

August 23, 2016

Mr. Chris Swain
Bureau of Remediation and Waste Management
Maine Department of Environmental Protection
17 State House Station
Augusta ME 04333

**Subject: Northern Drainage Ditch Corrective Measures Implementation Plan – Revision 1
Orrington Remediation Site
Orrington, Maine**

Dear Mr. Swain:

Please find enclosed the **Northern Drainage Ditch Corrective Measures Implementation Plan – Revision 1** for the Orrington Remediation Site. This CMI Plan includes a summary of the pre-design activities, a comparison of results to the Media Protection Standards (MPS) in Sections 1 & 2, the Design Objectives are outlined in Section 3, and the Corrective Measures Implementation components are described in detail in Section 4. Permitting issues and the schedule are addressed in Sections 5 and 6. The pre-design data, including analytical reports, is included in Appendices A - D. Drawings and Specifications are included in Appendices E & F, the Construction Quality Assurance (CQA) Plan is in Appendix G, design calculations are in Appendix H and the Soil Use Plan in Appendix I. The Remediation Contractor's Excavation and Restoration Plan and Construction Water Management Plan are included in Appendix J.

This CMI Plan, including the final Drawings and Contractor Work Plans, has been revised in accordance with the Maine DEP's written comments dated May 17, July 19, the Response to Comments submitted July 29, and the Maine DEP's final comments dated August 7, 2016. Various discussions with the Maine DEP regarding specific components of the CMI Plan were also held during this time.

The DEP Comment letter dated 8/7/16 stated *"...the MeDEP approves the Northern Drainage Ditch CMI and Remediation Contractor Work Plans as revised, subject to satisfactorily meeting the conditions outlined in this letter."* All conditions in the Maine DEP letter have been met and incorporated into the revised CMI Plan, therefore it is our understanding this CMI Plan – Revision 1 is considered approved upon submittal. We appreciate your review of these draft documents and the collaborative discussions that have resulted in this final plan. If you have questions or comments before then please don't hesitate to contact me at 314-281-5947.

Sincerely,



Kathy Zeigler
Remediation Program Manager

cc: Chris Greene, Geosyntec
John Weston, CDM Smith
Pat Duft, Mallinckrodt US LLC
Susanne Miller, DEP-Bangor

CMI PLAN

Northern Drainage Ditch Corrective Measures Implementation (CMI) Plan

Revision 1

Orrington Remediation Site
Orrington, Maine

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August 2016



PROFESSIONAL ENGINEER CERTIFICATION

The design set forth in the Northern Drainage Ditch Corrective Measures Implementation Plan (CMI Plan), Revision 1, dated August 23, 2016 was prepared under the direction of a Professional Engineer licensed in the State of Maine (i.e., a Maine PE). Work Plans prepared by the Remediation Contractor and included as attachments to the CMI Plan have been reviewed under the direction of a Maine PE for compliance with the design requirements set forth in the CMI Plan.



August 23 2016



Signature

Date

Stamp

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Acronyms

BEP	Board of Environmental Protection
bgs	below ground surface
CDM	Camp Dresser & McKee
CDM Smith	CDM Smith, Inc.
CGP	Construction General Permit
CMI	Corrective Measures Implementation
COC	Contaminant of Concern
CQA	Construction Quality Assurance
DEP	Department of Environmental Protection
DMA	Direct Mercury Analyzer
ft	feet
Geosyntec	Geosyntec Consultants, Inc.
GWTP	Groundwater Treatment Plant
HASP	Health and Safety Plan
LF	Linear Foot
Mallinckrodt	Mallinckrodt US LLC
MDIFW	Maine Department of Inland Fisheries and Wildlife
mg/kg	milligrams per kilogram
MPS	Media Protection Standard
NRPA	Natural Resources Protection Act
Order	Board of Environmental Protection Order
PCB	polychlorinated biphenyl
PM ₁₀	Particulate Matter
QA/QC	quality assurance/quality control
QAPP	Quality Assurance Project Plan
Site	Orrington Remediation Site
sq.	square
SVOC	semivolatile organic compound
USFWS	United States Fisheries and Wildlife Service
VOC	volatile organic compound
XRF	X-Ray Fluorescence

Section 1.

Introduction

1.1 Purpose

This Northern Drainage Ditch Corrective Measures Implementation (CMI) Plan was prepared by CDM Smith Inc. (CDM Smith) and Geosyntec Consultants, Inc. (Geosyntec) on behalf of Mallinckrodt US LLC (Mallinckrodt). The purpose of this CMI Plan is to present the corrective measures to support soil remediation and restoration of the Northern Drainage Ditch area at the Orrington Remediation Site (Site) located at 99 Industrial Way, Orrington, Maine. **Figure 1-1** is a Site Plan. The CMI Plan presents the results of the pre-design investigation, a narrative description of the remedial objectives and planned implementation, along with design drawings and specifications to implement the remedial activities.

The Northern Drainage Ditch is undergoing remediation in accordance with the Board of Environmental Protection (BEP) Order (the Order) effective April 3, 2014 which incorporates, with modifications, the Compliance Order issued by the Maine Department of Environmental Protection (DEP) dated November 24, 2008. The Order states that corrective measures will include at a minimum excavation and removal of soil exceeding the Media Protection Standards (MPSS).

Subsequent sections describe the results of the Northern Drainage Ditch pre-design study, and objectives and components of the CMI Plan. Additional details describing the field sampling methods, analytical methods, health and safety procedures, and quality assurance/quality control (QA/QC) procedures have been provided in the Health and Safety Plan (HASP) (CDM Smith 2014a) and Quality Assurance Project Plan (QAPP) (CDM Smith, 2015a).

1.2 Report Organization

The Northern Drainage Ditch CMI Plan presents analytical data collected to support the remedial design, followed by a description of the remedial design process. Analytical data was collected to support remedial design in the Northern Drainage Ditch in accordance with the Revised Plant Areas Pre-Design Work Plan (CDM Smith, 2015b). A summary of the data collection and results of these supporting data sets are presented in Section 2.

The remedial design objectives, based on the Order, are described in Section 3. The components of the remedial design that will be implemented to meet the remedial design objectives as well as the material transportation and disposal logistics are included in Section 4. The permitting requirements are presented in Section 5, and the anticipated schedule of CMI activities is presented in Section 6.

Section 2.

Summary of the Northern Drainage Ditch Pre-Design Results

The following section presents a summary of results from the pre-design activities completed at the Northern Drainage Ditch. Analytical pre-design activities were completed in accordance with the Revised Plant Areas Pre-Design Work Plan (CDM Smith, 2015b). An email approving the initial Northern Drainage Ditch Pre-Design activities was received from Maine DEP on July 23, 2015 and conditional approval of the Work Plan was received on October 22, 2015. Numerous e-mails approving step-out borings associated with this pre-design investigation were sent to the Maine DEP for review and approval.

2.1 Analytical Results

A total of 82 soil borings were advanced using a track mounted Geoprobe/7822DT and a hand probe in the Northern Drainage Ditch between August 12, 2015 and January 12, 2016. The Revised Plant Area Pre-Design Work Plan included 15 soil borings (SB-ND-01 through SB-ND-15) outside the limits of the Northern Drainage Ditch with possible step-out soil borings where mercury concentrations in perimeter borings were above 2.2 milligrams per kilogram (mg/kg). Thirty-nine step-out borings (SB-ND-16 through SB-ND-54) were performed with Maine DEP approval at the locations shown on **Figure 2-1**. SB-ND-05 was not performed because it was in close proximity to boring SB-LF1-02 performed as part of the Landfill 1 pre-design activities. Seven transects (TS-ND-A through TS-ND-G) comprised of 29 probe locations were advanced to delineate the ditch within the Northern Drainage Ditch area. Only the center line borings were performed on the A and B transects due to close proximity to other Northern Drainage Ditch soil borings SB-ND-18, SB-ND-06, and SB-ND-13. The locations of the soil borings advanced in the Northern Drainage Ditch area are shown on **Figure 2-1**.

Analytical samples were collected from soil samples obtained from these boring locations. **Appendix A** presents tabulated results of the analytical tests, **Appendix B** presents the boring logs from the investigation, **Appendix C** presents the Alpha Analytical and Direct Mercury Analyzer (DMA) Laboratory Reports, and **Appendix D** presents the Data Usability Assessment Reports. The sections below present a summary of the data collected and key findings to support the design activities.

2.1.1 Nature and Extent

The major findings from the analysis of the nature and extent of contaminants of concern (COCs) exceeding soil MPSs in the Northern Drainage Ditch are as follows:

- The maximum depth of material with mercury concentrations exceeding the MPS was most often encountered in the fill and occasionally extended into the silt and clay, sand, gravel and till strata.
- The Northern Drainage Ditch area abuts the eastern extent of Landfill 1 and southwestern portion of the Plant Area. Mercury distribution in Northern Drainage Ditch borings adjacent to Landfill 1 and the southwestern portion of the Plant Area are similar to pre-design borings performed in these areas.
- Chloropicrin concentrations above the MPS were encountered at depths ranging from 18-30 ft bgs (or an elevation of -8 to 15 ft) at four locations (SB-ND-14, SB-ND-19, SB-ND-20, and SB-

ND-21) and were found in the sand, silt, gravel and top of the till strata. These areas are downgradient of the Chloropicrin Spill Area.

- Non-mercury COCs with MPSs (other than chloropicrin) were not detected above their respective MPSs at any of the locations in the Northern Drainage Ditch analyzed for these parameters.
- Total Volatile Organic Compounds (VOCs) and semi-volatile organic compounds (SVOCs) without MPSs were not detected or were present at levels below the Maine Remedial Action Guidelines (RAGs) for unrestricted use at the sampled locations. Additional sampling for these compounds is therefore not required.
- No elemental mercury was observed in any of the borings.

Each boring was typically segregated into one-foot (ft) intervals and mercury concentrations were measured from these intervals. Where there was not enough material for analysis in a one ft segment, adjacent segments were combined. The sample intervals were initially screened with the XRF; if the XRF measurement was below 15 mg/kg, the sample was analyzed using the Maine-Certified Direct Mercury Analyzer (DMA)-80. Prior to November 25, 2015, if the DMA-80 measurement of mercury was below 2.2 mg/kg, the sample was submitted for analysis at a Maine certified off-site laboratory. Starting on November 25, 2015, submission to an off-site lab for mercury analysis was changed to 15% of samples with DMA results between 1.2 and 3.2 mg/kg, in accordance with a Maine DEP e-mail, dated November 19, 2015. The mercury concentrations measured using the XRF, DMA-80, and at the off-site Maine certified laboratory are provided in **Table A-1 of Appendix A**. **Figure 2-2** illustrates the location of each of the soil borings, with an accompanying bar chart for each boring showing the ground surface elevation, bottom of boring elevation, and which one-foot boring intervals exceeded the MPS for mercury.

The distribution of mercury in the subsurface soils in the Northern Drainage Ditch areas is not consistent. In some areas the mercury is surficial (e.g. 0 to 3 ft bgs), in other areas it is at depth (e.g. below 10 ft bgs), and in other areas it is throughout the borings. In most cases the mercury concentrations greater than 2.2 mg/kg are found in the fill material however occasionally it is found in the underlying sand, silts, and gravels or at the top intervals of the till.

Samples analyzed from soil borings and transects advanced during the pre-design activities vertically delineated the extent of mercury above the MPS at most boring locations. Vertical delineation of borings from the center of the Northern Drainage Ditch (e.g. TS-ND-A1, TS-ND-B1, TS-ND-C1, TS-ND-D1, TS-ND-E1, TS-ND-F1, and TS-ND-G1) was not obtained because the hand geoprobe was limited in depth to 6 feet bgs and the track mounted rig could not access these areas. SB-ND-08 and SB-ND-13 also were not vertically delineated as refusal was encountered at the bottom of both borings.

The lateral extent of mercury was delineated at most borings locations with the exception of those where step-out locations were not accessible by the drill rig (e.g. SB-ND-45, SB-ND-52, SB-ND-53, SB-ND-54, TS-ND-G1, and TS-ND-G3). These areas will be addressed and analyzed during excavation. Borings near the perimeter in the northern portion of the Northern Drainage Ditch area had mercury concentrations above 2.2 mg/kg in select intervals, (e.g. SB-ND-01, SB-ND-03, SB-ND-19, and SB-ND-21). These locations are adjacent to the outer extent of the pre-design borings for the Plant Area and Landfill 1 areas which also had mercury concentrations above 2.2 mg/kg in select intervals. Based on this data, and the lack of a defined boundary between the Plant Area, the northern section of the Northern Ditch, and the eastern boundary of Landfill 1, remediation of the northern section of the North Ditch will be completed as part of the Plant Area and/or Landfill 1.

Seventy-seven samples were collected from 67 locations and sent to an off-site Maine-certified laboratory for analysis of total VOCs and non-mercury COCs for which soil MPSs are established. After mercury concentrations had been analyzed from the original boring location, samples were collected

from designated discrete intervals below the deepest mercury MPS exceedance. A new boring was sampled approximately 1 ft from the original boring location. Samples were also collected and tested for chloropicrin at approximately 5-ft intervals at locations downstream of the chloropicrin spill area (e.g. SB-ND-18 through SB-ND-21).

Chloropicrin concentrations above the MPS were found from depths of 18 to 30 ft bgs (elevations of 1 ft to 15 ft) in borings located near the northeastern portion of the Northern Drainage Ditch area (e.g. SB-ND-14, SB-ND-19, SB-ND-20, and SB-ND-21) (**Figure 2-3**). These chloropicrin exceedances are generally co-located with the mercury exceedances at these locations. While these chloropicrin concentrations exceeded the MPS, the concentrations are relatively low and can be safely managed during excavation. Higher chloropicrin soil concentrations were detected in and downgradient of the Chloropicrin Spill Area which will be addressed during the Plant Area remediation. A treatability study to assess in-situ treatment of chloropicrin above the MPS at the Site is currently underway.

Aside from chloropicrin discussed above, there were no detections of other COCs with MPSs (PCBs, cadmium, ethylbenzene, and total xylenes) above their respective MPSs in the Northern Drainage Ditch. The results for the non-mercury COCs are presented in **Table A-2** of **Appendix A** and **Figure 2-3**. Other VOCs and SVOCs without MPSs were not detected or were present at low levels below the Maine unrestricted soil use standards and therefore do not require additional delineation. The total VOC and SVOC data are provided in **Table A-3** of **Appendix A**.

2.2 Subsurface Conditions

A geotechnical investigation was not necessary as part of the Northern Drainage Ditch pre-design activities due to its proximity to both Landfill 1 and Plant Area as well as the relative shallow nature of the anticipated impacts and existing geotechnical data collected during the Landfill 1 and Plant Area pre-design activities located adjacent to the deeper portions of the excavation. Subsurface conditions were characterized from this adjacent geotechnical information, boring logs from the analytical borings, and previous Site investigations (CDM, 1998). The subsections below summarize the observed stratigraphy and groundwater elevations, and the Northern Drainage Ditch boring logs are included in **Appendix B**.

2.2.1 Stratigraphy

The Northern Drainage Ditch stratigraphy can be described generally as a layer of fill underlain by soil materials of varying consistency. A subsurface profile of the Northern Drainage Ditch along the centerline of the area is shown on **Drawing 5** in the Northern Drainage Ditch CMI Plan drawing set (**Appendix E**).

Seven subsurface strata have been identified at the Orrington Remediation Site based on the information described above. The strata are generally defined from top to bottom as (1) Fill, (2) Peat, (3) Clay and Silt, (4) Sand, (5) Gravel, (6) Till, and (7) Bedrock, respectively. A detailed description of the strata encountered in the Northern Drainage Ditch is provided below. Standard Penetration Test (SPT) values referenced are from borings presented on Drawing 5 that were performed as part of previous investigations.

- Stratum 1 (Fill) – Fill overlays naturally occurring materials, and ranges from loose to dense (SPT $N_{avg} = 20$) silty sand and silty or clayey sand to silt or poorly graded sand with some to trace fine gravel and some to trace organics. Stratum 1 tapers out as the Northern Drainage Ditch drops in elevation.
- Stratum 2 (Peat) – Not encountered in the Northern Drainage Ditch.

- Stratum 3 (Clay and Silt) – The Clay and Silt layer ranges from silt, silt and clay, or clay, often with some to trace gravel or sand and a few stratified gravel pockets. In the Northern Drainage Ditch Stratum 3 is intermixed with sand layers.
- Stratum 4 (Sand) – The Sand layer ranges from very loose to very dense (SPT Navg=17) silty sand to poorly graded sand or well graded sand, with some to trace gravel or clay present. In the Northern Drainage Ditch, Sand was found in the southwest portion of the Northern Drainage Ditch where the ground surface is less steep (approximately Station 3+00 through 6+50 on Drawing 5, and increases in thickness near the Penobscot riverbank (approximately Station 6+50 to Station 7+50 on Drawing 5). In some areas, there was approximately 50 percent grey gravel with the sand
- Stratum 5 (Gravel) – The Gravel layer ranges from medium to dense (SPT Navg=28) coarse to fine rounded and angular gravel, with some sand and silt. In the Northern Drainage Ditch, the Gravel was found in pockets below Strata 3 and 4 and above Stratum 6. Stratum 5 was observed between approximately Station 0+75 and 2+25 shown on Drawing 5 and is brown, generally free of significant quantities of sand and fines, and consistent with gravel layers observed in the Landfill 1 geotechnical borings. This was a different stratum than layers of higher gravel percentages observed in Stratum 4 described above.
- Stratum 6 (Till) – Till consists of very stiff to hard (SPT Navg=61) clayey or silty sand with little to trace gravel and cobbles. In the Northern Drainage Ditch, it was found primarily below Strata 4 and 5.
- Stratum 7 (Bedrock) – Bedrock was not visually observed, however refusal was encountered at several locations in the Northern Drainage Ditch. From Station 0+00 to Station 3+00 refusal was encountered about 25 feet below ground surface. From Station 3+00 to Station 5+00 refusal was encounter about 15 feet below ground surface. Refusal was not encountered in any borings from Station 5+00 to the end of the Northern Drainage Ditch. In general, refusal was encountered at shallower depths in borings located to the southeast of the Northern Drainage Ditch than in borings located to the northwest of the Northern Drainage Ditch. Refusal in the Northern Drainage Ditch may be caused by bedrock.

2.2.2 Groundwater

Water levels from six monitoring wells in the vicinity of the Northern Drainage Ditch have been measured since December 2012. The monitoring wells are shown on **Drawing 4**. MW-510-01 is located near the upper portion of the Northern Drainage Ditch (Station 0+75) and groundwater was observed between elevation at 41.63 ft and 43.01 ft. B-316-01, MW-402-01, PZ14-8, and MW-602-01 are located approximately mid-way down the Northern Drainage Ditch (Station 2+75 to Station 3+75) and groundwater was observed between elevation -0.65ft and 9.56 ft. B-320-03 is located at the lower end of the Northern Drainage Ditch (Station 7+50) and groundwater was observed at elevation 0.74ft. A summary of the measurements is presented in Table 1. The groundwater elevations shown in Table 2-1 indicate a measured difference of between 41.73 ft at MW-510 near the upper part of the Northern Drainage Ditch and -0.74 ft at B-320-03 at near the lower portion of the Northern Drainage Ditch.

Table 2-1: Summary of Water Level Measurements

Monitoring Well	Screened Material (depth interval, ft)	Groundwater Elevation (Depth)		
		December 2012 ft	December 2014 ft	July-August 2015 ft
MW-510-01	Till (15ft-25 ft)	41.73(16.87)	43.01 (15.64)	41.63(16.97)
B-316-01	Till (30.8ft-40.4ft)	9.54(21.86)	Not Available	9.56(21.84)
MW-402-01	Sand (24ft-34ft)	0.32 (28.46)	1.87 (29.25)	0.72(28.08)
PZ14-8	Sand (34ft-39ft)	Not Installed	2.12(23.88)	1 (25.04)
MW-602-01	Gravel (53.1-63.1)	1.78(22.52)	Not Available	-0.65(24.95)
B-320-03	Sand (10ft-25ft)	1.51 (12.4)	Not Available	0.74(13.16)

Section 3. Northern Drainage Ditch Design Objectives

3.1 Corrective Measures Implementation Plan Objectives

The primary objective of the remedy for the Northern Drainage Ditch Area is to remove soil with concentrations of COCs exceeding the MPS (presented in Section 3.2), and dispose of those materials at an approved offsite disposal facility. This Northern Drainage Ditch CMI Plan does not include the northern-most section of the Northern Drainage Ditch where it overlaps with Landfill 1 and the Plant Area. The CMI of this northern-most section of the ditch will be included in the Plant Area and/or Landfill 1 CMI Plan. Additional objectives of the Northern Drainage Ditch CMI are to:

- Establish a new riprap lined ditch and settling basin (termed the Relocated Lower Northern Drainage Ditch) to convey stormwater after remediation;
- Establish final grades to direct stormwater runoff to the Relocated Northern Drainage Ditch and re-vegetate and restore grades in the backfilled Northern Drainage Ditch area such that it blends in with surrounding areas and minimizes the potential for future erosion; and
- Manage air quality conditions and be protective of on-site workers and the surrounding community.

3.2 Contaminants of Concern and Media Protection Standards

COCs at the Site for which soil MPS have been established are summarized in **Table 3-1**, as presented in Attachment 2 of the Order. Mercury is the primary COC identified in previous investigations in the Northern Drainage Ditch however chloropicrin will also be addressed in this CMI Plan.

Table 3-1: Soil Media Protection Standards – Numeric

	Soil (mg/kg)
Mercury	2.2
Chloropicrin	0.125
PCBs	1.0
Cadmium	8
Ethylbenzene	13
Xylene	190

NOTES:

Media Protection Standards as presented in Attachment 2 of the Order.

mg/kg = milligrams per kilogram

PCBs = polychlorinated biphenyls

Section 4.

Corrective Measures Implementation Components

The Northern Drainage Ditch CMI will include the following primary components presented in the general order of execution.

- Pre-Construction Activities;
- Implementation of Perimeter Air Monitoring Program;
- Site preparation including establishment of access roads, staging areas, erosion and sediment controls, etc.;
- Installation of new sump in the Plant Area Catch Basin 1 to collect discharge from former Chlorate Building underdrain;
- Removal of material exceeding the MPS from along the new alignment for the Relocated Lower Northern Drainage Ditch;
- Construction of the Relocated Lower Northern Drainage Ditch;
- Installation of a bypass piping system;
- Excavation and removal of material exceeding the MPS from the Northern Drainage Ditch area;
- Post-excavation confirmation sampling;
- Materials management including soil stockpiling and direct loading of rail cars;
- Backfilling the excavation and grading of the lower Northern Drainage Ditch area to the proposed final grades; and
- Surface stabilization of the final graded area with topsoil and vegetation.
- Construction of staging area for the Southern Cove remedial work.

Drawing 2 in Appendix E presents a detailed sequence of the remediation activities. Although listed as discrete tasks, portions of construction may be performed simultaneously. The remainder of Section 4 describes components of the CMI including pre-excavation confirmation sampling and pre-construction activities, site staging and layout, erosion and sediment control, excavation of soil above the MPS, post-excavation confirmation sampling, final grading plan, and re-vegetation. Many of the components of the CMI, including the Perimeter Air Monitoring Plan, Temporary Soil Stockpile Area, and portions of the access roads in the Plant Area, have already been constructed as part of the DEP approved Landfill Ridge area CMI Plan.

The CMI Plan Drawings (Drawings) are presented in **Appendix E**, Technical Specifications are presented in **Appendix F**, the Construction Quality Assurance (CQA) Plan is presented in **Appendix G**, design calculations are presented in **Appendix H**, and the Soil Use Plan is presented in **Appendix I**.

4.1 Confirmation Sampling

A combination of pre-excavation and post-excavation sidewall and bottom samples will be used to confirm that the materials exceeding the MPS criteria are removed from Northern Drainage Ditch area. Removal limits will be extended to the point where confirmation samples indicate the remaining soils are below the MPS criteria. Soils with MPS exceedances discussed in Section 2 will be removed as part of the excavation.

A pre-excavation bottom sample is defined as the first clean (e.g. COCs below the MPS) sample interval in a boring that vertically delineates the extent of mercury. A post-excavation bottom sample is a grab sample for mercury collected from the bottom of the open excavation. A pre-excavation sidewall sample defines the lateral extent of exceedances located at the perimeter of an excavation in which each sample interval in the boring has concentrations below the MPS. Since each interval in these pre-excavation borings is below the MPS, each sample collected from these pre-excavation sidewall borings is considered a separate sidewall sample. A post-excavation sidewall sample is a grab sample for mercury collected from the exposed sidewall of an open excavation. Upon completion of the confirmation sampling program, which includes both pre- and post-excavation samples, the following minimum sample frequencies will be achieved:

- One sidewall per 50 LF of excavation. If the depth of excavation at a sidewall sample location is greater than 10 feet then one sidewall sample per 10 feet will be obtained.
- Bottom samples on a 50-foot grid spacing. This is equivalent to an approximate 25 foot radius sampling frequency or one sample per 2500 square feet of bottom excavation area.

Post-excavation confirmation samples will all be analyzed for mercury. Based on the pre-excavation confirmation samples showing concentrations of other COCs as non-detect or below the respective MPS in the areas to be excavated as part of the Northern Drainage Ditch CMI, post-excavation sampling for other COCs is not required.

The excavation plan on **Drawing 10** indicates that the completed excavation will have a perimeter of approximately 1,293 LF and a bottom area of approximately 38,640 sq. ft. Based on the criteria above, this would result in a minimum of 26 sidewall samples and 16 bottom samples.

The actual number of confirmation samples and timeframe of collection are summarized in **Table 4-1**.

Table 4-1: Summary of Northern Drainage Ditch Confirmation Samples

Sampling Time Frame	Bottom Mercury Samples	Sidewall Mercury Samples
Pre-Excavation (complete)	38	281
Post Removal	25	18*
Total Confirmation Samples	63	299
Frequency	1 sample/610 ft ²	1 sample/ 4 linear feet

Note: *A total of 18 post-excavation sidewall samples will be collected from locations SW-ND-01 through SW-ND-12 (some of the sidewall locations have two sample depths). 12 of the 18 post-excavation sidewall samples (locations SW-ND-01 through SW-ND-07) will be collected by the Remediation Project Manager prior to installation of sheet piles, and excavation using a Geoprobe.

After completing removal activities, post-excavation bottom and sidewall confirmation samples will be collected. The sidewall confirmation sample locations will be biased towards the highest mercury concentration in the adjacent boring(s). The location of the post-excavation confirmation samples are shown on **Drawing 9**. An excavation area will be considered clean and available to be backfilled once the confirmation sample results from the Maine-certified DMA (for mercury) associated with that area have been validated and show the remaining soil is below the MPS.

4.1.1 Pre-Excavation Confirmation Samples

The locations and type of pre-excavation confirmation samples are provided in **Table 4.2**. The coordinates of these pre-excavation confirmation samples are provided on **Drawing 11**.

Table 4-2: Northern Drainage Ditch Pre-Excavation Confirmation Samples

Sampling Locations	Type of Confirmation Sample	Number of Samples	Depth Interval of Sample(s) (ft bgs)	Elevation Interval of Sample (ft)
SB-ND-10	Bottom	1	2 – 3	20.2 – 21.2
SB-ND-22	Bottom	1	11 – 12	11.3 - 12.3
SB-ND-24	Bottom	1	11 – 12	1.7 - 2.7
SB-ND-27	Bottom	1	9 – 10	6.9 - 7.9
SB-ND-28	Bottom	1	14 – 15	1.5 - 2.5
SB-ND-29	Bottom	1	2 – 3	18.8 - 19.8
SB-ND-31	Bottom	1	13 – 14	2.8 - 3.8
SB-ND-32	Bottom	1	2 – 3	13.7 - 14.7
SB-ND-34	Bottom	1	13 – 14	0.9 - 1.9
SB-ND-36	Bottom	1	7 – 8	3.5 - 4.5
SB-ND-37	Bottom	1	2 – 3	19.5 - 20.5
SB-ND-39	Bottom	1	14 – 16	-1.1 - 1
SB-ND-42	Bottom	1	4 – 5	5.7 - 6.7
SB-ND-43	Bottom	1	1 – 2	20.2 - 21.2
SB-ND-44	Bottom	1	7 – 8	3 - 4
SB-ND-45	Bottom	1	6 – 7	3.7 - 4.7
SB-ND-46	Bottom	1	3 – 4	18.1 - 19.1
SB-ND-48	Bottom	1	2 – 3	19.2 - 20.2
SB-ND-50	Bottom	1	8 – 9	12.3 - 13.3
SB-ND-51	Bottom	1	9 – 10	1.8 - 2.8
SB-ND-52	Bottom	1	7 – 8	2.6 - 3.6
SB-ND-53	Bottom	1	12 - 13	-2.8 - -1.8
SB-ND-54	Bottom	1	2 - 3	7.7 - 8.7
TS-ND-C2	Bottom	1	7 - 9	15.3 - 17.3
TS-ND-C3	Bottom	1	12 - 13	10.1 - 11.1
TS-ND-D2	Bottom	1	15 - 16	5.3 - 6.3
TS-ND-D3	Bottom	1	5 - 7	13.2 - 15.2
TS-ND-E2	Bottom	1	14 - 15	0.7 - 1.7
TS-ND-E4	Bottom	1	8 - 9	7.3 - 8.3
TS-ND-E6	Bottom	1	7 - 8	9.2 - 10.2
TS-ND-E8	Bottom	1	12 - 13	3.9 - 4.9
TS-ND-E10	Bottom	1	14 - 15	1.8 - 2.8
TS-ND-F3	Bottom	1	4 - 5	4.9 - 5.9
TS-ND-F5	Bottom	1	2 - 3	6.7 - 7.7
TS-ND-F7	Bottom	1	1 - 2	7.4 - 8.4
TS-ND-F9	Bottom	1	1 - 2	7.3 - 8.3
TS-ND-F11	Bottom	1	1 - 2	7.5 - 8.5
TS-ND-G3	Bottom	1	1 - 2	6.6 - 7.6

Sampling Locations	Type of Confirmation Sample	Number of Samples	Depth Interval of Sample(s) (ft bgs)	Elevation Interval of Sample (ft)
SB-ND-09	Sidewall	10	0 - 10	12.3 - 22.3
SB-ND-12	Sidewall	10	0 - 10	10.8 - 20.8
SB-ND-17	Sidewall	14	0 - 14	11.8 - 25.8
SB-ND-23	Sidewall	15	0 - 15	5.6 - 20.6
SB-ND-25	Sidewall	17	0 - 20	-2.5 - 17.5
SB-ND-26	Sidewall	20	0 - 20	-2.3 - 17.7
SB-ND-33	Sidewall	11	0 - 15	-6.2 - 8.8
SB-ND-35	Sidewall	15	0 - 20	-7.6 - 12.4
SB-ND-38	Sidewall	18	0 - 20	-6.8 - 13.2
SB-ND-40	Sidewall	17	0 - 20	-8.2 - 11.8
SB-ND-41	Sidewall	13	0 - 13	4.2 - 17.2
SB-ND-47	Sidewall	10	0 - 11.5	10.3 - 21.8
SB-ND-49	Sidewall	10	0 - 13	9.6 - 22.6
TS-ND-D4	Sidewall	15	0 - 15	7 - 22
TS-ND-D5	Sidewall	15	0 - 15	6.3 - 21.3
TS-ND-E3	Sidewall	15	0 - 15	1.9 - 16.9
TS-ND-E12	Sidewall	15	0 - 15	-1.5 - 13.5
TS-ND-F2	Sidewall	13	0 - 15	-0.5 - 14.5
TS-ND-F13	Sidewall	15	0 - 15	-4.8 - 10.2
TS-ND-G2	Sidewall	8	0 - 15	-6.3 - 8.7
SD-SC-35	Sidewall	5	0-2.5	6.2-3.7

4.1.2 Post-Excavation Confirmation Samples

The locations and type of the post-excavation confirmation samples are provided in **Table 4-3**. The coordinates of these post-excavation confirmation samples are provided on **Drawing 9**.

Table 4-3: Northern Drainage Ditch Post-Excavation Confirmation Samples

Sampling Locations	Type of Confirmation Sample	Elevation of Sample (ft)
BS-ND-01	Bottom	7.5
BS-ND-02	Bottom	-3.3
BS-ND-03	Bottom	5.8
BS-ND-04	Bottom	-0.2
BS-ND-05	Bottom	-0.2
BS-ND-06	Bottom	4.7
BS-ND-07	Bottom	-0.2
BS-ND-08	Bottom	6.2
BS-ND-09	Bottom	11.1
BS-ND-10	Bottom	21.1
BS-ND-11	Bottom	11.1

Sampling Locations	Type of Confirmation Sample	Elevation of Sample (ft)
BS-ND-12	Bottom	19
BS-ND-13	Bottom	2.7
BS-ND-14	Bottom	1.9
BS-ND-15	Bottom	6.2
BS-ND-16	Bottom	11.1
BS-ND-17	Bottom	-1.1
BS-ND-18	Bottom	1.9
BS-ND-19	Bottom	-3.3
BS-ND-20	Bottom	2.7
BS-ND-21	Bottom	2.7
BS-ND-22	Bottom	11.1
BS-ND-23	Bottom	11.1
BS-ND-24	Bottom	-0.2
BS-ND-25	Bottom	-0.2
SW-ND-01	Sidewall	8-9, 0-1
SW-ND-02	Sidewall	2-3, 5-6
SW-ND-03	Sidewall	15-16, 4-5
SW-ND-04	Sidewall	7-8, -1-0
SW-ND-05	Sidewall	7-8, 3-4
SW-ND-06	Sidewall	9.5-10.5
SW-ND-07	Sidewall	9.5-10.5
SW-ND-08	Sidewall	12-13, 2-3
SW-ND-09	Sidewall	16-17
SW-ND-10	Sidewall	19-20
SW-ND-11	Sidewall	21-22
SW-ND-12	Sidewall	19.5-20.5

4.2 Perimeter Air Monitoring Stations

The perimeter air monitoring system implemented for the Landfill Ridge Area CMI (CDM Smith, 2015c) will be continued for the Northern Drainage Ditch CMI, with modifications made to address potential chloropicrin in the air when working in areas impacted by chloropicrin. The system has been set up in accordance with the Perimeter Air Monitoring Plan (PAMP) (CDM Smith, 2015d). The objectives of the perimeter air monitoring system are to monitor air quality conditions during the CMI activities, provide real time data and information so that if action criteria are not met corrective actions can be taken promptly and/or work can be stopped, and protect both on-site workers and the surrounding community.

The perimeter air monitoring system measures mercury vapors, PM10, and VOCs using both fixed (e.g. permanent) and mobile stations. Measurements are taken in real time to allow for modifications of work activities or mitigation measures to be implemented in the event the air quality conditions are impacted by the CMI activities. The nearest permanent station (PAMS -4) is located approximately 200

ft to the east of the Northern Drainage Ditch. The temporary stations are also available for use during the Northern Drainage Ditch work.

Details on implementation of the air monitoring program, including MPS, response levels, corrective actions, and reporting are provided in the PAMP. Additional information regarding chloropicrin, will be provided in the Revised PAMP to be submitted to Maine DEP.

4.3 Site Staging and Layout

Site staging and layout is presented on **Drawings 6 and 7**. These drawings present features that will be implemented prior to removal of soils in the Northern Drainage Ditch area including installation of site trailers, construction of access roads, a decontamination pad, and staging area. Other staging and layout components were already constructed for the Landfill Ridge Area CMI Plan (CDM Smith, 2015c). Erosion and sediment controls are also presented on these drawings and discussed in Section 4.4.

4.3.1 Site Logistics

Site logistics are summarized in this section and more fully described in the Logistics Work Plan (CDM Smith, 2015e), which is currently under review by the Maine DEP.

Primary Site access will be through the main gate at the end of Industrial Way in Orrington, Maine. Access to the Site will be restricted; personnel and visitors will sign in at the security trailer (**Drawing 3**). Regular site workers will sign in during the daily safety meeting and the sign-in record will be provided to the security personnel to ensure an accurate record of personnel on-site is available. Visitors will be required to check out at the security trailer when leaving the Site.

Typical work hours for the Site will be Monday through Friday 7:00 AM to 5:00 PM. The hours may be adjusted as needed to accommodate construction schedules and inclement weather.

The remediation areas will be divided into three work zones: (i) support zones, (ii) contamination reduction zones, (iii) and exclusion zones. The support zone will be delineated using temporary construction fencing and will include the office trailer complex and supporting facilities. Signage will be used to identify work zones. The locations of the work zones will be included in the Remediation Contractor's Excavation and Restoration Work Plan, which will be submitted to Maine DEP for review in accordance with the schedule presented in Section 6.

The contamination reduction zone for access into the exclusion zone will be at the access point from the support zone into the exclusion zone. The contamination reduction zone for the Northern Drainage Ditch area will include the decontamination pad for cleaning vehicle tires (**Drawing 6**). Personnel decontamination facilities will be established by the Remediation Contractor in accordance with the HASP (CDM Smith, 2014a). Personnel will enter and exit the exclusion zone through these access points.

4.3.2 Site Trailers/Offices

Trailers for the Owner, Remediation Project Manager, Maine DEP, Transportation and Disposal Contractor, an on-site laboratory, and restroom facilities have been installed by the Remediation Project Manager. The Remediation Contractor will be responsible for providing their own trailers for use during remediation and which will be installed in the Remediation Contractor Trailer Area shown on **Drawing 7** and on Figure 1-1.

4.3.3 Clearing and Grubbing

The Remediation Contractor will be responsible for clearing and grubbing areas as necessary within the limit of work as required for access to the Site and execution of work. Clearing and grubbing will consist of removing trees and associated stumps, undergrowth, roots, deadwood and surficial debris. Cleared vegetation will be shredded or chipped prior to stockpiling and potential future use onsite. Root material and associated soil removed from clean areas outside the work area will be segregated and stockpiled for re-use on Site. Root material and soil removed during grubbing from within the excavation areas will be considered waste material and transported to the Temporary Soil Stockpile Area or Rail Loading Area for off-site disposal. Clearing activities will be performed in a manner so as to minimize the extent of area cleared.

4.3.4 Access Roads

An access road will be constructed as shown on the drawings and described in the Specifications (**Appendix F**) to provide access between the Northern Drainage Ditch and existing access roads already constructed at the Site. The access roads will be maintained clean (e.g. outside of the exclusion zones) during the Northern Drainage Ditch work. Vehicles leaving the exclusion zones will be cleaned at the decontamination pad shown on **Drawing 6** prior to traversing the access roads. The roads will be inspected daily by the Remediation Project Manager and documented in daily reports.

As shown in the detail on **Drawing 19**, the road surface will be pitched at approximately 1% to drain stormwater from the surface towards the Northern Drainage Ditch.

After completion of the Northern Drainage Ditch CMI material removal and final grading activities, a 15-ft wide one-way access road will be constructed from the southern end of the construction access road shown on **Drawing 6** to the Southern Cove as shown on the Final Grading Plan (**Drawing 12**).

4.3.5 Staging Area

The staging area constructed as part of the Scrap Metal Yard CMI (shown on **Drawing 7**) will provide an area for clean material staging during the Northern Drainage Ditch work. The staging area will be made up of 12 inches of dense graded gravel placed over an 8 oz/yd² nonwoven geotextile. It will not serve as a long-term material storage area or stockpile area for material that requires off-site disposal.

4.3.6 Decontamination Pad

Vehicles exiting from the exclusion zones will pass through a decontamination pad to remove soil that may exceed the MPS parameters. The Northern Drainage Ditch area will have a decontamination pad as shown on the **Drawing 6**. The decontamination pad will include a geomembrane liner to collect water used in the decontamination process (**Drawing 19**). Calculations demonstrating the minimum puncture resistance of the geomembrane are presented in **Appendix H-1**. Water collected in the decontamination pad will be considered contact water and will be sent to the groundwater treatment plant (GWTP) on-site. The Remediation Contractor will determine the actual location of the decontamination pad based on the proposed construction sequence, along with the method of conveyance of contact water to the GWTP. Both will be included in the Remediation Contractor's Construction Water Management Plan to be submitted to Maine DEP for review in accordance with the schedule presented in Section 6.

4.3.7 Rail Loading and Temporary Soil Stockpile Area

Vehicles transporting soil for off-site disposal will drive directly to the Rail Loading Area or the Temporary Soil Stockpile Area (shown on **Drawing 7**). The Rail Loading Area was constructed within

the Temporary Soils Stockpile Area. The Rail Loading Area and Temporary Soil Stockpile Area were constructed as part of the Landfill Ridge Area remedial action; drawings and calculations associated with these facilities were provided in Appendix F and Appendix I of the Landfill Ridge Area CMI Plan, Revision 1, respectively (CDM 2015c).

Materials in the Temporary Soil Stockpile Area will be segregated (e.g. clearing & grubbing material, soil excavated from the Northern Drainage Ditch Area, and soils excavated from other areas on-site). Material in the Temporary Soil Stockpile Area will be covered with tarps daily prior to being loaded for off-site disposal. The Temporary Soil Stockpile Area is graded to drain towards a sump. Water collected in the sump will be considered to be contact water, pumped to storage tanks using the pipe and pump configuration shown on **Drawing 7** and, then treated at the on-site GWTP. The Temporary Soil Stockpile Area contact water volume calculation was presented with the Landfill Ridge CMI Plan (CDM 2015c).

Upon completion of the Northern Drainage Ditch CMI, some of the Site staging and layout components may remain in place for use during the CMI of other areas of the Site.

4.4 Temporary Erosion and Sediment Control

Erosion and sediment controls including silt fence, super silt fence, fiber rolls, and a turbidity curtain will be necessary near the bottom of the slope and along the Relocated Northern Drainage Ditch (described in Section 4.6). The locations of the erosion and sediment controls specific to the Northern Drainage Ditch CMI are shown on **Drawing 6**. Erosion and sediment control measures will be installed in accordance with the Maine Erosion & Sediment Control Practices Field Guide for Contractors (Maine DEP, 2014) and Maine Stormwater Best Practices Manual (Maine DEP, 2015). Additional erosion and sediment controls may be installed as needed throughout the excavation and restoration area based on the Remediation Contractor's Excavation and Restoration Work Plan.

Throughout construction the Remediation Contractor will be required to provide sufficient temporary storage for contact water resulting from a 10-year 24-hour storm within the excavation area. The reason for the temporary storage is that during precipitation events, the on-site GWTP may have limited capacity since it may be receiving flows from other areas of the site. Calculations demonstrating the required storage volume are presented in **Appendix H-2**. The Remediation Contractor's Construction Water Management Plan will describe the proposed approach for managing the water collected.

4.5 Former Chlorate Building Underdrain

The underdrain for the former Chlorate building currently drains into a storm sewer in the Plant Area which discharges into the paved sump and the Northern Drainage Ditch. To prevent potentially impacted water from the underdrain reaching the Northern Drainage Ditch the outlet pipe from the underdrain collection system in Catch Basin 1 will be plugged. Water from the underdrain will be collected in concrete manhole that will be installed upgradient of Catch Basin 1. Water collected in the newly installed manhole will be pumped to the water treatment plant using a submersible pump or similar. The location and alignment of the pipe is shown on **Drawing 7** and the details of the underdrain collection manhole are shown on **Drawing 18**.

4.6 Northern Drainage Ditch Relocation

The Northern Drainage Ditch will be relocated to the location shown on **Drawing 12**. The Northern Drainage Ditch relocation will be conducted in two phases. As part of preparation for excavation of materials to be removed for off-site disposal, the lower portion will be constructed and flow will be

conveyed to the relocated lower (southern) portion with a bypass pipe (**Drawing 8**) as described in Section 4.7. The Excavation Area (shown on **Drawing 10**) extends into the lower portion of the Relocated Northern Drainage Ditch. Materials to be disposed of off-site within this area will be removed prior to construction of the lower portion of the Relocated Northern Drainage Ditch alignment. The upper portion of the Northern Drainage Ditch will be relocated after completion of the Landfill 1 and Plant Area CMI Plans. Grading for the upper portion of the Northern Drainage Ditch will be presented in the Landfill 1 or Plant area CMI Plan. The relocated ditch will be trapezoidal, located above the groundwater table, and riprap lined with a riprap apron at the termination. Details regarding the channel design for the relocated Northern Drainage Ditch are presented in **Appendix H-3** (Stormwater Design), **H-4** (Bypass Design), and **H-5** (Geotextile Puncture).

4.7 Northern Drainage Ditch Bypass Pipe

Prior to beginning excavation of the Northern Drainage Ditch area, a bypass pipe will be installed to divert water in the Northern Drainage Ditch, as shown on **Drawing 8**. The objectives of the bypass are:

- Minimize dewatering during excavation activities;
- Allow removal of soil/sediment exceeding the MPS “in the dry”; and
- Prevent recontamination of the Northern Drainage Ditch.

The bypass pipe will convey water from the existing concrete headwall in the former Mac’s Pond to a plunge pool at the inlet to the upper portion of the relocated lower Northern Drainage Ditch as shown on **Drawings 8** and **18**. The bypass pipe will be connected to the existing outlet pipe and flow by gravity to the plunge pool. The existing weir will be closed to stop flow into the existing Northern Drainage Ditch.

The bypass will remain in place until excavations for Landfill 1 and the Plant Area CMI Plans are complete and the upper (north) portion of the relocated Northern Drainage Ditch has been constructed. Calculations supporting the Northern Drainage Ditch Bypass are presented in **Appendix H-4**.

4.8 Excavation Plan

The approximate limits of materials that require excavation and off-site disposal are shown on **Drawing 10** and tabulated on **Drawing 11**. As discussed in Section 2, the upper portion of the Northern Drainage Ditch is contiguous with Landfill 1 to the west and the Plant Area to the north and east. As indicated on the drawings, excavation in the upper portion of the Northern Drainage Ditch will be performed in accordance with the Landfill 1 and/or the Plant Area CMI Plans.

The limits of the material to be removed are subdivided into excavation areas (e.g. NDD-1, NDD-2, etc.) with defined lateral limits and top and bottom elevations. The removal activities will extend, at a minimum, to these lateral limits and elevations. Additional excavation beyond the limits shown on **Drawing 10** may be required to maintain safe excavation conditions (e.g. excavation slopes) and to establish final grades. Additional excavation may also be required if the confirmation sampling locations exhibit concentrations above the MPS. Excavated materials that exceed MPS criteria will be transported to the Rail Loading or Temporary Soil Stockpile Area. Excavated material that does not exceed the MPS will be stockpiled for reuse in accordance with the Soil Use Plan presented in **Appendix I**.

4.8.1 Excavation

The area to be excavated has been divided into excavation areas defined by pre-design data as discussed in **Section 2**. The excavation bottom within each excavation area has a uniform bottom elevation

defined by the lowest sample interval at which COCs did not exceed MPS criteria. The limits of the excavation were driven by mercury exceeding the MPS. The Remediation Contractor will remove materials within the excavation limits shown on **Drawing 10** and transport them to the Rail Loading area or Temporary Soil Stockpile Area. Additional excavation may be required based on the results of post-excavation bottom and sidewall confirmation sampling described in Section 4.1.

Additional notes regarding the excavation are provided below.

- Excavations will be completed in the dry. See Section 4.8.2 below.
- Care will be taken such that materials requiring off-site disposal are not mixed with materials that are below the MPS (see Soil Use Plan in **Appendix I**).
- Throughout the excavation activities, the bottom and sides of each excavation area and the excavated materials will be visually inspected for elemental mercury. If observed, material containing elemental mercury will be segregated separately in the Temporary Soil Stockpile Area for disposal at an appropriate off-site facility.
- To the extent practical over-excavation will be minimized.
- Clean soil intervals indicated on the table on **Drawing 11** will be segregated and considered for use as On-Site Reused Material as described in the Soil Use Plan (**Appendix I**).
- During the excavation, the existing underground industrial sewer line (MEPDES Outfall) shown on Drawing 4 will be encountered. The Remediation Contractor will locate the pipe prior to beginning excavation and develop a contingency plan for the protection of the sewer line to be presented in the Remediation Contractor's Excavation and Restoration Work Plan.

4.8.2 Excavation Dewatering

Water encountered within the excavations prior to excavating to limits shown on **Drawings 10 and 11** will be considered contact water and will be conveyed by the Remediation Contractor to the on-site GWTP. Groundwater levels in the excavation area will be maintained at least one foot below the bottom of the excavation by the Remediation Contractor. Surface water flow toward the Northern Drainage Ditch excavation will be diverted by the Remediation Contractor. The Northern Drainage Ditch Bypass will reduce water flowing into the area but excavation dewatering will likely be necessary.

Sumps and/or well points will be used to remove contact water from the excavation areas. Contact water generated from precipitation events and groundwater inflows will be transferred to the GWTP either in tanker trucks or via pipe. Calculations for the necessary storage capacity to manage the anticipated quantity of contact water are presented in **Appendix H-2**. The means and methods that the Remediation Contractor will use to dewater the excavations (e.g. sumps, well points) and transport the contact water to the on-site GWTP will be presented in the Remediation Contractor's Construction Water Management Plan.

4.8.3 Excavation Support/Stability

Stability of the excavation sidewalls will be maintained by sloping, benching and/or shoring (e.g. sheet piles, soldier pile and lagging, trench boxes, etc.) in compliance with applicable safety regulations and the Site HASP (CDM Smith, 2014a). It is anticipated that the primary method of maintaining slope stability will be sloping and/or benching. The specific means and methods will be presented in the Remediation Contractor's Excavation and Restoration Work Plan.

4.8.4 Excavation As-Built Survey and Backfill

The limits of the excavation will be as-built surveyed at each control point location (e.g. confirmation sample location) and bottom elevations by a surveyor licensed in the State of Maine.

Backfilling will be incrementally performed once excavation has been completed in designated areas to the elevations shown on **Drawing 11** and post-excavation bottom and sidewall confirmation sampling has confirmed material exceeding the MPS criteria has been removed. The excavation areas will be backfilled in accordance with the Specifications (**Appendix F**) and Soil Use Plan (**Appendix I**). The excavation and backfilling sequencing will be presented in the Remediation Contractor's Excavation and Restoration Work Plan.

4.8.5 Transportation and Disposal

Transportation and disposal activities will be completed in accordance with the Logistics Work Plan (CDM Smith, 2015e) previously submitted to the Maine DEP and currently under review. Based on historical knowledge of the material placed in the Northern Drainage Ditch and the results of the pre-design investigation, the material will be sent to a non-hazardous waste disposal facility. Waste profile samples will be collected at a rate determined by the disposal facility. A waste profile(s) will be developed for the material and sent to the appropriate disposal facility for acceptance.

It is anticipated that the majority of the material from the Northern Drainage Ditch will be transported via rail car. In general, soils will be placed in the Temporary Soil Stockpile Area (**Drawing 7**) and then loaded into the gondola rail cars.

4.8.6 Final Grading and Slope Restoration

Design objectives for the Northern Drainage Ditch CMI include stabilizing the final (backfilled) grades in the Northern Drainage Ditch area against erosion. The lower portion of Northern Drainage Ditch will be relocated and stabilized with riprap and an Erosion Control Blanket at the time of bypass construction. The upper portion of the Relocated Northern Drainage Ditch will be constructed as part of the Landfill 1 or Plant Area CMI. Soil material generated during the grading of the relocated Northern Drainage Ditch will be stockpiled for reuse in accordance with the Soil Use Plan presented in **Appendix I**. As shown on **Drawing 12**, the final grades in the existing Northern Drainage Ditch area will be backfilled with On-Site Reused Material and/or Common Fill Type 1 from off-site and sloped toward the Relocated Northern Drainage Ditch. Six inches of topsoil will be placed over the backfilled area and seeded. The seed mix is designed for erosion control and vegetation restoration. Steeper sections approaching the Relocated Northern Drainage Ditch will include stabilization with an Erosion Control Blanket.

4.8.7 Southern Cove Staging Area

A staging area will be constructed adjacent to the Southern Cove to support the Southern Cove construction activities. The staging area will be constructed after completion of the lower Northern Drainage Ditch excavation. The staging area is shown on Drawing 12.

4.8.8 Stormwater Management

The Relocated Northern Drainage Ditch will be approximately two feet deep (below the existing ground surface) and will follow the existing topography along its alignment. The bottom of the relocated ditch will be above groundwater (based on the groundwater observations presented in Section 2.2.2). Water will be conveyed to the Penobscot River over a riprap apron at the termination of the relocated Northern Drainage Ditch. Upon completion of the Northern Drainage Ditch CMI the calculated discharge from the

Relocated Northern Drainage Ditch will be approximately the same as the discharge prior to implementation of the CMI. After completion of the site-wide remediation (including the Plant Area, Landfill 1 and Southerly Stream) the size of the area that drains to the Relocated Northern Drainage Ditch will increase, resulting in an increased discharge from the relocated Northern Drainage Ditch as compared to the pre-removal conditions. The design capacity of the relocated Northern Drainage Ditch accounts for the increase in stormwater flow that will result from this change in watershed area. An assessment of the discharge to the Northern Drainage Ditch, both after completion of the Northern Drainage Ditch CMI and after completion of the site-wide remediation, is presented in **Appendix H-3**.

Section 5.

Permitting

The Northern Drainage Ditch remediation requires the following permits:

- Shoreland Protection Ordinance (ZBA); per the Shoreland Protection Act, a Land Use Application must be submitted to the Orrington Code Enforcement Officer (CEO) for work within 250 feet of the Penobscot River. The Northern Drainage Ditch is within this 250-ft zone. The Application consists of a one-page notification form and a cover letter, in addition to project figures and plans. Typical turnaround time is a couple of weeks.
- Natural Resources Protection Act Permit (NRPA); per NRPA there is a 75-foot setback measured horizontally of the normal high water line of a great pond, river, stream or brook or the upland edge of a coastal wetland or freshwater wetland (Protected Natural Resources). NRPA also applies to projects located within essential habitats of a threatened or endangered species. The overall remediation project qualifies for a Permit by Rule Category #13 – Habitat Creation or Enhancement and Water Quality Improvement Activities. NRPA rules allow PBR applications to be submitted for work to be completed in two-year increments. The application consists of a one-page NRPA notification form, a cover letter and additional project information, figures, project plans, and documentation of correspondence with USFWS and MDIFW, as applicable. Presumptive approval is granted if no response is issued within 14 days of submittal and the permit is valid for two years. A PBR Application was previously filed for the Landfill Ridge CMI and presumptive approval was received 14 calendar days thereafter (i.e., no comments received). The Maine DEP (Jim Beyer) indicated that the Landfill Ridge PBR application applies to the entire project and that the only additional information required under the PBR is the CMI for each phase of work that occurs within the 75-foot setback and/or located within essential habitats, including the Northern Drainage Ditch. Therefore a separate NRPA submittal is not required at this time other than submittal of the final Northern Drainage Ditch CMI Plan. Following completion of each phase, photographs of the affected area should be submitted to Maine DEP.
- United States Fisheries and Wildlife Service (USFWS) and/or Maine Department of Inland Fisheries and Wildlife (MDIFW) Consultation. Because the Northern Long-Eared Bat (NLEB) was listed as a federally threatened species since initial contact with USFWS, CDM Smith wildlife and environmental scientists conducted a field assessment of the site for NLEB potential habitat on Thursday, June 18, 2015 and Friday, June 19, 2015. It was determined that the Northern Drainage Ditch provides poor potential habitat for the NLEB. Therefore, no follow-up with USFWS is required.
- Maine Construction General Permit (CGP); Maine DEP has been delegated authority by the USEPA under the National Pollutant Discharge Elimination System (NPDES) permit program to issue stormwater permits for construction activities (which include excavation, dredging, and filling). This permit is required for construction activities that result in greater than one acre of land disturbance. To address this requirement for the Northern Drainage Ditch, a Notice of Intent (NOI) will be submitted, consisting of a one-page notification form, a cover letter, an Erosion and Sedimentation Control Plan, and project figures and plans. Additionally, if work is to occur within an essential habitat of threatened or endangered species, documentation of approval from MDIFW must also be submitted. A Notice of Termination must be submitted at the completion of construction activities. Presumptive approval is granted if no response is issued within two weeks of submittal. The expiration of the permit is variable and it can be reissued.

Section 6.

Schedule

The anticipated schedule for the Northern Drainage Ditch Area CMI Plan is included as Table 6-1.

Table 6-1: Schedule for Northern Drainage Ditch Area CMI Plan.

Task	Anticipated Start Date	Anticipated End Date
Submit DRAFT Northern Drainage Ditch Area CMI Plan to Maine DEP	February 5, 2016	February 5, 2016
Maine DEP CMI Plan Meeting	February 23, 2016	February 23, 2016
Maine DEP Review of Draft CMI Plan	February 8, 2016	April 8, 2016
Procurement of Remedial Contractor	April 8, 2016	April 8, 2016
Submission of Draft Remedial Contractor Work Plans to Maine DEP	July 29, 2016	July 29, 2016
Maine DEP Review of Contractor Work Plans	July 29, 2016	August 7, 2016
Finalize CMI Plan & Contractor Work Plans	August 7, 2016	August 23, 2016
Maine DEP Final Review and Approval of CMI Plan	August 23, 2016	August 23, 2016
Mobilize for Construction Activities	August 29, 2016	September 5, 2016

*The DEP Comment letter dated 8/7/16 states "...the MeDEP approves the Northern Drainage Ditch CMI and Remediation Contractor Work Plans as revised, subject to satisfactorily meeting the conditions outlined in this letter." All conditions in the MeDEP letter have been met and incorporated into the revised CMI Plan, therefore the CMI Plan – Revision 1 is considered approved upon submittal.

Section 7.

References

- Camp Dresser & McKee Inc. (CDM), 1998. Site Investigation Report, HoltraChem Manufacturing Site, Orrington, Maine, Volume I Text. December 22, 1998; Revised August 15, 2001.
- CDM Smith, Inc, 2014a. Health and Safety Plan, Orrington Remediation Site, Orrington, Maine, October 9.
- CDM Smith, Inc, 2015a. Quality Assurance Project Plan (QAPP), Revision 1, Orrington Remediation Site, Orrington, Maine, December 15, revised August 15, 2015.
- CDM Smith, Inc. 2015b. Revised Plant Areas Pre-Design Work Plan (Including the Scrap Metal Yard, Southerly Stream and Northern Ditch), Orrington Remediation Site, Orrington, Maine, September 4, 2015.
- CDM Smith, Inc. 2015c. Landfill Ridge Area CMI Plan, Rev 1, Orrington Remediation Site, Orrington Maine, October 28.
- CDM Smith, Inc. 2015d. Perimeter Air Monitoring Plan (PAMP), Orrington Remediation Site, Orrington Maine, October 30.
- CDM Smith, Inc. 2015e. Logistics Work Plan, Orrington Remediation Site, Orrington Maine, April 15.
- CDM Smith Inc, 2015f. Draft Scrap Metal yard CMI Plan, Orrington Remediation Site, Orrington Maine, October 26.
- Maine BEP, 2014. Mallinckrodt US LLC et al. v. Department of Environmental Protection. April 3, 2014.
- Maine DEP 2014. Maine Erosion & Sediment Control Practices Field Guide for Contractors.
- Maine DEP, 2015. Maine Stormwater Best Practices Manual.
- Maine DEP, 2008. Compliance Order: Designation of Uncontrolled Hazardous Substance Site and Order in the Matter of United States Surgical Corporation, Mallinckrodt LLC Concerning a Chloralkali Manufacturing Facility in Orrington, Penobscot County, Maine Formerly Owned and Operated by Mallinckrodt Inc., Proceeding Under 38 M.R.S.A. § 1365, Uncontrolled Hazardous Substance Sites Law; November 24.



LEGEND

- PROPERTY LINE
- EXISTING GROUND ELEVATION (FT)
- FENCE LINE
- ROADWAY
- RAILROAD
- SOUTHERLY STREAM (CAULVERT)
- SOUTHERLY STREAM (NORTH SIDE) DITCH



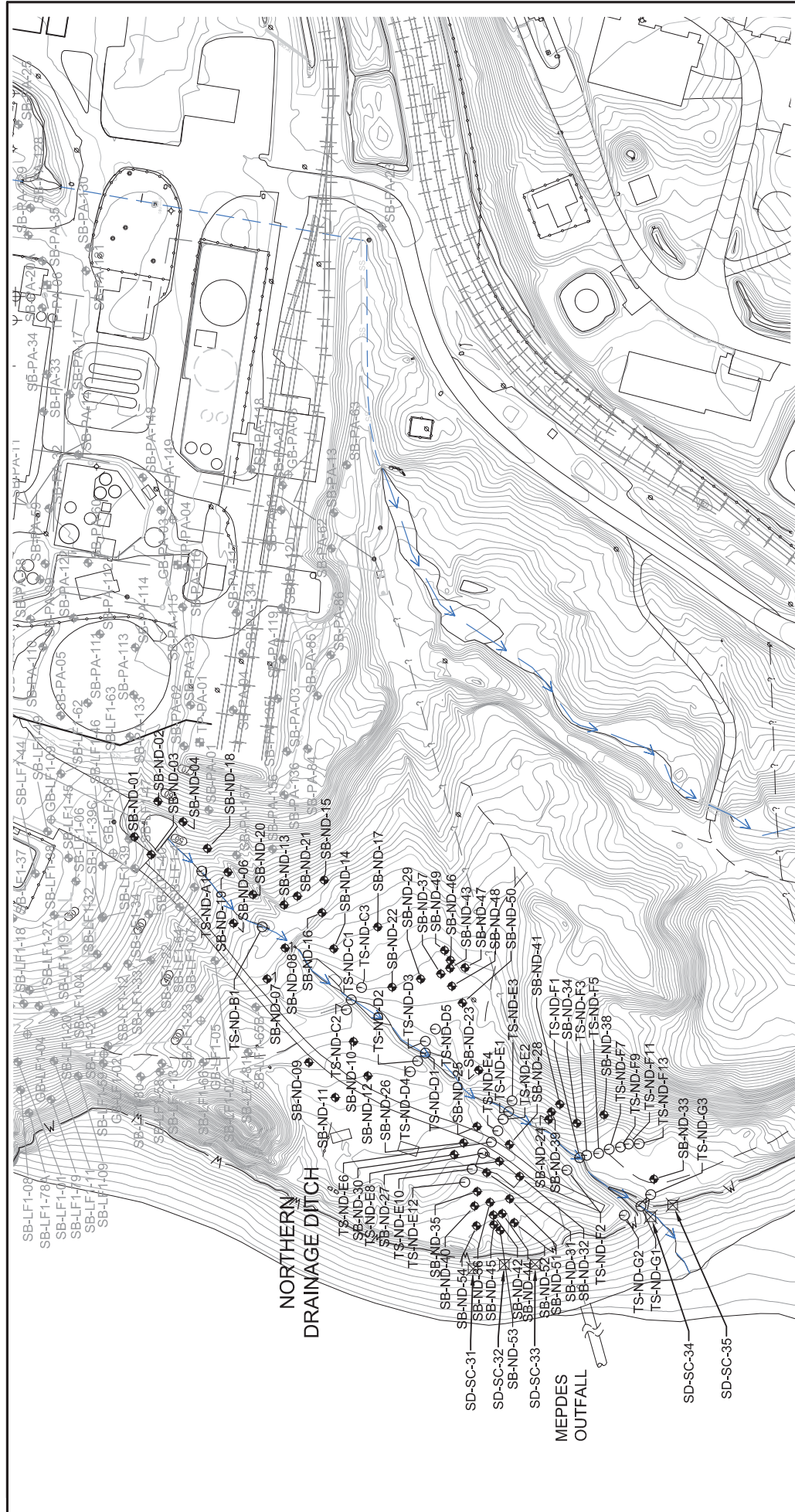
- NOTES:
1. THE SITE IS LOCATED AT 99 INDUSTRIAL WAY, ORRINGTON MAINE 04474.
 2. EXISTING TOPOGRAPHY AND SITE FEATURES ARE BASED ON A SURVEY CONDUCTED BY THE JAMES V. SEWALL COMPANY IN 2003 AND PROVIDED IN THE PROJECT RECORDS. THE HORIZONTAL DATUM IS NAD83 (NORTH AMERICAN DATUM 1983) MAINE STATE PLANE (EAST ZONE) AND THE VERTICAL DATUM IS NAVD83 (NORTH AMERICAN DATUM 1983) MEAN SEA LEVEL.
 3. EXISTING FOUNDATIONS ARE APPROXIMATE AND HAVE BEEN OBTAINED FROM WASHINGTON CONSULTING ENGINEERS, INC. (WCE).
 4. STRUCTURES HAVE BEEN DEMOLISHED AND ONLY FOUNDATIONS REMAIN, WITH THE EXCEPTION OF IDENTIFIED WHICH REMAIN.

SITE PLAN

ORRINGTON REMEDIATION SITE
ORRINGTON, MAINE

		Figure:
		1-1
Acton, MA	FEBRUARY 2016	

CMI PLAN



LEGEND

- EXISTING GROUND ELEVATION (FEET)
- STREAM TRANSECT SAMPLE LOCATION
- PRE-DESIGN TEST PIT
- PRE-DESIGN GEOTECHNICAL BORING
- PRE-DESIGN SOIL BORING
- PRE-DESIGN SEDIMENT BORING

NOTES:

- EXISTING TOPOGRAPHY AND SITE FEATURES ARE BASED ON A SURVEY CONDUCTED BY THE JAMES W. SEWALL COMPANY IN 2003 AND PROVIDED IN CDMSMITH DRAWING "38410C MASTER SURVEY.DWG". THE HORIZONTAL DATUM IS NAD83 (NORTH AMERICAN DATUM 1983) MAINE STATE PLANE (EAST ZONE) AND THE VERTICAL DATUM IS NAVD83 (NORTH AMERICAN DATUM 1983) MAINE STATE PLANE (EAST ZONE) AND THE VERTICAL DATUM IS NAVD83 (NORTH AMERICAN DATUM 1983).
- PRE-DESIGN INVESTIGATION LOCATIONS OBTAINED BY CES, INC. OF BANGOR MAINE BETWEEN THE DATES OF JUNE 15, 2015 AND JANUARY 02, 2016.
- SB-ND-05 WAS NOT PERFORMED BECAUSE IT WAS IN CLOSE PROXIMITY TO BORING SB-LF-102 PERFORMED AS PART OF THE LANDFILL 1 PRE-DESIGN ACTIVITIES.

Figure:
2-1

CDM Smith
Acton, MA

Geosyntec
consultants

AUGUST 2016

NORTHERN DRAINAGE DITCH AREA
PRE-DESIGN INVESTIGATION LOCATIONS
ORRINGTON REMEDIATION PROJECT
ORRINGTON, MAINE

Rev 1 8/22/2016

CMI PLAN

NORTHERN DRAINAGE DITCH CORRECTIVE MEASURES IMPLEMENTATION PLAN

ORRINGTON REMEDIATION SITE

ORRINGTON, MAINE

FEBRUARY 2016



SOURCE: BY BING MAPS.

VICINITY MAP
NOT TO SCALE



LIST OF DRAWINGS		
DRAWING NO.	DRAWING TITLE	REV.
1	COVER SHEET	1.1
2	GENERAL NOTES AND LEGEND	1
3	SITE PLAN	1
4	EXISTING CONDITIONS	1
5	SUBSURFACE PROFILE	1
6	EROSION CONTROL AND SITE LAYOUT-SHEET 1	1
7	EROSION CONTROL AND SITE LAYOUT-SHEET 2	1
8	NORTHERN DRAINAGE DITCH BYPASS PLAN	1
9	CONFIRMATION SAMPLING PLAN	1.1
10	EXCAVATION PLAN	1.1
11	EXCAVATION TABLES	1.1
12	FINAL GRADING PLAN	1
13	FINAL GRADE PROFILE	1
14	FINAL GRADE SECTIONS	1
15	SITE RESTORATION PLAN	1
16	RESTORATION-STABILIZATION-VEGETATION DETAILS - SHEET 1	0
17	RESTORATION-STABILIZATION-VEGETATION DETAILS - SHEET 2	0
18	STORMWATER MANAGEMENT DETAILS	1
19	MISCELLANEOUS DETAILS	0

MODIFICATIONS TO DRAWINGS ARE INDICATED BY A



SOURCE: Aerial photo provided by CDMSmith in image file named 'aerial poster'

LOCATION MAP
NOT TO SCALE



PREPARED FOR:

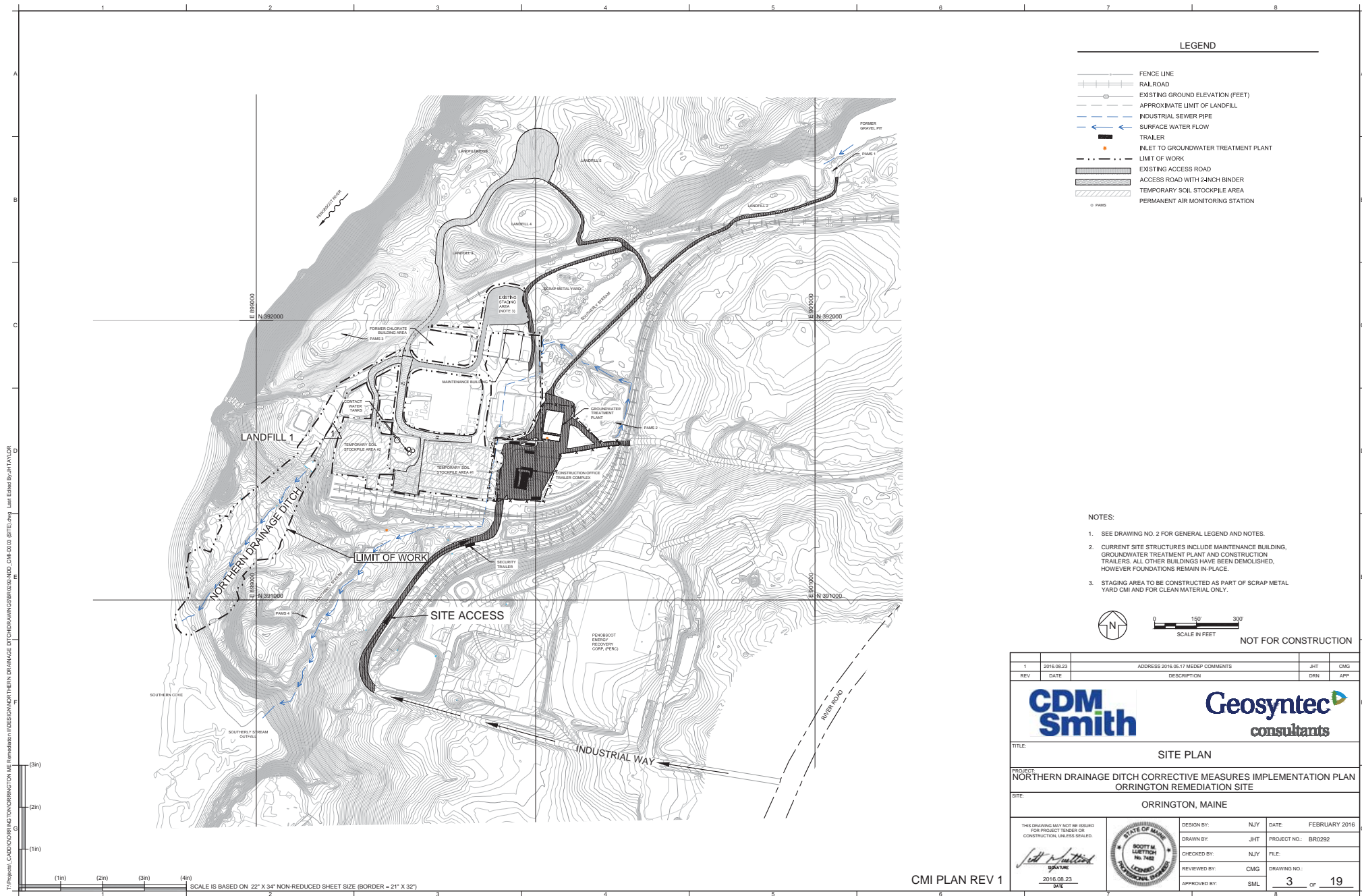
MALLINCKRODT US LLC

ISSUED FOR CONSTRUCTION

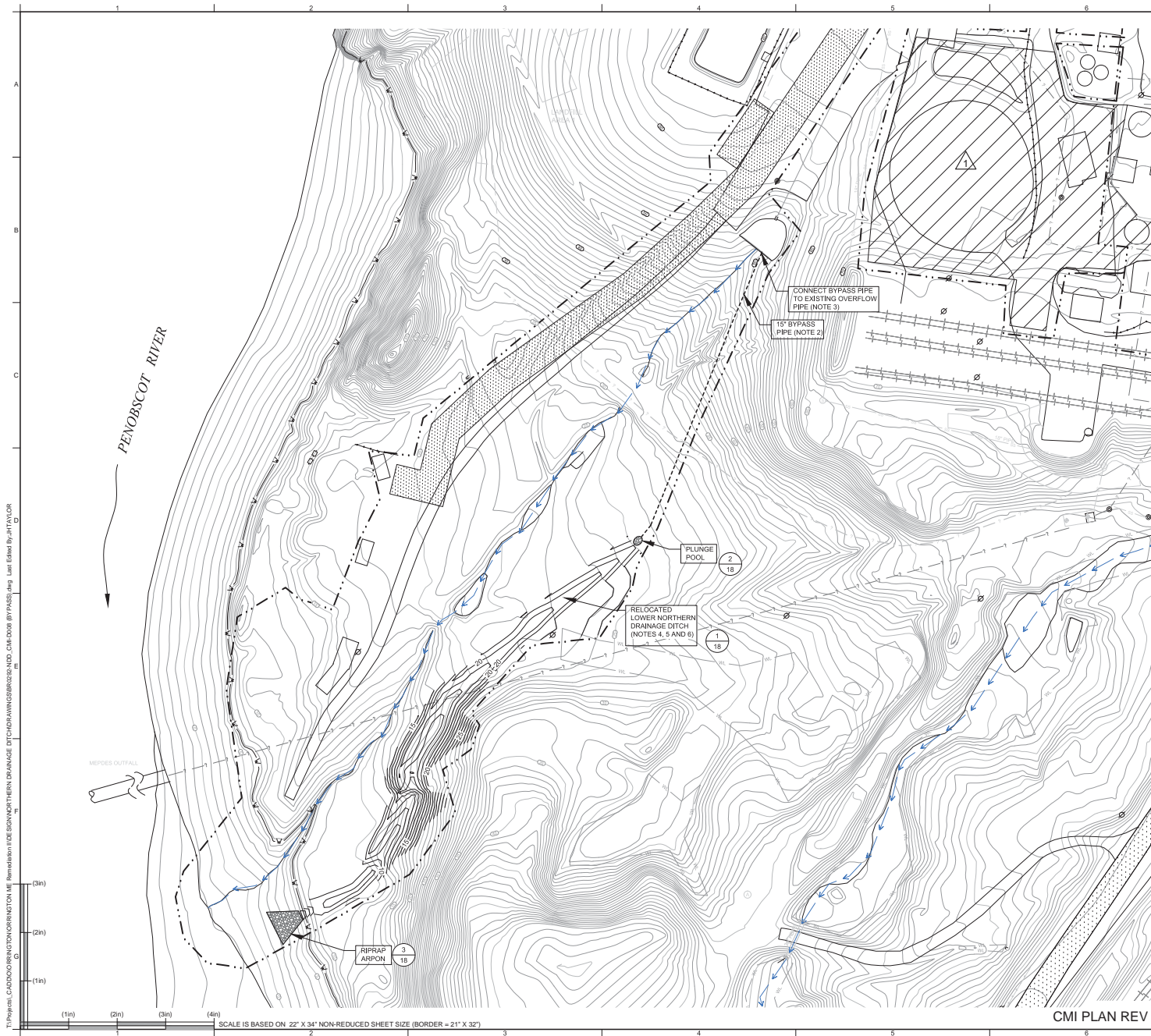
1.1	2016.09.28	REV 1 ADDENDUM 1 - INCORPORATE SIDEWALL SAMPLES TAKEN PRIOR TO EXCAVATION	JHT	CMG
1	2016.08.23	ADDRESS 2016.05.17 MEEDP COMMENTS	JHT	CMG
REV	DATE	DESCRIPTION	DRN	APP
TITLE:		COVER SHEET		
PROJECT:		NORTHERN DRAINAGE DITCH CORRECTIVE MEASURES IMPLEMENTATION PLAN ORRINGTON REMEDIATION SITE		
SITE:		ORRINGTON, MAINE		
THIS DRAWING MAY NOT BE ISSUED FOR PROJECT TENDER OR CONSTRUCTION UNLESS SEALED.		DESIGN BY: NJY DATE: FEBRUARY 2016		
		DRAWN BY: JHT PROJECT NO.: BR0292		
		CHECKED BY: NJY FILE:		
		REVIEWED BY: CMG DRAWING NO.: 19		
2016.09.28 DATE		APPROVED BY: SML 1 OF 19		

CM I PLAN REV 1 - ADDENDUM 1

T:\Project_CADD\ORRINGTON\ORRINGTON ME Remediation\DESIGN\NORTHERN DRAINAGE DITCH\DRAWINGS\BR0229.DWG, CMI PLAN 0200 (SITE PLAN) - Last Edited By JHT/AN 08



CMI PLAN REV 1



NOTES:

- SEE DRAWING NO. 2 FOR GENERAL NOTES AND ADDITIONAL LEGEND INFORMATION.
- BYPASS PIPE LOCATION IS APPROXIMATE AND MAY BE MOVED DURING CONSTRUCTION.
- CONNECT BYPASS PIPE TO EXISTING 9" (OD) DUCTILE IRON PIPE IN HEADWALL. PLUG ADDITIONAL OUTLET PIPES WITH CONCRETE OR OTHER METHOD APPROVED BY THE REMEDIATION PROJECT MANAGER.
- MATERIAL EXCAVATED FOR RELOCATED NORTHERN DRAINAGE DITCH SHALL BE USED AS ON-SITE REUSED MATERIAL FOR BACKFILLING NORTHERN DRAINAGE DITCH EXCAVATION AREA.
- GRADES SHOWN ARE TOP OF RIPPAP AND NOT BOTTOM OF EXCAVATION.
- EXCAVATION AREAS (SHOWN ON DRAWING 10) WITHIN THE AREA OF THE RELOCATED LOWER NORTHERN DRAINAGE DITCH SHALL BE EXCAVATED PRIOR TO CONSTRUCTION OF THE RELOCATED LOWER NORTHERN DRAINAGE DITCH.



NOT FOR CONSTRUCTION

1	2016.08.23	ADDRESS 2016.05.17 MEPDES COMMENTS	JHT	CMG
REV	DATE	DESCRIPTION	DRN	APP

CDM Smith

Geosyntec consultants

TITLE: NORTHERN DRAINAGE DITCH BYPASS PLAN

PROJECT: NORTHERN DRAINAGE DITCH CORRECTIVE MEASURES IMPLEMENTATION PLAN ORRINGTON REMEDIATION SITE

SITE: ORRINGTON, MAINE

THIS DRAWING MAY NOT BE ISSUED FOR PROJECT TENDER OR CONSTRUCTION UNLESS SEALED.

Scott M. Luetjens

2016.08.23

DATE

DESIGN BY: NJY DATE: FEBRUARY 2016

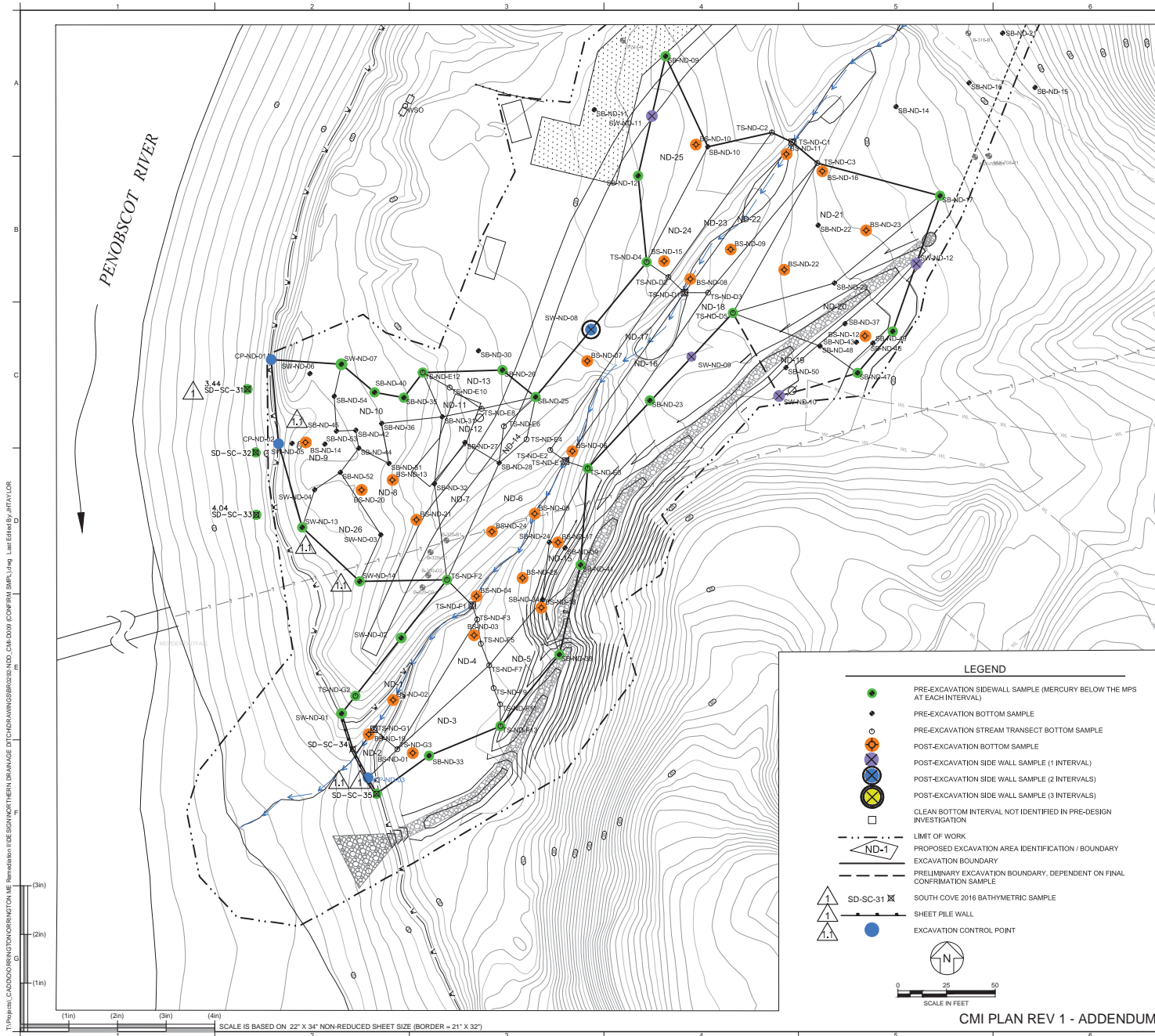
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CHECKED BY: NJY FILE:

REVIEWED BY: CMG DRAWING NO.:

APPROVED BY: SML 8 OF 19

CMI PLAN REV 1



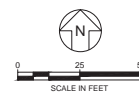
BOTTOM SAMPLE AND SIDEWALL SAMPLE SUMMARY TABLE			
LOCATION ID	Northing (USSurveyFoot)	Easting (USSurveyFoot)	Elevation (USSurveyFoot)
BS-ND-01	390964.2	898823.6	7.5
BS-ND-02	390991.4	898813.5	-3.3
BS-ND-03	391024.7	898855.1	5.8
BS-ND-04	391044.8	898856.4	-0.2
BS-ND-05	391087.2	898886.3	-0.2
BS-ND-06	391119.3	898905.6	4.7
BS-ND-07	391165.6	898913.3	-0.2
BS-ND-08	391207.8	898964.3	6.2
BS-ND-09	391223.0	898967.0	11.1
BS-ND-10	391276.9	898969.1	21.1
BS-ND-11	391272.0	899015.5	11.1
BS-ND-12	391178.6	899025.9	19
BS-ND-13	391104.5	898813.0	2.7
BS-ND-14	391123.8	898748.4	1.9
BS-ND-15	391217.0	898952.8	6.2
BS-ND-16	391263.2	899034.1	11.1
BS-ND-17	391072.4	898898.2	-1.1
BS-ND-18	391038.9	898889.7	1.9
BS-ND-19	390973.8	898801.0	-3.3
BS-ND-20	391099.4	898797.3	2.7
BS-ND-21	391084.1	898825.5	2.7
BS-ND-22	391212.6	899014.5	11.1
BS-ND-23	391232.8	899056.6	11.1
BS-ND-24	391078.0	898864.2	-0.2
BS-ND-25	391054.1	898880.0	-0.2
SW-ND-01	390984.5	898787.0	7 - 3
SW-ND-02	391023.4	898817.7	9.3 - 0.7
SW-ND-03	391076.3	898807.2	10.1 - 2.1
SW-ND-04	391099.5	898773.2	10.5 - 5.5, 2.5 - 2.5
SW-ND-05	391123.3	898761.6	9.9 - 0.1
SW-ND-06	391159.2	898770.7	10.5 - 5.5
SW-ND-07	391164.0	898786.9	10.9 - 5.9
SW-ND-08	391181.8	898915.3	12.13, 2 - 3
SW-ND-09	391167.9	898966.8	16 - 17
SW-ND-10	391147.7	899011.9	19 - 20
SW-ND-11	391291.6	898946.5	21 - 22
SW-ND-12	391215.7	899082.4	19.5 - 20.5
SW-ND-13	391080.1	898766.8	8.4 - 1.6
SW-ND-14	391052.4	898796.3	11.7 - 2.7

Note: The elevations of sidewall confirmation samples will be determined after excavation activities and be biased to the highest mercury concentrations of the adjacent boring.

- NOTES:
- SEE DRAWING NO. 2 FOR GENERAL NOTES AND ADDITIONAL LEGEND INFORMATION.
 - SIDEWALL SAMPLES SW-ND-01 THROUGH SW-ND-07 AND SW-ND-13 AND SW-ND-14 WERE OBTAINED BY THE REMEDIATION PROJECT MANAGER PRIOR TO INSTALLATION OF SHEET PILES AND EXCAVATION. PRELIMINARY SURVEY COORDINATES ARE SHOWN IN THE TABLE ABOVE.

LEGEND

- PRE-EXCAVATION SIDEWALL SAMPLE (MERCURY BELOW THE MPS AT EACH INTERVAL)
- PRE-EXCAVATION BOTTOM SAMPLE
- PRE-EXCAVATION STREAM TRANSECT BOTTOM SAMPLE
- POST-EXCAVATION BOTTOM SAMPLE
- POST-EXCAVATION SIDE WALL SAMPLE (1 INTERVAL)
- POST-EXCAVATION SIDE WALL SAMPLE (2 INTERVALS)
- POST-EXCAVATION SIDE WALL SAMPLE (3 INTERVALS)
- CLEAN BOTTOM INTERVAL NOT IDENTIFIED IN PRE-DESIGN INVESTIGATION
- LIMIT OF WORK
- PROPOSED EXCAVATION AREA IDENTIFICATION / BOUNDARY
- EXCAVATION BOUNDARY
- PRELIMINARY EXCAVATION BOUNDARY, DEPENDENT ON FINAL CONFIRMATION SAMPLE
- SOUTH COVE 2016 BATHYMETRIC SAMPLE
- SHEET PILE WALL
- EXCAVATION CONTROL POINT



CM I PLAN REV 1 - ADDENDUM 1

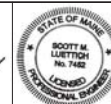
ISSUED FOR CONSTRUCTION

1.1	2016.09.28	REV 1 ADDENDUM 1 - INCORPORATE SIDEWALL SAMPLES TAKEN PRIOR TO EXCAVATION	JHT	CMG
1	2016.08.23	ADDRESS 2016.05.17 MESEP COMMENTS	JHT	CMG
REV	DATE	DESCRIPTION	DRN	APP

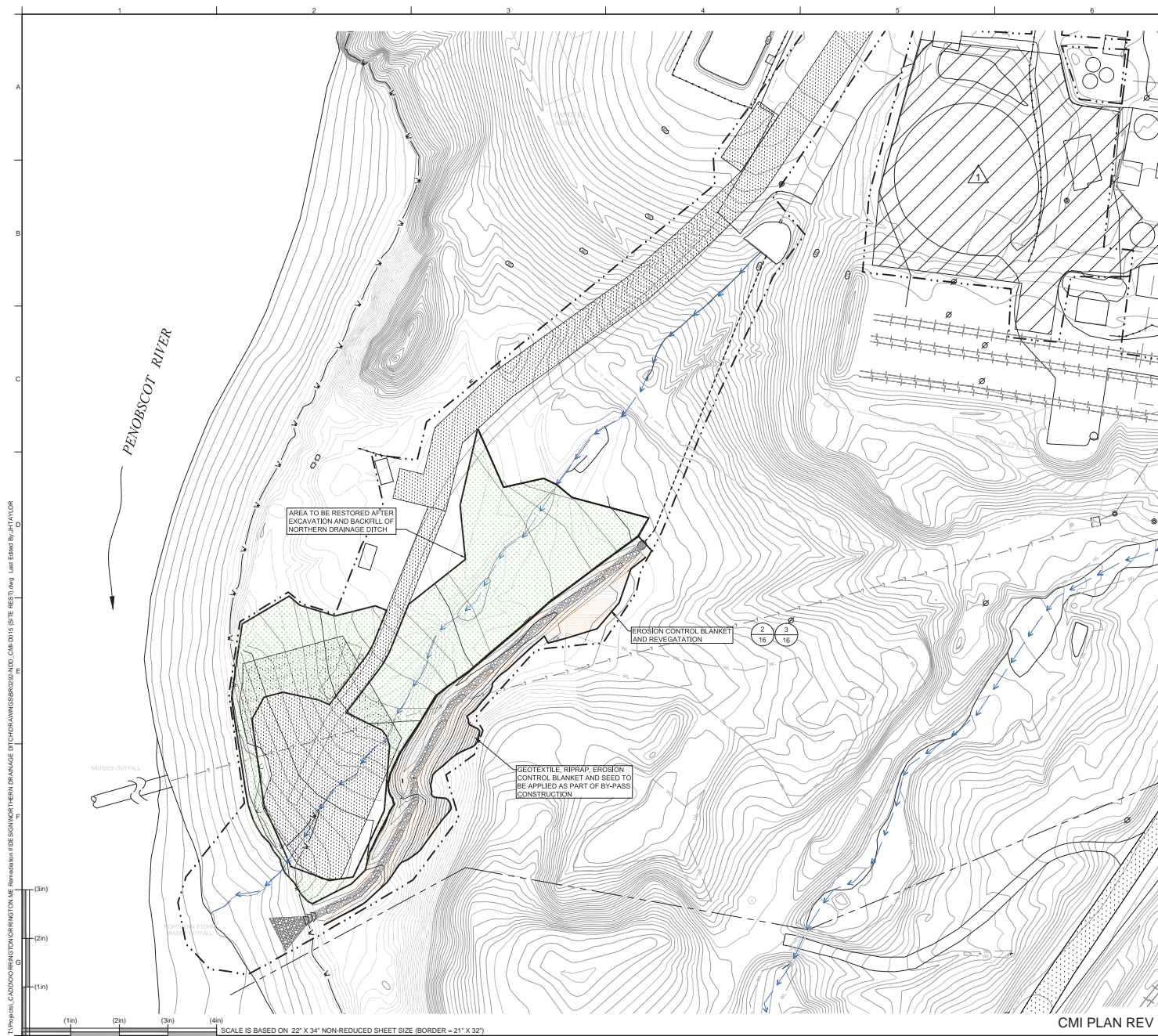


TITLE: CONFIRMATION SAMPLING PLAN
PROJECT: NORTHERN DRAINAGE DITCH CORRECTIVE MEASURES IMPLEMENTATION PLAN ORRINGTON REMEDIATION SITE
SITE: ORRINGTON, MAINE

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DESIGN BY: NJY DATE: FEBRUARY 2016
DRAWN BY: JHT PROJECT NO.: BR0292
CHECKED BY: NJY FILE:
REVIEWED BY: CMG DRAWING NO.:
APPROVED BY: SML 9 OF 19



LEGEND

MANAGEMENT AREA	MEASURE	APPLICATION
EROSION CONTROL BLANKET AND PERMANENT SEED MIX	EROSION CONTROL BLANKETS SHALL CONSIST OF A BIODEGRADABLE FIBER DOUBLE NET BLANKET SPECIFIED FOR 3:1 V/SLOPES OR GREATER, OR USE IN AREAS OF CONCENTRATED FLOW.	APPLY ON SLOPED AREAS WITH GRADES 3:1 V/SLOPES AND STEEPER AND AS SPECIFIED ON THE PLAN. BLANKETS SHOULD BE INSTALLED ACCORDING TO THE MANUFACTURER'S SPECIFICATIONS AND DETAIL 3 ON DRAWING 16.
PERMANENT SEED MIX	PERMANENT SEED MIX SHALL CONSIST OF A NEW ENGLAND EROSION CONTROL/RESTORATION MIX FOR DRY SITES (NEW ENGLAND WETLAND PLANTS, INC.) APPLIED AT A RATE OF 35 LB/Acre OR 1,250 LB/Acre PLUS. RATE OF SEED SHALL BE TRIPLED IF SEED IS APPLIED AS DORMANT SEED BETWEEN THE DATES OF NOVEMBER 15 THROUGH APRIL 1.	PERMANENT SEED MIX SHALL BE APPLIED TO AREAS THAT HAVE BEEN FINAL GRADED AND ARE AT PERMANENT FINISH GRADE AT THE RATES SPECIFIED. THE CONTRACTOR SHALL COLLECT SOIL SAMPLES (A MINIMUM OF TWO SAMPLES PER Acre) OF TOPSOIL USED FOR FINAL GRADING AND SUBMIT FOR A VEGETATION SUPPORT ANALYSIS. SAMPLING EQUIPMENT/INSTRUCTIONS AND SOIL SAMPLE ANALYSES ARE AVAILABLE FROM THE UNIVERSITY OF MAINE COOPERATIVE EXTENSION, 5741 LIBBY HALL, ORONO, MAINE 04469-5741, (207-581-3091). THE CONTRACTOR SHALL APPLY FERTILIZER AND AMENDMENTS AS RECOMMENDED BY THE VEGETATION SUPPORT ANALYSIS RECOMMENDATIONS PRIOR TO SEEDING.

Seed Mixture: New England Erosion Control/Restoration Mix for Dry Sites (New England Wetland Plants, Inc.)

Species:

- Creeping Red Fescue (*Festuca rubra*)
- Canada Wild Rye (*Elymus canadensis*)
- Annual Ryegrass (*Lolium multiflorum*)
- Perennial Ryegrass (*Lolium perenne*)
- Blue Grama (*Bouteloua gracilis*)
- Little Bluestem (*Schizachyrium scoparium*)
- Indian Grass (*Sorghastrum nutans*)
- Rough Bentgrass (*Agrostis scabra*)
- Upland Bentgrass (*Agrostis perennans*)

NOTES:

- SEE DRAWING NO. 2 FOR GENERAL NOTES AND ADDITIONAL LEGEND INFORMATION.
- AREAS TO BE ADDRESSED IN THE LANDFILL 1 OR PLANT AREA CMI (AS INDICATED ON DRAWING 4) WILL BE RESTORED AS PART OF THOSE CMI PLANS.



NOT FOR CONSTRUCTION

1	2016.08.23	ADDRESS 2016.05.17 MEDP COMMENTS	JHT	CMG
REV	DATE	DESCRIPTION	DRN	APP
CDM Smith		Geosyntec consultants		
TITLE: SITE RESTORATION PLAN				
PROJECT: NORTHERN DRAINAGE DITCH CORRECTIVE MEASURES IMPLEMENTATION PLAN ORRINGTON REMEDIATION SITE				
SITE: ORRINGTON, MAINE				
THIS DRAWING MAY NOT BE ISSUED FOR PROJECT TENDER OR CONSTRUCTION UNLESS SIGNED.		DESIGN BY: NJY DATE: FEBRUARY 2016		
CHECKED BY: JHT		PROJECT NO.: BR0292		
REVIEWED BY: CMG		FILE:		
APPROVED BY: SML		DRAWING NO.: 15 OF 19		
DATE: 2016.08.23				