both quantitatively and qualitatively. A trip blank consists of a set of sample bottles filled at the laboratory with laboratory demonstrated analyte-free water. The following requirements will be observed:

- Trip blanks must be handled, transported, and analyzed in the same manner as the VOC samples acquired that day, except that the sample containers themselves are not opened in the field. Rather, they just travel with the sample collector.

- The temperature of the trip blanks must be maintained at 4°C while on-site and during shipment.

## 6.0 DECONTAMINATION OF EQUIPMENT

Decontamination of sampling equipment is required both before initiation of sampling and between each sample location to minimize the potential for cross-contamination of samples with the analytes of interest. When conducting decontamination activities, as well as when handling cleaned equipment prior to and during sampling, clean nitrile or PVC gloves will be worn to further reduce potential for contamination.

### 6.1 Field Instrumentation

Field instrumentation (i.e., pH, specific conductance, dissolved oxygen, Eh, turbidity, and temperature probes) will not be introduced into a sampling device or sample bottle under any circumstances. However, to minimize latent influences between sampling locations, the probes and flow-through cell will be rinsed with clean water and, when appropriate, wiped dry with clean paper towels. The electronic water level probe will be introduced into monitoring wells prior to the purging process. Upon extraction from each well, the probe and associated electronic leads will be washed with consecutive rinses of clean water.

### 6.2 Sampling Equipment

A peristaltic pump with dedicated tubing will be used at most well locations, thereby eliminating the need for sampling equipment decontamination. A dedicated bladder pump with dedicated tubing will be used in wells too deep to sample with a peristaltic pump.

## 7.0 SAMPLE CUSTODY

Sample COC procedures will be followed during sample collection and handling activities in both the field and laboratory operations. These procedures ensure that each sample is accounted for at all times. To maintain the highest degree of control in sample handling, preprinted labels will be used so that all necessary information is retained with the sample. COC records will be used to maintain control over sample access during and after shipment from the location of sample collection. Additionally, proper completion of field sample logs, accession books, tracking sheets, and extraction logs by appropriate field and laboratory personnel will provide for thorough monitoring of the samples from collection through analysis and final report generation.

The objective of sample identification, COC, and monitoring procedures is to ensure that:

- All samples collected for analysis are uniquely labeled for identification purposes throughout the analytical process;
- Samples are correctly analyzed, and results are traceable to field records;
- Important sample characteristics are preserved;
- Samples are protected from loss, damage, or tampering;
- Any alteration of samples (e.g., preservation or damage due to shipment or other processes) is documented; and
- A record of sample integrity and analytical fate is established.

Samples to be collected from the JRL will be identified in accordance with SME's standard procedure. A copy of the sample identification procedure is in Appendix F.

### 7.1 Sample Monitoring Forms

The use of forms accomplishes one or more of the specific objectives of sample custody, identification, or control. Standard SME forms will be utilized as discussed in the following subsections. These include the COC Record, Monitoring Well Sample Purging Form, Surface Water Sample Data Record, Leachate Sample Data Record, and the Instrument Calibration Form. A copy of each form is in Appendix E.

#### 7.1.1 Chain-of-Custody Record

The COC Record (see Appendix E) is completed in the field by the person physically in charge of sample collection. The COC Record must be completed prior to shipment of samples to the laboratory. The COC Record contains information on the date and time of sample collection, the sampler, the project name

and number, the laboratory project number, the number of containers of each sample being shipped, and an itemization of the analyses requested for each sample, together with any remarks about the sample prior to shipment. The COC Record is enclosed with the samples after it has been signed by the sampler. It is then signed each time possession of the samples changes, with the signatures of the people relinquishing and receiving the sample, as well as the time of exchange, indicated on the form.

### 7.1.2 Monitoring Well, Surface Water, and Leachate Monitoring Forms

The Monitoring Well Sample Purging Form, Surface Water Monitoring Form, and Leachate Monitoring Forms (see Appendix E) will be completed in the field by the person placed in charge of sample collection. These forms correlate the assigned sample bottle designation to a specific well or sample location or other distinguishing feature or attribute (e.g., duplicate sample). The forms also list pertinent sampling information that must be recorded at the time of sample collection (e.g., day and time of sampling, and pH, specific conductance, temperature, Eh, dissolved oxygen, and turbidity measurements).

### 7.1.3 Instrument Calibration Form

Field instrument calibration procedures will be recorded on the Instrument Calibration Form (see Appendix E) on a daily basis.

## 7.2 Packing and Shipping

In addition to sample collection and preservation requirements, especially the maintenance of sample temperatures at 4°C until extraction or analysis, samples will be packed and shipped so as to maintain the sample container integrity and the health and safety of sample transporters.

Sample containers are generally packed in picnic coolers for shipment. Bottles will be packed tightly so that no motion is possible. Styrofoam, vermiculite, and "bubble-pack" are suitable in most cases. (High-hazard samples require different packing.) Ice is placed in double Ziploc® bags and added to the cooler, along with all paperwork in a separate Ziploc® bag. The cooler top is then taped shut. Custody seals and taping of coolers may be required for certain samples.

The standard procedures for shipping environmental samples to the analytical laboratory are as follows:

1. All shipping of environmental samples must be done via Federal Express or an equivalent overnight delivery service.
2. If prompt shipping and laboratory receipt of the samples cannot be guaranteed (e.g., a Sunday arrival), the samplers will be responsible for proper storage of the samples until suitable transportation arrangements can be made.

The laboratory must be kept informed of all field sampling activities. This communication is critical to allow the laboratory enough time to prepare for arrival of the samples. The samples are shipped to the laboratory together with the COC documents.

## 8.0 QUALITY ASSURANCE/QUALITY CONTROL

Quality assurance/quality control (QA/QC) is an integral part of this sampling and analytical program to allow assessment of the adequacy of analytical results for their intended use. QA/QC activities associated with sampling include the use of standardized collection procedures and sample data records (as described previously), calibration of field instruments, and COC procedures. Analytical QA/QC involves the use of approved analytical protocols by qualified laboratories. Analytical data quality is assessed through review of method-specified QC data, to be delivered along with the analytical results.

### 8.1 Data Validation

The following data validation methods will be used to verify the accuracy and precision of the reported results:

- Chain-of-Custody for each sample is continuous and included with report;
- Verification that all sample holding times were met;
- TDS/specific conductance calculated. Samples outside range (0.55 – 0.75) identified;
- Calculation and tabulation of relative percent differences. Values greater than (>) 10 percent reported;
- Identification of values falling outside of historical range(once 5 sampling rounds have been collected);
- Identification of parameters present in equipment blanks:
    - Not applicable: dedicated equipment used for all samples;
- Identification of parameters present in trip blanks; and
- Identification of wells whose depths have changed since construction.

### 8.2 Statistical Analyses

Where data are sufficient, statistical analysis of the sample data from each monitoring well will be completed and reported annually. The statistical analysis will consist of water quality data plots that can be used to identify trends in the data. Parameters will be plotted which are indicative of the leachate quality or the geochemical effects of the leachate in the natural soils or bedrock.

## 9.0 REPORTING REQUIREMENTS

Monitoring data will be submitted to MEDEP within 30 days of the landfill's receipt of the evaluation of laboratory results along with the data validation calculations. This data transmittal will also include a tabulation (in electronic format) of the monthly measurements of the landfill's underdrain and leak detection systems. This will be submitted with the spring, summer, and fall sampling results.

Annually, a report summarizing the results of the environmental monitoring program; historical data summaries including analytical and field data; statistical analysis; a comparison to the Remedial Actional Guidelines (RAG) for groundwater samples or the Maine Freshwater Criterion Continuous Concentration (MFCCC) for surface water samples; an evaluation of historical changes in water levels around the site; and recommendations for any proposed changes (e.g., locations, parameters, frequency, etc.) will be submitted to MEDEP. The annual report will also include responses to any MEDEP comments on the previous year's Annual Report.

## 10.0 WELL ABANDONMENT PROCEDURE

Some monitoring wells and piezometers designated for sampling by this EMP will be abandoned as construction progresses with the development of the expansion cells. They will be sealed in a manner appropriate to geologic conditions at each location and in accordance with MEDEP procedures, as follows:

1. Remove all material installed in the original borehole, including casing, screen, and annular materials, to the greatest extent possible;
2. Seal the borehole by pressure injection from bottom to top with cement bentonite or other appropriate material to within 5 feet of the ground surface. The upper 5 feet may be backfilled with native material and the entire site must be restored to a safe condition; and
3. Document the abandonment through a written description of the procedures, drilling methods and depths, borehole depth, and volume and type of sealant.

# APPENDIX A

# ENVIRONMENTAL MONITORING PLAN REVISION TABLE

SME
SEVEE & MAHER
ENGINEERS

**JUNIPER RIDGE LANDFILL FACILITY**
**ENVIRONMENTAL MONITORING PLAN REVISION TABLE**
**(UPDATED APRIL 2024)**

| Date | EMP Revision | Location of Change in EMP | Page Location |
|---|---|---|---|
| | | | |
| April 2024 | Combined EMP for Cells 1 thru 10 and the EMP for expansion Cells 11 thru 17 into a single document. Abandoned MW-302R as part of cell development and construction. | Changes made throughout the entire document | |
| January 2023 | Added pore-water location PWS-4 and surface water location SW-4 to the monitoring program. | Table 3-2 | 3-5 |
| October 2022 | Added Cell 15-17 wells to the monitoring program (MW-508, P-04-07A, P-04-07B, and OW-610A) | Tables 3-1 and 3-3 | 3-4 and 3-7 |
| October 2020 | Added Cell 12 wells to the monitoring program (MW-04-09A, MW-04-09B, MW-502). Former scale house and office building water supply wells abandoned during Cell 12 construction. | Tables 3-1 and 3-3 | 3-4 and 3-7 |
| October 2018 | Added Cell 11 wells to the monitoring program (MW-501, OW-601A, OW-601B, OW-603B, OW-604A, OW-06-03). MW-304A and MW11-207R abandoned during Cell 11 construction. | Tables 3-1 and 3-3 | 3-4 and 3-7 |
| July 2016 | MW-304A decommission. | Tables 3-1 and 3-3 | 3-4 and 3-7 |
| April 2016 | Landfill underdrain location -UD-9 added to monitoring program. | Tables 3-2 and 3-3 | 3-5 and 3-7 |
| April 2016 | Casella office well and scale house well added to monitoring program to be sampled in spring only. | Tables 3-1 and 3-3 | 3-4 and 3-7 |
| April 2016 | Removed dissolved methane from PWS-1, PWS-3, PWS-3, and MW-223B. | Table 4-1 | 4-2 |
| July 2015 | Monitoring well P-04-02R installed (to replace P-04-02) and monitored. | Tables 3-1 and 3-3 | 3-4 and 3-7 |
| April 2015 | Removed tannin-lignins from monitoring program. | Table 4-1 | 4-2 |
| April 2015 | Removed nickel, cadmium, nitrate, bicarbonate, field alkalinity, and COD from monitoring program. | Table 4-1 | 4-2 |
| April 2015 | Added $NO_2$+$NO_3$, bicarbonate, and alkalinity to the monitoring program. | Table 4-1 | 4-2 |
| April 2015 | Added dissolved methane to PWS10-1, PWS10-2, and PWS10-3 to the monitoring program. | Table 4-1 | 4-2 |
| October 2013 | Monitoring well MW-216BR removed from program. | Tables 3-1 and 3-3 | 3-4 and 3-7 |
| October 2013 | Leak detection monitoring location LP-LD-1 removed from program. | Tables 3-1 and 3-3 | 3-4 and 3-7 |
| July 2013 | Monitoring wells MW-212 and P-04-02 removed from monitoring program. | Tables 3-1 and 3-3 | 3-4 and 3-7 |
| July 2013 | Monitoring location P-206A added to program. | Tables 3-1 and 3-3 | 3-4 and 3-7 |
| July 2013 | Frequency of MW-204, DP-4, and MW04-105 changed from tri-annual monitoring to field parameter only during the fall event. | Tables 3-1 and 3-3 | 3-4 and 3-7 |
| July 2013 | Surface water location SWDP-2 was removed from monitoring program. | Tables 3-2 and 3-3 | 3-5 and 3-7 |
| April 2013 | Location SWDP-5 was added to monitoring program. | Tables 3-2 and 3-3 | 3-5 and 3-7 |
| January 2012 | Landfill underdrain locations LF-UD-3A and B added to monitoring program. | Tables 3-2 and 3-3 | 3-5 and 3-7 |
| January 2012 | Landfill underdrain locations LF-UD-5 and 6 added to monitoring program. | Tables 3-2 and 3-3 | 3-5 and 3-7 |
| November 2011 | Landfill underdrain location LF-UD-7 added to monitoring program. | Tables 3-2 and 3-3 | 3-5 and 3-7 |
| February 2011 | Landfill underdrain location LF-UD-6 added to monitoring program. | Tables 3-2 and 3-3 | 3-5 and 3-7 |

# APPENDIX B

# LINER ACTION PLAN (JULY 2015)

SME
SEVEE & MAHER
ENGINEERS

# JUNIPER RIDGE LANDFILL EXPANSION APPLICATION
# LINER ACTION PLAN

**Submitted by:**

**STATE OF MAINE BUREAU OF GENERAL SERVICES,**
**as Owner**
**and**
**NEWSME LANDFILL OPERATIONS, LLC,**
**as Operator**

**July 2015**

SME
Sevee & Maher Engineers, Inc.

ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

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**JUNIPER RIDGE LANDFILL EXPANSION**
**LINER ACTION PLAN**

## 1.0 INTRODUCTION

This document describes the Liner Action Plan (Plan) for Cells 11 through 16 of the proposed landfill expansion (Expansion) at the Juniper Ridge Landfill (JRL) in Old Town, Maine. The Plan describes the method to be used by NEWSME Landfill Operations, LLC (NEWSME) to monitor the performance of the Expansion's primary liner, and if appropriate, trigger response activities in the event monitoring suggests additional actions are warranted. The monitoring and evaluation techniques described in this Plan have been successfully employed at other landfill facilities in the State of Maine to monitor the performance of primary liner systems.

The expansion cells (i.e., Cells 11 through 16) have a primary and secondary liner system with a dedicated leak detection system (LDS) between them. The primary liner is a composite liner consisting of an 80-mil HDPE geomembrane, a geosynthetic clay liner (GCL) and one foot of compacted clay. The secondary liner is a 60-mil HDPE geomembrane.[1] Under the entire landfill base a one foot compacted clay layer exists. The leak detection system for the cells is located between the primary and secondary liners and consists of a geocomposite, one foot of sand, and piping which drains to an internal sump located within the cells. The sumps are equipped with a dedicated pumping system in each cell which allows both the flow and water quality of LDS fluids to be monitored by means of data collected from the totalizing flow meter and dedicated sample ports on each cell's LDS pump discharge.

The Plan describes a procedure to monitor the performance of the primary liner system using water quantity and quality data from the cell's LDS to a calculated Action Leakage Rates (ALRs). ALRs are calculated flow rates collected by the leak detection layer that trigger further

[1] In some areas of the landfill the secondary geomembrane is augmented with a GCL and one foot of clay.

investigations or actions that will be undertaken to evaluate primary liner's performance. For the Expansion two ALRs have been identified and are discussed in Section 3.0

The procedure for monitoring the primary liner performance uses a comparison of the specific conductance measurements in the LDS with the specific conductance identified as LDS Action Levels (LDSALs). The LDSALs are calculated using the ALR flow rates, the background flow rates in the leak detection system, and the specific conductance measurements of the LDS discharge prior to active use of the cell, and the specific conductance of the landfill leachate. This approach allows for a more representative evaluation of primary liner performance than a straight comparison of flow from the LDS system to the ALR's since flow in the LDS system can be from a number of sources which are not leachate related. These can include fluid present in the system as a result of construction or non-leachate leakage into the system from the perimeter of the cells. By incorporating specific conductance measurements into the evaluation of the primary liner performance the source of water collected in the LDS system can be better quantified. As the landfill cells are operated, actual flow and specific conductance measurements, obtained from the LDSs will be incorporated into the monitoring program. The procedures for both calculating the LDSALs and incorporating data into the monitoring program are discussed in Section 3.0.

NEWSME will be responsible for collecting the monitoring data (i.e., flows and conductivity measurements), compiling and evaluating the data, and reporting the data to the Maine Department of Environmental Protection (MEDEP). In the event the data suggests a leak has occurred, they may also involve a professional technical consultant to evaluate the data and assist in determining whether a leak has occurred and appropriate response actions. NEWSME will collect flow data and water quality samples from the leachate and individual cell's leak detection systems on a monthly basis for use in implementing this Plan.

The remainder of this Plan discusses the approach and methodology for monitoring the performance of the landfill cells' primary liner. Section 2.0 provides an overview of the Expansion containment systems design, and possible sources of fluids that would be collected by the leak detection layer. Section 3.0 discusses the two specific ALRs selected for the Expansion, and the corresponding Response Activities (RAs). This section also describes the

methodology for converting ALRs to LDSALs. Section 4.0 describes the location and frequency of monitoring associated with the Plan, as well as the methodology for collecting samples from the Expansion cells' leachate sumps.

## 2.0 OVERVIEW OF CONTAINMENT SYSTEM DESIGN AND PROJECTED FLOW RATES

### 2.1 Containment System Design

The cells' containment system is designed to contain and collect leachate generated in the cells and monitor the performance of the primary liner system with a dedicated leak detection system. The containment system design includes the following components:

Leachate collection layer:

- a 12-inch layer of drainage sand ($K \geq 1x10^{-2}$ cm/sec),
- a network of 6 and 8-inch diameter perforated HDPE pipe,
- a geocomposite drainage net and piping system, and
- an internal leachate sump and pump system.

Primary liner system:

- a 80-mil high-density polyethylene (HDPE) textured geomembrane,
- a geosynthetic clay liner (GCL), and
- a 12-inch clay layer (hydraulic conductivity (K) less than or equal to $1x10^{-7}$ cm/sec).

Leak detection system:

- a 12-inch layer of drainage sand ($K \geq 1x10^{-2}$ cm/sec),
- a network of 6-inch diameter perforated HDPE pipe with sampling,
- a geocomposite drainage net and piping system, and
- an internal leak detection sump and pump system within each cell.

Secondary liner system:

- a 60-mil HDPE textured geomembrane.

The entire double liner system is underlain by and a 12 inch clay layer, having a hydraulic conductivity (K) less than or equal to $1x10^{-7}$ cm/sec.

## 2.2 Leak Detection Flow Rates

Fluid within the leak detection layer will flow to the individual LDS pump stations. There are several potential sources of fluid that could be present in the leak detection layer. These include construction water and liquids that enter the LDS before waste filling begins; liquids that enter the LDS system from areas not in contact with wastes, such as along the perimeter of the landfill cells in the vicinity of the anchor trench, and any fluid which may flow through the liner system due to defects in the primary liner system. The amount of these fluids can vary depending on the site conditions.

## 3.0 ACTION LEAKAGE RATES \ACTION LEVELS\ AND RESPONSE ACTIONS

### 3.1 Background

40 CFR § 265.302 defines Action Leakage Rate as the "maximum design flow rate that the leak detection system can remove without the fluid head on the bottom liner exceeding one foot." The action leakage rate must include an adequate safety margin to allow for uncertainties in the design (e.g., slope, hydraulic conductivity, thickness of drainage material), construction operation, and location of LDS, waste and leachate characteristics, likelihood and amounts of other sources of liquids in the LDS and proposed response actions (e.g. the action leakage rate must consider decreases in flow capacity of the system over time resulting from siltation, and clogging, rib layover and creep of synthetic components of the system overburden pressure, etc.) U.S.EPA initially proposed a range for ALRs of between 5 and 20 gallon per acre per day (gpad) for waste management units with a composite liner system (Federal Register, 1987). In a supplemental document supporting final rulemaking, U.S.EPA acknowledged that these values may not be achievable in waste facilities meeting the minimum U.S.EPA design standards for double lined facilities (U.S.EPA, 1992). U.S.EPA recommended an ALR of 100 gpad for landfill facilities. This recommendation was based on measurements of actual flow rates in leakage detection systems of operating facilities, which meet the U.S.EPA minimum design requirements, and a theoretical analysis using a sophisticated three-dimensional seepage model. In recommending the 100 gpad, U.S.EPA states "leakage rates above this value often indicate that major localized or general failure of the top liner system. Flow rates of 1,000 gpad or greater represent significant flow rates and potentially significant hole sizes that may be readily identified and repaired."

The information contained in the supplemental U.S.EPA document (U.S.EPA, 1992) suggests that facilities constructed with proper QA/QC, as proposed for the Expansion cells, typically have flow rates in their LDS of less than 100 gpad; whereas, only 70 percent of the well-designed facilities with good QA/QC can meet the original proposed upper bounds of 20 gpad, included in U.S.EPA's original proposal. The Expansion cells will be constructed with an extensive amount of QA/QC testing and oversight as is currently done for the existing landfill

cells. Therefore, site-specific ALRs were being proposed to the Expansion as described in Section 3.2

## 3.2 Landfill Cells Action Leakage Rates

For Cells 11 through 16, two ALRs will be used to monitor and evaluate the primary liner's performance. These ALR's have been established based on the EPA guidance and the site specific design assumptions, characteristics, and QA/QC Plans. Each ALR has an appropriate Response Activity (RA) associated with it. The purpose of defining two ALRs is to provide an initial response level set at a low level that triggers an initial review and increased monitoring of the data collected from the LDS, and a second level that warrants a more immediate investigation of potential sources of primary liner leaks. The exceedance of the first ALR would trigger a more frequent sampling regime. Then a more detailed analysis of LDS water quality to determine the cause for the ALR exceedance. The first ALR (ALR-I) will require obtaining additional measurements during the work week to confirm the initial results; notification of the MEDEP after obtaining four weekly sets of readings; continue monitoring the LDS during the work week for four consecutive months to confirm the ALR-I is consistently being exceeded. If four consecutive monthly readings indicate a leak, then monitor the individual LDS sumps for detection monitoring water quality parameters. The second ALR (ALR-II) will indicate a potential compromise of the primary liner system requiring a more immediate action, including additional investigations and the notification of MEDEP.

The Action Leakage Rates established for the cells consist of two liner leakage rates that were utilized to evaluate the potential impact of landfill leakage on the surrounding environment.[1]

- The first ALR (ALR-I) is set at 4.6 gallons gpad. This value was used to evaluate the effect on site groundwater if three 1 $cm^2$ holes develop in the secondary liner

[1] In a total liner failure, the amount of leachate that would enter the environment will be controlled by the hydraulic conductivity of the soil present under the liner including the imported clay layer. Volume III of the MEDEP Application contained a contaminant transport analysis (Section 4.0) as required by the MEDEP Solid Waste Management Rules (Section 401.2.D.).

system. This ALR is below the 20 gpad that has historically been used in the State of Maine.

- The second ALR (ALR-II) is set 92 gpad. This value was used in the contaminant transport analysis to evaluate potential effect of on-site groundwater assuming no liner is present.[2]

The total leachate leakage rates for the individual cells based on these ALRs are summarized in Table 1.

**TABLE 1**

**ACTION LEAKAGE RATES – EXPANSION CELLS**

| Cell ID | Cell Area (Acres) | LDS-ALR-I (gallons per day) | LDS-ALR-II (gallons per day) |
|---|---|---|---|
| 11 | 9.5 | 44 | 874 |
| 12 | 12.6 | 58 | 1159 |
| 13 | 11.8 | 54 | 1085 |
| 14 | 6.7 | 31 | 616 |
| 15 | 6 | 28 | 552 |
| 16 | 7.1 | 33 | 653 |

## 3.3 Leak Detection System Action Levels

To determine if an ALR has been exceeded in a landfill cell, the monthly measured specific conductance value of the LDS discharge will be compared to a calculated Leak Detection System Action Level (LDSAL). The LDSAL will be calculated using ALR values in Table 1; the base LDS flow rate and the baseline LDS specific conductance measurement collected before active cell operations, and the specific conductance measurements of the leachate. The LDSAL will be calculated for each cell using the equation: LDSAL = *{[(base flow rates) * (the baseline specific conductance)] + [action leakage rates) * (leachate specific conductance)] /((base flow rate to the underdrain) + action leachate rates))*.

Tables 2 shows the general specific conductance values associated LDSAL-I and LDSAL-2 for Cell 11 with for the solution to this equation for each of the ALRs, and assumed values for both

[2] The contaminant transport analysis demonstrated that a leak of this level would not result in contamination at sensitive receptors.

baseline flow in the LDS and Specific conductance of the leachate. As the facility is operated, operational data will be incorporated into the calculation of the LDSALs for each of the individual cells. The collection of this data, and its incorporation into determining the LDSAL, is discussed in Section 4.1.

**TABLE 2**

**LEAK DETECTION SYSTEM ACTION LEVELS**

| Cell | Cell Size acres | Total Leachate Seepage Flows (gpd) | | Baseline Values | | | Leak Detection System Action Levels | |
|---|---|---|---|---|---|---|---|---|
| | | ALR I 4.6 gpad | ALR II 92 gpad | Flow gpd | LDS Cond. µmhos/cm | Leach. Cond. µmhos/cm | LDSAL I µmhos/cm | LDSAL II µmhos/cm |
| 11 | 9.5 | 44 | 874 | 2,025 | 400 | 20,000 | 817 | 6,309 |

## 3.4 Response Actions

NEWSME will notify the MEDEP within 15 working days of obtaining four consecutive monthly readings from the leak detection discharge, suggesting exceedance of ALR-I (as determined by comparing the specific conductance measurement to the corresponding LDSAL). After notifying the MEDEP, NEWSME will monitoring the leak detection discharges at weekly intervals for four consecutive months, and notify the MEDEP of the results. If the results from the four months of weekly monitoring program suggests that liner seepage in excess of the ALR-I rate has occurred, a sample of the water from the offending LDS will be analyzed for the detection monitoring parameters contained in the facility's Environmental Monitoring Plan, at the end of the four months to assist in evaluating the source of the fluid in the LDS system. The MEDEP will be kept informed either verbally or written of the results of the sampling. NEWSME will prepare a report summarizing the results of the sampling and submit it to the MEDEP for its review within 60 days of receiving the detection monitoring test results. The report will contain recommendations for addressing the ALR-1 exceedance.

If the results of LDS monitoring exceed the LDSAL value associated ALR-II rate, NEWSME will notify MEDEP within 10 working days, and after consultation with MEDEP will submit a plan to the MEDEP which identifies the approach it will implement to evaluate the cause of the exceedance of ALR-II and identify appropriate corrective actions. Upon receipt of approval of

this plan, NEWSME will undertake the plan and provide MEDEP with monthly progress reports. NEWSME will continue to collect measurements of flow and specific conductance from the LDS on a weekly basis until NEWSME and MEDEP agree to a modified plan.

# 4.0 MONITORING PROCEDURES

## 4.1 Monitoring Frequency

To implement the Plan, water quality and quantity samples will be collected from the LDS for each landfill cell. The total flows will be obtained from the totalizing flow meters installed on the discharge lines for the LDSs. The water quality samples will be collected from the sampling port on the LDS pump station discharge from each cell.

During the initial baseline period of operations, after a cell has been constructed and waste placed in the cell, LDS water quality and quantity samples will be collected at a frequency defined in Table 3. The baseline period is anticipated to last up to a year after the construction of a cell is completed and waste is placed in the cell.[4] Data collected during this baseline period will be used to calculate the LDSALs used to monitor the performance of the primary liner, and provide baseline conductivity measurements at each sampling port. After this baseline period, the frequency of data collection will be modified during the operating and closure life of the facility. The frequency of sample collections during the operational and closure period is summarized in Table 3. At the end of each calendar year, the data from that preceding year will be incorporated into the calculation of the UALs values used to monitor the primary liner performance. This will be done by calculating the monthly-means of the leachate specific conductance measurement, and recalculating the LDSAL values using this data for each cell. NEWSME will make appropriate recommendations for changes to the methodology for calculating the LDSALs based on the data collected as part of the annual report prepared for the Landfill. NEWSME will make no changes to the methodology until it receives MEDEP's approval.

[4] The baseline period will be extended after initial waste in placed in the landfill cell provided the data collected suggests that the liner system is functioning as designed.

**TABLE 3**

**LINER ACTION PLAN SAMPLING FREQUENCY**

| Item | Baseline Period[2] | After Baseline Period Provided LDSAL-I is not Exceeded | After Baseline Period If LDSAL-I is Exceeded for Four Consecutive Months | After Baseline Period If LDSAL-II is Exceeded |
|---|---|---|---|---|
| LDS Flow Rate(gpd) | Bi-Weekly | Monthly | Weekly | Daily |
| LDS Specific Conductance (μmhos/cm) | Bi-Weekly | Monthly | Weekly | Weekly |
| Leachate Specific Conductance(μmhos/cm) | Bi-weekly | Monthly | Weekly | Weekly |
| Leak Detection Water Quality Characterization | 1 | 1 | 2 | As Required[3] |

Notes:
1. Leak detection water quality will be characterized as outlines in the Facility's EMP.
2. The sample period during the baseline period may be decreased as the data collected is consistent. The data will be collected no less than monthly during the baseline period.
3. A sample will be obtained after four consecutive months of LDSAL-1 exceedance.

## 4.2 Reporting Procedures

During the baseline period of operation for each cell, NEWSME will submit a report to the MEDEP with the results of the sampling program three times per year. The report will include cumulative flow data from the LDS with specific conductance measurements. After the baseline period for each cell, NEWSME will submit a yearly report presenting all of the data collected during the preceding year, and any recommended changes to the monitoring program, such as adjustments of the LDSAL values for each cell.

# APPENDIX C

# LOW-FLOW GROUNDWATER SAMPLING ASSESSMENT AND SAMPLING PROCEDURE

SME
SEVEE & MAHER
ENGINEERS

# LOW-FLOW GROUNDWATER SAMPLING ASSESSMENT AND SAMPLING PROCEDURE

## OBJECTIVES

To perform both a low-flow sampling assessment and to sample each individual well at the same time the assessment is being performed.

## SAMPLING PROCEDURES

The following sampling procedures should be followed for this Low Flow Assessment/ Sampling Event:

1. Obtain static water level.
2. Begin pumping the well at a flow rate of 200 ml/min. In the event the well drawdown is equal or greater than 1 foot during a five minute period, the flow rate will be reduced to 100 ml/min.
3. During the first ten minutes of pumping, the water level measurements should be taken at two minute intervals. A set of field parameters should be taken at the five and ten minute marks.
4. Both field parameters and water level measurements will then be measured at five minute intervals. These five minute readings will continue until one of the four conditions described below are met. Once one of the following four conditions are met, a complete set of field measurements will be obtained (i.e., temperature, pH, specific conductance, dissolved oxygen, and turbidity) prior to filling the sample bottles. All samples will be obtained through the peristaltic pump. None of the samples will be filtered. Once sampling is complete, obtain a bottom depth from the well (annual requirement) and lock the well.

Condition 1

Both field parameters and water levels stabilize within 30 minutes. The stabilization criteria is listed below.

Complete stabilization will be verified by three successive field parameter and water level measurements at 3-minute intervals, which meet the following criteria::

| | |
|---|---|
| pH: | ± 0.1 standard pH unit with respect to previous pH measurement |
| Specific conductance: | ± 5% of previous measurement |
| Turbidity: | ± 10% of previous measurement when turbidity is above 10 nephelometer turbidity units (NTU) |
| | ± 1 NTU with respect to previous measurement when turbidity is below 10 NTU |

Condition 2

A drawdown of three feet from the static water level has occurred.

Condition 3

A time period of 30 minutes has elapsed and the field parameter stabilization listed in Condition 1 has been met.

Condition 4

A time period of one hour has elapsed without field parameter or water level stabilization.

5. A note should be made that in rare cases, the water level in the well being sampled may drawdown and approach the tubing inlet. If the field sampler feels that he may not be able to obtain the appropriate sample volume from the well due to this condition, the sampler should use his best judgement and collect the water sample prior to meeting any of the four conditions listed above.

6. Sampling procedure should be documented and duplicated for all successive sampling rounds.

# APPENDIX D

# MONITORING WELL INSTALLATION DIAGRAMS

SME
SEVEE & MAHER
ENGINEERS

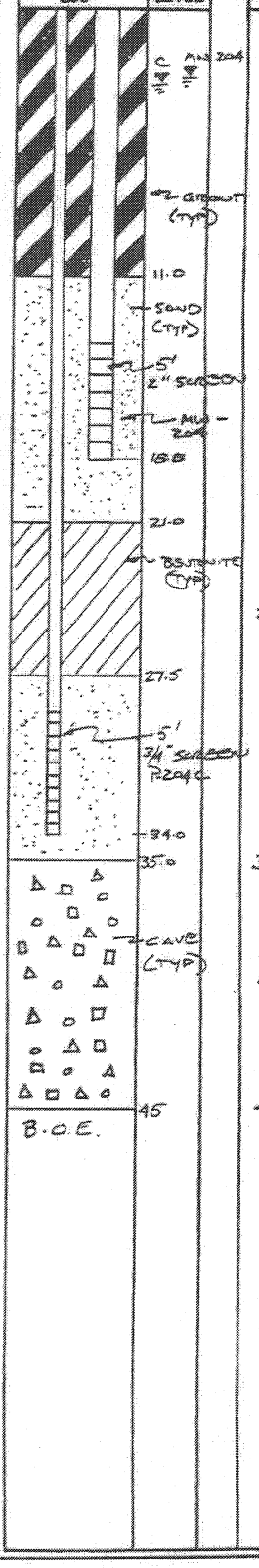
MW-204

GROUND SURFACE ELEVATION (FT) 158.5 | DRILLER MAINE TEST BORINGS | LOGGED BY M W M

BOREHOLE DIAMETER (IN) 3.5 O.D. | ROCK CORE DIAMETER (IN) ——— | SHEET 1 OF 1

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | N | MC (%) | % PASS #200 | ATTER-BERG LIMITS | PERME-ABILITY (FT/DAY) |
|---|---|---|---|---|---|---|---|
| | 1D | TOPSOIL | 8 | | | | |
| | 2D | | 36 | | | | |
| 5 | 3D | BROWN SANDY GRAVELLY SILT TO SILTY SAND W/ TRACE OF COBBLES (BASAL TILL) | 24 | | | | |
| | 4D | | 72 | | | | |
| | 5D | | 43 | 14 | | | |
| 10 | 6D | | 62 | | | | |
| | 7D | | — | | | | |
| | 8D | | — | 6 | 43 | | |
| 15 | 9D | 15.0 | 116 | | | | $K_F$ = 0.029 |
| | 10D | | 80 | | | | |
| 20 | 11D | | 74 | 10 | | | |
| | 12D | GRAY SANDY GRAVELLY SILT-CLAY TRACE OF COBBLES (BASAL TILL) | 45 | | | | |
| 25 | 13D | | 64 | 11 | | | |
| | 14D | | 55 | | | | |
| 30 | 15D | | 46 | 10 | | | $K_P$ = 0.025 |
| | 16D | | 117 | | | | |
| 35 | 17D | | 76 | 9 | 59 | | |
| | 18D | | — | | | | |
| 40 | 19D | | — | | | | |
| | 20D | | — | | | | |
| | 21D | | 164 | 9 | | | |
| 45 | | 45.0 B.O.E.* | | | | | |

INSTRUMENT LOG / WATER LEVEL




NOTES * BOTTOM OF BORING 45.0'; DRIVE SHOE BROKE OFF

5/90

SEVEE & MAHER ENGINEERS

PROJECT West Old Town Landfill | JOB NO. 9006 | BORING NO. B206

DATE COMPLETED 05 08 90 | WELLS INSTALLED B206 A & B | DRILLING METHOD WASHED BORING

GROUND SURFACE ELEVATION (FT) 201.5 | DRILLER MANN TEST BORINGS | LOGGED BY KPJ

BOREHOLE DIAMETER (IN) 0-13' 4.5" O.D. 13-70.5 3.5" O.D. | ROCK CORE DIAMETER (IN) 2.0 I.D. | SHEET 1 OF 2

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | N | MC (%) | Pc (TSF) | ATTERBERG LIMITS | SECONDARY PERMEABILITY (cm/sec) | INSTRUMENT LOG | WATER LEVEL | DEPTH (FT) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | 0-5 TOPSOIL | | | | | | | | |
| | 1D | | 11 | | | | | | Bentonite Pellets (Typ) | |
| | 2D | Brown Sandy Gravelly Silt-Clay w/ Cobbles (Basal Till) | 69 | | | | | | 4.0 | |
| 5 | 3D | | 122 | | | | | | | 5 |
| | 4D | | 145 | | | | | | | |
| | 5D | | 160 | | | | | | | |
| | 6D | | 180 | 10 | | | $K_H$ = 0.00024 | | Sand (Typ) | |
| 10 | 7D | | 167 | 11 | | LL=22 PI=6 | $K_V$ = 0.00028 | | | 10 |
| | 8D | Brownish Gray Sandy Gravelly Silt-Clay Trace of Cobbles (Basal Till) | 133 | | | | | | | |
| 15 | 9D | | 106 | | | | | | | 15 |
| | 10D | | 114 | 11 | 20 | | | | 17.5 | |
| | 11D | | — | 11 | 57 | | | | 20.0 | |
| 20 | 12D | 22.5 | 137 | | 30 | | | | | 20 |
| | 13D | Gray Sandy Gravelly Silt-Clay w/ Cobbles (Basal Till) | 212 | | 62 | | | | | |
| | 14D | | 100 | 8 | 59 | | | | | |
| 25 | 15D | | | | 50 | | | | | 25 |
| | 16D | Brown Silty Gravelly Sand Trace of Cobbles (Washed Till) | — | | | | | | | |
| | 17D | 32.6 | 130 | | | | | | 34.0 | |
| 30 | 18D | Brown Gravelly Sand, Some Silt Trace of Cobbles w/ Silty Sand Layers | 190 | | 12 | | | | 35.0 | 30 |
| | 19D | | 195 | | 23 | | | | | |
| | 20D | | 113 | 22 | 10 | | $K_R$ = 0.59 | | Grout (Typ) | |
| 35 | 21D | 41.5 | 122 | | 10 | | | | | 35 |
| | 22D | Brown Very Silty Gravelly Sand Has Till-Like Appearance | 99 | 17 | 10 | | | | | |
| | 23D | | 111 | 17 | 9 | | | | | |
| | 24D | | 106 | 18 | 10 | | | | 40.5 | |
| 40 | 25D | 49.0 | 96 | | 8 | | | | | 40 |
| | 26D | Black to Gray Silty Sand | 110 | | 12 | | $K_F \geq 9.0$ | | 5' 3/4" Slotted PVC Screen | |
| | 27D | 59.0 | 110 | 21 | 14 | | | | | |
| 45 | 28D | Brown Silty | — | | 67 | | | | 54.7 | 45 |
| | 29D | Brown Silty Gravelly Sand | 200 | | 26 | | | | | |
| | 30D | | 136 | 8 | 9 | | | | 55 | |
| 50 | | | | | | | | | 57 | 50 |
| | 31D | (Washed Till) | 237 | | 11 | | | | | |
| | | | | | | | | | | |
| 55 | | | | | | | | | | 55 |
| | | | | | | | | | | |
| 60 | | | | | | | | | | 60 |

CONTINUED FROM PG 2

NOTES

Revision as per letter correspond

SEVEE & MAHER ENGINEERS

| | | | |
|---|---|---|---|
| PROJECT Lines Old Town (Gardiner) | JOB NO. 3006 | BORING NO. B206 | |
| DATE COMPLETED 05.08.90 | WELLS INSTALLED B206 A & B | DRILLING METHOD Wash-rotary Boring | |
| GROUND SURFACE ELEVATION (FT) 201.5 | DRILLER Main Test Borings | LOGGED BY KPN | |
| BOREHOLE DIAMETER (IN) 0-13' 4¾ O.D. 13'-70' 3.5" O.D. | ROCK CORE DIAMETER (IN) 2.0 I.D. | SHEET 2 OF 2 | |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | N | MC(%) | % CLASS #200 | ATTERBERG LIMIT | PERMEABILITY (FT/DAY) | INSTRUMENT LOG | WATER LEVEL | DEPTH (FT) |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | 32D | Brown Gravelly Sand some Silt trace of cobbles w/ silty sand layers (washed till) | 182 | 9 | 10 | | | | Caved (typ) | |
| 65 | 33D | | 118 | | 11 | | | | 65 | 65 |
| | | | | | | | | | 68 | |
| 70 | | 69.9 | | | | | | | | 70 |
| | 1-R | RQD=100% Interbedded metagray wacke and phyllite (bedrock) | | | | | | | | |
| 75 | 2-R | RQD: 96% | | | | | | | | 75 |
| 80 | 3-R | RQD: 28% | | | | | | | 82.5 | 80 |
| 85 | 4-R | RQD=68% ... many pegmatite veins | | | | | $K_f$ = 0.027 | | P-206A | 85 |
| | | | | | | | | | 5' 3/4" screen | |
| 90 | 5-R | 90.5 B.O.E. | | | | | | | 90.5 | 90 |
| 95 | | | | | | | | | | 95 |

NOTES

5/90

SEVEE & MAHER ENGINEERS

| | | | |
|---|---|---|---|
| PROJECT West Old Town Landfill | JOB NO. 2006 | BORING NO. B206A | |
| DATE COMPLETED 05.10.90 | WELLS INSTALLED MW206 PZ06 | DRILLING METHOD WASHED BORING | |
| GROUND SURFACE ELEVATION (FT) 201.2 | DRILLER MAINE TEST BORINGS | LOGGED BY KPN | |
| BOREHOLE DIAMETER (IN) 4.5 O.D. | ROCK CORE DIAMETER (IN) ——— | SHEET 1 OF 1 | |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | N | MC(%) | % PASS #200 | ATTER-BERG LIMIT | PERME-ABILITY (FT/DAY) | INSTRUMENT LOG | WATER LEVEL | DEPTH (FT) |
|---|---|---|---|---|---|---|---|---|---|---|
| 5 | | BROWN SANDY GRAVELLY SILT-CLAY TRACE OF COBBLES (BASAL TILL) | | | | | $K_F$=.. 0.03 | | | 5 |
| 10 | | 11.9 | | | | | | | | 10 |
| 15 | | BROWNISH-GRAY SANDY GRAVELLY SILT-CLAY W/ COBBLES (BASAL TILL) | | | | | $K_B$= 0.00096 | | | 15 |
| 20 | | 22.0 B.O.E | | | | | | | | 20 |
| 25 | | | | | | | | | | 25 |

INSTRUMENT LOG: 3.0; PZ06 5' 1/4" SLOT; 11.0; 11.6 BENTONITE (TYP); 14.1; MW206 5' 2" SCREEN; SAND (TYP); 20.0; Z06; 22.0

NOTES

SEVEE & MAHER ENGINEERS

5/90

| | | | |
|---|---|---|---|
| PROJECT West Old Town Landfill | JOB NO. 9006 | BORING NO. B223A (B-23M) | |
| DATE COMPLETED 09.10.90 | WELLS INSTALLED MW-223A | DRILLING METHOD WASHED BORING | |
| GROUND SURFACE ELEVATION (FT) 173.5 | DRILLING CONTRACTOR Maine Test Boring, Inc | LOGGED BY KPN / MWM | |
| BOREHOLE DIAMETER (IN) 4.5" O.D. | ROCK CORE DIAMETER (IN.) 3 25/32" O.D. | SHEET 1 OF 1 | |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | N | MC (%) | % PASS #200 | ATTERBERG LIMIT | PERMEABILITY (FT/DAY) |
|---|---|---|---|---|---|---|---|
| | 1D | 0.5 TOPSOIL | 44 | | | | |
| | 2D | | 33 | | | | |
| | 3D | BROWN SANDY GRAVELLY SILT-CLAY TRACE OF COBBLES AND BOULDERS (GLACIAL TILL) | 47 | | | | |
| 5 | 4D | | 51 | | | | |
| | 5D | | 56 | 10 | | | |
| 10 | 6D | | 124 | | | | |
| | 7D | | 65 | | | | |
| | 8D | | — | | | | |
| 15 | 9D | | 71 | 12 | 59 | | |
| | 10D | 18.6 | — | | | | |
| 20 | 1R | INTERBEDDED PHYLLITE AND METAGRAYWACKE (BEDROCK) RQD = 96% | | | | | |
| | 2R | | | | | | |
| 25 | 3R | RQD = 66% | | | | | $K_F$ = 0.77 |
| 30 | 4R | RQD = 56% | | | | | |
| | | 33.3 | | | | | |
| 35 | | | | | | | |

INSTRUMENT LOG

- BENTONITE (TYP) 3.0
- GROUT (TYP)
- 25.0
- MW-223A 5' SCREEN
- SAND (TYP) 33.0

NOTES

PROJECT WEST OLD BRIDGTON LANDFILL | JOB NO. 30006 | BORING NO. B223B DGM

DATE COMPLETED 03-11-90 | WELLS INSTALLED MW-223B | DRILLING METHOD WASHED BORING

GROUND SURFACE ELEVATION (FT) 173.5 | DRILLING CONTRACTOR MAINE TEST BORINGS, INC | LOGGED BY MWM

BOREHOLE DIAMETER (IN) 4.5" O.D. | ROCK CORE DIAMETER (IN) N/A | SHEET 1 OF 1

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | N | M.C. (%) | TORVANE STR. | ATTERG. LIMITS | PERMEABILITY (FT/DAY) | INSTRUMENT LOG | DEPTH (FT) |
|---|---|---|---|---|---|---|---|---|---|
| 0 | SEE B223A FOR SOIL SAMPLES | 0.5 TOPSOIL | | | | | | BENTONITE (TYP) | 0 |
| 5 | | BROWN SANDY GRAVELLY SILT-CLAY TRACE OF COBBLES AND BOULDERS (BASAL TILL) | | | | | | | 5 |
| 10 | | | | | | | K_F = 0.12 | 9.0 SAND (TYP) | 10 |
| 15 | | | | | | | | MW-223B 5' SCREEN | 15 |
| | | 17.6 | | | | | | 17.6 | |
| 20 | | B.O.E | | | | | | | 20 |

NOTES

SEVEE & MAHER ENGINEERS

PROJECT West Old Town Landfill | JOB NO. 3006 | BORING NO. B227

DATE COMPLETED 09.17.90 | WELLS INSTALLED MW-227 | DRILLING METHOD WASHED BORING

GROUND SURFACE ELEVATION (FT) 161.0 | DRILLING CONTRACTOR MAINE TEST BORING, INC | LOGGED BY KAN

BOREHOLE DIAMETER (IN) 3.5" O.D. | ROCK CORE DIAMETER (IN) N/A | SHEET 1 OF 1

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | N | MC (%) | % PASS #200 | ATTER-BERG LIMIT | PERME-ABILITY (FT/DAY) | INSTRUMENT LOG | DEPTH (FT) |
|---|---|---|---|---|---|---|---|---|---|
| | 1D | 0.2 TOPSOIL | 103 | | | | | GROUT (TYP) | |
| 5 | | BROWN VERY SILTY GRAVELLY SAND TRACE OF COBBLES (BASAL TILL) | | | | | | | 5 |
| | 2D | | 51 | | | | | | |
| 10 | 3D | | — | 11 | | | | 10.2 SAND/LOAM | 10 |
| | | 13.0 | | | | | | 13.4 | |
| 15 | 4D | GRAY SANDY GRAVELLY SILT-CLAY TRACE OF COBBLES (BASAL TILL) | 116 | 11 | 67 | | $K_F$ = 0.00046 | MW-227 5' SCREEN 2" Φ SAND (TYP) | 15 |
| | 5D | 22.0 B.O.E. | 60 | 10 | | | | 20.4 BENTONITE 22.0 (TYP) | 20 |
| | | | | | | | | | 25 |

NOTES

SEVEE & MAHER ENGINEERS

PROJECT WEST OLD TOWN LANDFILL JOB NO. 90006 BORING NO. MW 301

| | | |
|---|---|---|
| DATE COMPLETED 07 02 96 | DATE WELLS INSTALLED 07-02-96 | DRILLING METHOD SPIN CASING |
| GROUND SURFACE ELEVATION (FT) | DRILLING CONTRACTOR Maine Test Boring, Inc | LOGGED BY T. Sumner / KAN |
| BOREHOLE DIAMETER (IN) 4½" | ROCK CORE DIAMETER (IN) 3 15/16 | SHEET 1 OF 4 |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | INSTRUMENT LOG | DEPTH (FT) |
|---|---|---|---|---|
| 0 | | | | |
| 5 | | Mottled Brown Silt, Clay, and Gravel | | |
| 6 | | Fill | | |
| | | Olive Clayey Silt | | |
| 9 | | Trace of Gravel | | |
| 10 | | | | |
| 15 | | Brown Sandy Gravelly Silt w/ cobbles | | |
| 17.0 | | | Bentonite Chips | |
| 21.0 | | | | |
| 25 | | | | |
| 27 | | | | |
| 30 | | Gray Sand/ Gravelly Silt w/ cobbles | | |
| 35 | | | | |
| 40 | | | | |
| 45 | | | | |
| 50 | | | | |
| 55 | | | | |
| 60 | | | | |

NOTES

PROJECT WEST OLD TOWN LANDFILL JOB NO. BORING NO. MW 301

| DATE COMPLETED | DATE WELLS INSTALLED | DRILLING METHOD |
|---|---|---|
| GROUND SURFACE ELEVATION (FT) | DRILLING CONTRACTOR | LOGGED BY |
| BOREHOLE DIAMETER (IN) | ROCK CORE DIAMETER (IN.) | SHEET 2 OF 4 |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | RQD (%) | INSTRUMENT LOG | DEPTH (FT) |
|---|---|---|---|---|---|
| 70 | | ... BECOMING Gray Clayey Sandy Silt w/ Gravel & Cobbles | | 65 Bentonite Chips (typ) 73 | |
| 80 | | 81.3 BASAL TILL | | | |
| 85 | 1R | | 92 | Bentonite Grout (typ) | |
| 90 | 2R | BEDROCK | 99 | | |
| 95 | 3R | | 100 | | |
| 100 | 4R | | 100 | | |
| 105 | 5R | | 100 | | |
| 110 | 6R | | 100 | | |
| 115 | 7R | | 100 | | |
| 120 | | | | | |

NOTES

SEVEE & MAHER ENGINEERS

5/90

PROJECT WEST OLD TOWN LANDFILL JOB NO. BORING NO. MW 301

| DATE COMPLETED | DATE WELLS INSTALLED | DRILLING METHOD |
|---|---|---|
| GROUND SURFACE ELEVATION (FT) | DRILLING CONTRACTOR | LOGGED BY |
| BOREHOLE DIAMETER (IN) | ROCK CORE DIAMETER (IN) | SHEET 3 OF 4 |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | RQD % | Kmax cm/sec | | | |
|---|---|---|---|---|---|---|---|
| 125 | 8R | | 100 | | | | |
| | 9R | | 100 | | | | |
| 130 | 10R | | 100 | 7.0 x10⁻⁷ cm/sec (146.9-182.7 TEST INTERVAL) | | | |
| 135 | 11R | | 100 | | | | |
| 140 | 12R | | 100 | | | | |
| 145 | 13R | | 100 | 6.8x10⁻⁷ cm/sec (146.9-182.7 TEST INTERVAL) | | | |
| 150 | 14R | | 76 | | | | |
| 155 | 15R | | 86 | 6.0 x10⁻⁷ cm/sec (151.7-182.7 TEST INTERVAL) | | | |
| 160 | 16R | | 94 | | | | |
| 165 | 17R | | 100 | | | | |
| 170 | 18R | | 100 | 1.2x10⁻⁶ cm/sec (TEST INTERVAL 161.5-182.7) | | | |
| 175 | 19R | | 86 | | | | |
| 180 | | | | | | | |

INSTRUMENT LOG

155.0
"00" SAND (TYP)
157.5
"0" SAND (TYP)
2" ϕ SCH 40 PVC SLOTTED NO 10 SLOT L=20 FT

DEPTH (FT) 160

NOTES

5/90

SEVEE & MAHER ENGINEERS

PROJECT WEST OLD TOWN LANDFILL JOB NO. BORING NO. MW 301

| DATE COMPLETED | DATE WELLS INSTALLED | DRILLING METHOD |
|---|---|---|
| GROUND SURFACE ELEVATION (FT) | DRILLING CONTRACTOR | LOGGED BY |
| BOREHOLE DIAMETER (IN) | ROCK CORE DIAMETER (IN.) | SHEET 4 OF 4 |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | Rad Ck | | | | INSTRUMENT LOG | DEPTH (FT) |
|---|---|---|---|---|---|---|---|---|
| 185 | 20R | 1810<br>B.O.E. | 94 | | | | | |

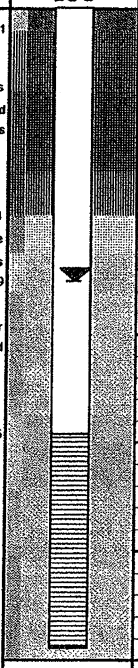
NOTES

SEVEE & MAHER ENGINEERS

9/90

| PROJECT: CASELLA - JRL DETENTION POND #5 | | JOB NO.: 07086 | BORING NO.: B-302R |
|---|---|---|---|
| DATE STARTED: 10/01/07 | DATE FINISHED: 10/01/07 | DRILLING METHOD: DRIVE & WASH | |
| GROUND SURFACE ELEVATION (FT): 204.49 | DRILLING CONTRACTOR: MTB | LOGGED BY: EJL | |
| BOREHOLE DIA. (IN): 41/4 in. | ROCK CORE DIA. (IN): 2 1/2 | SHEET 1 OF 1 | |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | N-VALUE (bpf) | RECOVERY (ft.) | RQD % |
|---|---|---|---|---|---|
| | | 0.4 Dark brown silty SAND with organics | | | |
| 5 | | Brown silty c-f SAND, trace gravel, dense | | | |
| | 1D | (basil till) | 136 | 2 | |
| 10 | 1R | Refusal at 7.7 ft. Drive casing to 7.4 ft. Wash to 8.0 ft. and begin coring | | 3.9 | 100 |
| 15 | 2R | | | 5.0 | 88 |
| 20 | 3R | Interbedded PHYLLITE and Metagray WACKE | | 5.0 | 92 |
| 25 | 4R | | | 5.0 | 94 |
| 30 | 5R | (bedrock) | | 3.0 | 100 |
| | | 29.9 BOTTOM OF EXPLORATION | | | |
| 35 | | | | | |
| 40 | | | | | |
| 45 | | | | | |
| 50 | | | | | |
| 55 | | | | | |
| 60 | | | | | |




DEPTH (FT): 5, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60

NOTES:
- Installed 2" PVC Piezometer with 10 ft. screened interval at 29.5 ft.
- Elevation MW-302R = 206.86 TPVC
- Wire line system used for rock coring (HQ)

- Filter Sand
- Bentonite Chips
- Mixture of borehole cuttings, sand, and chips

MW12-303R

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

PROJECT
Replacement Well
CASELLA - Juniper Ridge Landfill
West Old Town, ME

REPORT OF BORING No. MW-303R
SHEET 1 OF 2
JOB No. 12064.00
CHKD. BY

Driller: MAINE TEST BORINGS
18 Mack Lane, Hermon, ME

INSPECTOR: Brian Johnson

BORING LOCATION N 477517.1 E 927635.5 Maine State Plane

GROUND SURFACE ELEVATION 206.1 feet DATUM (Site Datum)

DATE START 9/11/2012 DATE END 9/11/2012

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 In.

AUGER: NA

HAMMER: High-speed winch and safety hammer

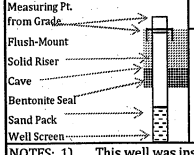
CASING SIZE: 4-inch OTHER: NA

GROUNDWATER READINGS

| DATE | TIME | WATER | CASING | STABILIZATION TIME |
|---|---|---|---|---|
| 9/19/2012 | | 28.72 ft BTOC | | |
| | | | | |

| DEPTH | WELL DETAILS (See Below) | SAMPLE NO. | PEN./ REC | DEPTH (Ft.) | BLOWS/6" | SAMPLE DESCRIPTION | SPT N Value | STRATUM DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | Surface has topsoil and grass. | | |
| 5 | | S-1 | 2.0/2.0 | 5-7 | 19/17/25/28 | Brown Silt; little coarse sand to fine gravel; trace clay; subrounded to rounded. | 42 | |
| | | | | | | | | |
| 10 | | S-2 | 1.6/2.0 | 10-12 | 17/26/31/36 | Simmilar to above. | 57 | BROWN SANDEY SILT WITH GRAVEL AND COBBLES (TILL) |
| | | | | | | Encountered Cobble | | |
| 15 | | S-3 | 1.8/2.0 | 15-17 | 17/29/33/41 | Brown; Silt; little clay; little to trace fine sand to fine gravel; rounded to subrounded. | 62 | |
| | | | | | | | | |
| 20 | | S-4 | 1.5/1.5 | 20-21.5 | 15/67/98 | Brown; Silt, little clay; little fine sand to fine gravel; trace fine gravel; rounded to subrounded. | >100 | |
| | | | | | | | | |
| 25 | | S-5 | 1.2/1.5 | 25-26.5 | 36/126/65 | Gray, black and rust colored; Coarse to medium SAND; little to some fine gravel; trace to little silt; subangular to angular. | >100 | GRAY SAND, GRAVEL AND SILT WITH COBBLES (TILL) |
| | | | | | | Cobbles encountered. | | |
| 30 | | S-6 | 0.5/1.5 | 30-31.5 | 58/93/63 | Rust colored, brown and gray; Sandy GRAVEL; little sand and silt; trace clay; angular. | >100 | |
| | | | | | | Cobbles encountered. | | |

PIEZOMETER DETAILS




GRANULAR SOILS

| Blows/Ft | Rel. Density |
|---|---|
| 0 - 4 | Very Loose |
| 4-10 | Loose |
| 10-30 | Medium Dense |
| 30-50 | Dense |
| >50 | Very Dense |

COHESIVE SOILS

| Blows/Ft | Rel. Density | Approx Su. (psf) |
|---|---|---|
| <2 | Very Soft | 0-250 |
| 2-4 | Soft | 250-500 |
| 4-8 | Med. Stiff | 500-1000 |
| 8-15 | Stiff | 1000-2000 |
| 15-30 | Very Stiff | 2000-4000 |
| >30 | Hard | >4000 |

MODIFIED BERMISTER SYSTEM

| Descriptive Term | Portion of Total |
|---|---|
| Trace | 0% - 10% |
| Little | 10% - 20% |
| Some | 20% - 35% |
| Adjective (e.g., clayey) | 35% - 49% |

Well Details
Screen: 40.4 to 30.4 ft bgs
Sand: 41.5 to 28.3 ft bgs
Chips: 28.3 to 19 and 11 to 1 ft bgs
Cuttings: 19 to 11 ft bgs
Stickup = 2.9 feet

NOTES: 1) This well was installed to replace MW-303, which was damaged in the summer of 2012.

BORING No. MW-303R

P:\Casella\OldTownLandfill\GeneralSiteInfo\SSI\Boring Log\2012\MW-303R.xls

MW12-303R

SME
Sevee & Maher Engineers, Inc.
ENVIRONMENTAL • CIVIL • GEOTECHNICAL • WATER • COMPLIANCE

PROJECT
Replacement Well
CASELLA - Juniper Ridge Landfill
West Old Town, ME

REPORT OF BORING No. MW-303R
SHEET 2 OF 2
JOB No. 12064.00
CHKD. BY

Driller: MAINE TEST BORINGS
18 Mack Lane, Hermon, ME

INSPECTOR: Brian Johnson

BORING LOCATION See Page 1

GROUND SURFACE ELEVATION See Page 1

DATE START 9/11/2012 DATE END 9/11/2012

SAMPLER: UNLESS OTHERWISE NOTED, SAMPLER CONSISTS OF A 2" SPLIT SPOON DRIVEN USING A 140 lb. HAMMER FALLING 30 In.

AUGER NA

HAMMER:

CASING SIZE: OTHER:

GROUNDWATER READINGS

| DATE | TIME | WATER | CASING | STABILIZATION TIME |
|---|---|---|---|---|
| See Pg 1 | | | | |
| | | | | |

| DEPTH | WELL DETAILS (See Pg 1) | SAMPLE NO. | PEN./ REC | DEPTH (Ft.) | BLOWS/6" | SAMPLE DESCRIPTION | SPT N Value | STRATUM DESCRIPTION |
|---|---|---|---|---|---|---|---|---|
| 32 | | | | | | | | |
| 35 | | S-7 | 1.5/2.0 | 35-37 | 53/48/50/61 | Mixed- Brown and Black; Medium SAND; SILT and Gravelly Zones;; angular. | 98 | BROWN AND BLACK (MIXED) SANDY SILTY GRAVEL (TILL) |
| 40 | | S-8 | 0.8/1.1 | 40-41.1 | 16/100/50(0.1") | Brown Fine to Medium SAND. | NA | SAND |
| | | | | | | Roller coned to 41.5 feet | | INTERPRETED AS BEDROCK |
| 45 | | | | | | BOTTOM OF EXPLORATION AT 41.5 feet BGS | | |
| 50 | | | | | | | | |
| 55 | | | | | | | | |
| 60 | | | | | | | | |

PIEZOMETER DETAILS
Measuring Pt. from Grade
Flush-Mount
Solid Riser
Cave
Bentonite Seal
Sand Pack
Well Screen

GRANULAR SOILS

| Blows/Ft | Rel. Density |
|---|---|
| 0 - 4 | Very Loose |
| 4-10 | Loose |
| 10-30 | Medium Dens |
| 30-50 | Dense |
| >50 | Very Dense |

COHESIVE SOILS

| Blows/Ft | Rel. Density | Approx Su. (psf) |
|---|---|---|
| <2 | Very Soft | 0-250 |
| 2-4 | Soft | 250-500 |
| 4-8 | Med. Stiff | 500-1000 |
| 8-15 | Stiff | 1000-2000 |
| 15-30 | Very Stiff | 2000-4000 |
| >30 | Hard | >4000 |

MODIFIED BERMISTER SYSTEM

| Descriptive Term | Portion of Total |
|---|---|
| Trace | 0% - 10% |
| Little | 10% - 20% |
| Some | 20% - 35% |
| Adjective (e.g., clayey) | 35% - 49% |

Well Details
See Page 1

NOTES: 1) This well was installed to replace MW-303, which was damaged in the summer of 2012.

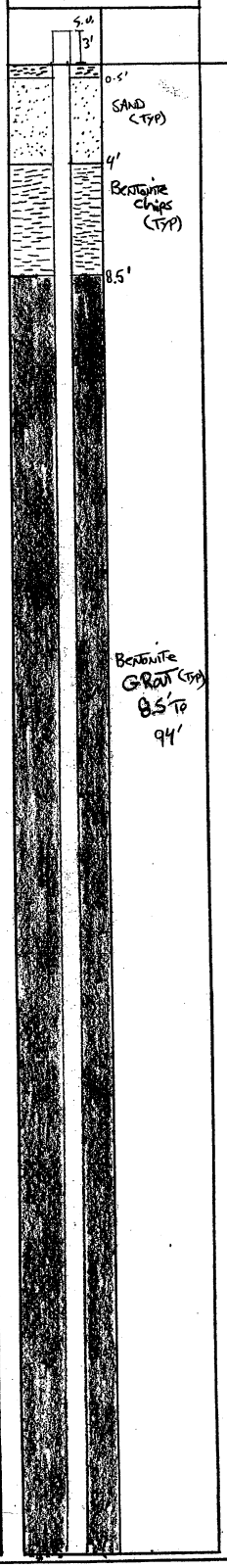
BORING No. MW-303R

P:\Casella\OldTownLandfill\GeneralSiteInfo\SSI\Boring Log\2012\MW-303R.xls

| | | | |
|---|---|---|---|
| PROJECT West Old Town Land Fill Expansion | JOB NO. 03076.09 | BORING NO. 401A | |
| DATE COMPLETED 7/13/04 | DATE WELLS INSTALLED 7/12/04 | DRILLING METHOD Wash Rotary | |
| GROUND SURFACE ELEVATION (FT) 153.8' | DRILLING CONTRACTOR MTTS | LOGGED BY T. Riley | |
| BOREHOLE DIAMETER (IN) 4.5" O.D. | ROCK CORE DIAMETER (IN.) 2.5" | SHEET 1 OF 2 | |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | N | RQD | % Passing #200 Screen | Water Content % |
|---|---|---|---|---|---|---|
| 0 | 1D | 0-0.5' Topsoil<br>Mottled silty very fine SAND w/ trace of clay | 18 | | | |
| 3.5' | | | | | | |
| 5 | 2D | Brown silty fine to medium SAND w/ little gravel and trace of cobbles | 25 | | | |
| 10' | | | | | | |
| 10 | 3D | Brown fine to medium SAND w/ little silt, course sand and gravel, trace of cobbles. | 50-0.1' | | 27.7% | 11.9% |
| 3' | | Becomes increased clay color silts. | | | | |
| 15.5' | 4D | Clayey silt w/ very fine sand and some cobbles | 115 | | | |
| 15 | | | | | | |
| 18' | | Boulder | | | | |
| 21' | | | | | | |
| 20 | | | | | | |
| 25 | 5D | Gray clayie silty fine to medium SAND with little gravel and cobbles | 68 | | | |
| 30 | 6D | | 56 | | | |
| 35' | | | | | | |
| 35 | 7D | Becomes increased clay content. | 48 | | | |
| 40 | 8D | | 50-0.4' | | | |
| 45 | 9D | | 50-0.2' | | | |
| 50 | 10D | | 50-0.4' | | | |
| 55 | 11D | 56' Gray clayey silt, with some gravel and cobbles | 50-0.3' | | 62.3% | 11.1% |
| 60 | | BASAL TILL | | | | |

INSTRUMENT LOG




DEPTH (FT)

NOTES

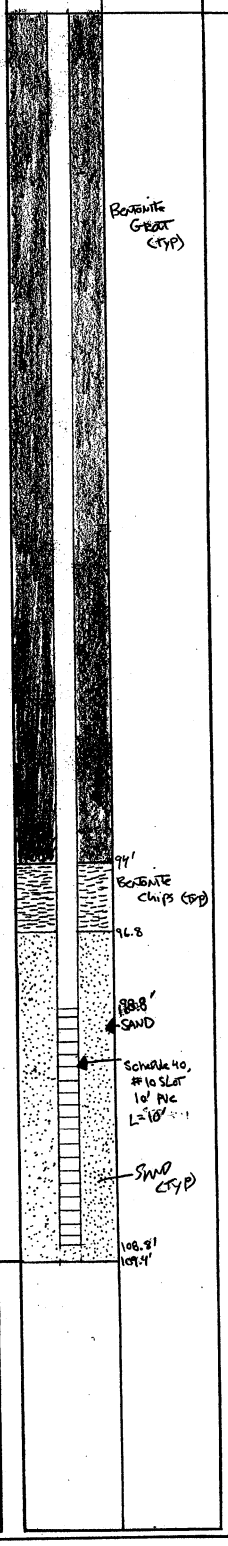
5/90

SEVEE & MAHER ENGINEERS

| | | |
|---|---|---|
| PROJECT West old Town Expansion | JOB NO. 0307609 | BORING NO. 401A |
| DATE COMPLETED 7/13/04 | DATE WELLS INSTALLED 7/12/04 | DRILLING METHOD Wash Rotary |
| GROUND SURFACE ELEVATION (FT) 153.8' | DRILLING CONTRACTOR MTB | LOGGED BY T. Riley |
| BOREHOLE DIAMETER (IN) 4.5" O.D. | ROCK CORE DIAMETER (IN.) 2.5" | SHEET 2 OF 2 |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | N | RQD |
|---|---|---|---|---|
| 60 | 12D | Gray clayey SILT w/ some gravel and cobbles. | 56-0.1' | |
| 65 | 65' | | 90-0.5' | |
| | 13D | | | |
| | 14D | Brown gravelly SILT, ... and trace cobbles. | NA | |
| 70 | | | | |
| 75 | 15D | | NA 50-0.2' | |
| | 16D | | | |
| | | 78.5' BASAL TILL | | |
| 80 | Rock core | no sample | | |
| | 1R | | | 0% |
| 85 | 2R | | | 48% |
| 90 | 3R | | | 86% |
| 95 | 4R | | | 62% |
| 100 | 5R | | | 30% |
| 105 | 6R | | | 0% |
| | 7R | | | 50% |
| | | 109.4' Bedrock | | |
| 110 | | B.O.E. | | |

INSTRUMENT LOG




NOTES



SEVEE & MAHER ENGINEERS

| | | |
|---|---|---|
| PROJECT West Old Town Landfill Expansion | JOB NO. 03076.09 | BORING NO. 401B |
| DATE COMPLETED 7/13/04 | DATE WELLS INSTALLED 7/13/04 | DRILLING METHOD Wash-Rotary |
| GROUND SURFACE ELEVATION (FT) 154.6' | DRILLING CONTRACTOR M.T.B | LOGGED BY T. Riley |
| BOREHOLE DIAMETER (IN) 4.5" O.D. | ROCK CORE DIAMETER (IN.) N/A" | SHEET 1 OF 1 |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | INSTRUMENT LOG | DEPTH (FT) |
|---|---|---|---|---|
| 0 | | See Log 401A for Stratigraphy. | S.U. 2' — Sand and Bentonite Chips (Typ) — 4' — Bentonite Chips (Typ) — 8' — 10' — Sand (Typ) — 2" Schedule 40 #10 Slot PVC L=10' — 20' 20.5' | 0 |
| 5 | | | | 5 |
| 10 | | | | 10 |
| 15 | | | | 15 |
| 20 | | 20.5' B.O.E. Basal Till | | 20 |
| 25 | | | | 25 |

NOTES

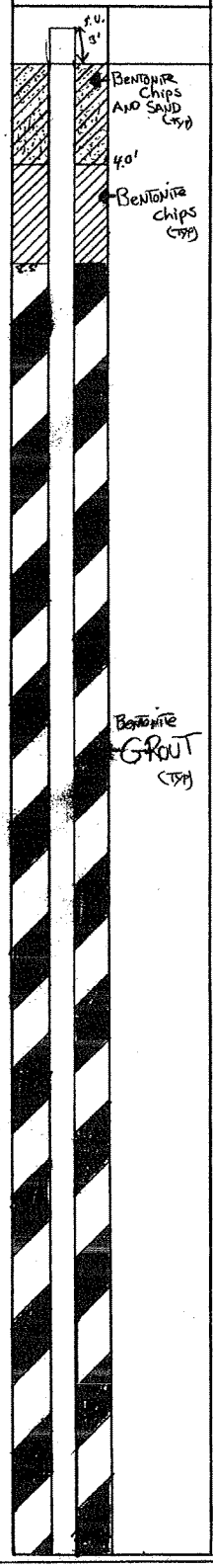
5/90

SEVEE & MAHER ENGINEERS

| | | | |
|---|---|---|---|
| PROJECT: WEST OLDTOWN LANDFILL EXPANSION | JOB NO. 03676.09 | BORING NO. 402A | |
| DATE COMPLETED: 6/29/04 | DATE WELLS INSTALLED: 6/29/04 | DRILLING METHOD: WASH-ROTARY | |
| GROUND SURFACE ELEVATION (FT): 149.5' | DRILLING CONTRACTOR: MTB | LOGGED BY: T. Riley / JES | |
| BOREHOLE DIAMETER (IN): 4.5" O.D. | ROCK CORE DIAMETER (IN.): 2.5" | SHEET 1 OF 2 | |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | N | RQD | % Passing #200 Screen | Water Content % |
|---|---|---|---|---|---|---|
| | | 0.3' TOP SOIL | | | | |
| | 1D | Mottled clayey SILTY FINE SAND | 10 | | | |
| 5 | | 5.5' | | | | |
| | 2D | Gray SILTY SANDY CLAY (MARINE CLAY) | 14 | | 86.9% | 21.9% |
| 10 | 3D | 11' MARINE SEDIMENTS. | 50-0.2' | | | |
| | | BROWN GRAVELY SANDY SILT WITH A TRACE OF COBBLES. | | | | |
| 15 | 4D | ...Becoming gray with a TRACE of clay. | 50-0.1' | | | |
| 20 | | 20' | | | | |
| | 5D | | 53 | | | |
| 25 | 6D | | 50-0.1' | | | |
| | | Gray GRAVELY SANDY clayey SILT. TRACE of COBBLES. | | | | |
| 30 | 7D | | 50-0.2' | | | |
| 35 | 8D | | 78 | | | |
| 40 | 9D | | 92 | | | |
| 45 | | 45' | | | | |
| | 10D | ...Becoming, TRACE of clay (0.9' thick cobble) | 60-0.2' | | | |
| 50 | | | | | | |
| 55 | 11D | | 106 | | 65.5% | 11.0% |
| 60 | | BASAL TILL | | | | |

INSTRUMENT LOG



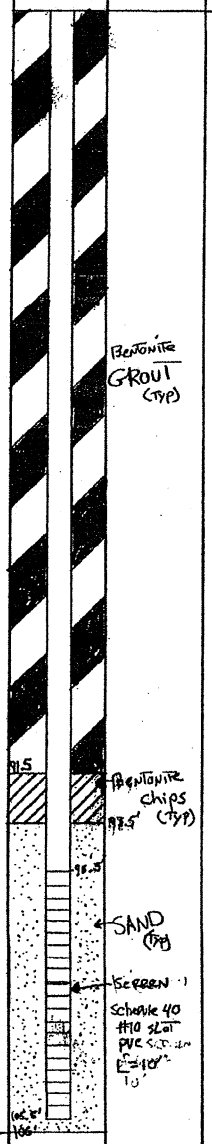

DEPTH (FT)

NOTES

| | | | |
|---|---|---|---|
| PROJECT West Old Town Landfill Expansion | JOB NO. 03076.09 | BORING NO. 402A | |
| DATE COMPLETED 6/29/04 | DATE WELLS INSTALLED 6/29/04 | DRILLING METHOD Wash - Rotary | |
| GROUND SURFACE ELEVATION (FT) 147.5' | DRILLING CONTRACTOR MTB | LOGGED BY TCR / JES | |
| BOREHOLE DIAMETER (IN) 4.5" O.D. | ROCK CORE DIAMETER (IN.) 2.5" | SHEET 2 OF 2 | |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | N | RQD | % < #200 | K cm/sec |
|---|---|---|---|---|---|---|
| 60 | 12D | From Above... Gray Gravelly Sandy Clayey Silt. Trace of Cobbles. Trace of Clay | 50-0.1' | | | |
| 65 | 13D | | 50-0.1' | | | |
| 70 | 14D | (BASALTIC) | 100-0.4' | | 59% | $9.6 \times 10^{-4}$ |
| | | 76.5 1' Thick Boulder | | | | |
| 75 | 15D | Glacial Till Bottom of Rock | 100-0.3' | | | |
| | 3R | | | 63% | | |
| 80 | 4R | | | 76% | | |
| 85 | 5R | | | 10% | | |
| 90 | 6R | | | 60% | | |
| 95 | 7R | | | 56% | | |
| 100 | 8R | | | 80% | | |
| 105 | 9R | | | 92% | | |
| | | 106' Bedrock B.O.E. | | | | |
| 110 | | | | | | |

INSTRUMENT LOG




NOTES

5/90

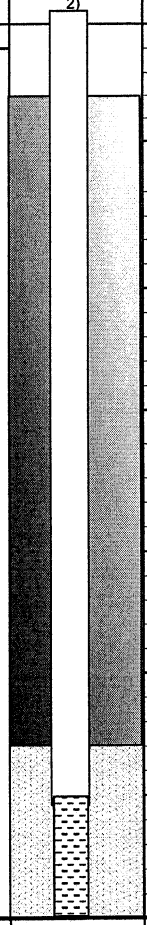
SEVEE & MAHER ENGINEERS

| | | |
|---|---|---|
| PROJECT West Old Town Landfill Expansion | JOB NO. 03076.09 | BORING NO. 402B |
| DATE COMPLETED 6/29/04 | DATE WELLS INSTALLED 6/29/04 | DRILLING METHOD Wash-Rotary |
| GROUND SURFACE ELEVATION (FT) 149.8' | DRILLING CONTRACTOR MTB | LOGGED BY T. Riley |
| BOREHOLE DIAMETER (IN) 4.5" O.D. | ROCK CORE DIAMETER (IN.) 2.5" | SHEET 1 OF 1 |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | INSTRUMENT LOG | DEPTH (FT) |
|---|---|---|---|---|
| 0 | | See LOG 402A for STRATIGRAPHY. | 5.0' 3.1' | 0 |
| 5 | | | Bentonite Chips (TYP) | 5 |
| 10 | | | SAND (TYP) | 10 |
| 15 | | | SCREEN Schedule 40 #10 SLOT PVC L=10' | 15 |
| 20 | | 22.5' BASAL TILL | 22 22.5' | 20 |
| 25 | | B.O.E. | | 25 |

NOTES

| PROJECT: A JRL Landfill, Old Town, ME | | JOB NO.: 15093.00 | | **Boring ID: P-04-02R** |
|---|---|---|---|---|
| DATE STARTED: 07/09/2015 | DATE FINISHED: 07/09/2015 | DRILLING METHOD: 4-inch casing | | |
| GROUND SURFACE ELEVATION: | | DRILLING CONTRACTOR: NewEngland Boring Contractors | | LOGGED BY: Tom S. |
| BOREHOLE DIA. (IN): 4-inches | ROCK CORE DIA. (IN): NA | | | SHEET 1 OF 1 |

| DEPTH (FT) | DRILLING DESCRIPTION | Notes | Piezometer Detail (See Note 2) | DEPTH (FT) |
|---|---|---|---|---|
| | This is a replacement of P-04-02. See P-04-02 for soil conditions. P-04-02R was installed adjacent to P-04-02. P-04-02 was abandoned, see Note 1. | |  | 3 28 30 35 |
| 5 10 15 20 25 30 35 | | | | |
| | BOTTOM OF BORING AT 35 feet | | | |
| 40 45 | | | | |

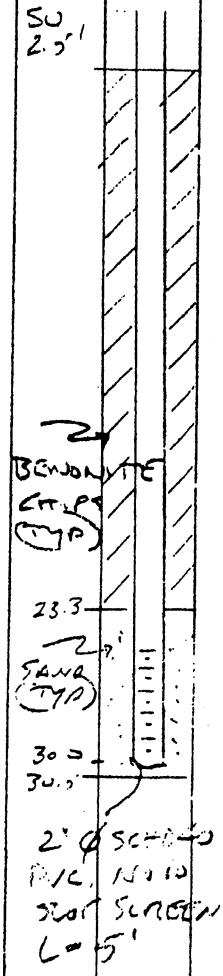
NOTES: Piezometer is located approximately 5 feet north of the original P-04-02 location.

2. Piezometer construction (completed 7/9/2015), bottom up: drilled to approximately 35 ft bgs; sand 35 to 28 ft bgs; bentonite chips 28 to 3 ft bgs; 2-inch diameter PVC screen 35 - 30 ft; 2-inch PVC riser pipe to 30 to 2.87 ft above ground surface. Water measured at 14.89 ft below the top of PVC on 7/15/2015.

| | | | |
|---|---|---|---|
| PROJECT VERTICAL LANDFILL EXP | JOB NO. 03076 | BORING NO. P04 |
| DATE COMPLETED 03/02/04 | DATE WELLS INSTALLED 03/02/04 | DRILLING METHOD DRIVE & WASH |
| GROUND SURFACE ELEVATION (FT) SEE PLAN | DRILLING CONTRACTOR ME TEST | LOGGED BY KPN |
| BOREHOLE DIAMETER (IN) 4 1/2 OD | ROCK CORE DIAMETER (IN.) N/A | SHEET 1 OF 1 |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | PID ppm |
|---|---|---|---|
| 0 | | | |
| 5 | | BROWN SILTY GRAVELLY SAND TRACE OF COBBLES | |
| 10 | | | |
| 14.0 | | | |
| 15 | | ... BECOMING GRAY AND FINER | |
| 20 | | | |
| 25 | | | |
| 30 | | | |
| 30.5 | | B.O.E. | |
| 35 | | | |

INSTRUMENT LOG




DEPTH (FT)

NOTES

VERY MINIMAL WASH WATER LOSS MUD TUB DOWN (1-3 GAL WASH AT TUB AT SLOT ESTIMATE 10-15 GAL. MOSTLY BOREHOLE DISPLACEMENT

| MAINE TEST BORINGS, INC.<br>BREWER, MAINE 04412 | CLIENT<br>Sevee & Maher Engineering, Inc. | SHEET 1 OF 2<br>HOLE NO. P-04-11 |
|---|---|---|
| DRILLER<br>Tom Schaefer | PROJECT NAME<br>West Old Town Landfill, 03076.09 | LINE & STATION |
| M.T.B. JOB NUMBER<br>04-095-B | LOCATION<br>Old Town, ME | OFFSET |

GROUND WATER OBSERVATIONS
09/08/04 7:15am Water @ 1.2', Hole Depth=10.9';
09/09/04 7:30am Water @ 3.8', Hole depth= 39.5'

| | CASING | SAMPLER | CORE BARREL | DATE 09/07/04 Start | DATE 09/09/04 Finish |
|---|---|---|---|---|---|
| TYPE | HW | SS | HQ | | |
| SIZE I.D. | 4" | 1 3/8" | 2.5" | | |
| HAMMER WT. | 300# | 140# | | | |
| HAMMER FALL | 16" | 30" | | SURFACE ELEVATION | |

| CASING BLOWS PER FOOT | SAMPLE NO. | O.D. | PEN. | REC. | DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER 0-6 | 6-12 | 12-18 | 18-24 | VANE READING | DEPTH | STRATUM DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Auger | | | | | | | | | | | 0.2 | Topsoil |
| " | 1D | 2" | 24" | | 2.0 | 1 | 3 | 2 | 2 | | 2.0 | Brown Fine Sandy Silt |
| " | | | | | | | | | | | | |
| " | 2D | 2" | 17" | | 3.4 | 6 | 27 | 50 | | | | |
| 62 | | | | | | | | | | | | Brown Silty F/M Sand, |
| 15 | 3D | 2" | 14" | | 5.2 | 28 | 70 | 50 | | | 5.2 | w/Little Coarse Sand, w/Trace of Gravel |
| 28 | | | | | | | | | | | | |
| 34 | 4D | 2" | 17" | | 7.4 | 35 | 60 | 50 | | | | |
| 25 | 5D | 2" | 2" | | 8.2 | 50 | | | | | | |
| 52 | | | | | | | | | | | | |
| 15 | 6D | 2" | 23" | | 10.9 | 38 | 40 | 52 | 50 | | | Brown Silty F/M Sand, |
| 18 | | | | | | | | | | | | w/Some Coarse Sand & Gravel, |
| 23 | | | | | | | | | | | | w/Trace of Cobbles |
| 27 | 7D | 2" | 24" | | 14.0 | 20 | 45 | 45 | 52 | | 14.0 | |
| 30 | D | 2" | 0" | 0" | 14.0 | 25 | | | | | | |
| 29 | 8D | 2" | 10" | | 15.8 | 38 | 50 | | | | | |
| 40 | | | | | | | | | | | | |
| 31 | | | | | | | | | | | | Brown Silty F/M Sand, |
| 92 | 9D | 2" | 8" | | 18.7 | 30 | 50 | | | | | w/Some Coarse Sand, Gravel & Cobbles, |
| 54 | | | | | | | | | | | | w/Trace of Clay |
| 25 | | | | | | | | | | | 20.5 | |
| 22 | 10D | 2" | 23" | | 21.9 | 24 | 47 | 58 | 50 | | | Brown Silty F/M Sand, |
| 25 | | | | | | | | | | | 22.0 | w/Little Coarse Sand, Gravel & Cobbles |
| 25 | 11D | 2" | 24" | | 24.0 | 20 | 40 | 53 | 46 | | | |
| 18 | | | | | | | | | | | | |
| 17 | 12D | 2" | 24" | | 26.0 | 20 | 35 | 35 | 40 | | | Brown Silty Fine Sand, |
| 18 | | | | | | | | | | | | w/Fine Sandy Silt & F/M Sand Layers |
| 29 | 13D | 2" | 22" | | 27.8 | 22 | 48 | 68 | 50 | | 28.0 | |
| 78 | | | | | | | | | | | 29.0 | Brown Silty Fine Sand w/Little Gravel |
| 122 | 14D | 2" | 16" | | 29.3 | 38 | 42 | 50 | | | | |
| 53 | | | | | | | | | | | | |
| 45 | 15D | 2" | 12" | | 32.0 | 32 | 70 | | | | | |
| 48 | D | 2" | 0" | 0" | 33.0 | 25 | | | | | | Brown Silty Gravelly Sand w/Some Cobbles |
| 105 | | | | | | | | | | | | |
| 190 | 16D | 2" | 6" | | 34.5 | 75 | | | | | 36.0 | |
| 68 | | | | | | | | | | | | |
| 45 | 17D | 2" | 6" | | 36.5 | 80 | | | | | | Olive Silty Cobbley Gravelly Sand |
| 165 | | | | | | | | | | | | |
| 25 | | | | | | | | | | | | |
| 58 | 18D | 2" | 6" | | 39.5 | 85 | | | | | | |

SAMPLES
D = SPLIT SPOON
C = 2" SHELBY TUBE
S = 3" SHELBY TUBE
U = 3½" SHELBY TUBE
R =ROCK CORE
V = VANE TEST

SOIL CLASSIFIED BY:
[XX] DRILLER-VISUALLY
[ ] SOIL TECHNICIAN-VISUALLY
[ ] LABORATORY TESTS

REMARKS:
Washed ahead from 5.0' to 28.0' and from 30.0' to 50.0'

| MAINE TEST BORINGS, INC.<br>BREWER, MAINE 04412 | CLIENT<br>Sevee & Maher Engineering, Inc. | SHEET 2 OF 2<br>HOLE NO. P-04-11 |
|---|---|---|
| DRILLER<br>Tom Schaefer | PROJECT NAME<br>West Old Town Landfill, 03076.09 | LINE & STATION |
| M.T.B. JOB NUMBER<br>04-095-B | LOCATION<br>Old Town, ME | OFFSET |

GROUND WATER OBSERVATIONS
09/08/04 7:15am Water @ 1.2', Hole Depth=10.9';
09/09/04 7:30am Water @ 3.8', Hole depth= 39.5'

| | CASING | SAMPLER | CORE BARREL | DATE 09/07/04 Start | DATE 09/09/04 Finish |
|---|---|---|---|---|---|
| TYPE | HW | SS | HQ | | |
| SIZE I.D. | 4" | 1 3/8" | 2.5" | | |
| HAMMER WT. | 300# | 140# | | SURFACE ELEVATION | |
| HAMMER FALL | 16" | 30" | | | |

| CASING BLOWS PER FOOT | SAMPLE NO. | O.D. | PEN. | REC. | DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER 0-6 | 6-12 | 12-18 | 18-24 | VANE READING | DEPTH | STRATUM DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 35 | | | | | | | | | | | | |
| 45 | 19D | 2" | 12" | | 41.5 | 40 | 78 | | | | | |
| 80 | | | | | | | | | | | | |
| 60 | 20D | 2" | 6" | | 43.5 | 110 | | | | | | |
| 80 | | | | | | | | | | | | |
| 40 | D | 2" | 24" | 0" | 45.2 | 100 | | | | | | Olive Silty Cobbley Gravelly Sand |
| 58 | 22D | 2" | 7" | | 46.6 | 60 | 50 | | | | | |
| 80 | | | | | | | | | | | | |
| 42 | 23D | 2" | 6" | | 48.5 | 85 | | | | | | |
| 45 | | | | | | | | | | | | |
| | 24D | 2" | 6" | | 50.5 | 90/ | | | | | 50.5 | |
| | | | | | | | | | | | | Bottom of Boring @ 50.5' |
| | | | | | | | | | | | | Caved @ 50.0' |
| | | | | | | | | | | | | Piezometer Installed @ 49.5' |
| | | | | | | | | | | | | Piezometer Installed @ 10.0' |

SAMPLES
D = SPLIT SPOON
C = 2" SHELBY TUBE
S = 3" SHELBY TUBE
U = 3½" SHELBY TUBE
R =ROCK CORE
V = VANE TEST

SOIL CLASSIFIED BY:
[XX] DRILLER-VISUALLY
[ ] SOIL TECHNICIAN-VISUALLY
[ ] LABORATORY TESTS

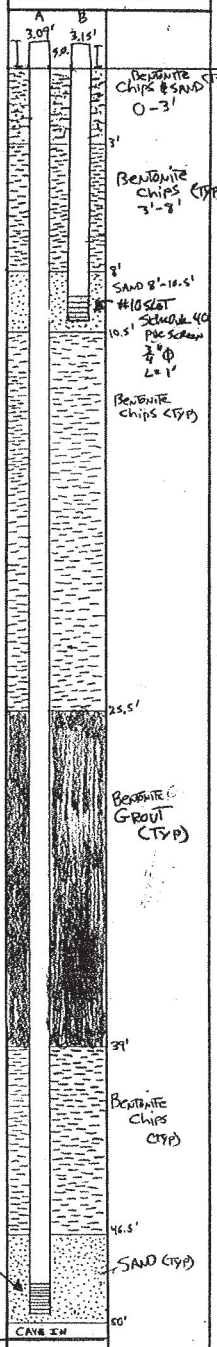
REMARKS:
Washed ahead from 5.0' to 28.0' and from 30.0' to 50.0'

HOLE NO. P-04-11

| | | | |
|---|---|---|---|
| PROJECT West Old Town Landfill Expansion | JOB NO. 03076.09 | BORING NO. P-04-11 Pezometers A+B | |
| DATE COMPLETED 9/9/04 | DATE WELLS INSTALLED 9/9/04 | DRILLING METHOD Wash Rotary | |
| GROUND SURFACE ELEVATION (FT) 1040' | DRILLING CONTRACTOR M.T.B | LOGGED BY T. Riley / JCS | |
| BOREHOLE DIAMETER (IN) 4.5" O.D. | ROCK CORE DIAMETER (IN.) N/A | SHEET 1 OF 1 | |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | N | % Passing #200 Screen | Water Content % | | |
|---|---|---|---|---|---|---|---|
| 0 | 1D | 0-0.2' TOPSOIL<br>Brown Sandy Silt | 4 | | | | |
| | 2D | 2'<br>Brown Silt / Clay w/ Little Coarse Sand and a Trace of Gravel. | 50/0.4' | | | | |
| 5 | 3D | 5' | 60/0.2' | 55.1% | 13.2% | | |
| | 4D | | 50/3.4' | | | | |
| | 5D | | 50/0.2' | | | | |
| 10 | 6D | | 60/3.4' | | | | |
| | 7D | | 97 | | | | |
| 15 | 8D | | 50/0.3' | | | | |
| | 9D | ... Becoming Clayey | 50/0.2' | | | | |
| 20 | 10D | 22' | 50/0.4' | | | | |
| | 11D | Brown Silt / Clay w/ Fine Sandy Silt and Fine to Medium Sand Layers. | 99 | | | | |
| 25 | 12D | | 75 | 50.3% | 20.6% | | |
| | 13D | | 50/0.3' | | | | |
| | 14D | 29' | 50/0.3' | | | | |
| 30 | 15D | Brown Silt gravely Sand with some Cobbles. | 102 | | | | |
| | 16D | | 75/0.5' | | | | |
| 35 | 17D | 36' | 80/0.5' | | | | |
| | 18D | Very Tc Clayey Olive Silty Cobbley Gravely Sand. | 85/0.6' | | | | |
| 40 | 19D | | 118 | 32.9% | 10.4% | | |
| | 20D | | 110/0.5' | | | | |
| 45 | 21D | | 100/0.2' | | | | |
| | 22D | | 50/0.1' | | | | |
| | 23D | | 85/0.5' | | | | |
| 50 | 24D | 50.5' (Basal Till)<br>B.O.E. | 90/0.5' | | | | |
| 55 | | | | | | | |
| 60 | | | | | | | |

INSTRUMENT LOG




#10 Slot Schedule 40 PVC Screen 3/4" ϕ L=1'

NOTES

5/90

SEVEE & MAHER ENGINEERS

| MAINE TEST BORINGS, INC.<br>BREWER, MAINE 04412 | CLIENT<br>Sevee & Maher Engineering, Inc. | SHEET 1 OF 2<br>HOLE NO. P-04-09 |
|---|---|---|
| DRILLER<br>Tom Schaefer | PROJECT NAME<br>West Old Town Landfill, 03076.09 | LINE & STATION |
| M.T.B. JOB NUMBER<br>04-095-A | LOCATION<br>Old Town, ME | OFFSET |

GROUND WATER OBSERVATIONS

| | CASING | SAMPLER | CORE BARREL | DATE<br>08/02/04<br>Start | DATE<br>08/03/04<br>Finish |
|---|---|---|---|---|---|
| TYPE | HW | SS | NQ2 | SURFACE ELEVATIC | |
| SIZE I.D. | 4" | 1 3/8" | 2" | | |
| HAMMER WT. | 300# | 140# | | | |
| HAMMER FALL | 16" | 30" | | | |

| CASING BLOWS PER FOOT | SAMPLE NO. | O.D. | PEN. | REC. | DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER 0-6 | 6-12 | 12-18 | 18-24 | VANE READING | DEPTH | STRATUM DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Auger | | | | | | | | | | | 0.3 | Topsoil |
| " | 1D | 2" | 24" | | 2.0 | 1 | 2 | 2 | 10 | | | |
| " | | | | | | | | | | | | |
| " | 2D | 2" | 24" | | 4.0 | 14 | 35 | 33 | 40 | | | |
| 25 | | | | | | | | | | | | |
| 3 | 3D | 2" | 24" | | 6.0 | 12 | 17 | 23 | 28 | | | |
| 5 | | | | | | | | | | | | |
| 9 | 4D | 2" | 17" | | 7.4 | 29 | 45 | 50 | | | | |
| 17 | | | | | | | | | | | | |
| 22 | 5D | 2" | 24" | | 10.0 | 21 | 30 | 51 | 48 | | | Olive Silty Fine Sand, w/Little Coarse Sand & Gravel, w/Trace of Cobbles |
| 2 | | | | | | | | | | | | |
| 7 | 6D | 2" | 24" | | 12.0 | 17 | 34 | 47 | 40 | | | |
| 27 | | | | | | | | | | | | |
| 52 | 7D | 2" | 24" | | 14.0 | 21 | 28 | 29 | 37 | | | |
| 135 | | | | | | | | | | | | |
| 14 | 8D | 2" | 17" | | 15.4 | 25 | 33 | 50 | | | | |
| 16 | | | | | | | | | | | | |
| 14 | 9D | 2" | 20" | | 17.7 | 14 | 18 | 33 | 50 | | 18.0 | |
| 20 | 10D | 2" | 11" | | 18.9 | 22 | 50 | | | | 18.9 | Gray Fine Sandy Silt w/Trace of Gravel |
| 50 | | | | | | | | | | | 19.9 | Boulder |
| Spun | 11D | 2" | 10" | | 20.8 | 30 | 50 | | | | | |
| Casing | | | | | | | | | | | | |
| " | 12D | 2" | 11" | | 22.9 | 35 | 50 | | | | | Gray Fine Sandy Silt w/Some Gravel & Cobbles |
| " | | | | | | | | | | | | |
| " | | | | | | | | | | | 25.0 | |
| " | 13D | 2" | 8" | | 25.7 | 35 | 50 | | | | | |
| " | | | | | | | | | | | | |
| " | | | | | | | | | | | | |
| " | 14D | 2" | 6" | | 28.5 | 125 | | | | | | Gray Silty Very Fine Sand w/Little M/C Sand, Some Gravel & Cobbles |
| " | | | | | | | | | | | | |
| " | D | 2" | 2" | 0" | 30.2 | 50 | | | | | | |
| " | 15D | 2" | 7" | | 31.6 | 55 | 50 | | | | 31.6 | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | 1R | 3" | 3.0' | 3.0' | 35.1 | 100% | | | | | | Rock |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | 2R | 3" | 4.9' | 4.9' | 40.0 | 100% | | | | | | |

SAMPLES
D = SPLIT SPOON
C = 2" SHELBY TUBE
S = 3" SHELBY TUBE
U = 3½" SHELBY TUBE
R = ROCK CORE
V = VANE TEST

SOIL CLASSIFIED BY:
[XX] DRILLER-VISUALLY
[ ] SOIL TECHNICIAN-VISUALLY
[ ] LABORATORY TESTS

REMARKS:
4" Casing refusal @ 19.2', Boulder from 18.9' to 19.9', Went open hole to 25.0', some cave in, Changed over to 3" casing & spun 3" casing to 28.0', pulled 4" casing out

HOLE NO. P-04-09

| | | |
|---|---|---|
| MAINE TEST BORINGS, INC.<br>BREWER, MAINE 04412 | CLIENT<br>Sevee & Maher Engineering, Inc. | SHEET 2 OF 2<br>HOLE NO. P-04-09 |
| DRILLER<br>Tom Schaefer | PROJECT NAME<br>West Old Town Landfill, 03076.09 | LINE & STATION |
| M.T.B. JOB NUMBER<br>04-095-A | LOCATION<br>Old Town, ME | OFFSET |

GROUND WATER OBSERVATIONS

| | CASING | SAMPLER | CORE BARREL | DATE 08/02/04 Start | DATE 08/03/04 Finish |
|---|---|---|---|---|---|
| TYPE | HW | SS | NQ2 | | |
| SIZE I.D. | 4" | 1 3/8" | 2" | | |
| HAMMER WT. | 300# | 140# | | | |
| HAMMER FALL | 16" | 30" | | | |

SURFACE ELEVATION

| CASING BLOWS PER FOOT | SAMPLE NO. | O.D. | PEN. | REC. | DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER 0-6 | 6-12 | 12-18 | 18-24 | VANE READING | DEPTH | STRATUM DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 3R | 3" | 5.0' | 5.0' | 45.0 | 100% | | | | | | Rock |
| | R | 3" | 2.0' | 0.0' | 47.0 | 0% | Very | Hard | Rock | | 47.0 | |
| | | | | | | | | | | | | Bottom of Boring @ 47.0' |
| | | | | | | | | | | | | Piezometer Installed @ 39.0' |
| | | | | | | | | | | | | Piezometer Installed @ 15.0' |

SAMPLES
D = SPLIT SPOON
C = 2" SHELBY TUBE
S = 3" SHELBY TUBE
U = 3½" SHELBY TUBE
R = ROCK CORE
V = VANE TEST

SOIL CLASSIFIED BY:
XX DRILLER-VISUALLY
SOIL TECHNICIAN-VISUALLY
LABORATORY TESTS

REMARKS:
4" Casing refusal @ 19.2', Boulder from 18.9' to 19.9', Went open hole to 25.0', some cave in, Changed over to 3" casing & spun 3" casing to 28.0', pulled 4" casing out

HOLE NO. P-04-09

# BEDROCK CORE LOG

PROJECT West old Town Landfill — BORING NO. P-04-09 — PAGE 1 OF 1

JOB NO. _____ DRILLER _____

CORE DIAMETER (IN.) 2" — ELEVATION (FT) INTERVAL _____ — DEPTH (FT) INTERVAL 31.6-45'

AZIMUTH — — INCLINATION 90° — LOGGED BY M. Scully (NAME) — 1/3/05 (DATE)

BREAKS IN CORE: MEASURED BREAKS OR PARTINGS ACROSS CORE; CHIPS, CAVITY, LOST CORE; MEASURED HIGH-ANGLE JOINT (JT = JOINT); D = CORE BROKEN BY DRILLER; M = CORE PARTED ALONG MICA CONCENTRATION

WX: WEATHERED - WEATHERING; SL - SLIGHT; MOD - MODERATE; SEV - SEVERE

DIP: DIP OF LAYERING, TEXTURE, FOLIATION, BEDDING, ETC.

| DEPTH | CONDITION OF CORE, WX, ETC. | DIP | RECOVERY (%) | RQD (%) | GRAPHIC LOG | ROCK TYPE, GRAIN SIZE, COLOR, TEXTURE, ETC. |
|---|---|---|---|---|---|---|
| 31 | | — | 0 | 0 | | 31.6': Top of Bedrock - rolleveone no recovery to 32'. |
| 33 | 80° - minor FeOx<br>" " "<br>80° " " " | 75°-80° | 94 | 70 | R1 | 32'-40': Interbedded black sulfidic phyllite & med. gray siltstone/graywacke - same as P-04-10.<br>- thin Qtz-Ca veinlets common. |
| | D<br>75° w. FeOx | | | | | |
| 35 | D w. minor FeOx<br>5° | 70°-75° | 100 | 82 | R2 | |
| 37 | 80° - w FeOx + silt<br>70° D | | | | | |
| 39 | 75° w. FeOx<br>75° w. FeOx | | | | | 40': Rock changes to med. gray massive-bedded, fine grained meta-graywacke - as P-04-07 |
| 41 | | 65-75° | 100 | 100 | R3 | |
| 43 | 25° D - on Qtz vein | | | | | |
| | 20° D | | | | | |
| 45 | | | | | | 45': End of Core: TD? |

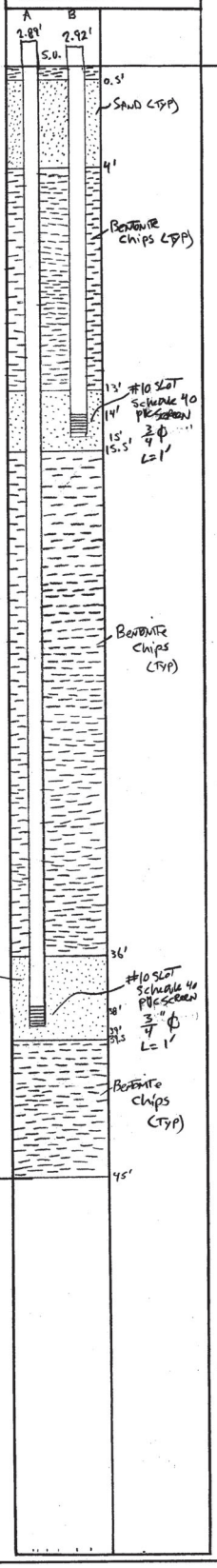
5/90

SEVEE & MAHER ENGINEERS

| | | | |
|---|---|---|---|
| PROJECT West Old Town Landfill Expansion | JOB NO. 03076.09 | BORING NO. P-04-09 | |
| DATE COMPLETED 8/5/04 | DATE WELLS INSTALLED 8/5/04 | DRILLING METHOD Wash-Rotary | |
| GROUND SURFACE ELEVATION (FT) 167.0' | DRILLING CONTRACTOR M.T.B. | LOGGED BY T. Riley | |
| BOREHOLE DIAMETER (IN.) 4.5" O.D. / 3.5" O.D. in Rock. | ROCK CORE DIAMETER (IN.) 2" | SHEET 1 OF 1 | |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | N | RQD | % Passing #200 Screen | Water Content % |
|---|---|---|---|---|---|---|
| 0 | 1D | 0-0.5' Topsoil | 12 | | | |
| | 2D | | 73 | | | |
| 5 | 3D | Olive Silty Fine SAND with Little Gravel, Course Sand and A Trace of Cobbles. | 51 | | 46% 51.4% | 11.4% |
| | 4D | | 50-0.4' | | | |
| | 5D | | 99 | | | |
| 10 | 6D | | 87 | | | |
| | 7D | | 66 | | | |
| 15 | 8D | | 50-0.4' | | | |
| | 9D | | 50-0.2' | | | |
| | 10D | 19' 20' Boulder | 50-0.4' | | | |
| 20 | 11D | Gray Fine Sandy SILT with some Gravel and Cobbles | 50-0.3' | | | |
| | 12D | | 50-0.4' | | | |
| 25 | 13D | | 50-0.2' | | | |
| | 14D | Gray Silty Very Fine Sand w/ Little Medium To Coarse Sand and some gravel and Cobbles | 125-0.5' | | 46.8% | 13.0% |
| 30 | 15D | 31.6' BASAL TILL | 55'-0.1' | | | |
| | | Rotary Core, No Sample | | | | |
| 35 | 1R | | | 70% | | |
| | 2R | | | 82% | | |
| 40 | 3R | | | 100% | | |
| 45 | | 45' Bedrock B.O.E. | | | | |
| 50 | | | | | | |
| 55 | | | | | | |
| 60 | | | | | | |

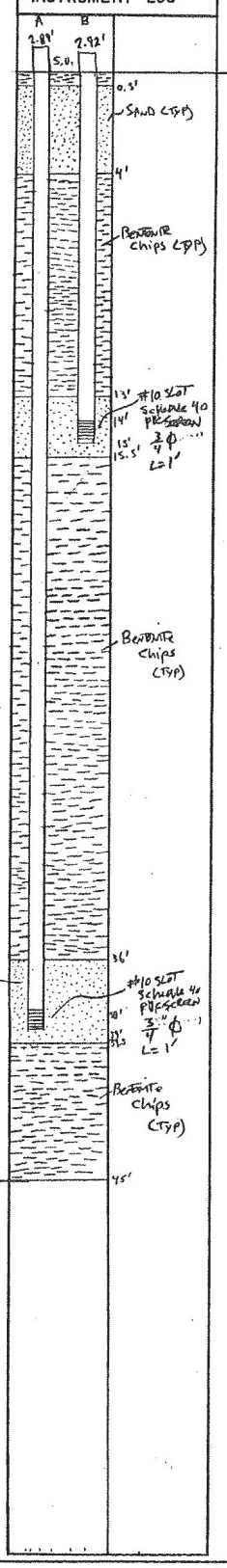
INSTRUMENT LOG




NOTES

| | | | |
|---|---|---|---|
| PROJECT West Old Town Landfill Expansion | JOB NO. 03076.09 | BORING NO. P-04-09 | |
| DATE COMPLETED 8/5/04 | DATE WELLS INSTALLED 8/5/04 | DRILLING METHOD Wash-Rotary | |
| GROUND SURFACE ELEVATION (FT) 167.0' | DRILLING CONTRACTOR M.T.B | LOGGED BY T. Riley / JES | |
| BOREHOLE DIAMETER (IN) 4.5" O.D. / 3.5" O.D. in Rock. | ROCK CORE DIAMETER (IN.) 2" | SHEET 1 OF 1 | |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | N | RQD | % Passing #200 Screen | Water Content % |
|---|---|---|---|---|---|---|
| 0 | 1D | 0-0.3' Topsoil | 12 | | | |
| | 2D | | 73 | | | |
| 5 | 3D | Olive Silty Fine Sand with Little Gravel, Coarse Sand and a Trace of Cobbles. | 51 | | 51.4% | 11.4% |
| | 4D | | 50/6.4' | | | |
| | 5D | | 99 | | | |
| 10 | 6D | | 87 | | | |
| | 7D | | 66 | | | |
| 15 | 8D | | 50/0.4' | | | |
| | 9D | | 50/0.2' | | | |
| | 10D | 19.9' | 50/0.4' | | | |
| 20 | | 20' Boulder | | | | |
| | 11D | | 50/0.3' | | | |
| | 12D | Gray Fine Sandy SIT / CLAY with some Gravel and Cobbles | 50/0.4' | | | |
| 25 | 13D | | 50/0.2' | | | |
| | 14D | VERY Gray Silty Very Fine Sand w/ Little Medium to Coarse Sand and some Gravel and Cobbles | 125/2.5' | | 46.9% | 13.0% |
| 30 | 15D | 31.6' (BASAL TILL) | 55/0.1' | | | |
| | 1R | INTACT BEDDED PHYLLITE, SILTSTONE, METAGRAYWACKE | | 50% | | |
| 35 | 2R | | | 50% | | |
| 40 | 3R | MISTA - GRAY WACKE | | 100% | | |
| 45 | | 45' (Bedrock) B.O.E. | | | | |
| 50 | | | | | | |
| 55 | | | | | | |
| 60 | | | | | | |




$K_f = 9.7 \times 10^{-6}$ cm/s

NOTES

| | | | |
|---|---|---|---|
| PROJECT West Old Town Landfill | JOB NO. 04119.00 | BORING NO. B-04-102 | MW-04-102 |
| DATE COMPLETED 12/29/04 | DATE WELLS INSTALLED 12/29/04 | DRILLING METHOD Auger + Rotary Wash | |
| GROUND SURFACE ELEVATION (FT) 167.68' | DRILLING CONTRACTOR M.T.B | LOGGED BY T. Riley | |
| BOREHOLE DIAMETER (IN) 4.5" | ROCK CORE DIAMETER (IN.) N/A | SHEET 1 OF 1 | |

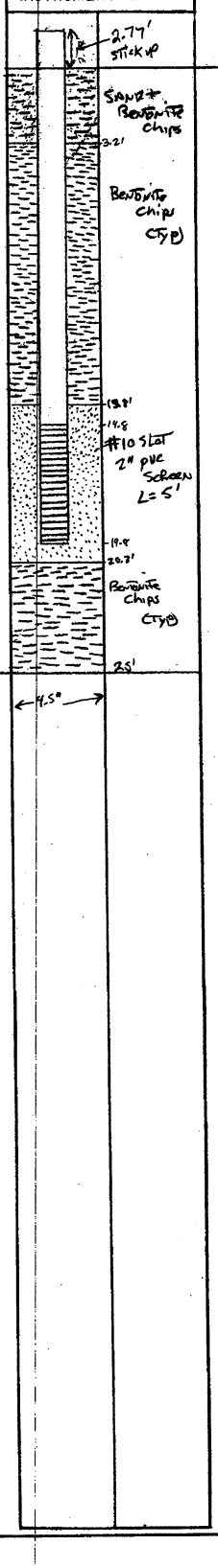
| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | DRILLING METHOD | DRILLING No. | INSTRUMENT LOG | DEPTH (FT) |
|---|---|---|---|---|---|---|
| 0 | 1D 0.5'–2.5' | Brown silty fine sand w/ little coarse sand, gravel & cobbles | Auger | 25 | 2.64' stick up; Bentonite chips & sand | 0 |
| 5 | 2D 5'–6.2' | | Rotary wash | 57-50/0.2' | Bentonite chips | 5 |
| 10 | 3D 10'–11.7' | | | 55-50/0.2' | 1"; 10' #1 slot 2" pvc screen L=5'; sand 9' to 16' | 10 |
| 13' | | Grey fine sandy silt w/ coarse sand & gravel, trace of clay | | | | |
| 15 | 4D 15'–16.2' | | | 50-50/0.2' | 15'; 16' | 15 |
| 19' | | Grey clayey sandy silt w/ coarse sand + gravel | Open hole | 36 | Bentonite chips (typ) | 20 |
| 20' | 5D 22'–23' | | | | | |
| 22.5 | | Grey fine sandy silt w/ coarse sand + gravel, trace of clay | | | | |
| 25 | 6D 23'–25' | | | 64 | | 25 |
| | | Bor. 25' | | | 4.5" | |

NOTES

| | | | |
|---|---|---|---|
| PROJECT West Old Town Landfill | JOB NO. 04/17.00 | BORING NO. B-04-105 | MW-04-105 |
| DATE COMPLETED 12/21/04 | DATE WELLS INSTALLED 12/21/04 | DRILLING METHOD Auger + Rotary wash | |
| GROUND SURFACE ELEVATION (FT) 162.86' | DRILLING CONTRACTOR M.T.B. | LOGGED BY T. Riley | |
| BOREHOLE DIAMETER (IN) 4.5" | ROCK CORE DIAMETER (IN.) N/A | SHEET 1 OF 1 | |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | N | Drilling Sequence |
|---|---|---|---|---|
| 0 | 1D | Brown silty fine to medium sand w/ little course sand + gravel | 5 | Auger |
| 4.5' | | | | |
| 5 | 2D | Mottled clayie sandy silt | 20 | Rotary wash |
| 8' | | | | |
| 10 | 3D | Brown fine to medium sand w/ little silt, course sand, and gravel, trace of cobbles. | 42 | |
| 14' | | | | |
| 15 | 4D | Becoming - and a trace of silt. | 90 | |
| 20 | 5D | 20.3' | 105-0.5' | Open Hole |
| | | Olive clayie silt w/ fine to medium sand and some course sand, gravel and a trace of cobbles. | | |
| 25 | 6D | 25' B.O.E | 98 | |

INSTRUMENT LOG




DEPTH (FT)

NOTES



SEVEE & MAHER ENGINEERS

| MAINE TEST BORINGS, INC.<br>BREWER, MAINE 04412 | CLIENT<br>Sevee & Maher Engineering, Inc. | SHEET 1 OF 3<br>HOLE NO. P-04-07 ~~P-04-03~~ |
|---|---|---|
| DRILLER<br>Tom Schaefer | PROJECT NAME<br>West Old Town Landfill, 03076.09 | LINE & STATION |
| M.T.B. JOB NUMBER<br>04-095-A | LOCATION<br>Old Town, ME | OFFSET |

GROUND WATER OBSERVATIONS

| | CASING | SAMPLER | CORE BARREL | DATE 07/22/04 Start | DATE 07/28/04 Finish |
|---|---|---|---|---|---|
| TYPE | HW | SS | NQ2 | | |
| SIZE I.D. | 4" | 1 3/8" | 2" | | |
| HAMMER WT. | 300# | 140# | | | |
| HAMMER FALL | 16" | 30" | | SURFACE ELEVATION | |

| CASING BLOWS PER FOOT | SAMPLE NO. | O.D. | PEN. | REC. | DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER 0-6 | 6-12 | 12-18 | 18-24 | VANE READING | DEPTH | STRATUM DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Auger | | | | | | | | | | | 0.2 | Topsoil |
| " | 1D | 2" | 24" | 22" | 2.0 | 3 | 3 | 9 | 20 | | 0.5 | Gray Brown Fine Sandy Silt |
| " | | | | | | | | | | | | Mottled Silty Fine Sand, |
| " | 2D | 2" | 24" | | 4.0 | 28 | 46 | 32 | 32 | | 3.0 | w/Little Coarse Sand & Gravel |
| 130 | 3D | 2" | 10" | | 4.8 | 24 | 50 | | | | | Olive Silty Fine Sand |
| Spun | | | | | | | | | | | 4.0 | w/Little Coarse Sand, Gravel & Cobbles |
| Casing | | | | | | | | | | | | Olive Silty Fine Sand, |
| | | | | | | | | | | | 4.8 | w/Little Coarse Sand & Gravel |
| | 1R | 3" | 4.5' | 4.5' | 11.5 | 100% | | | | | | |
| | 2R | 3" | 5.0' | 5.0' | 16.5 | 100% | | | | | | |
| | 3R | 3" | 5.0' | 5.0' | 21.5 | 100% | | | | | | Rock |
| | 4R | 3" | 5.0' | 5.0' | 26.5 | 100% | | | | | | |
| | 5R | 3" | 5.0' | 5.0' | 31.5 | 100% | | | | | | |
| | 6R | 3" | 5.0' | 5.0' | 36.5 | 100% | | | | | | |

SAMPLES
D = SPLIT SPOON
C = 2" SHELBY TUBE
S = 3" SHELBY TUBE
U = 3½" SHELBY TUBE
R = ROCK CORE
V = VANE TEST

SOIL CLASSIFIED BY:
[XX] DRILLER-VISUALLY
[ ] SOIL TECHNICIAN-VISUALLY
[ ] LABORATORY TESTS

REMARKS:
Washed ahead from 4.0' to 7.0';
Artesian Pressure @ 25.0'

HOLE NO. P-04-03

| MAINE TEST BORINGS, INC.<br>BREWER, MAINE 04412 | CLIENT<br>Sevee & Maher Engineering, Inc. | SHEET 2 OF 3<br>HOLE NO. P-04-07<br>~~P-04-03~~ |
|---|---|---|
| DRILLER<br>Tom Schaefer | PROJECT NAME<br>West Old Town Landfill, 03076.09 | LINE & STATION |
| M.T.B. JOB NUMBER<br>04-095-A | LOCATION<br>Old Town, ME | OFFSET |

GROUND WATER OBSERVATIONS

| | CASING | SAMPLER | CORE BARREL | DATE 07/22/04 Start | DATE 07/28/04 Finish |
|---|---|---|---|---|---|
| TYPE | HW | SS | NQ2 | SURFACE ELEVATION | |
| SIZE I.D. | 4" | 1 3/8" | 2" | | |
| HAMMER WT. | 300# | 140# | | | |
| HAMMER FALL | 16" | 30" | | | |

| CASING BLOWS PER FOOT | SAMPLE NO. | O.D. | PEN. | REC. | DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER 0-6 | 6-12 | 12-18 | 18-24 | VANE READING | DEPTH | STRATUM DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 7R | 3" | 5.0' | 5.0' | 41.5 | 100% | | | | | | |
| | 8R | 3" | 5.0' | 4.0' | 46.5 | 80.% | | | | | | |
| | 9R | 3" | 4.2' | 4.7' | 50.7 | 111.9% | | | | | | |
| | 10R | 3" | 4.3' | 5.0' | 55.0 | 116.3% | | | | | | |
| | 11R | 3" | 3.2' | 3.2' | 58.2 | 100% | | | | | | Rock |
| | 12R | 3" | 5.0' | 5.0' | 63.2 | 100% | | | | | | |
| | 13R | 3" | 5.0' | 4.8' | 68.2 | 96% | | | | | | |
| | 14R | 3" | 5.0' | 5.2' | 73.2 | 104% | | | | | | |
| | 15R | 3" | 4.5' | 4.5' | 77.7 | 100% | | | | | | |

SAMPLES

D = SPLIT SPOON
C = 2" SHELBY TUBE
S = 3" SHELBY TUBE
U = 3½" SHELBY TUBE
R = ROCK CORE
V = VANE TEST

SOIL CLASSIFIED BY:

[XX] DRILLER-VISUALLY
[ ] SOIL TECHNICIAN-VISUALLY
[ ] LABORATORY TESTS

REMARKS:
Washed ahead from 4.0' to 7.0';
Artesian Pressure @ 25.0'

HOLE NO. P-04-03

| MAINE TEST BORINGS, INC.<br>BREWER, MAINE 04412 | CLIENT<br>Sevee & Maher Engineering, Inc. | SHEET 3 OF 3<br>HOLE NO. P-04-07 ~~P-04-03~~ |
|---|---|---|
| DRILLER<br>Tom Schaefer | PROJECT NAME<br>West Old Town Landfill, 03076.09 | LINE & STATION |
| M.T.B. JOB NUMBER<br>04-095-A | LOCATION<br>Old Town, ME | OFFSET |

| GROUND WATER OBSERVATIONS | | CASING | SAMPLER | CORE BARREL | DATE 07/22/04 Start | DATE 07/28/04 Finish |
|---|---|---|---|---|---|---|
| | TYPE | HW | SS | NQ2 | SURFACE ELEVATION | |
| | SIZE I.D. | 4" | 1 3/8" | 2" | | |
| | HAMMER WT. | 300# | 140# | | | |
| | HAMMER FALL | 16" | 30" | | | |

| CASING BLOWS PER FOOT | SAMPLE NO. | O.D. | PEN. | REC. | DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER 0-6 | 6-12 | 12-18 | 18-24 | VANE READING | DEPTH | STRATUM DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 16R | 3" | 5.0' | 5.0' | 82.7 | 100% | | | | | | |
| | 17R | 3" | 5.0' | 5.0' | 87.7 | 100% | | | | | | |
| | 18R | 3" | 5.0' | 4.8' | 92.7 | 96% | | | | | | Rock |
| | 19R | 3" | 4.8' | 5.0' | 97.5 | 104% | | | | | | |
| | 20R | 3" | 5.0' | 4.9' | 102.5 | 98% | | | | | | |
| | 21R | 3" | 5.0' | 4.8' | 107.5 | 96% | | | | | 107.5 | |
| | | | | | | | | | | | | Bottom of Boring @ 107.5'<br>Piezometer Installed @ 83.0'<br>Piezometer Installed @ 25.4' |

SAMPLES

D = SPLIT SPOON
C = 2" SHELBY TUBE
S = 3" SHELBY TUBE
U = 3½" SHELBY TUBE
R = ROCK CORE
V = VANE TEST

SOIL CLASSIFIED BY:

XX DRILLER-VISUALLY
SOIL TECHNICIAN-VISUALLY
LABORATORY TESTS

REMARKS:
Washed ahead from 4.0' to 7.0';
Artesian Pressure @ 25.0'

HOLE NO. P-04-03

# BEDROCK CORE LOG

PROJECT West Old Town Land Fill — BORING NO. P-04-07 — PAGE 1 OF 8

JOB NO. _____ DRILLER _____

CORE DIAMETER (IN.) 2" — ELEVATION (FT) INTERVAL _____ — DEPTH (FT) INTERVAL 4.8'-107.5'

AZIMUTH — — INCLINATION 90° — LOGGED BY M. Scully (NAME) — 12/30/04 (DATE)

| | |
|---|---|
| MEASURED BREAKS OR PARTINGS ACROSS CORE | D CORE BROKEN BY DRILLER |
| CHIPS, CAVITY, LOST CORE | |
| MEASURED HIGH-ANGLE JOINT (JT = JOINT) | M CORE PARTED ALONG MICA CONCENTRATION |

WX: WEATHERED - WEATHERING
SL - SLIGHT
MOD - MODERATE
SEV - SEVERE

DIP: DIP OF LAYERING, TEXTURE, FOLIATION, BEDDING, ETC.

| DEPTH | BREAKS IN CORE | CONDITION OF CORE, WX, ETC. | DIP | RECOVERY (%) | RQD (%) | GRAPHIC LOG | ROCK TYPE, GRAIN SIZE, COLOR, TEXTURE, ETC. |
|---|---|---|---|---|---|---|---|
| 4 | | | | | | | 4.8' - Top of Bedrock |
| 6 | | Rollerconed No recovery | - | 0 | - | X | Rollerconed to 7.0' no recovery |
| 8 | | 2° D | 88° -90° | 100 | 100 | R1 | 7'-25.5': Rock is interbedded dark gray to black sulfidic, carbonaceous shale/phyllite and light to medium gray siltstone. - weathered fracture surfaces have abundant FeOx staining. - Black phyllite beds occassionally have abundant disseminated pyrite. - Bedding is nearly vertical |
| 10 | | D | | | | | |
| 12 | | | 88° -90° | 100 | 100 | R2 | |
| 14 | | 10° w. FeOx stain | | | | | |
| 16 | | D No stain | | | | | |
| 18 | | 10° w. FeOx Stain 20° " " | 80 -90° | 100 | 88 | | 17'-23': several thin white quartz-Ca veinlets. weathered fractures have small cavities due to dissolution of calcite. |

# BEDROCK CORE LOG

PROJECT West Old Town Land Fill BORING NO. P-04-07 PAGE 2 OF 8

JOB NO. _____ DRILLER _____

CORE DIAMETER (IN.) 2" ELEVATION (FT) INTERVAL _____ DEPTH (FT) INTERVAL _____

AZIMUTH — INCLINATION 90° LOGGED BY M. Scully (NAME) 12/30/04 (DATE)

BREAKS IN CORE: MEASURED BREAKS OR PARTINGS ACROSS CORE; CHIPS, CAVITY, LOST CORE; MEASURED HIGH-ANGLE JOINT (JT = JOINT); D CORE BROKEN BY DRILLER; M CORE PARTED ALONG MICA CONCENTRATION

WX: WEATHERED - WEATHERING; SL - SLIGHT; MOD - MODERATE; SEV - SEVERE

DIP: DIP OF LAYERING, TEXTURE, FOLIATION, BEDDING, ETC.

| DEPTH | CONDITION OF CORE, WX, ETC. | DIP | RECOVERY (%) | RQD (%) | GRAPHIC LOG | ROCK TYPE, GRAIN SIZE, COLOR, TEXTURE, ETC. |
|---|---|---|---|---|---|---|
| 18 | | | | | | |
| | 35° D | 80° -90° | 100 | 88 | R3 | |
| 20 | 40° D | | | | | |
| | 15° D | | | | | |
| 22 | 50° - Stained | | | | | |
| | 5° " | | | | | |
| | 50° " | | | | | |
| → | 20° - Rubbly core - stained | 80° | | | | 23.3-23.7': Fracture zone - rubbly + FeOx - stained core. |
| 24 | | -90° | 96 | 50 | R4 | 24.1-25.2': " |
| → | Rubbly core - stained w. FeOx | | | | | |
| | 20° FeOx | | | | | 25.5' Rock shows abrupt change to medium gray, fine to medium grained meta-graywacke |
| 26 | 20° D | | | | | - rock is generally hard and competent |
| | D | | | | | - whitish Qtz+Ca veins are common at various angles. |
| 28 | | | | | | |
| | 40° D | | 100 | 100 | R5 | |
| 30 | | | | | | |
| | 10° D | | | | | |
| | D | | | | | |
| 32 | | | | | | 31.8-32.2': Qtz-Ca vein |

# BEDROCK CORE LOG

PROJECT West Old Town Landfill BORING NO. P-04-07 PAGE 3 OF 8

JOB NO. _____ DRILLER _____

CORE DIAMETER (IN.) 2" ELEVATION (FT) INTERVAL _____ DEPTH (FT) INTERVAL _____

AZIMUTH — INCLINATION 90° LOGGED BY M. Scully (NAME) 12/30/04 (DATE)

BREAKS IN CORE
- MEASURED BREAKS OR PARTINGS ACROSS CORE
- CHIPS, CAVITY, LOST CORE
- MEASURED HIGH-ANGLE JOINT (JT = JOINT)
- D: CORE BROKEN BY DRILLER
- M: CORE PARTED ALONG MICA CONCENTRATION

WX: WEATHERED - WEATHERING
SL - SLIGHT
MOD - MODERATE
SEV - SEVERE

DIP: DIP OF LAYERING, TEXTURE, FOLIATION, BEDDING, ETC.

| DEPTH | CONDITION OF CORE, WX, ETC. | DIP | RECOVERY (%) | RQD (%) | GRAPHIC LOG | ROCK TYPE, GRAIN SIZE, COLOR, TEXTURE, ETC. |
|---|---|---|---|---|---|---|
| 32 | D | | | | | |
| | 20° stained | 80° | | | | |
| 34 | 10° weathered | -90° | 98 | 86 | R6 | |
| | Rubbly - weathered | | | | | |
| | 70° - on contact | | | | | 35.3': Thin layer of black phyllite at ~ 80° |
| 36 | D | | | | | |
| | | | | | | 37'-40': several thin, whitish Qtz-ca veins. |
| 38 | | 80° -90° | 100 | 90 | R7 | |
| | 5° D | | | | | |
| 40 | D | | | | | |
| | 75° - FeOx stained | | | | | |
| 42 | | 85° -90° | 100 | 93 | R8 | |
| | 5° D | | | | | |
| 44 | D | | | | | |
| | 25° - FeOx stained | | | | | |
| 46 | | | | | | |

# BEDROCK CORE LOG

PROJECT West Old Town Landfill BORING NO. P-04-07 PAGE 4 OF 8

JOB NO. _____ DRILLER _____

CORE DIAMETER (IN.) 2" ELEVATION (FT) _____ DEPTH (FT) _____
INTERVAL INTERVAL

AZIMUTH - INCLINATION 90° LOGGED BY M. Scully (NAME) 12/30/04 (DATE)

BREAKS IN CORE
- MEASURED BREAKS OR PARTINGS ACROSS CORE
- CHIPS, CAVITY, LOST CORE
- MEASURED HIGH-ANGLE JOINT (JT = JOINT)
- D: CORE BROKEN BY DRILLER
- M: CORE PARTED ALONG MICA CONCENTRATION

WX: WEATHERED - WEATHERING
SL - SLIGHT
MOD - MODERATE
SEV - SEVERE

DIP: DIP OF LAYERING, TEXTURE, FOLIATION, BEDDING, ETC.

| DEPTH | CONDITION OF CORE, WX, ETC. | DIP | RECOVERY (%) | RQD (%) | GRAPHIC LOG | ROCK TYPE, GRAIN SIZE, COLOR, TEXTURE, ETC. |
|---|---|---|---|---|---|---|
| 46 | 15° D<br>5°<br>50° clean | 85°<br>-90° | 100 | 87 | R9 | |
| 48 | 5° D<br>D - clean | | | | | |
| 50 | | 80° | | | | |
| 52 | 20° D<br>20° FeOx stain | -90° | 100 | 90 | R10 | |
| 54 | Rubbly - weathered to reddish-brown<br>" | | | | | 54.2' - 55.3': Rock is rubbly and bleached to a medium reddish brown. |
| 56 | 10° | 85° | 81 | 67 | R11 | |
| 58 | 5° w. FeOx Stain<br>- Rubble - D | -90° | | | | |
| 60 | 22°<br>40° > w. FeOx Stain | 85°<br>-90° | | | | |

# BEDROCK CORE LOG

PROJECT West Old Town Land Fill BORING NO. P-04-07 PAGE 5 OF 8

JOB NO. _____ DRILLER _____

CORE DIAMETER (IN.) 2" ELEVATION (FT) INTERVAL _____ DEPTH (FT) INTERVAL _____

AZIMUTH - INCLINATION 90° LOGGED BY M. Scully (NAME) 12/30/04 (DATE)

BREAKS IN CORE
- MEASURED BREAKS OR PARTINGS ACROSS CORE
- CHIPS, CAVITY, LOST CORE
- MEASURED HIGH-ANGLE JOINT (JT = JOINT)
- D CORE BROKEN BY DRILLER
- M CORE PARTED ALONG MICA CONCENTRATION

WX: WEATHERED - WEATHERING
SL - SLIGHT
MOD - MODERATE
SEV - SEVERE

DIP: DIP OF LAYERING, TEXTURE, FOLIATION, BEDDING, ETC.

| DEPTH | CONDITION OF CORE, WX, ETC. | DIP | RECOVERY (%) | RQD (%) | GRAPHIC LOG | ROCK TYPE, GRAIN SIZE, COLOR, TEXTURE, ETC. |
|---|---|---|---|---|---|---|
| 60 | 0° 20° staining | 85° -90° | 96 | 82 | R12 | 60'- Rock begins to show a fragmental texture + has some layers and lenses of black phyllite. |
| 62 | D | | | | | |
| 64 | 70° FeOx stain. | 80° -90° | 98 | 84 | R13 | |
| 66 | 5° - FeOx. | | | | | |
| 68 | D | | | | | |
| | D | | | | | |
| 70 | 85° D | 80° -90° | 102 | 100 | R14 | |
| 72 | D | | | | | |
| | 20° D | | | | | |
| 74 | | | | | | |

# BEDROCK CORE LOG

PROJECT West Old Town Landfill BORING NO. P-04-07 PAGE 6 OF 8

JOB NO. _____ DRILLER _____

CORE DIAMETER (IN.) 2" ELEVATION (FT) INTERVAL _____ DEPTH (FT) INTERVAL _____

AZIMUTH - INCLINATION 90° LOGGED BY M. Scully (NAME) 12/30/04 (DATE)

BREAKS IN CORE
- MEASURED BREAKS OR PARTINGS ACROSS CORE
- CHIPS, CAVITY, LOST CORE
- MEASURED HIGH-ANGLE JOINT (JT = JOINT)
- D CORE BROKEN BY DRILLER
- M CORE PARTED ALONG MICA CONCENTRATION

WX: WEATHERED - WEATHERING
SL - SLIGHT
MOD - MODERATE
SEV - SEVERE

DIP: DIP OF LAYERING, TEXTURE, FOLIATION, BEDDING, ETC.

| DEPTH | CONDITION OF CORE, WX, ETC. | DIP | RECOVERY (%) | RQD (%) | GRAPHIC LOG | ROCK TYPE, GRAIN SIZE, COLOR, TEXTURE, ETC. |
|---|---|---|---|---|---|---|
| 74 | | | | | | |
| | 5° stained, Rubbly | 85° | | | | |
| 76 | | -90° | 96 | 75 | R15 | |
| | 70° FeOx | | | | | |
| | 10° FeOx | | | | | |
| | D | | | | | |
| | D | | | | | |
| 78 | 15° D | | | | | |
| | 50° stained | | | | | |
| | 25° " | | | | | |
| 80 | | 85° | 98 | 78 | R16 | |
| | | -90° | | | | |
| | 5° FeOx | | | | | |
| 82 | | | | | | |
| | D | | | | | |
| | 5° D | | | | | |
| 84 | | | | | | |
| | 10° D | | | | | |
| | | 85° | | 96% | | |
| 86 | | -90° | 100 | | R17 | |
| 88 | | | | | | |

# BEDROCK CORE LOG

PROJECT West Old Town Landfill BORING NO. P-04-07 PAGE 7 OF 8

JOB NO. _____ DRILLER _____

CORE DIAMETER (IN.) 2" ELEVATION (FT) INTERVAL _____ DEPTH (FT) INTERVAL _____

AZIMUTH - INCLINATION 90° LOGGED BY M. Scully (NAME) 12/30/04 (DATE)

BREAKS IN CORE
- MEASURED BREAKS OR PARTINGS ACROSS CORE
- CHIPS, CAVITY, LOST CORE
- MEASURED HIGH-ANGLE JOINT (JT = JOINT)
- D: CORE BROKEN BY DRILLER
- M: CORE PARTED ALONG MICA CONCENTRATION

WX: WEATHERED - WEATHERING
SL - SLIGHT
MOD - MODERATE
SEV - SEVERE

DIP: DIP OF LAYERING, TEXTURE, FOLIATION, BEDDING, ETC.

| DEPTH | CONDITION OF CORE, WX, ETC. | DIP | RECOVERY (%) | RQD (%) | GRAPHIC LOG | ROCK TYPE, GRAIN SIZE, COLOR, TEXTURE, ETC. |
|---|---|---|---|---|---|---|
| 88 | 20° D | | | | | |
| 90 | | 85°-90° | 100 | 100 | R18 | |
| | 30° D | | | | | |
| 92 | 20° D | | | | | |
| | D | | | | | |
| 94 | | 85°-90° | 100 | 100 | R19 | |
| 96 | D | | | | | |
| 98 | | 85°-90° | 100 | 100 | R20 | |
| 100 | 15° D | | | | | |
| 102 | | | | | | |

# BEDROCK CORE LOG

PROJECT West Old Town Landfill BORING NO. P-04-07 PAGE 8 OF 8

JOB NO. _____ DRILLER _____

CORE DIAMETER (IN.) 2" ELEVATION (FT) INTERVAL _____ DEPTH (FT) INTERVAL _____

AZIMUTH - INCLINATION 90° LOGGED BY M. Scully (NAME) 12/30/04 (DATE)

BREAKS IN CORE

MEASURED BREAKS OR PARTINGS ACROSS CORE
CHIPS, CAVITY, LOST CORE
MEASURED HIGH-ANGLE JOINT (JT = JOINT)
D CORE BROKEN BY DRILLER
M CORE PARTED ALONG MICA CONCENTRATION

WX: WEATHERED - WEATHERING
SL - SLIGHT
MOD - MODERATE
SEV - SEVERE

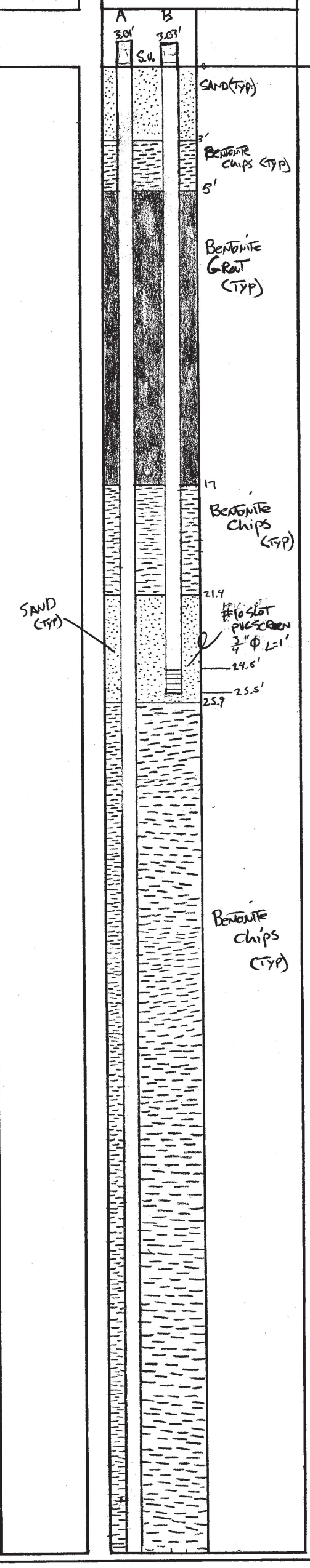
DIP: DIP OF LAYERING, TEXTURE, FOLIATION, BEDDING, ETC.

| DEPTH | CONDITION OF CORE, WX, ETC. | DIP | RECOVERY (%) | RQD (%) | GRAPHIC LOG | ROCK TYPE, GRAIN SIZE, COLOR, TEXTURE, ETC. |
|---|---|---|---|---|---|---|
| 102 | 75° - on Qtz-Ca vein | | | | | |
| 104 | | 85° 90° | 95 | 100 | R21 | |
| 106 | 20° D | | | | | |
| 108 | | | | | | 107.5': TD |

| | | | |
|---|---|---|---|
| PROJECT West Old Town Landfill Extension | JOB NO. 03076.09 | BORING NO. P-04-07 Piezometers A&B | |
| DATE COMPLETED 7/29/04 | DATE WELLS INSTALLED 7/28/04 | DRILLING METHOD Wash-Rotary | |
| GROUND SURFACE ELEVATION (FT) 174.1' | DRILLING CONTRACTOR M.T.B | LOGGED BY T. Riley | |
| BOREHOLE DIAMETER (IN.) 4.5" O.D. / 3.5" O.D. in Rock | ROCK CORE DIAMETER (IN.) 2" | SHEET 1 OF 2 | |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | N | RQD | % Passing #200 Screen | Water Content % |
|---|---|---|---|---|---|---|
| 0 | 1D | 0 - 0.2 Topsoil<br>Gray Brown Fine Sandy Silt<br>Mottled Silty Fine Sand with Little Course Sand and Gravel | 29 | | 60.2% | 11.6% |
| 2' | 2D | Increased Gravel | 64 | | | |
| 4' | 3D | Olive Silty Fine Sand w/ Little Course Sand + Gravel<br>Bedrock at 4.8' | 50-0.3' | | 60% | 11.4% |
| | | Roller Cone. - No Sample. | | | | |
| 10 | 1R | | | 100% | | |
| 15 | 2R | | | 100% | | |
| 20 | 3R | | | 88% | | |
| 25 | 4R | | | 50% | | |
| 30 | 5R | | | 100% | | |
| 35 | 6R | | | 86% | | |
| 40 | 7R | | | 90% | | |
| 45 | 8R | | | 93% | | |
| | 9R | | | 87% | | |
| 50 | 10R | | | 90% | | |
| 55 | 11R | | | 67% | | |
| 60 | | Bedrock | | | | |

INSTRUMENT LOG



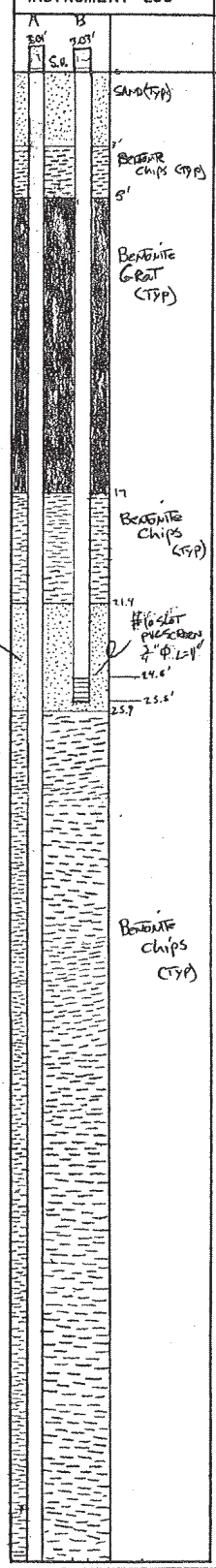

NOTES



SEVEE & MAHER ENGINEERS

| | | | |
|---|---|---|---|
| PROJECT West Old Town Landfill Extension | JOB NO. 03076.09 | BORING NO. P-04-07 | Piezometers A & B |
| DATE COMPLETED 7/29/04 | DATE WELLS INSTALLED 7/28/04 | DRILLING METHOD Wash-Rotary | |
| GROUND SURFACE ELEVATION (FT) 174.1' | DRILLING CONTRACTOR M.T.B | LOGGED BY T.Riley / JLS | |
| BOREHOLE DIAMETER (IN) 4.5" O.D / 3.5" OD in Rock | ROCK CORE DIAMETER (IN.) 2" | | SHEET 1 OF 2 |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | N | RQD | % Passing #200 Screen | Water Content % |
|---|---|---|---|---|---|---|
| 0 | 1D | 0-2' TOPSOIL<br>Grey Brown Fine Sandy Silt<br>2' MOTTLED Silty Fine Sand with little coarse Sand and Gravel | 29 | | 60.2% | 11.6% |
| | 2D | 4' ... increased Gravel CONTENT (BASAL TILL) | 64 | | | |
| 5 | 3D | 6' Silty Fine Sand w/ little coarse Sand & Gravel<br>4.8' | 50/0.3' | | 60% | 11.4% |
| | | Roller Cone. - No Sample. | | | | |
| 10 | 1R | | | 100% | | |
| | 2R | DARK GRAY PHYLLITE AND GRAY SILTSTONE | | 100% | | |
| 15 | | ... WX | | | | |
| 20 | 3R | | | 88% | | |
| | 4R | ... FRACTURE ZONE<br>25.5' | | 20% | | |
| 25 | 5R | GRAY META-GRAYWACKE | | 100% | | |
| 30 | 6R | | | 86% | | |
| 35 | 7R | ... OCCASIONAL PHYLLITE LAYERS | | 90% | | |
| 40 | 8R | | | 93% | | |
| 45 | 9R | | | 87% | | |
| 50 | 10R | | | 90% | | |
| | | ... WX ZONE | | | | |
| 55 | 11R | | | 67% | | |
| 60 | | (Bedrock) | | | | |




NOTES

| PROJECT | JOB NO. | BORING NO. |
|---|---|---|
| West Old Town Landfill Extension | 03076.09 | P-04-07 |

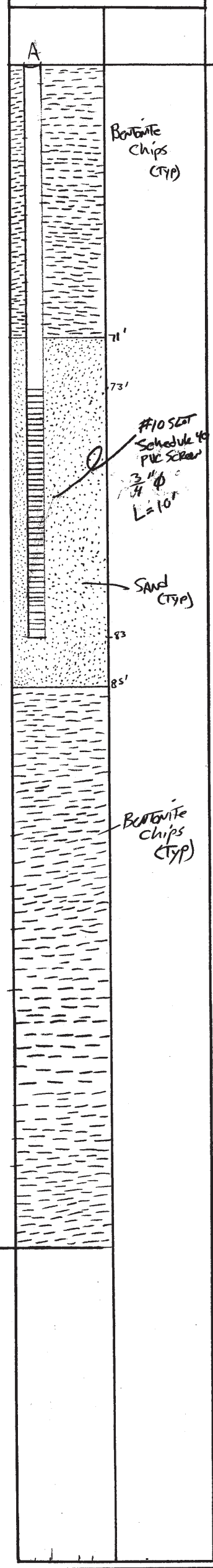
| DATE COMPLETED | DATE WELLS INSTALLED | DRILLING METHOD |
|---|---|---|
| 7/29/04 | 7/28/04 | Wash-Retnry |

| GROUND SURFACE ELEVATION (FT) | DRILLING CONTRACTOR | LOGGED BY |
|---|---|---|
| 174.1' | M.T.B | T. Riley |

| BOREHOLE DIAMETER (IN) | ROCK CORE DIAMETER (IN.) | SHEET |
|---|---|---|
| 4.5" O.D. / 3.5" O.D. in Rock | 2" | 2 OF 2 |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | RQD |
|---|---|---|---|
| 60 | | | |
| | 12R | | 82% |
| 65 | 13R | | 84% |
| 70 | 14R | | 100% |
| 75 | 15R | | 75% |
| 80 | 16R | | 78% |
| 85 | 17R | | 96% |
| 90 | 18R | | 100% |
| 95 | 19R | | 100% |
| 100 | 20R | | 100% |
| 105 | 21R | | 100% |
| | | 107.5' Bedrock B.O.E. | |

INSTRUMENT LOG




DEPTH (FT) 60 65 70 75 80 85 90 95 100 105

NOTES



SEVEE & MAHER ENGINEERS

| PROJECT: JUNIPER RIDGE LANDFILL EXPANSION | JOB NO.: 18018.00 | | BORING NO.: MW-501 |
|---|---|---|---|
| DATE STARTED: 3/27/2018 | DATE FINISHED: 3/29/2018 | DRILLING METHOD: DRIVE & WASH | |
| GROUND SURFACE ELEVATION (FT): 163.19 | DRILLING CONTRACTOR: N.E.B.C. | | LOGGED BY:NMT |
| BOREHOLE DIA. (IN): 4.5 (HW) | ROCK CORE DIA. (IN): 2 (NQ) | | SHEET 1 OF 1 |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | N-VALUE (bpf) | RECOVERY (in.) | | WELL LOG | DEPTH (FT) |
|---|---|---|---|---|---|---|---|
| | | Brown fine sandy SILT | | | | A | |
| | 1E | | 2,3,4,6 | 19 | | | |
| 5 | | | | | | | 5 |
| | 2E | Same as above | 10,17,26,22 | 17 | | | |
| | | 5-6.3 | | | | | |
| | | Becoming gray, silty sand with cobble | | | | | |
| 10 | | | | | | | 10 |
| | 3E | 10-10.7 | 27,27,21,24 | 0 | | | |
| 15 | | | | | | | 15 |
| | 4E | Gray, silty sand with cobble | 10,14,49,38 | 14.5 | | | |
| 20 | | | | | | | 20 |
| | 5E | Gray silty sand with cobble | 10,13,17,19 | 12.5 | | | |
| | | Refusal at 22 ft. | | | | | |
| | | Began rock coring at 22.8 ft. | | | | | |
| 25 | | | | | | | 25 |
| 30 | | | | | | | 30 |
| 35 | | | | | | | 35 |
| 40 | | | | | | | 40 |
| 45 | | BOB at 45 ft. | | | | | |

NOTES: MW-501 --10 ft slotted screen set from 45 to 35 ft. TPVC elevation = 166.19

Well is flowing on 4/3/2018.

| | | | |
|---|---|---|---|
| PROJECT: JUNIPER RIDGE LANDFILL CELL 12 | JOB NO.: 19063.00 | | BORING NO.: MW-502 |
| DATE STARTED: 10/24/2019 | DATE FINISHED: 10/25/2019 | DRILLING METHOD: DRIVE & WASH | |
| GROUND SURFACE ELEVATION (FT): | DRILLING CONTRACTOR: N.E.B.C. | | LOGGED BY:RNF |
| BOREHOLE DIA. (IN): 4.5 (HW) | ROCK CORE DIA. (IN): 3.88 (HQ) | | SHEET 1 OF 1 |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | WELL LOG | DEPTH (FT) |
|---|---|---|---|---|
| 5 | | | | 5 |
| 10 | | | | 10 |
| | | Refusal at 14 ft. | | |
| 15 | Run 1 | 14' - 19' | | 15 |
| 20 | Run 2 | 19--24' | | 20 |
| 25 | Run 3 | 24'-29' | | 25 |
| 30 | Run 4 | 29'-34' | | 30 |
| 35 | Run 5 | 34'-39' | | 35 |
| 40 | Run 6 | 39'-44' | | 40 |
| 45 | Run 7 | 44'-48' | | |
| 50 | | BOB at 48 ft. | | |

NOTES: 5 ft slotted screen set from 38 to 43 ft.

| PROJECT: JUNIPER RIDGE LANDFILL | | JOB NO.: 20750 | | BORING NO.: MW-503 |
|---|---|---|---|---|
| DATE STARTED: 12/9/20 | DATE FINISHED: 12/11/20 | | DRILLING METHOD: Drive & Wash | |
| GROUND SURFACE ELEVATION (FT): | 160.7 | DRILLING CONTRACTOR: N.E.B.C. | | LOGGED BY: RNF |
| BOREHOLE DIA. (IN): 4.5 (HW) | ROCK CORE DIA. (IN): 3.88 (HQ) | | | SHEET 1 OF 1 |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | BLOWS/ 0.5' (bpf) | RECOVERY (in.) | | WELL LOG | DEPTH (FT) |
|---|---|---|---|---|---|---|---|
| 5 | 1A | Silty sand with some small stones, some moisture | 9, 10, 18, 15 | 14 | | | 5 |
| 10 | 2A | Silty sand with some small stone | 10, 22, 15, 17 | 15 | | | 10 |
| 15 | 3A | Silty sand with some small stone | 12, 10, 11, 18 | 24 | | | 15 |
| 20 | 4A | Clay silt with some sand and small stones | 26, 26, 28, 19 | 18 | | | 20 |
| 25 | 5A | Grey gravel | 28, 32, 38, 55 | 12 | 1" Schedule 40 PVC Riser | | 25 |
| 30 | 6A | Clay silt with some sand and small stones | 12, 14, 19, 24 | 14 | | | 30 |
| 35 | | | | | | | 35 |
| 40 | | | | | | | 40 |
| 45 | | | | | | | 45 |
| 50 | Run 1 | 46 - 48'. Bedrock at 46'. RQD = 71% | | | | | 50 |
| 55 | Run 2 | 48' - 53'. RQD = 77%. | | | Bentonite Chips | | 55 |
| 60 | Run 3 | 53' -58'. RQD = 87% | | | Bentonite Pellets | | 60 |
| 65 | Run 4 | 58' - 63'. RQD = 48% | | | Top of Screen @ 60.0' | | 65 |
| 70 | Run 5 | 63 - 65'. Bedrock at 46'; Saple did not meet soundess requirmetns and RQD not calcuated. | | | Sand | | 70 |
| | Run 6 | 65' - 69'; RQD = 60% | | | 1" Schedule 40 PVC | | |
| | Run 4 | 69' -72'. RQD = 94% | | | Bottom of Screen @ 70.0' | | |
| | | | | | Bottom of Boring @ 72.0' | | |

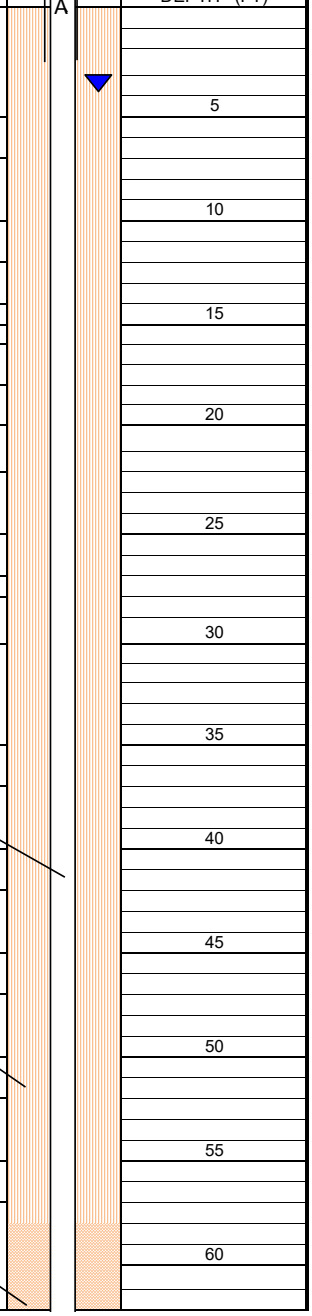
NOTES: 1" PVC Well

| PROJECT: JUNIPER RIDGE LANDFILL | | JOB NO.: 20750 | | | BORING NO.: MW-504 |
|---|---|---|---|---|---|
| DATE STARTED: 11/9/20 | DATE FINISHED: 11/12/20 | | DRILLING METHOD: Drive & Wash | | |
| GROUND SURFACE ELEVATION (FT): | 172.6 | DRILLING CONTRACTOR: N.E.B.C. | | | LOGGED BY: BAM |
| BOREHOLE DIA. (IN): 4.5 (HW) | ROCK CORE DIA. (IN): 3.88 (HQ) | | | | SHEET 1 OF 2 |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | BLOWS/ 0.5' (bpf) | RECOVERY (in.) | |
|---|---|---|---|---|---|
| 5 | | | | | |
| | 1A | Silty sand with some gravel (<0.5"), some moisture | 7, 10, 17, 20 | 24 | |
| 10 | | | | | |
| | | Boulder | | | |
| | 2A | Silt, sand, fragmented rock | 25, 35, 59, 40 | 24 | |
| 15 | | | | | |
| | 3A | | 21, 20, 30, 30 | 24 | |
| 20 | | | | | |
| | 4A | | 14, 30, 47, 60 | 24 | |
| 25 | | | | | |
| | 5A | Brown Sand with silt, trace gravel | 17, 37, 33, 45 | 18.5 | |
| 30 | 6A | Brown Sand with silt, some gravel | 38, 70 | 9 | |
| 35 | | | | | |
| | 7A | Brown Sand with silt, some gravel (~1") | 50, 52 | 9.5 | |
| 40 | | | | | 1" Schedule 40 PVC Riser |
| | 8A | Brown Sand with silt, some gravel | 27, 50 / 0.3 | 9 | |
| | | Boulder | | | |
| 45 | | | | | |
| | 9A | Olive silt with sand, gravel, some clay | 50 / 0.4 | 5 | |
| 50 | | | | | Bentonite Chips |
| | 10A | Olive silt with some sand, trace clay, trace gravel | 50, 55 / 0.2 | 10 | |
| 55 | | | | | |
| | 11A | Olive silt with trace sand, clay at tip | 65, 50 / 0.2 | 11.25 | |
| 60 | Run 1 | 57' - 62'; Bedrock at 57'; RQD = 100% | | 60 | Bentonite Pellets |

WELL LOG

A



| PROJECT: JUNIPER RIDGE LANDFILL | | | JOB NO.: 20750 | | | BORING NO.: MW-504 |
|---|---|---|---|---|---|---|
| DATE STARTED: 11/9/20 | | DATE FINISHED: 11/12/20 | | | DRILLING METHOD: Drive & Wash | |
| GROUND SURFACE ELEVATION (FT): | | 172.6 | DRILLING CONTRACTOR: N.E.B.C. | | | LOGGED BY: BAM |
| BOREHOLE DIA. (IN): 4.5 (HW) | | ROCK CORE DIA. (IN): 3.88 (HQ) | | | | SHEET 1 OF 2 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 65 | Run 2 | 62' - 67'; RQD = 100%. | | 60 | | | 65 |
| 70 | Run 3 | 67' - 72'; RQD = 95%. | | 57 | **Sand**<br>Top of Screen @ 71.5' | | 70 |
| 75 | Run 4 | 72' - 77'; RQD = 92%. | | 60 | **1" Schedule 40 PVC Slotted Screen** | | 75 |
| 80 | Run 5 | 77' - 82'; RQD = 100%. | | | Bottom of Screen @ 81.5' | | 80 |
| 85 | | | | | Bottom of Boring @ 82.0' | | 85 |

NOTES: 1" PVC Well

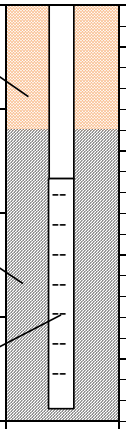
| PROJECT: JUNIPER RIDGE LANDFILL | | JOB NO.: 20750 | | | BORING NO.: MW-505 |
|---|---|---|---|---|---|
| DATE STARTED: 11/18/20 | DATE FINISHED: | | | DRILLING METHOD: Drive & Wash | |
| GROUND SURFACE ELEVATION (FT): | 197.0 | DRILLING CONTRACTOR: N.E.B.C. | | | LOGGED BY: BAM |
| BOREHOLE DIA. (IN): 4.5 (HW) | ROCK CORE DIA. (IN): 3.88 (HQ) | | | | SHEET 1 OF 2 |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | BLOWS/ 0.5' (bpf) | RECOVERY (in.) | | WELL LOG | DEPTH (FT) |
|---|---|---|---|---|---|---|---|
| | | | | | | A | |
| 5 | | | | | | | 5 |
| | 1A | Brown sand with silt and organics | 20, 50 / 0.2 | 8.5 | | | |
| 10 | | | | | | | 10 |
| | 2A | Dark gray/olive sand with silt | 22, 22, 23, 23 | 22.5 | | | |
| 15 | | | | | | | 15 |
| | 3A | Brown silty sand wth trace gravel | 14, 18, 18, 34 | 18 | | | |
| 20 | | | | | | | 20 |
| | 4A | Brown silty sand with some gravel, trace clay | 10, 11, 50 / 0.1 | 11 | | | |
| 25 | | | | | | | 25 |
| | 5A | Brown sand with some silt, trace gravel | 12, 12, 15, 16 | 13 | | | |
| 30 | | | | | | | 30 |
| | 6A | Light brown silt with clay, trace gravel | 19, 27, 50 / 0.4 | 11.5 | | | |
| 35 | | | | | 1" Schedule 40 PVC Riser | | 35 |
| | 7A | Olive silt with sand, some gravel | 32, 57, 54, 50 | 16.5 | | | |
| 40 | | | | | | | 40 |
| | 8A | Brown silt with sand, some gravel | 67, 50 / 0.3 | 8 | | | |
| 45 | | | | | | | 45 |
| | 9A | Brown silt with sand, some gravel | 50 / 0.3 | 3 | | | |
| 50 | | | | | Bentonite Chips | | 50 |
| | 10A | Gravel | 50 / 0.2 | 3 | | | |
| 55 | | | | | | | 55 |
| | 11A | Gray silt with clay, trace gravel | 75 / 0.4 | 7.5 | | | |
| 60 | Run 1 | 58.5 - 63.5'. Bedrock 58.5 - 59.5', Silt 59.5' - 61', Bedrock 61'. Mechanical fracture at 61.75' | | 56.5 | | | 60 |

| PROJECT: JUNIPER RIDGE LANDFILL | | JOB NO.: 20750 | | BORING NO.: MW-505 |
|---|---|---|---|---|
| DATE STARTED: 11/18/20 | DATE FINISHED: | | DRILLING METHOD: Drive & Wash | |
| GROUND SURFACE ELEVATION (FT): | 197.0 | DRILLING CONTRACTOR: N.E.B.C. | | LOGGED BY: BAM |
| BOREHOLE DIA. (IN): 4.5 (HW) | ROCK CORE DIA. (IN): 3.88 (HQ) | | | SHEET 1 OF 2 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 65 | Run 2 | 63.5 - 68.5'. Mechanical fracture at 65.5' | | 54 | **Bentonite Pellets** | 65 |
| 70 | Run 3 | 68.5 - 73.5' | | 56.5 | Top of Sand @ 69.5'<br>Top of Screen @ 72.2' | 70 |
| 75 | Run 4 | 73.5 - 78.5'. Bedrock with natural fractures throughout | | 42 | **Sand** | 75 |
| 80 | Run 5 | 78.5 - 83.0'. Bedrock with natural fractures throughout | | 60 | **1" Schedule 40 PVC Slotted Screen**<br>Bottom of Screen @ 82.2' | 80 |
| 85 | | | | | Bottom of Boring @ 82.5' | 85 |

NOTES: 1" PVC Well



| PROJECT: JUNIPER RIDGE LANDFILL | | JOB NO.: 20750 | | BORING NO.: MW-506 |
|---|---|---|---|---|
| DATE STARTED: 12/3/20 | DATE FINISHED: 12/7/20 | | DRILLING METHOD: Drive & Wash | |
| GROUND SURFACE ELEVATION (FT): | 195.8 | DRILLING CONTRACTOR: N.E.B.C. | | LOGGED BY: RNF |
| BOREHOLE DIA. (IN): 4.5 (HW) | ROCK CORE DIA. (IN): 3.88 (HQ) | | | SHEET 1 OF 1 |

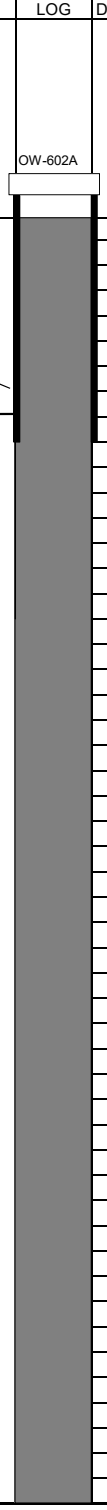
| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | BLOWS/ 0.5' (bpf) | RECOVERY (in.) | | WELL LOG | DEPTH (FT) |
|---|---|---|---|---|---|---|---|
| 5 | | | | | | A | 5 |
| | 1A | Silty sand with some small stones, some moisture | 7, 8, 8, 13 | 24 | | | |
| 10 | | | | | | | 10 |
| | | Cobbles | | | | | |
| | 2A | Silty sand with some small stone | 14, 23, 24, 50 / 0.2 | 20 | | | |
| 15 | | | | | | | 15 |
| | 3A | Clay silt with some sand and small stones | 10, 12, 12, 18 | 24 | | | |
| 20 | | | | | 1" Schedule 40 PVC Riser | | 20 |
| | 4A | Clay silt with some sand and small stones | 6, 8, 8, 12 | 24 | | | |
| 25 | | | | | | | 25 |
| | 5A | Clay silt with some sand and small stones | 5, 5, 7, 10 | 24 | | | |
| 30 | | | | | | | 30 |
| | 6A | Clay silt with some sand and small stones | 7, 15, 20, 32 | 24 | | | |
| 35 | | Boulder | | | | | 35 |
| | 7A | Clay silt with some sand and small stones | 19, 25, 31, 60 | 24 | | | |
| 40 | | Cobbles | | | | | 40 |
| | 8A | Clay silt with some sand and small stones | 20, 32, 36, 45 | 24 | | | |
| 45 | | | | | Bentonite Chips | | 45 |
| | 9A | Clay silt with some sand and small stones | 14, 25, 50 / 0.4 | 17 | | | |
| 50 | Run 1 | 47 - 52'. Bedrock at 47'. RQD = 92% | | | Top of Screen @ 50.0' | | 50 |
| | | | | | | | CONFIRM TOP OF SAN |
| 55 | Run 2 | 52 -57'. RQD = 98% | | | 1" Schedule 40 PVC Slotted Screen | | 55 |
| 60 | Run 3 | 57 - 62'. RQD = 92% | | | Sand<br>Bottom of Screen @ 60.0' | | 60 |
| | | | | | Bottom of Boring @ 62.0' | | |
| 65 | | | | | | | 65 |

NOTES: 1" PVC Well

# WELL INSTALLATION LOG

| | | |
|---|---|---|
| **PROJECT:** Juniper Ridge Landfill, Old Town, Maine | **JOB NO.:** 18018.00 | **BORING NO.** **MW-507** |
| **DATE STARTED:** 12/13/2017 | **DRILLING METHOD:** Air Rotary w/ 6" dia. casing | |
| **GROUND SURFACE ELEVATION (FT):** 174.72 Site Datum | **TOP OF CASING ELEVATION (FT):** 176.83 Site Datum | **LOGGED BY:** Sevee & Maher |
| **BOREHOLE DIA.:** Soil 8.75", Rock 6" | | **SHEET 1 OF 2** |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION |
|---|---|---|
| 0 | | Basal Till<br>Brown, gravely, sandy silt, trace of cobbles and boulders |
| 25 | | Dirty fracture zone 28'<br>30 GPM |
| 50 | | light brown soft phyllite |
| 75 | | Bedrock |
| 100 | | Gray/White Phyllite |
| 125 | | |




NOTES:

Monitoring Point Elevation for MW-507= 176.83 ft (top of DI casing)

Water level measured on 1/2/2018: 3.8 ft-below monitoring point, 173.03 ft

Water level measured on 1/11/2018: 3.88 ft-below monitoring point, 172.95 ft

Soil Key

- Fill
- Marine Clay
- Submarine Sand & Gravel
- Ablation Till
- Basal Till
- Bedrock

# WELL INSTALLATION LOG

| | | |
|---|---|---|
| **PROJECT:** Juniper Ridge Landfill, Old Town, Maine | **JOB NO.:** 18018.00 | **BORING NO.** **MW-507** |
| **DATE STARTED:** 12/13/2017 | **DRILLING METHOD:** Air Rotary w/ 6" dia. casing | |
| **GROUND SURFACE ELEVATION (FT):** 174.72 Site Datum | **TOP OF CASING ELEVATION (FT):** 176.83 Site Datum | **LOGGED BY:** Sevee & Maher |
| **BOREHOLE DIA.:** Soil 8.75", Rock 6" | | **SHEET 2 OF 2** |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | WELL LOG | DEPTH (FT) |
|---|---|---|---|---|
| 125 | | Bedrock | | 125 |
| 150 | | Gray/White Phyllite | | 150 |
| 175 | | | | 175 |
| 200 | | | | 200 |
| | | Bottom of boring at 220.0 ft | | |
| 225 | | | | 225 |
| 250 | | | | 250 |

NOTES:

Monitoring Point Elevation for MW-507= 176.83 ft (top of DI casing)

Water level measured on 1/2/2018: 3.8 ft-below monitoring point, 173.03 ft

Water level measured on 1/11/2018: 3.88 ft-below monitoring point, 172.95 ft

Soil Key

- Fill
- Marine Clay
- Submarine Sand & Gravel
- Ablation Till
- Basal Till
- Bedrock

| MAINE TEST BORINGS, INC.<br>BREWER, MAINE 04412 | CLIENT<br>Sevee & Maher Engineering, Inc. | SHEET 1 OF 1<br>HOLE NO. MW06-01 |
|---|---|---|
| DRILLER<br>Darrel McKeen | PROJECT NAME<br>Landfill | LINE & STATION |
| M.T.B. JOB NUMBER<br>06-044 | LOCATION<br>Old Town, ME | OFFSET |

GROUND WATER OBSERVATIONS

| | CASING | SAMPLER | CORE BARREL | DATE 2/28/06 Start | DATE 2/28/06 Finish |
|---|---|---|---|---|---|
| TYPE | HW | SS | | SURFACE ELEVATIC | |
| SIZE I.D. | 4" | 1 3/8" | | | |
| HAMMER WT. | 300# | 140# | | | |
| HAMMER FALL | 16" | 30" | | | |

| CASING BLOWS PER FOOT | SAMPLE NO. | O.D. | PEN. | REC. | DEPTH @ BOT. | BLOWS PER 6" ON SAMPLER 0-6 | 6-12 | 12-18 | 18-24 | VANE READING | DEPTH | STRATUM DESCRIPTION |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Auger | | | | | | | | | | | 0.3 | Topsoil |
| " | | | | | | | | | | | 2.0 | Brown Silty Sand w/Trace of Cobbles |
| " | | | | | | | | | | | | |
| " | 1D | 2" | 24" | | 4.0 | 4 | 5 | 8 | 18 | | | Gray Brown Sandy Clayey Silt w/Trace of Gravel |
| " | | | | | | | | | | | | |
| " | 2D | 2" | 12" | | 6.0 | 45 | 50 | | | | 6.0 | |
| " | | | | | | | | | | | 6.5 | Cobble |
| " | | | | | | | | | | | | |
| " | | | | | | | | | | | | |
| " | | | | | | | | | | | | |
| 30 | | | | | | | | | | | | Gray Brown Sandy Clayey Silt w/Trace of Gravel |
| 100 | 3D | 2" | 24" | | 12.0 | 24 | 27 | 63 | 30 | | | |
| 95 | | | | | | | | | | | 13.0 | |
| 80 | | | | | | | | | | | | |
| 85 | | | | | | | | | | | | |
| 90 | | | | | | | | | | | | |
| 90 | 4D | 2" | 24" | | 17.0 | 13 | 11 | 11 | 12 | | | Brown Gravelly Sand w/Trace of Silt |
| 85 | | | | | | | | | | | | |
| 80 | | | | | | | | | | | | |
| 80 | | | | | | | | | | | | |
| | | | | | | | | | | | | |
| | 5D | 2" | 24" | | 22.0 | 19 | 17 | 16 | 17 | | 22.0 | |
| | | | | | | | | | | | | Bottom of Boring @ 22.0' |
| | | | | | | | | | | | | 2" PVC Well Installed @ 20.0' |

SAMPLES
D = SPLIT SPOON
C = 2" SHELBY TUBE
S = 3" SHELBY TUBE
U = 3½" SHELBY TUBE
R = ROCK CORE
V = VANE TEST

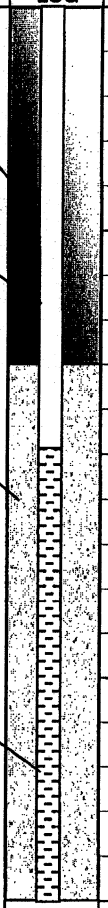
SOIL CLASSIFIED BY:
[XX] DRILLER-VISUALLY
[ ] SOIL TECHNICIAN-VISUALLY
[ ] LABORATORY TESTS

REMARKS:
Washed ahead from 10.0' to 15.0'

HOLE NO. MW06-01

| | | | |
|---|---|---|---|
| **PROJECT:** WOTL Expansion | | **JOB NO.:** 05055.00 | **BORING NO.:** MW06-01A |
| **DATE STARTED:** 2-28-06 | **DATE FINISHED:** 3-1-06 | **DRILLING METHOD:** Auger (0-5 ft) Drive & Wash (5-20 ft) | |
| **GROUND SURFACE ELEVATION (FT):** 163.3 | **DRILLING CONTRACTOR:** Maine Test Borings | | **LOGGED BY:** JAB JBS |
| **BOREHOLE DIA. (IN):** 4 | **ROCK CORE DIA. (IN):** NA | | **SHEET 1 OF 1** |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | Blows/ .5' | Recovery (%) |
|---|---|---|---|---|
| | | 0.3 ft Topsoil | | |
| | D-1 | (BASAL TILL) | 4-5-8-18 | 100 |
| 5 | | | | |
| | D-2 | | 45-50 | 100 |
| 10 | | | | |
| | D-3 | | 24-27-63-30 | 10 |
| | | Brown gravelly silt transitioning to silty gravel transitioning to silty sand with trace of cobble | | |
| 15 | | | | |
| | D-4 | | 13-11-11-12 | 12 |
| 20 | | | | |
| | D-5 | 22 ft BOE (COBBLE ZONE) | 15-11-16-17 | 90 |




| WELL LOG | DEPTH (FT) |
|---|---|
| | 5 |
| | 10 |
| | 15 |
| | 20 |

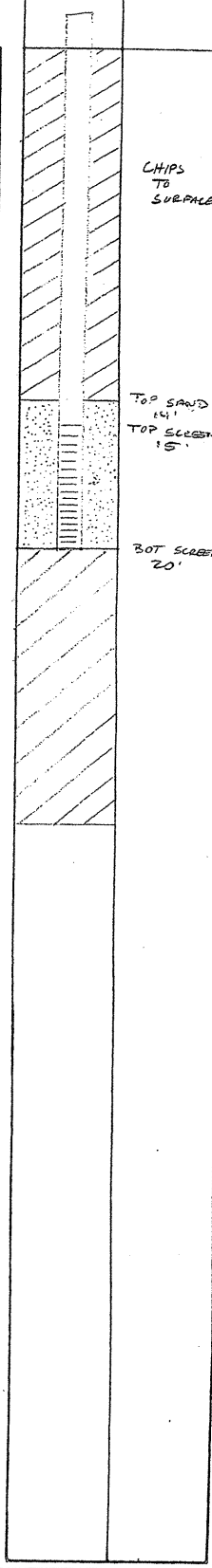
NOTES:

Artesian flow through casing @ 15'

| | | | |
|---|---|---|---|
| PROJECT JRL WGL REPLACEMENT | JOB NO. | BORING NO. MW09-901 | |
| DATE COMPLETED 11-9-09 | DATE WELLS INSTALLED 11-9-09 | DRILLING METHOD | |
| GROUND SURFACE ELEVATION (FT) | DRILLING CONTRACTOR MTB | LOGGED BY PLM | |
| BOREHOLE DIAMETER (IN) | ROCK CORE DIAMETER (IN.) N/A | SHEET 1 OF 1 | |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | |
|---|---|---|---|
| | | BROWN CLAY (SILTY) 0-10' | AUGER TO 5.0' |
| | | BROWN TILL / COBBLES 10-20' | |
| | | GREY TILL 20-25' NO SAND PRESENT | |
| | | GREY TILL 25-31' NO SAND PRESENT | 31'- SPOON REFUSAL |

INSTRUMENT LOG




DEPTH (FT)

NOTES

| PROJECT: JUNIPER RIDGE LANDFILL EXPANSION | | JOB NO.: 18018.00 | | BORING NO.: OW-601 A |
|---|---|---|---|---|
| DATE STARTED: 3/15/2018 | DATE FINISHED: 3/20/2018A | | DRILLING METHOD: SPIN & WASH | |
| GROUND SURFACE ELEVATION (FT): 214.89 | | DRILLING CONTRACTOR: N.E.B.C. | | LOGGED BY:NMT |
| BOREHOLE DIA. (IN): 4.5 (HW) | ROCK CORE DIA. (IN): 2 (NQ) | | | SHEET 1 OF 1 |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | N-VALUE (bpf) | RECOVERY (in.) | WELL LOG | DEPTH (FT) |
|---|---|---|---|---|---|---|
| | | | 35,28,18,19 | 15 | A | |
| | 1A | Brown fine sandy SILT | | | | |
| 5 | | | | | | 5 |
| | 2A | 5-6.2 | 33,73,50/.2 | 10 | | |
| 10 | | | | | | 10 |
| | 3A | Olive sandy SILT, little gravel | 16,25,5,7 | 19.5 | | |
| 15 | | | | | | 15 |
| | 4A | | 22,25,27,36 | 5 | | |
| 20 | | | | | | 20 |
| | 5A | Gray sandy SILT, little gravel | 12,30,50 | 21.5 | | |
| 25 | | 20-21.5 | | | | 25 |
| | 6A | 25-25.5 | 26 | 3 | | |
| | | Granular dense silty sand (till) w/ areas of cobble and sand | | | | |
| 30 | 7A | | 26,25,19,50 | 13 | | 30 |
| 35 | | | | | | 35 |
| | 8A | 35.5-36.4 | 44,50 | 5 | | |
| 40 | | | | | | 40 |
| | 9A | 40-41.7 | 18,22,50 | 6 | | |
| 45 | | Gray sandy SILT, with gravel | | | | 45 |
| | 10A | | 14,31,23,31 | 12.5 | | |
| 50 | | | | | | 50 |
| | 11A | | 25,31,38,19 | 16 | | |
| 55 | 12A | | 21,37,13,13 | 12.5 | | 55 |
| | | Refusal at 56.8 ft. | | | | |
| 60 | | Begin Rock Coring at 56.8 ft. | | | | 60 |
| 65 | | | | | | 65 |
| 70 | | | | | | 70 |
| 75 | | | | | | 75 |
| | | BOB at 76.6 ft. | | | | |

NOTES: OW-601A --10 ft slotted screen set from 76.6 to 66.6 ft. TPVC elevation = 217.94

Water level on 4/4/2018.

| PROJECT: JUNIPER RIDGE LANDFILL EXPANSION | | JOB NO.: 18018.00 | | BORING NO.: OW-601B |
|---|---|---|---|---|
| DATE STARTED: 3/29/2018 | DATE FINISHED: 4/3/2018 | | DRILLING METHOD: SPIN & WASH | |
| GROUND SURFACE ELEVATION (FT): 214.5 | | DRILLING CONTRACTOR: N.E.B.C. | | LOGGED BY:NMT |
| BOREHOLE DIA. (IN): 4.5 (HW) | ROCK CORE DIA. (IN): 2 (NQ) | | | SHEET 1 OF 1 |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | N-VALUE (bpf) | RECOVERY (in.) | WELL LOG | DEPTH (FT) |
|---|---|---|---|---|---|---|
| | | | 35,28,18,19 | 15 | B | |
| | 1A | Brown fine sandy SILT | | | | |
| 5 | | | | | | 5 |
| | 2A | 5-6.2 | 33,73,50/.2 | 10 | | |
| 10 | | | | | | 10 |
| | 3A | Olive sandy SILT, little gravel | 16,25,5,7 | 19.5 | | |
| 15 | | | | | | 15 |
| | 4A | | 22,25,27,36 | 5 | | |
| 20 | | | | | | 20 |
| | 5A | Gray sandy SILT, little gravel | 12,30,50 | 21.5 | | |
| 25 | | 20-21.5 | | | | 25 |
| | 6A | 25-25.5 Granular dense silty sand (till) w/ areas of cobble and sand | 26 | 3 | | |
| 30 | 7A | | 26,25,19,50 | 13 | | 30 |
| 35 | | | | | | 35 |
| | 8A | 35.5-36.4 | 44,50 | 5 | | |
| 40 | | | 18,22,50 | 6 | | 40 |
| | 9A | 40-41.7 | | | | |
| 45 | | Gray sandy SILT, with gravel | 14,31,23,31 | 12.5 | | 45 |
| | 10A | | | | | |
| 50 | | | | | | 50 |
| | 11A | | 25,31,38,19 | 16 | | |
| 55 | 12A | | 21,37,13,13 | 12.5 | | 55 |
| 60 | | Refusal at 56.8 ft.<br>BOB at 56.2 ft. | | | | 60 |

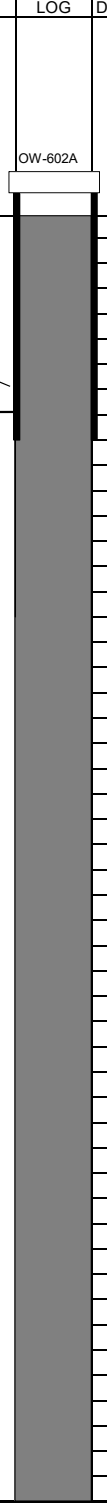
NOTES: OW-601B --10 ft slotted screen set from 56.2 to 46.2 ft. TPVC elevation = 217.5

Water level on 4/4/2018.

# WELL INSTALLATION LOG

| | | |
|---|---|---|
| **PROJECT:** Juniper Ridge Landfill, Old Town, Maine | **JOB NO.:** 18018.00 | **BORING NO.** **OW-602A** |
| **DATE STARTED:** 12/11/2017 | **DRILLING METHOD:** Air Rotary w/ 6" dia. casing | |
| **GROUND SURFACE ELEVATION (FT):** 211.69 Site Datum | **TOP OF CASING ELEVATION (FT):** 213.17 Site Datum | **LOGGED BY:** Sevee & Maher |
| **BOREHOLE DIA.:** Soil 8.75", Rock 6" | | **SHEET 1 OF 2** |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION |
|---|---|---|
| 0 | | Basal Till<br>Brown, gravely, sandy silt, trace of cobbles and boulders |
| 25 | | increasing hardness… |
| 50 | | light brown soft phyllite |
| 75 | | increasing hardness… |
| 100 | | Bedrock<br>light brown soft phyllite at 105', 20 GPM |
| 125 | | |




NOTES:

Monitoring Point Elevation for OW-602A= 213.17 ft (top of DI casing)

Water level measured on 1/2/2018: 34.40 ft-below monitoring point, 178.77 ft

Water level measured on 1/11/2018: 34.55 ft-below monitoring point, 178.62 ft

Soil Key

- Fill
- Marine Clay
- Submarine Sand & Gravel
- Ablation Till
- Basal Till
- Bedrock

# WELL INSTALLATION LOG

| | | |
|---|---|---|
| **PROJECT:** Juniper Ridge Landfill, Old Town, Maine | **JOB NO.:** 18018.00 | **BORING NO.** **OW-602A** |
| **DATE STARTED:** 12/11/2017 | **DRILLING METHOD:** Air Rotary w/ 6" dia. casing | |
| **GROUND SURFACE ELEVATION (FT):** 211.69 Site Datum | **TOP OF CASING ELEVATION (FT):** 213.17 Site Datum | **LOGGED BY:** Sevee & Maher |
| **BOREHOLE DIA.:** Soil 8.75", Rock 6" | | **SHEET 2 OF 2** |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | WELL LOG | DEPTH (FT) |
|---|---|---|---|---|
| 125 | | | | 125 |
| | | Fracture at 140, 100 GPM | | |
| | | Bedrock | | |
| 150 | | | | 150 |
| | | 160'-220', Gray/white phyllite | | |
| 175 | | | | 175 |
| 200 | | | | 200 |
| 225 | | | | 225 |
| | | Bottom of boring at 240.0 ft<br>After development flow = 100 gpm | | |
| 250 | | | | 250 |

NOTES:

Monitoring Point Elevation for OW-602A= 213.17 ft (top of DI casing)

Water level measured on 1/2/2018: 34.40 ft-below monitoring point, 178.77 ft

Water level measured on 1/11/2018: 34.55 ft-below monitoring point, 178.62 ft

Soil Key

- Fill
- Marine Clay
- Submarine Sand & Gravel
- Ablation Till
- Basal Till
- Bedrock

| PROJECT: JUNIPER RIDGE LANDFILL EXPANSION | JOB NO.: 18018.00 | | BORING NO.: OW-603B |
|---|---|---|---|
| DATE STARTED: 3/21/2018 | DATE FINISHED: 3/21/2018 | DRILLING METHOD: DRIVE & WASH | |
| GROUND SURFACE ELEVATION (FT): 205.07 | DRILLING CONTRACTOR: N.E.B.C. | | LOGGED BY:NMT |
| BOREHOLE DIA. (IN): 4.5 (HW) | ROCK CORE DIA. (IN): N/A | | SHEET 1 OF 1 |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | N-VALUE (bpf) | RECOVERY (in.) | | WELL LOG | DEPTH (FT) |
|---|---|---|---|---|---|---|---|
| | | Brown fine sandy SILT | | | | B | |
| | 1B | | 12,18,15,16 | 23 | | | |
| 5 | | | | | | | 5 |
| | 2B | Same as above | 12,19,19,25 | 24 | | | |
| 10 | | | | | | | 10 |
| | 3B | Grayish brown and sandy SILT with cobble | 20,20,22,32 | 19 | | | |
| 15 | | | | | | | 15 |
| | 4B | Grayish Brown, sandy SILT, trace of clay with cobble | 22,34,38,32 | 17.5 | | | |
| 20 | | | | | | | 20 |
| | 5B | Granular dense silty sand (till) w/ areas of cobble and sand | 17,27,30,49 | 15 | | | |
| 25 | | Weathered Bedrock 25-26.2 | | | | | 25 |
| | 6B | | 14,46,50 | 13 | | | |
| 30 | | Refusal at 26.2 ft. BOB at 26.2 ft. | | | | | 30 |
| 35 | | | | | | | 35 |
| 40 | | | | | | | 40 |

NOTES: OW-603B --10 ft slotted screen set from 26.2 to 16.2 ft. TPVC elevation = 208.07

Water Level on 4/3/2018.

| PROJECT: JUNIPER RIDGE LANDFILL EXPANSION | JOB NO.: 18018.00 | | BORING NO.: OW-604A |
|---|---|---|---|
| DATE STARTED: 3/22/2018 | DATE FINISHED: 3/27/2018 | DRILLING METHOD: DRIVE & WASH | |
| GROUND SURFACE ELEVATION (FT): 195.8 | | DRILLING CONTRACTOR: N.E.B.C. | LOGGED BY:NMT |
| BOREHOLE DIA. (IN): 4.5 (HW) | ROCK CORE DIA. (IN): 2 (NQ) | | SHEET 1 OF 1 |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | N-VALUE (bpf) | RECOVERY (in.) | | WELL LOG | DEPTH (FT) |
|---|---|---|---|---|---|---|---|
| | | Brown fine sandy SILT | | | | A | |
| | 1D | | 29,25,41,38 | 19.5 | | | |
| 5 | | | | | | | 5 |
| | 2D | Olive sandy SILT | 20,30,50 | 15.5 | | | |
| | | 5-6.3 trace of gravel | | | | | |
| | | Gray sandy SILT with gravel | | | | | |
| 10 | | 10-10.7 | | | | | 10 |
| | 3D | | 35,50 | 0.3 | | | |
| | | Refusal at 10.7 ft. | | | | | |
| | | Began rock coring at 12.5 ft. | | | | | |
| 15 | | | | | | | 15 |
| | | | | | | | |
| 20 | | | | | | | 20 |
| | | | | | | | |
| 25 | | | | | | | 25 |
| | | | | | | | |
| 30 | | | | | | | 30 |
| | | | | | | | |
| | | BOB at 32.5 ft. | | | | | |
| 35 | | | | | | | 35 |
| | | | | | | | |
| 40 | | | | | | | 40 |

NOTES: OW-604A --10 ft slotted screen set from 32.5 to 22.5 ft. TPVC elevation = 198.8

Water level on 4/3/20118.

# WELL INSTALLATION LOG

| | | | |
|---|---|---|---|
| **PROJECT:** Juniper Ridge Landfill, Old Town, Maine | | **JOB NO.:** 18018.00 | **BORING NO. OW-605A** |
| **DATE STARTED:** 12/12/2017 | | **DRILLING METHOD:** Air Rotary w/ 6" dia. casing | |
| **GROUND SURFACE ELEVATION (FT):** 184.71 Site Datum | **Top of Casing Elevation (FT):** 186.76 Site Datum | | **LOGGED BY:** Sevee & Maher |
| **BOREHOLE DIA.:** Soil 8.75", Rock 6" | | | **SHEET 1 OF 2** |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | WELL LOG | DEPTH (FT) |
|---|---|---|---|---|
| 0 | | Basal Till<br>Brown, gravely, sandy silt, trace of cobbles and boulders | OW-605A<br>6" Dia. Black Iron Steel Casing | 0 |
| 30 | | | | 30 |
| 60 | | Gray/White Phyllite<br>Dirty fracture zone 83'<br>4 GPM | | 60 |
| 90 | | | | 90 |
| | | Bedrock | | |
| 120 | | | | 120 |
| 150 | | | | 150 |

NOTES:

Monitoring Point Elevation for OW-605A = 186.76 ft-Site Datum (top of DI casing)

Water level measured on 1/02/2018: 25.5 ft-below monitoring point, 161.26 ft

Water level measured on 1/11/2018: 25.35 ft-below monitoring point, 161.41 ft

Soil Key

- Fill
- Marine Clay
- Submarine Sand & Gravel
- Ablation Till
- Basal Till
- Bedrock

# WELL INSTALLATION LOG

| | | | |
|---|---|---|---|
| **PROJECT:** Juniper Ridge Landfill, Old Town, Maine | | **JOB NO.:** 18018.00 | **BORING NO. OW-605A** |
| **DATE STARTED:** 12/12/2017 | | **DRILLING METHOD:** Air Rotary w/ 6" dia. casing | |
| **GROUND SURFACE ELEVATION (FT):** 184.71 Site Datum | **Top of Casing Elevation (FT):** 186.76 Site Datum | | **LOGGED BY:** Sevee & Maher |
| **BOREHOLE DIA.:** Soil 8.75", Rock 6" | | | **SHEET 2 OF 2** |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | WELL LOG | DEPTH (FT) |
|---|---|---|---|---|
| 150 | | 100'-160', Gray/white phyllite | | 150 |
| | | Bedrock | | |
| 180 | | light brown soft phyllite | | 180 |
| 210 | | | | 210 |
| 240 | | | | 240 |
| | | Bottom of boring at 260.0 ft | | |
| 270 | | | | 270 |
| 300 | | | | 300 |

NOTES:

Monitoring Point Elevation for OW-605A = 186.76 ft-Site Datum (top of DI casing)

Water level measured on 1/02/2018: 25.5 ft-below monitoring point, 161.26 ft

Water level measured on 1/11/2018: 25.35 ft-below monitoring point, 161.41 ft

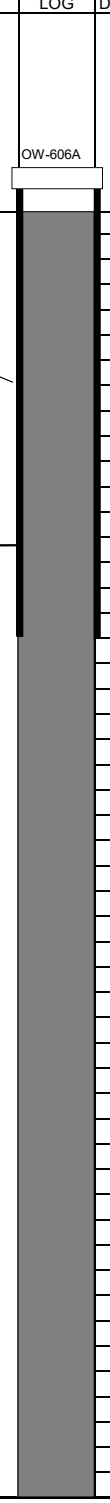
Soil Key

- Fill
- Marine Clay
- Submarine Sand & Gravel
- Ablation Till
- Basal Till
- Bedrock

# WELL INSTALLATION LOG

| | | |
|---|---|---|
| **PROJECT:** Juniper Ridge Landfill, Old Town, Maine | **JOB NO.:** 18018.00 | **BORING NO.** **OW-606A** |
| **DATE STARTED:** 12/14/2017 | **DRILLING METHOD:** Air Rotary w/ 6" dia. casing | |
| **GROUND SURFACE ELEVATION (FT):** 156.98 Site Datum | **TOP OF CASING ELEVATION (FT):** 159.62 Site Datum | **LOGGED BY:** Sevee & Maher |
| **BOREHOLE DIA.:** Soil 8.75", Rock 6" | | **SHEET 1 OF 2** |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION |
|---|---|---|
| 0 | | Basal Till<br>Brown, gravely, sandy silt, trace of cobbles and boulders |
| 25 | | |
| 50 | | light brown soft phyllite<br>Fracture at 48', 4 GPM<br>increasing hardness… |
| 75 | | Gray/White Phyllite |
| 100 | | Bedrock |
| 125 | | |




NOTES:

Monitoring Point Elevation for OW-606A= 159.62 ft (top of DI casing)

Water level measured on 1/2/2018: Flowing, 159.62+ ft

Water level measured on 1/11/2018: Flowing, 159.62+ ft

Soil Key

- Fill
- Marine Clay
- Submarine Sand & Gravel
- Ablation Till
- Basal Till
- Bedrock

# WELL INSTALLATION LOG

| | | |
|---|---|---|
| **PROJECT:** Juniper Ridge Landfill, Old Town, Maine | **JOB NO.:** 18018.00 | **BORING NO.** **OW-606A** |
| **DATE STARTED:** 12/11/2017 | **DRILLING METHOD:** Air Rotary w/ 6" dia. casing | |
| **GROUND SURFACE ELEVATION (FT):** 211.69 Site Datum | **TOP OF CASING ELEVATION (FT):** 213.17 Site Datum | **LOGGED BY:** Sevee & Maher |
| **BOREHOLE DIA.:** Soil 8.75", Rock 6" | | **SHEET 2 OF 2** |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | WELL LOG | DEPTH (FT) |
|---|---|---|---|---|
| 125 | | Bedrock | | 125 |
| 150 | | light brown soft phyllite at 158', 40 GPM | | 150 |
| 175 | | | | 175 |
| 200 | | Gray/White Phyllite | | 200 |
| 225 | | Bottom of boring at 240.0 ft<br>After development flow = 100 gpm | | 225 |
| 250 | | | | 250 |

NOTES:

Monitoring Point Elevation for OW-606A= 159.62 ft (top of DI casing)

Water level measured on 1/2/2018: Flowing, 159.62+ ft

Water level measured on 1/11/2018: Flowing, 159.62+ ft

Soil Key

- Fill
- Marine Clay
- Submarine Sand & Gravel
- Ablation Till
- Basal Till
- Bedrock

| PROJECT: JUNIPER RIDGE LANDFILL | | JOB NO.: 20750 | | BORING NO.: OW-606B |
|---|---|---|---|---|
| DATE STARTED: 12/8/20 | DATE FINISHED: 12/8/20 | | DRILLING METHOD: Drive & Wash | |
| GROUND SURFACE ELEVATION (FT): | 162.9 | DRILLING CONTRACTOR: N.E.B.C. | | LOGGED BY: RNF |
| BOREHOLE DIA. (IN): 4.5 (HW) | ROCK CORE DIA. (IN): 3.88 (HQ) | | | SHEET 1 OF 1 |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | BLOWS/ 0.5' (bpf) | RECOVERY (in.) | | WELL LOG | DEPTH (FT) |
|---|---|---|---|---|---|---|---|
| | | | | | 2" Schedule 40 PVC Riser | A | |
| | | | | | Bentonite Chips | | |
| 5 | | | | | | | 5 |
| | 1A | Silty sand with some small stone | 7, 15, 17, 20 | 12 | | | CONFIRM TOP OF SAN |
| | | | | | Top of Screen @ 7.0' | -- | |
| 10 | | | | | 2" Schedule 40 PVC Slotted Screen | -- | 10 |
| | 2A | Silty sand with some small stone | 9, 15, 18, 22 | 20 | | -- | |
| | 3A | Bedrock at 12 ft. Rollacone Cuttings 12.2 ft - 13.7 ft | | | Bottom of Screen @ 12.7' Bottom of Boring @ 13.7' | | |
| 15 | | | | | Sand | | 15 |

NOTES: 2" PVC Well
Augur refusal at 12.2'

| PROJECT: JUNIPER RIDGE LANDFILL | | JOB NO.: 20750 | | BORING NO.: OW-607B |
|---|---|---|---|---|
| DATE STARTED: 11/13/20 | DATE FINISHED: 11/16/20 | | DRILLING METHOD: Drive & Wash | |
| GROUND SURFACE ELEVATION (FT): | 172.2 | DRILLING CONTRACTOR: N.E.B.C. | | LOGGED BY: BAM |
| BOREHOLE DIA. (IN): 4.5 (HW) | ROCK CORE DIA. (IN): N/A | | | SHEET 1 OF 1 |

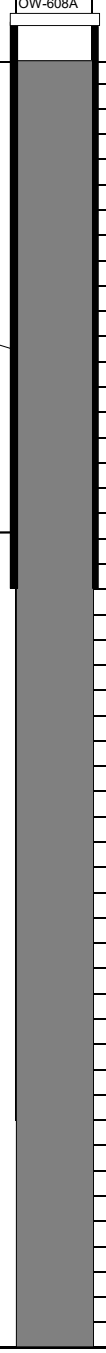
| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | BLOWS/ 0.5' (bpf) | RECOVERY (in.) | | WELL LOG | DEPTH (FT) |
|---|---|---|---|---|---|---|---|
| 5 | | | | | | A | 5 |
| | 1A | Brown sand, some organics, trace gravel | 25, 40, 38, 36 | 18 | | | |
| 10 | | | | | | | 10 |
| | 2A | Light brown sand with silt, some gravel | 24, 20, 17, 22 | 14.5 | 2" Schedule 40 PVC Riser | | |
| 15 | | Boulder | | | | | 15 |
| | 3A | Light brown sand with silt, some gravel throughout | 37, 55, 55, 47 | 18 | | | |
| 20 | | | | | | | 20 |
| | 4A | Light brown sand with silt, gravel in top 0.5' | 16, 32, 30, 34 | 20 | | | |
| 25 | | | | | | | 25 |
| | 5A | Light brown sand with silt, some clay, trace gravel | 6, 13, 21, 48 | 17.5 | | | |
| 30 | | | | | | | 30 |
| | 6A | Olive silty sand, some dark brown strains, trace gravel | 32, 55, 50, 50 / 0.1 | 14 | | | |
| 35 | | | | | Bentonite Chips | | 35 |
| | 7A | Olive silty sand, some gravel | 45, 50 / 0.1 | 8 | | | |
| 40 | | | | | | | 40 |
| | 8A | Gravel with some olive silty sand | 50 / 0.3 | 6.5 | Top of Screen @ 41.0' | | |
| 45 | | | | | Sand | | 45 |
| | 9A | Gravel with some olive silt, trace clay | 50 / 0.3 | 7 | 2" Schedule 40 PVC Slotted Screen | | |
| 50 | | | | | | | 50 |
| | 10A | Gray silt with clay, some gravel | 50 / 0.4 | 8.5 | Bottom of Screen @ 51.0' | | |
| | | Bedrock at 53' | | | Bottom of Boring @ 53.0' | | |
| 55 | | | | | | | 55 |
| 60 | | | | | | | 60 |

NOTES: 2" PVC Well

# WELL INSTALLATION LOG

| | | | |
|---|---|---|---|
| **PROJECT:** Juniper Ridge Landfill, Old Town, Maine | | **JOB NO.:** 18018.00 | **BORING NO. OW-608A** |
| **DATE STARTED:** 12/15/2017 | | **DRILLING METHOD:** Air Rotary w/ 6" dia. casing | |
| **GROUND SURFACE ELEVATION (FT):** 196.07 Site Datum | **Top of Casing Elevation (FT):** 196.61 Site Datum | | **LOGGED BY:** Sevee & Maher |
| **BOREHOLE DIA.:** Soil 8.75", Rock 6" | | | **SHEET 1 OF 2** |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION |
|---|---|---|
| 0 | | Basal Till<br>Brown, gravely, sandy silt, trace of cobbles and boulders |
| 30 | | |
| 60 | | Gray/White Phyllite |
| | | light brown soft phyllite |
| | | Gray/White Phyllite |
| 90 | | Bedrock |
| 120 | | |
| 150 | | light brown soft phyllite at 148', 100+ GPM |




NOTES:

Monitoring Point Elevation for OW-608A = 196.61 ft-Site Datum (top of DI casing)

Water level measured on 1/02/2018: 33.5 ft-below monitoring point, 163.11 ft

Soil Key

- Fill
- Marine Clay
- Submarine Sand & Gravel
- Ablation Till
- Basal Till
- Bedrock

# WELL INSTALLATION LOG

| | | | |
|---|---|---|---|
| **PROJECT:** Juniper Ridge Landfill, Old Town, Maine | | **JOB NO.:** 18018.00 | **BORING NO. OW-608A** |
| **DATE STARTED:** 12/15/2017 | | **DRILLING METHOD:** Air Rotary w/ 6" dia. casing | |
| **GROUND SURFACE ELEVATION (FT):** 196.07 Site Datum | **Top of Casing Elevation (FT):** 196.61 Site Datum | | **LOGGED BY:** Sevee & Maher |
| **BOREHOLE DIA.:** Soil 8.75", Rock 6" | | | **SHEET 2 OF 2** |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | WELL LOG | DEPTH (FT) |
|---|---|---|---|---|
| 150 | | Bedrock | | 150 |
| 180 | | Gray/White Phyllite | | 180 |
| 210 | | | | 210 |
| 240 | | | | 240 |
| | | Bottom of boring at 260.0 ft | | |
| 270 | | | | 270 |
| 300 | | | | 300 |

NOTES:

Monitoring Point Elevation for OW-608A = 196.61 ft-Site Datum (top of DI casing)

Water level measured on 1/02/2018: 33.5 ft-below monitoring point, 163.11 ft

Soil Key

- Fill
- Marine Clay
- Submarine Sand & Gravel
- Ablation Till
- Basal Till
- Bedrock

| PROJECT: JUNIPER RIDGE LANDFILL | | JOB NO.: 20750 | | BORING NO.: OW-608B |
|---|---|---|---|---|
| DATE STARTED: 12/15/2020 | DATE FINISHED: 12/16/2020 | DRILLING METHOD: | Drive & Wash | |
| GROUND SURFACE ELEVATION (FT): | 198.4 | DRILLING CONTRACTOR: N.E.B.C. | | LOGGED BY: DPW |
| BOREHOLE DIA. (IN): 4.5 (HW) | ROCK CORE DIA. (IN): N/A | | | SHEET 1 OF 1 |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | BLOWS/ 0.5' (bpf) | RECOVERY (in.) | | WELL LOG | DEPTH (FT) |
|---|---|---|---|---|---|---|---|
| 5 | | | | | | A | 5 |
| | 1A | Brown/Olive Sand with some silt and organics | 23 | 18 | | | |
| 10 | | | | | 2" Schedule 40 PVC Riser | | 10 |
| | 2A | Brown/Olive Sand, Silt, Some Stone | 36 | 19 | | | |
| 15 | | | | | | | 15 |
| | 3A | Brown/Olive Sand Silt, Some Stone | 42 | 21 | | | |
| 20 | | | | | | | 20 |
| | 4A | Brown/Olive Silt, Sand, and Stone | 40 | 19 | | | |
| 25 | | NOTE: Sizeable Boulder at 24.9' | | | | | 25 |
| | 5A | Brown/Olive Silt, Sand, More Sand then previous samples | 46 | 23 | Bentonite Chips | | |
| 30 | | | | | | | 30 |
| | 6A | Brown/Olive/Gray Sand, Silt, Clay, More prominent stone. | 42 | 11.5 | | | |
| 35 | | NOTE: Sizeable Boulder at 32' | | | Top of Screen @ 33.5' | | 35 |
| | 7A | Olive/Green/Gray Sand, Silt, Clay, Some Stone. | 44.5 | 25 | Sand | | |
| 40 | | | | | 2" Schedule 40 PVC Slotted Screen | | 40 |
| | 8A | Olive/Green/Gray Sand, Silt, Clay, Some Stone. | 36 | 9 | | | |
| 45 | | | | | Bottom of Screen @ 43.5' Bottom of Boring @ 44.0' | | 45 |

NOTES: 2" PVC Well

| PROJECT: JUNIPER RIDGE LANDFILL | | JOB NO.: 20750 | | | BORING NO.: OW-609B |
|---|---|---|---|---|---|
| DATE STARTED: 12/2/20 | DATE FINISHED: 12/3/20 | | DRILLING METHOD: Drive & Wash | | |
| GROUND SURFACE ELEVATION (FT): | 209.9 | DRILLING CONTRACTOR: N.E.B.C. | | | LOGGED BY: RNF |
| BOREHOLE DIA. (IN): 4.5 (HW) | ROCK CORE DIA. (IN): 3.88 (HQ) | | | | SHEET 1 OF 1 |

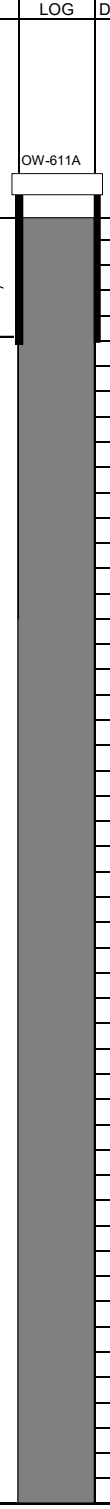
| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | BLOWS/ 0.5' (bpf) | RECOVERY (in.) | | WELL LOG | DEPTH (FT) |
|---|---|---|---|---|---|---|---|
| 5 | | | | | | A | 5 |
| | 1A | Silty sand, some moisture | 7, 10, 17, 20 | 24 | | | |
| 10 | | | | | 2" Schedule 40 PVC Riser | | 10 |
| | 2A | Silt, sand, fragmented rock | 16, 29, 24, 21 | 12 | | | |
| 15 | | Boulder | | | | | 15 |
| | 3A | Silt, sand, some clay | 10, 12, 12, 21 | 18 | | | |
| 20 | | | | | | | 20 |
| | 4A | Grey silty clay | 7, 7, 7, 9 | 18 | | | |
| 25 | | | | | | | 25 |
| | 5A | Grey silty clay | 11, 14, 15, 20 | 24 | | | |
| 30 | | | | | | | 30 |
| | 6A | Grey glacial till | 18, 16, 27, 42 | 18 | | | |
| 35 | | | | | Bentonite Chips | | 35 |
| | 7A | Grey glacial till | 13, 19, 20, 31 | 24 | | | |
| 40 | | | | | Top of Screen @ 39' | -- | 40 |
| | 8A | Grey glacial till | 13, 50 / 0.1 | 7.2 | | -- | |
| 45 | | | | | 2" Schedule 40 PVC Slotted Screen | -- | 45 |
| | 9A | Grey glacial till, some stones | 11, 18, 22, 28 | 24 | Sand | -- | |
| 50 | | | | | Bottom of Screen @ 49' | -- | 50 |
| | 10A | Weathered Rock | 50, 50, 30, 50 | 3.6 | Bottom of Boring @ 51' | | |
| 55 | | | | | | | 55 |

NOTES:

# WELL INSTALLATION LOG

| | | |
|---|---|---|
| **PROJECT:** Juniper Ridge Landfill, Old Town, Maine | **JOB NO.:** 18018.00 | **BORING NO.** **OW-611A** |
| **DATE STARTED:** 12/13/2017 | **DRILLING METHOD:** Air Rotary w/ 6" dia. casing | |
| **GROUND SURFACE ELEVATION (FT):** 183.07 Site Datum | **TOP OF CASING ELEVATION (FT):** 185.15 Site Datum | **LOGGED BY:** Sevee & Maher |
| **BOREHOLE DIA.:** Soil 8.75", Rock 6" | | **SHEET 1 OF 2** |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION |
|---|---|---|
| 0 | | Basal Till<br>Brown, gravely, sandy silt, trace of cobbles and boulders |
| 25 | | Dirty fracture zone 28'<br>28 GPM |
| | | Gray/White Phyllite |
| 50 | | Bedrock |
| 75 | | Dirty fracture zone 82'<br>88+ GPM |
| 100 | | Gray/White Phyllite |
| 125 | | |




NOTES:

Monitoring Point Elevation for OW-611A= 185.15 ft (top of DI casing)

Water level measured on 1/2/2018: 9.7 ft-below monitoring point, 175.45 ft

Water level measured on 1/11/2018: 9.85 ft-below monitoring point, 175.3 ft

Soil Key

- Fill
- Marine Clay
- Submarine Sand & Gravel
- Ablation Till
- Basal Till
- Bedrock

# WELL INSTALLATION LOG

| | | | |
|---|---|---|---|
| **PROJECT:** Juniper Ridge Landfill, Old Town, Maine | | **JOB NO.:** 18018.00 | **BORING NO.** **OW-611A** |
| **DATE STARTED:** 12/13/2017 | | **DRILLING METHOD:** Air Rotary w/ 6" dia. casing | |
| **GROUND SURFACE ELEVATION (FT):** 183.07 Site Datum | **TOP OF CASING ELEVATION (FT):** 185.15 Site Datum | | **LOGGED BY:** Sevee & Maher |
| **BOREHOLE DIA.:** Soil 8.75", Rock 6" | | | **SHEET 2 OF 2** |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | WELL LOG | DEPTH (FT) |
|---|---|---|---|---|
| 125 | | Bedrock | | 125 |
| 150 | | Gray/White Phyllite | | 150 |
| 175 | | | | 175 |
| 200 | | | | 200 |
| | | Bottom of boring at 220.0 ft | | |
| 225 | | | | 225 |
| 250 | | | | 250 |

NOTES:

Monitoring Point Elevation for OW-611A= 185.15 ft (top of DI casing)

Water level measured on 1/2/2018: 9.7 ft-below monitoring point, 175.45 ft

Water level measured on 1/11/2018: 9.85 ft-below monitoring point, 175.3 ft

Soil Key

- Fill
- Marine Clay
- Submarine Sand & Gravel
- Ablation Till
- Basal Till
- Bedrock

| PROJECT: JUNIPER RIDGE LANDFILL EXPANSION | JOB NO.: 18018.00 | | BORING NO.: OW-06-03 |
|---|---|---|---|
| DATE STARTED: 3/22/2018 | DATE FINISHED: 3/22/2018 | DRILLING METHOD: DRIVE & WASH | |
| GROUND SURFACE ELEVATION (FT): 203.04 | DRILLING CONTRACTOR: N.E.B.C. | | LOGGED BY:NMT |
| BOREHOLE DIA. (IN): 4.5 (HW) | ROCK CORE DIA. (IN): N/A | | SHEET 1 OF 1 |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | N-VALUE (bpf) | RECOVERY (in.) | | WELL LOG | DEPTH (FT) |
|---|---|---|---|---|---|---|---|
| | | Brown fine sandy SILT | | | | B | |
| | 1C | | 2,2,6,10 | 14 | | | |
| 5 | | | | | | | 5 |
| | 2C | Gray sandy SILT trace of gravel | 7,10,8,9 | 20 | | | |
| 10 | | | | | | | 10 |
| | N/A | | 3,5,7,8 | 0 | | | |
| 15 | | | | | | | 15 |
| | 3C | Grayish brown silty sand with cobble | 11,5,6,16 | 15 | | | |
| 20 | | | | | | | 20 |
| | 4C | 20.5-22.5 Granular dense silty sand (till) w/ areas of cobble and sand | 20,54,34,33 | 14.5 | | | |
| 25 | | BOB 23 ft. | | | | | 25 |
| 30 | | | | | | | 30 |
| 35 | | | | | | | 35 |
| 40 | | | | | | | 40 |

NOTES: OW-06-03 --10 ft slotted screen set from 23 to 13 ft. TPVC elevation = 206.04

Water level on 4/3/2018.

| PROJECT: JUNIPER RIDGE LANDFILL | | JOB NO.: 20750 | | BORING NO.: MW-08-01 |
|---|---|---|---|---|
| DATE STARTED: 11/17/20 | DATE FINISHED: 11/17/20 | | DRILLING METHOD: N/A | |
| GROUND SURFACE ELEVATION (FT): | 173.1 | DRILLING CONTRACTOR: N.E.B.C. | | LOGGED BY: BAM |
| BOREHOLE DIA. (IN): 6 (HW) | ROCK CORE DIA. (IN): N/A | | | SHEET 1 OF 3 |

| DEPTH (FT) | SAMPLE NO. | MATERIAL DESCRIPTION | BLOWS/ 0.5' (bpf) | RECOVERY (in.) | | WELL LOG | DEPTH (FT) |
|---|---|---|---|---|---|---|---|
| 10 | | | | | | A | 10 |
| 20 | | | | | | | 20 |
| 30 | | | | | | | 30 |
| 40 | | | | | | | 40 |
| 50 | | | | | 2" Schedule 40 PVC Riser | | 50 |
| 60 | | | | | Bentonite Chips | | 60 |
| 70 | | | | | | | 70 |
| 80 | | | | | Bentonite Pellets | | 80 |
| 90 | | | | | | | 90 |
| 100 | | | | | | | 100 |
| 110 | | | | | | | 110 |
| 120 | | | | | Top of Screen @ 117.0' | -- | 120 |
| 130 | | | | | 2" Schedule 40 PVC Slotted Screen<br>Bottom of Screen @ 127.0' | -- -- | 130 |

| PROJECT: JUNIPER RIDGE LANDFILL | | JOB NO.: 20750 | | BORING NO.: MW-08-01 |
|---|---|---|---|---|
| DATE STARTED: 11/17/20 | DATE FINISHED: 11/17/20 | DRILLING METHOD: N/A | | |
| GROUND SURFACE ELEVATION (FT): | 173.1 | DRILLING CONTRACTOR: N.E.B.C. | | LOGGED BY: BAM |
| BOREHOLE DIA. (IN): 6 (HW) | ROCK CORE DIA. (IN): N/A | | | SHEET 1 OF 3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | | | | Sand | | |
| 140 | | | | | | | 140 |
| 150 | | | | | | | 150 |
| 160 | | | | | | | 160 |
| 170 | | | | | | | 170 |
| 180 | | | | | | | 180 |
| 190 | | | | | | | 190 |
| 200 | | | | | | | 200 |
| 210 | | | | | | | 210 |
| 220 | | | | | | | 220 |
| 230 | | | | | | | 230 |
| 240 | | | | | | | 240 |
| 250 | | | | | | | 250 |

| PROJECT: JUNIPER RIDGE LANDFILL | | JOB NO.: 20750 | | BORING NO.: MW-08-01 |
|---|---|---|---|---|
| DATE STARTED: 11/17/20 | DATE FINISHED: 11/17/20 | | DRILLING METHOD: N/A | |
| GROUND SURFACE ELEVATION (FT): | 173.1 | DRILLING CONTRACTOR: N.E.B.C. | | LOGGED BY: BAM |
| BOREHOLE DIA. (IN): 6 (HW) | ROCK CORE DIA. (IN): N/A | | | SHEET 1 OF 3 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 260 | | | | | Bottom of Boring @ 259.7' | | 260 |
| 270 | | | | | | | 270 |

NOTES: 2" PVC Well, installed in existing PW-08-01

# APPENDIX E

# SAMPLE MONITORING FORMS

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SME
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ENGINEERS

## ANNUAL CONDUCTIVITY MEASUREMENTS
## JUNIPER RIDGE, OLD TOWN, MAINE

| | Date | Time | Water Level (TPVC) | Well Depth (TPVC) | Conductivity (µmhos/cm) | Sampling Equipment Used |
|---|---|---|---|---|---|---|
| P-206A | | | | | | Geotech |
| DP-4 | | | | | | Geotech |
| MW04-101 | | | | | | Geotech |
| MW04-102 | | | | | | Geotech |
| MW04-104 | | | | | | Geotech |
| MW04-105 | | | | | | Geotech |
| MW04-109R | | | | | | Geotech |
| MW12-303R | | | | | | Geotech |
| MW-204 | | | | | | Geotech |
| MW-223A | | | | | | Geotech |
| MW-223B | | | | | | Geotech |
| MW-227 | | | | | | Geotech |
| MW-301 | | | | | | Geotech |
| MW-302R | | | | | | Geotech |
| MW-401A | | | | | | Geotech |
| MW-401B | | | | | | Geotech |
| MW-402A | | | | | | Geotech |
| MW-402B | | | | | | Geotech |
| MW-216BR | | | | | | Geotech |
| MW09-901 | | | | | | Geotech |
| P-04-02R | | | | | | Geotech |
| P-04-04 | | | | | | Geotech |
| P-201A | | | | | | Bailer |
| P-201B | | | | | | Bailer |
| P-201C | | | | | | Bailer |
| P-201D | | | | | | Bailer |
| P-201E | | | | | | Bailer |
| P-202A | | | | | | Geotech |
| P-202B | | | | | | Geotech |
| P-206A | | | | | | Bailer |
| P-209A | | | | | | Bailer |
| P-209B | | | | | | Bailer |
| P-209C | | | | | | Bailer |
| P-211A | | | | | | Geotech |
| P-211B | | | | | | Geotech |
| P-220A | | | | | | Bailer |
| P-220B | | | | | | Bailer |

Sampler Name _____

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## GAS VENT MONITORING
## JUNIPER RIDGE LANDFILL, OLD TOWN, MAINE

**PROJECT NO.** 21044 **WEATHER:** _____

**DATE:** _____ **CALIBRATION GAS:** See Attached Calibration Sheet

**METER ID:** RKI GX-2003

| Vent ID Number | Time of Reading | Methane Equivalent | | Methane Equiv. Ambient | | $H_2S$ ppm | $H_2S$ Ambient ppm | $O_2$ | $CO_2$ | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | | % LEL | % Vol | % LEL | % Vol | | | | | |
| MW04-102 | | | | | | | | | | |
| MW04-105 | | | | | | | | | | |
| MW04-109R | | | | | | | | | | |
| MW–204 | | | | | | | | | | |
| MW–206 | | | | | | | | | | |
| MW – 223A | | | | | | | | | | |
| MW – 223B | | | | | | | | | | |
| MW – 227 | | | | | | | | | | |
| MW – 301 | | | | | | | | | | |
| MW – 302R | | | | | | | | | | |
| MW – 303R | | | | | | | | | | |
| MW – 401A | | | | | | | | | | |
| MW – 401B | | | | | | | | | | |
| MW – 402A | | | | | | | | | | |
| MW – 402B | | | | | | | | | | |
| MW09-901 | | | | | | | | | | |
| DP-4 | | | | | | | | | | |
| P-206A | | | | | | | | | | |
| P-04-04 | | | | | | | | | | |
| P-04-02R | | | | | | | | | | |
| MW-06-01 | | | | | | | | | | |
| MW-501 | | | | | | | | | | |
| OW-06-03 | | | | | | | | | | |
| OW-601A | | | | | | | | | | |
| OW-601B | | | | | | | | | | |
| OW-602A | | | | | | | | | | |
| OW-603B | | | | | | | | | | |
| OW-604A | | | | | | | | | | |

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| Vent ID Number | Time of Reading | Methane Equivalent | Methane Equiv. Ambient | $H_2S$ ppm | $H_2S$ Ambient ppm | $O_2$ | $CO_2$ | Comments |
|---|---|---|---|---|---|---|---|---|
| | | % LEL | % Vol | % LEL | % Vol | | | |
| LF-UD | | | | | | | | |
| LP-UD | | | | | | | | |
| LP-LD | | | | | | | | |
| LT-C4LR | | | | | | | | |
| West Property Line A | | | | | | | | |
| West Property Line B | | | | | | | | |
| South Property Line | | | | | | | | |

LEL CONVERSION: (% LEL/100) X 5 = % VOLUME

**SAMPLER SIGNATURE:** _____

**NOTES:**

**Ambient readings for % LEL and $H_2S$ should be taken next to the sample site prior to the reading taken at the sample site.**

**ATTENTION: If your % Methane reading equals 0, please write 0.1US as your reading**

US – Not detected above the minimal reporting limit determined by interpreted instrument specification.

SME
SEVEE & MAHER ENGINEERS
4 Blanchard Road, P.O. Box 85A
Cumberland, ME 04021
Tel: 207.829.5016 / Fax: 207.829.5692
smemaine.com



# FIELD INSTRUMENT CALIBRATION
# DAILY OPERATING LOG

| CLIENT: | DATE: |
|---|---|
| PROJECT SITE: | JOB NUMBER: |

| METER SET | INSTRUMENT | MODEL ID NUMBER | UNIT ID NUMBER | STANDARDS USED FOR CALIBRATION * | WAS CALIBRATION SUCCESSFULLY COMPLETED? (If yes, place ✓ in appropriate area) (For ORP, place results of calibration in appropriate box) | | MIDDAY STANDARD(S) CHECK * (Check off appropriate standard if meter is in calibration) | | OPERATOR INITIALS |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Standard | Reading | |
| A | pH | YSI PRO PLUS | SME001 | 4.01<br>7.00<br>_____ | 4 ____ reading _____<br>7 ____ reading _____<br>10 ____ reading _____ | | _____<br>7.00<br>_____ | _____<br>_____<br>_____ | |
| | Specific Conductivity | YSI PRO PLUS | SME001 | _____ Microsiemens | _____ reading _____ | | ____ Microsiemens | _____ | |
| | DO | YSI PRO PLUS | SME001 | 100%<br>ZERO Oxygen solution | _____ 100% reading _____<br>_____ ZERO reading _____ | | 100% | _____ | |
| | ORP | YSI PRO PLUS | SME001 | 240 mV ORP Solution | _____ 240 mV | Reading _____ | 240 mV ORP | _____ | |
| | Turbidity | LaMotte 2020we | SME001 | 1 NTU 10 NTU | ___ 1 NTU Reading_____ | ___ 10 NTU Reading _____ | ___ 1 NTU ___ 10 NTU | _____ | |
| B | pH | YSI PRO PLUS | SME002 | 4.01<br>7.00<br>_____ | 4 ____ Reading _____<br>7 ____ Reading _____<br>10 ____ Reading _____ | | _____<br>_____<br>_____ | _____<br>_____<br>_____ | |
| | Specific Conductivity | YSI PRO PLUS | SME002 | _____ Microsiemens | _____ Reading _____ | | ____ Microsiemens | _____ | |
| | DO | YSI PRO PLUS | SME002 | 100%<br>ZERO Oxygen solution | _____ 100% Reading _____<br>_____ ZERO Reading _____ | | 100% | _____ | |
| | ORP | YSI PRO PLUS | SME002 | 240 mV ORP Solution | _____ 240 mV | Reading _____ | 240 mV ORP | _____ | |
| | Turbidity | LaMotte 2020we | SME002 | 1 NTU 10 NTU | ___ 1 NTU Reading_____ | ___ 10 NTU Reading _____ | ___ 1 NTU ___ 10 NTU | _____ | |

* Calibration of meters is completed once daily before work starts – a standards check for pH, conductivity, and turbidity should be completed midway through each day or if a particular field value falls outside of historic ranges.

**ADDITIONAL NOTES:** _____

_____

SME
SEVEE & MAHER
ENGINEERS

# MONITORING WELL – SAMPLE PURGING
# JUNIPER RIDGE LANDFILL, OLD TOWN, MAINE

| | |
|---|---|
| **PROJECT:** _____ | **PROJECT NO.:** 144021 _____ **DATE:** _____ |
| **SAMPLE LOCATION ID:** _____ | **ACTIVITY** |
| | **START TIME:** _____ **END TIME:** _____ |

| | | | |
|---|---|---|---|
| **WELL DEPTH:** _____ FT | ☐ Measured ☐ Historical | ☐ Top of Well ☐ Top of Casing | CASING STICK-UP (FROM GROUND) _____ F CASING/ WELL DIFF_____ |

| | | | | |
|---|---|---|---|---|
| **WATER DEPTH:** _____ FT | **WELL MATERIAL** ☐ PVC ☐ SS ☐ _____ | **WELL LOCKED** ☐ Yes ☐ No | **WELL DIAMETER** ☐ 2" ☐ 6" ☐ 4" ☐ _____" | **WATER LEVEL EQUIPMENT USED** ☐ Elect. Cond. Probe ☐ Float Activated ☐ Press Activated ☐ _____ |

| | | | |
|---|---|---|---|
| **HEIGHT OF WATER COL** _____ FT | ☐ 0.16 GAL/FT (2") ☐ 0.65 GAL/FT (4") | ☐ 1.50 GAL/FT (6") ☐ _____ GAL/FT (_____ in.) | _____ GAL/VOL _____ TOTAL GAL. PURGED |

**PURGING/SAMPLING EQUIPMENT USED:**

| Check if used for PURGING | SAMPLING | |
|---|---|---|
| ☐ | ☐ | PERISTALTIC PUMP _____ |
| ☐ | ☐ | SUBMERSIBLE PUMP _____ |
| ☐ | ☐ | BAILER _____ |
| ☐ | ☐ | PVC/SILICON TUBING _____ |
| ☐ | ☐ | TEFLON/SILICON TUB. _____ |
| ☐ | ☐ | AIR LIFT _____ |
| ☐ | ☐ | HAND PUMP _____ |
| ☐ | ☐ | IN-LINE FILTER _____ |
| ☐ | ☐ | PRESS/VAC FILTER _____ |

**DECONTAMINATION FLUIDS USED:**
*(check all that apply at that location)*

- ☐ ETHYL ALCOHOL
- ☐ DEIONIZED WATER
- ☐ TSP SOLUTION
- ☐ HEXANE
- ☐ HN03/D.I. WATER SOLUTION
- ☐ POTABLE WATER
- ☐ NONE
- OTHER _____
- OTHER _____

| PURGE VOLUME | @ _____ GAL | @ _____ GAL | @ _____ GAL | @ _____ GAL | @ _____ GAL | SAMPLE OBSERVATIONS |
|---|---|---|---|---|---|---|
| TEMPERATURE (°C) | | | | | | ☐ TURBID |
| pH units | | | | | | ☐ COLORED |
| SPECIFIC CONDUCTANCE (µmhos/cm) | | | | | | ☐ CLOUDY |
| OXIDATION REDUCTION (+/- mV) | | | | | | ☐ CLEAR |
| DISSOLVED OXYGEN (PPM) | | | | | | ☐ ODOR |
| TURBIDITY | | | | | | ORP OFFSET: _____mV |

LAB SAMPLE ID _____ DUPLICATE ID _____

**NOTES:**

**SAMPLED BY:** _____

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| **Elapsed Time** (min) | **Liters Pumped** | **Flow Rate** (mL/min) | **WL TPVC** (FT) | **WL Top of Casing** (FT) | **Turbidity** (1) | **pH** (2) | **Specific Cond.** (3) | **Temp ° C** (4) | **DO** (5) | **ORP** (6) | **Comments** |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Unit ID No.:** | | | | | | | | | | | |
| **Model ID:** | | | | | | | | | | | |
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**NOTES:**

1 TURBIDITY (NTU)
2 pH (STD UNITS)
3 SPECIFIC CONDUCTANCE (µmhos/cm @25°C)
4 TEMPERATURE
5 DISSOLVED OXYGEN (mg/L)
6 UNADJUSTED OXIDATION REDUCTION POTENTIAL (+/- mV)

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smemaine.com



# SAMPLE DATA RECORD
## SURFACE WATER

**SITE ID:** JRL

**SAMPLE LOCATION:** SW-1

**SAMPLE ID:** _____

**SAMPLE DATE:** _____

**SAMPLE TIME:** _____

**SAMPLER:** _____

**WATER BODY SAMPLED:** Bog Stream

**COLLECTION METHOD:** Grab

**DECONTAMINATED:** ☒ YES ☐ NO

**DEPTH AT SAMPLE SITE:** _____

**DEPTH OF SAMPLE:** _____

**FLOW RATE/VELOCITY:** _____

**INSTRUMENTS CALIBRATED (date):** _____

**DUPLICATE SAMPLE COLLECTED:** ☐ Yes ☐ No **IF YES, SAMPLE ID:** _____

**SAMPLE BOTTLES FILLED (ID):** *See Chain of Custody*

**SAMPLE APPEARANCE / ODOR:** _____

**TEMPERATURE:** _____ °C

**ORP:** _____ mV

**ORP OFFSET:** _____ mV

**pH:** _____ SU

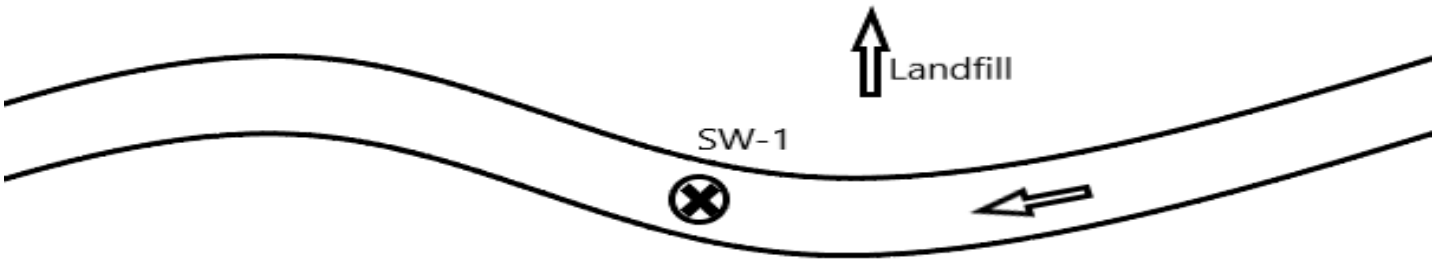
**SPECIFIC CONDUCTANCE:** _____ µmhos/cm

**DISSOLVED OXYGEN:** _____ mg/L

**TURBIDITY:** _____ NTU

**NOTES:**

**LOCATION SKETCH:**



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# SAMPLE DATA RECORD
## SURFACE WATER / LEACHATE

**SITE ID:** _____ **SAMPLE DATE:** _____

**SAMPLE LOCATION:** _____ **SAMPLE TIME:** _____

**SAMPLE ID:** _____ **SAMPLER:** _____

**WATER BODY/STRUCTURE SAMPLED:** _____ **DEPTH AT SAMPLE SITE:** _____

**COLLECTION METHOD:** _____ **DEPTH OF SAMPLE:** _____

**DECONTAMINATED**: ☐ YES ☐ NO **FLOW RATE/VELOCITY:** _____

**INSTRUMENTS CALIBRATED (date):** _____

**DUPLICATE SAMPLE COLLECTED:** ☐ Yes ☐ No **IF YES, SAMPLE ID:** _____

**SAMPLE BOTTLES FILLED (ID):** *See Chain of Custody*

**SAMPLE APPEARANCE / ODOR:** _____

**TEMPERATURE:** _____ °C **DISSOLVED OXYGEN:** _____ mg/L

**ORP:** _____ mV **TURBIDITY:** _____ NTU

**ORP OFFSET:** _____ mV **TOTAL ALKALINITY:** _____ (# of drops) x

**pH:**_____ SU _____ (mg/L per drop) =

**SPECIFIC CONDUCTANCE:** _____ µmhos/cm _____ mg/L

**NOTES:**

**LOCATION SKETCH:**

# CHAIN–OF–CUSTODY RECORD

PAGE ____ OF ____

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| | | |
|---|---|---|
| CLIENT: | PROJECT NAME: | PROJECT/ P.O. #: |
| REPORT TO: | ADDRESS: | |
| INVOICE TO: | ADDRESS: | |
| SAMPLED BY: (PRINT) | SAMPLER SIGNATURE: | |

FILTERED (Y/N)
PRESERVED
ANALYSIS REQUIRED

LEGEND FOR PRESERVATIVE
1 – 4° CELSIUS
2 – HCL
3 – $HNO_3$
4 – $H_2SO_4$
5 – $Na_2SO_3 + H_2SO_4$
6 – NaOH

| ITEM NO. | SAMPLE IDENTIFICATION | DATE | TIME | COMPOSITE OR GRAB | W–WATER L–LIQUID S–SOLID | TOTAL NUMBER OF CONTAINERS | REMARKS | LAB SAMPLE # |
|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | |
| 2 | | | | | | | | |
| 3 | | | | | | | | |
| 4 | | | | | | | | |
| 5 | | | | | | | | |
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| 8 | | | | | | | | |
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| 10 | | | | | | | | |
| 11 | | | | | | | | |
| 12 | | | | | | | | |
| 13 | | | | | | | | |
| 14 | | | | | | | | |
| 15 | | | | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| RELINQUISHED BY: | DATE: | TIME: | RECEIVED BY: | DATE: | TIME: |
| RELINQUISHED BY: | DATE: | TIME: | RECEIVED BY: | DATE: | TIME: |
| RELINQUISHED BY: | DATE: | TIME: | RECEIVED BY: | DATE: | TIME: |

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A CHAIN OF CUSTODY IS REQUESTED WITH EACH SET OF SAMPLES

# APPENDIX F

# IDENTIFICATION OF ENVIRONMENTAL SAMPLES

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# IDENTIFICATION OF ENVIRONMENTAL SAMPLES

## PURPOSE

To uniquely and systematically identify the source of environmental samples within a designated site, especially those destined for chemical analysis. The structure of the identification system is selected to be compatible with computerized database management.

## SCOPE

This procedure should be utilized whenever environmental samples are collected for either physical or chemical analysis.

## PROCEDURE

The sample identification system consists of 9 alphanumeric characters in four information groups:

SAMPLE IDENTIFICATION EXAMPLE

12-345-6-789

-- --- - ---

GW-101-1-0A6

| | |
|---|---|
| Type | GW (see type codes below) |
| Horizontal Locator | 101 (corresponds to boring, well ID or other location) |
| Vertical Locator | A (A = deepest well in a cluster) |
| Serial Code | 0A6 (computer generated unique serial code) |

If only one character is needed in a multi-character field, the character should be right-justified, and the leading spaces filled with an X for alphanumeric fields or zeros (0) for numeric fields.

Type: The two-character sample type code identifies the general source type and media of the sample. The physical location coordinates are addressed in the horizontal and vertical codes.

Standard sample type codes are:

| | |
|---|---|
| GW - groundwater | SL - sludge |
| SW - surface water | SD - sediment |
| WW - wastewater | WT - waste |
| DW - drinking water | WP - wipe |
| WS - water supply | AA - ambient air, grab sample |
| LT - leachate | LA - ambient air, long-term sample |
| PC - primary clarifier effluent | SG - soil gas |
| SC - secondary clarifier effluent | LV - landfill vent gas |
| DF - drilling fluid | TP - test pit |
| BS - blank, sampler | SS - surface soil |
| BB - blank, bailer | SB - soil boring |
| BU - blank, tubing | RC - rock core |
| BL - blank, lot | DC - drum cuttings |
| BF - blank, filtration | TE - treated effluent |
| BT - blank, trip | RI - raw influent |
| BP - blank, pump | RW - raw water |

Horizontal Locator: Also known as the "sampling point," this code locates the sampling/exploration on the surface of the site (x, y coordinates). The horizontal locator allows designation of a variety of samples (e.g. AA, SS, SB, MW) all from the same point on site. Two approaches may be used:

(1) a number sequence for the exploration (e.g. MW-010). For wells and borings it is important to note that a boring #10 which subsequently has a monitoring well installed has the same horizontal locator, #10.

(2) use of a grid system. If a sampling program utilizes a grid system, as surface soil sampling often does, it is recommended that the grid system be used for all horizontal locations. A three-character grid system allows about 2,600 locations (A00 through Z99).

Vertical Locator: The vertical locator is primarily used for water samples taken from monitoring well clusters. The convention used is a capital letter where "A" represents the deepest well in the cluster. "B" and "C" would represent progressively less deep wells in the same cluster. Soil samples will not use the vertical locator in the sample ID. Depths for soil samples are recorded as field data and this space contains an X.

Serial Code: The sample serial code is generated by the computer sample tracking program when a planned sample is entered into the database. The serial code is unique for each sample on a given site. The serial code is made up of numeric characters [0-9] and alphanumeric characters [A-J] and is a

sequential numbering using a base 20 numeric system. The first sample entered into the tracking program receives the code “001”, the tenth sample “00A”, the twentieth sample “010” and so on. In this way over 8,000 unique sample codes can be generated in the three character group. Sample codes are never reissued even if a sample has been dropped from the plan. The last 1,000 serial codes are reserved for contingency samples, that is those samples which are not planned but are collected due to some technical decision made in the field.