REMEDIAL DESIGN
COOPER CROUSE-HINDS, LLC
NORTH LANDFILL AND SOUTH LANDFILL
TOWN OF SALINA AND SYRACUSE, NY

Prepared for:

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February, 2014

CERTIFICATION

I, the undersigned, certify under penalty of law, that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly prepared this Remedial Design/Remedial Action Work Plan for the Cooper Crouse-Hinds North Landfill and South Landfill located in the Town of Salina and City of Syracuse, New York, in accordance with the Division of Environmental Remediation (DER) Draft DER-10 Technical Guidance for Site Investigation and Remediation (December 2002). Based upon my personal activities and my direct supervision of the persons directly responsible for preparing this Remedial Design/Remedial Action Work Plan, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

For Tetra Tech:

(Professional Seal)

Peter A. Rich
Printed Name of Certifying Engineer

Signature of Certifying Engineer

12 February 2014
Date of Certification

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Registration Number

NY
Registration State

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Principal Engineer
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1.0 INTRODUCTION

This Remedial Design Report has been prepared on behalf of Cooper Crouse-Hinds, LLC (CC-H) and presents the design and implementation plan for the remediation and closure of CC-H North Landfill and South Landfill, collectively referred to herein as the "Site." The Site has been designated a Class 3 Inactive Hazardous Waste Disposal Site (Site No. 7-34-004) by the New York State Department of Environmental Conservation (NYSDEC). CC-H entered into a Consent Order (R7-0666-05-11) on August 29, 2011 with NYSDEC to implement the selected remedy for the Site as outlined in the Record of Decision (ROD) issued on March 31, 2011. The ROD was incorporated into and made a part of the Consent Order.

1.1 Site Location and Description

The Cooper Crouse-Hinds, LLC (CC-H) Site consists of two former landfills, referred to as the North Landfill and South Landfill with associated wetland areas, separated by seventh North Street, which are located immediately west of CSX railroad tracks and the adjacent operating CC-H manufacturing facility. The Site is located in the Town of Salina (North Landfill) and City of Syracuse (South Landfill), Onondaga County, New York (Latitude 043º 05’ 7” N, Longitude 076º 09’ 40” W). The North Landfill consists of three contiguous parcels (Tax ID Nos. 073.-01-08.1, 073.-01-08.3, and 073.-01-08.4) totaling 21.48 acres in size. The South Landfill consists of one parcel (Tax ID No. 01.01-03) totaling 19.4 acres in size. The Site is located in an area of mixed usage including light industrial/manufacturing, commercial and retail usage. Seventh North Street is oriented southeast-northwest and separates the two landfills that comprise the Site. A Site Location Map is presented as Figure 1 and a Site Plan is presented as Figure 2.

1.1.1 Landfills

The North Landfill is bordered along its northern border by a former landfill (approximately 37 acres) owned by Plaza East, LLC (Plaza), which consists of areas of fill (municipal waste and miscellaneous debris) with woodland cover and wetland areas. The North Landfill is bordered to the east and southeast by CSX railroad tracks and the CC-H facility and to the south and southwest by Seventh North Street and the South Landfill. West of the North Landfill are wetlands (Plaza property) followed by Ley Creek.

The South Landfill is bordered to the north by Seventh North Street and the North Landfill. To the east and southeast of the South Landfill are CSX railroad tracks followed by mixed commercial and retail development and Hiawatha Boulevard. Further to the South is undeveloped woods, wetlands and mixed commercial and retail development border the South Landfill further to the south. Ley Creek abuts the entire west and northwest boundary of the South Landfill.

Review of available historical documentation indicates that prior to the mid-to-late 1950s the North and South Landfills had been occupied by low lying fields, salt marshes and woodlands. From the mid-1950s to 1989 fill material had been placed across various areas of the North and South Landfills. An overall Site Plan is shown on Figure 2.

Current topographic conditions are shown on the topographic survey map included on Figure 3.

1.1.2 Topography

The site topography is shown on Figure 3. Topography of the North Landfill is generally flat across the southern half of the landfill with an average elevation range of approximately 370 feet to 372 feet above mean sea level (AMSL). However, moving to the north from the central area of the North Landfill, the elevation rises moderately and increases to near an average of 381 feet AMSL across a notably mounded area of the landfill. Topography slopes moderately to steeply downward from the fill-mound along the northern portion of the North Landfill. Drainage across the North Landfill is generally radially outward from the fill-mound area in all directions. Drainage to the north and west is to the west wetland (Wetland B) and then to the adjacent wetland property owned by Plaza East. Drainage to the south and east is towards the east wetland (Wetland A) and the eastern stream segment (Stream A).

Topography of the South Landfill is generally flat across the landfill area with an average elevation range of 373 feet to 377 feet AMSL. Topography along the edges of the fill-mound slopes moderately to steeply away from the fill-mound to the north, east, south and west. Drainage across the South Landfill is generally radially outward from the fill-mound in all directions. Drainage to the east-southeast is to the stream (Stream B) and wetland areas (Wetland C) located on the east-southeast side of the landfill. Drainage to the south is to the wetland area (Wetland C) located to the south of the fill-mound. Drainage to the west is collected along the landfill's western border for drainage into Wetland C and eventual flows to Ley Creek.

1.1.3 Surface Water Features

Ley Creek is located between 80 feet and 120 feet west of the western property boundary of the North Landfill and adjacent to the western boundary of the South Landfill (Figure 2). Ley Creek is part of the Onondaga Lake drainage basin and flows to the south/southwest towards Onondaga Lake. Between the mouth of Ley Creek and the Onondaga County Ley Creek Transfer Station and former sewage treatment plant (POTW) outfall, Ley Creek is classified as a Class C water body. From the POTW outfall to a point located 3.1 miles north of the creek mouth, Ley Creek is classified as a Class B water body. The section of Ley Creek adjacent to the CC-H Landfill Site is classified as a Class C water body. Flood insurance maps indicate that the CC-H Landfill Site is located within the 100-year flood plain of Ley Creek as defined by the Federal Emergency Management Agency (FEMA). The base flood water surface water elevation for the Site is 374 feet AMSL at the southern half of the South Landfill and is 375 AMSL at the northwest corner of the South Landfill and mid-way through the North Landfill.

Bear Trap Creek drains into Ley Creek at its terminus that is located approximately 260 feet west of the southwest corner of the North Landfill, which is to the immediate north of the Seventh North Street bridge that crosses Ley Creek (Figure 2). Bear Trap Creek extends northward from its terminus and receives drainage from areas that range from undeveloped usage to commercial usage and potentially light industrial usage.

Two stream segments and one drainage ditch are located on the CC-H Landfill Site and are described in the next section.

1.1.4 Wetlands

In November 2005, wetland delineation was conducted across the Site to define the extent of wetlands on-site. All work was conducted according to the criteria set forth in the *1987 United States Army Corps of Engineers Wetlands Delineation Manual, Classification of Wetlands and Deepwater Habitats of the United States*, and the *1995 NYSDEC Freshwater Wetlands Delineation Manual*. Wetland areas identified on-site are described further below.

Two wetland areas and one stream section were identified on the North Landfill (Figure 2). The first wetland, Wetland A (a.k.a. the "east wetland") extends along the majority of the southeastern side of the North Landfill and is approximately 2.63 acres in size. The east wetland receives flow from an off-site drainage ditch/stream form the Plaza East former landfill and CSX Railroad properties that enters the wetland at the east corner of the landfill. Surface water in this ditch/stream appears to originate as surface water runoff and drainage from and across the adjacent properties owned by Plaza East, LLC and CSX Railroad. Surface water discharge from the east wetland is to a stream (Stream A) that is 675 feet in length and flows southwest from Wetland A to the south point of the North Landfill where it then turns to the northwest and parallels Seventh North Street. At its terminus, the stream discharges into two 24-inch diameter culverts, which carry flow beneath Seventh North Street and into a drainage ditch that is located along the northeast boundary of the South Landfill. Drainage in the ditch flows northwest and ultimately discharges to Ley Creek. The second wetland, Wetland B (a.k.a. the "west wetland") is located along the northwest side of the North Landfill; the on-site portion of this wetland feature is approximately 2.61 acres in size. Wetland B occurs adjacent to and within the flood plain of Ley Creek and extends offsite from the northwest property boundary, and across the adjacent property owned by Plaza East, LLC, to Ley Creek. Wetland B is identified on National Wetland Inventory (NWI) maps (ID No. PFO1/SS1E).

One wetland area, stream section, and drainage ditch were identified on the South Landfill (Figure 2). Wetland C (a.k.a. the "south wetland") is located south of the southwest point of the South Landfill and is approximately 1.29 acres in size. The stream section (Stream B) is approximately 1,825 feet in length and extends along the southeast side of the South Landfill. The stream channel begins near the east point of the landfill and runs parallel with the CSX railroad tracks and southeastern edge of the landfill until it enters the Wetland C. Upon entering Wetland C, the stream flows southwest along the northwest edge of Wetland C.

Prior to 2009, surface water from Stream B and Wetland C discharged into Ley Creek at the terminus of the stream via a 36-inch diameter culvert pipe. The culvert pipe was removed in 2009 and the area backfilled with imported gravel material and fill (Figure 2) to prevent the flow of surface water and entrained sediments from Ley Creek to the South

Landfill and vice versa. There is no longer a discharge point to Ley Creek, however surface water can still flow along Stream B and into Wetland C.

Surface water flow in Stream B appears to be primarily from surface water runoff from the South Landfill and the adjacent CSX railroad property. Observations indicate that flow in the stream is generally limited to times of heavy runoff due to either rainfall events or snow melt. Generally, the upper one third of the stream area is dry for the majority of the year. Prior to the removal of the 36-inch culvert pipe, observations indicated that surface water from Ley Creek flowed into Stream B and Wetland C during high water events in Ley Creek.

The drainage ditch is located along the northern boundary of the South Landfill and Seventh North Street. The ditch is 1,075 feet in length and begins at the east point of the South Landfill. Flow in the ditch is to the northwest to its terminus where it discharges into Ley Creek. The ditch accepts discharge from a culvert pipe located at the head of the ditch and from the two 24-inch culvert pipes leading beneath the roadway. The source of flow from the culvert pipe at the head of the ditch is from unknown off-site sources to the southeast. The head of the ditch is located at an elevation of approximately two feet below the head of the South Landfill (Stream B) and does not provide discharge flow to Stream B.

Based on the NYSDEC wetlands maps, the wetlands located on the North and South Landfills are not under the direct jurisdiction of New York State. The United States Army Corps of Engineers (USACE) provided a preliminary Jurisdictional Determination (JD) dated June 19, 2009 on these wetland areas.

1.2 Remedial Objectives

The objectives for the remedial program have been established through the remedy selection process provided in 6 NYCRR Part 375. The goal for the remedial program is to restore the Site to pre-disposal conditions to the extent feasible. At a minimum, the remedy will eliminate or mitigate all significant threats to public health and the environment presented by the contamination identified at the Site through the proper application of scientific and engineering principles. The remedial objectives for this site are provided below.

1.2.1 Public Health Protection

Groundwater

- Prevent people from drinking groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with contaminated groundwater.
- Prevent potential for inhalation of contaminants volatilizing from the groundwater.

Soil

- Prevent ingestion/direct contact with contaminated soil.
- Prevent potential for inhalation of contaminants volatilizing from the soil.

Surface water

- Prevent people from drinking surface water impacted by contaminants.
- Prevent contact with contaminants from impacted water bodies.

Sediment

- Prevent direct contact with contaminated sediments.

Air/Soil Gas

Control landfill methane gas generated within the landfills so as not to create hazards to health, safety or property.

1.2.2 Environmental Protection

Groundwater

- Restore the groundwater aquifer to meet ambient groundwater quality criteria, to the extent feasible.
- Prevent discharge of contaminated groundwater to surface water.

Soil

- Prevent migration of contaminants that would result in groundwater or surface water contamination.
- Prevent impacts to biota from ingestion/direct contact with soil causing toxicity or impacts from bioaccumulation through the terrestrial food chain.

Surface Water

- Restore surface water to ambient water quality criteria for contaminants of concern, to the extent feasible.
- Prevent impacts to biota from ingestion/direct contact with surface water causing toxicity and impacts from bioaccumulation through marine and aquatic food chain.

Sediment

- Prevent releases of contaminants from sediment that would result in surface water levels in excess of ambient water quality criteria.
- Prevent impacts to biota from ingestion/direct contact with sediments causing toxicity and impacts from bioaccumulation through marine and aquatic food chain.

Air/Soil Gas

- Prevent adverse environmental impact related to landfill methane gas migration and odors

1.3 Remedy of Record

The elements of the selected remedy set forth in the ROD are as follows:

1. A remedial design program will be implemented to provide the details necessary for the construction, operation, maintenance, and monitoring of the remedial program.

2. There are three areas with elevated contaminant levels that will be targeted for excavation and off-site disposal. All three areas occur in the North Landfill. One area on the east side includes approximately 750 cubic yards of waste containing PCBs at concentrations of 50 parts per million (ppm) or greater. The other area on

the east side includes approximately 4,500 cubic yards of waste that contains elevated solvents. The area on the west side of the North Landfill includes approximately 1,500 cubic yards of oily waste in the vicinity of monitoring well MW-6. The ROD provides for all three areas to be characterized, excavated and transported off-site to a Toxic Substances Control Act (TSCA) facility and/or hazardous waste landfill as applicable. Characterization will include design borings to further delineate these areas. During excavation, the areas containing oily waste or solvents will be further delineated through visual confirmation, detection of strong odors, measurement of elevated contaminant vapor concentrations, or by otherwise readily implementable methods without the need for laboratory analyses.

3. Both the North and South Landfills will be consolidated to reduce their current area. The consolidated areas will be fenced and will have engineered cap systems designed and constructed in conformance with the substantive requirements for landfill caps set forth in 6 NYCRR Part 360. The areas to be consolidated will be determined during the design; however, areas to be excavated will include a 50-foot buffer zone area between the South Landfill and Ley Creek and 30-foot buffer zone areas between the landfills and on-site wetlands. If required for cap installation, buffer zones will be established between the landfills and Seventh North Street. This excavated material will be consolidated in the landfills above the water table.

4. Wetland sediment with PCB concentrations greater than 1 ppm and less than 50 ppm will be excavated for consolidation and capping on-site with the material discussed above. PCB contaminated sediment with concentrations of 50 ppm or greater will be properly transported off-site for disposal.

5. The excavated wetlands and buffer zones will be restored and maintained per an approved restoration plan developed during the remedial design phase. Buffer zone soils will need to meet the Unrestricted Use Soil Cleanup Objectives set forth in Table 375-6.8(a) of 6 NYCRR Part 375 for a minimum of two feet in depth measured from the finished surface grade. The remaining buffer zone soils will need to meet, at a minimum, the lower of the protection of groundwater or the protection of public health soil cleanup objectives for commercial use as set forth in Table 375-6.8(b) of 6 NYCRR Part 375.

6. Green remediation and sustainability efforts will be considered in the design and implementation of the remedy to the extent practicable, including:
    a. using renewable energy sources;
    b. reducing green house gas emissions;
    c. encouraging low carbon technologies;
    d. conserve natural resources;
    e. increase recycling and reuse of clean materials;
    f. preserve open space and working landscapes; and,
    g. design cover systems to be usable for habitat or recreation.

7. Imposition of an institutional control in the form of an environmental easement for the controlled property that will:
    a. require the remedial party or site owner to complete and submit to the Department a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
    b. allow the use and development of the controlled property for industrial use, although subject to local zoning laws;
    c. restrict the use of groundwater and surface water as a source of potable or process water, without necessary water quality treatment as determined by the Department, NYSDOH or County DOH; prohibit agriculture or vegetable gardens on the controlled property;
    d. require compliance with the Department approved Site Management Plan; and,
    e. include provisions to evaluate the potential for vapor intrusion for any buildings developed on the site and to implement actions recommended for addressing exposures related to soil vapor intrusion.

8. A Site Management Plan will be developed to include the following:
    a. an Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to assure the following institutional and/or engineering controls remain in place and effective:

        Institutional Controls: The Environmental Easement discussed above.
        Engineering Controls: The landfill caps and fencing discussed above.
        This plan will include, but may not be limited to:
        i. an Excavation Plan which details the provisions for management of future excavations in areas of remaining contamination;
        ii. descriptions of the provisions of the environmental easement including any land use, groundwater and surface water use restrictions;
        iii. provisions for the management and inspection of the identified engineering controls;
        iv. maintaining site access controls and Department notification;
        v. the steps necessary for the periodic reviews and certification of the institutional and/or engineering controls; and
    b. a Monitoring Plan to assess the performance and effectiveness of the remedy. The plan includes, but would not be limited to:
        i. monitoring of wetlands, groundwater, surface water and sediment to assess the performance and effectiveness of the remedy;
        ii. a schedule of monitoring and frequency of submittals to the Department; and.
        iii. monitoring of wetlands and buffer areas to assess restoration success.

9. The remedial party or subsequent property owner will provide a periodic certification of institutional and engineering controls for the site, prepared and submitted by a professional engineer or such other expert, acceptable to the Department, until the Department notifies the property owner in writing that this certification is no longer needed. This submittal will:
    a. contain certification that the institutional controls and engineering controls put in place are still in place, and are either unchanged from the previous certification or are compliant with Department-approved modifications;
    b. allow the Department access to the site; and,
    c. state that nothing has occurred that would impair the ability of the control to protect public health or the environment, or constitute a violation or failure to comply with the site management plan unless otherwise approved by the Department.

2.0 PRE-DESIGN ACTIVITIES

This section provides a summary of pre-design and design-related activities conducted to date to support design of the selected remedy.

2.1 Remedial Investigation/Feasibility Study

Field efforts that were part of the Remedial Investigation for the CC-H Site were conducted in 2004 to 2006. In 2004, a Preliminary Site Assessment (PSA) was conducted at the Site to determine the nature and extent of any impacts at the Site and to determine if the Site had the potential to and/or was impacting Ley Creek. The PSA Report was submitted to NYSDEC, USEPA and New York State Department of Health (NYSDOH) on September 29, 2004. In 2005 and 2006, a Supplemental Site Assessment (SSA) was conducted at the Site to address data gaps identified during the 2004 PSA and to determine if interim remedial measures (IRMs) were necessary at the Site. The Preliminary Site Assessment and Supplemental Site Assessment Report was submitted to NYSDEC, USEPA and NYSDOH on May 25, 2006.

The final RI report was submitted in August 2009 and approved by NYSDEC in correspondence dated October 6, 2009. The purpose of the RI was to define the nature and extent of any contamination resulting from previous activities at the Site. The RI included test pits and boreholes for collection of waste material and surface and subsurface soil samples. New monitoring wells were installed and groundwater samples were collected from new and existing monitoring wells. Surface water samples were collected from on-site stream segments and Ley Creek. Surface and subsurface sediment samples were collected from the on-site wetlands, stream segments and ditches and from Ley Creek. In total, approximately 200 samples of groundwater, soil, sediments, and surface water were collected during the RI. Output from these efforts were applied as appropriate during the remedial design effort.

Preliminary analyses conducted as part of the FS (GeoTrans, 2010) included Applicable or Relevant and Appropriate Requirements (ARARs) associated with the remedial action for the Site. This analysis was used as a basis for further remedial design evaluations.

2.2 Landfill Gas Survey

Material encountered in test pits excavated in the North Landfill and South Landfill during the RI consisted primarily of foundry sand, core butts, foundry molds, metal debris, wood debris and industrial debris. Test pits across the South Landfill also encountered municipal wastes which included paper, glass bottles, plastic, wood, metal cans, metal debris and general municipal refuse. The need for a gas venting layer as a component of proposed landfill caps is dependent upon whether or not landfill gas is being produced at the landfills.

A landfill gas bar hole survey was conducted as part of pre-design activities for the proposed landfill caps on the North Landfill and South Landfill. A total of 39 bar hole probes were installed on the North Landfill (22 probes) and South Landfill (17 probes).

On the North Landfill, elevated landfill gas measurements were observed at three probes in an isolated area located near the south entrance gate to the North Landfill. Peak methane measurements ranged from 8.2-23.5% and sustained methane measurements ranged from 7.8-17%. On the South Landfill, elevated landfill gas measurements were observed at six probes across a large part of the South Landfill. Peak methane measurements ranged from 7.0-79% and sustained methane measurements ranged from 6.9-79%.

These results indicate that a landfill gas venting layer will be needed for the South Landfill as expected due to the greater amounts of municipal refuse from the City of Syracuse landfilling operations that occurred from 1960 through 1965. For the North Landfill, while there does not appear to be a large amount of landfill gas being generated, the future placement of organic sediments from the wetlands could generate future methane gas.

2.3 Construction Traffic Assessment

An evaluation of the truck route to transport trucks between the CC-H North Landfill and South Landfill and the local interstate system was conducted in November, 2012. The need for this assessment was based upon the amount of materials and pieces of equipment that will need to be delivered to the project site and hundreds of truck trips that will be generated over the course of the project. The evaluation was intended to look at the best routing for the truck traffic that will minimize off-site impacts. The assessment concluded that the best truck route is Seventh North Street to Interstate 81. A memo summarizing the traffic survey is included as Appendix A.

2.4 Site Clearing, Aerial Photography and Topographic Map

A boundary and topographic survey of the Site was completed in 2003, but more detail and coverage was needed for the wetland areas, streams and Ley Creek. Updating of the topographic information was crucial to the remedial design, particularly relative to balancing cuts and fills on grading plans. In addition, the location of underground and overhead utilities and associated structures needed to be established. In order to prepare an accurate and up to date site topographic map, the site was cleared of brush and trees in October 2012 to facilitate aerial photography for planimetric mapping of the site. A detailed topographic map with one-foot contour intervals was prepared and serves as the base of design drawings. Brush and trees were cleared from the North and South Landfills as part of the Removal Action described in Section 2.4 below.

2.5 Removal Action for North Landfill Hot Spots

A Removal Action was completed in general accordance with a Removal Action Work Plan (RAWP) dated October 2, 2012 and a Removal Action Work Plan Addendum dated November 2, 2012. The RAWP was approved by NYSDEC in correspondence dated October 16, 2012.

In preparation of the removal action select groundwater monitoring wells (MW-11A, MW-11-B, MW-6A, MW-6B, and OW-1) in the Removal Action areas were abandoned in accordance with the RAWP.

The Removal Action involved the following tasks: construction of lined decontamination pads at both the North and South Landfill entrances and dewatering pads on North Landfill; excavation of soil and landfill waste containing elevated concentrations of PCBs, VOCs and NAPL oil in areas identified by prior site remedial investigations; loading the soil and waste into trucks suitable for hauling TSCA, hazardous and non-hazardous waste; transporting the soil and waste to an appropriate off-site landfill; placement of the exported soil and waste in the destination landfill for ultimate disposal; and backfilling and/or grading the excavated areas for stabilization prior to future cap construction. The amounts of waste removed included 149 tons of PCB waste; 2,267 tons of elevated VOC waste; and 2,882 tons of NAPL oil waste. The Removal Action was documented in a Construction Completion Report dated March 20, 2013. NYSDEC approved the CCR in correspondence dated June 6, 2013.

2.6 Test Pits Along North Property Line

On November 27, 2012, seven test pits were excavated along the North Property line of the North Landfill to determine if the property line location resulted in differing waste disposal practices on the adjoining properties. The test pits were located at varying horizontal distances along the property line to be representative of the site conditions. The test pits varied in depth from 6.5 to 14 feet, and were terminated when native peat or native clay was encountered. Municipal solid waste was encountered at each test pit in varying thicknesses, along with cover soil and foundry sand. It was determined that similar waste disposal practices took place across the property boundary and that no discontinuity was present. A figure indicating the test pit locations and the test pit logs are included as Appendix B.

2.7 Cultural Resources Assessment

Tetra Tech's Cultural Resources Services Group performed a Phase IA cultural resources assessment (CRA) of the North Landfill and South Landfill in December 2012 which was documented in a report dated February 2013. The Phase IA cultural resources assessment of the site included a reconnaissance survey (visual assessment, site walkover, and photographic documentation), and background research of the approximately 40.88 acre project area.

The Phase IA reconnaissance survey of the project area indicated that there are no historic structures within the Project area. The CSX railroad grade (formerly Syracuse Junction Railroad) located adjacent to the project area is greater than 50 years old; however design plans indicate no impacts to this resource. If prehistoric or historic archaeological resources were ever present within the Project area they were likely destroyed by late-twentieth century landfill activities. Given this situation no further archaeological investigations were recommended. NYSDEC approved the CRA in correspondence dated July 2, 2013.

2.8 Utility Assessment

There are several existing utilities that traverse the North Landfill and South Landfill properties including overhead power lines (National Grid) and underground water (Metropolitan Water Board) and sanitary sewer pipelines (Onondaga County Department of Water Environment Protection).

Contact with National Grid resulted in an Assent agreement granting Cooper access to the National Grid power line rights-of-way being signed on July 23, 2013. Landfill construction to within 50-feet of a power line is allowed without National Grid supervision. Landfill construction within 50-feet will require National Grid supervision.

Metropolitan Water Board comments on the buffer zone excavation detail along the 36-inch diameter water line located along the northern edge of the South Landfill resulted in modification of the clearances allowed and the slope of the excavation indicated on the design drawings (Sheet 8). On-site supervision by the Water Board will be requested during the excavation near this water line.

The sanitary sewer line located immediately north of 7th North Street is outside of the project area and will not be affected by the landfill construction. Extension or renewal of the permit for treated water disposal obtained for the 2012 Hot Spot Removals in the North Landfill will be pursued for treated water disposal during the landfill construction project. The point of water disposal is a sanitary sewer manhole located immediately west of the North Landfill entrance.

2.9 Additional PCB Sampling

Additional shallow soil and sediment sampling was completed in August, 2013 along the proposed buffer zone area along Ley Creek on the South Landfill to determine if the soil cover overlying the waste could be replaced in the buffer zone or if it should be consolidated under the landfill cap. These results indicated that much of the soil would not meet NYSDEC requirements for reuse in the buffer zone and will therefore be consolidated beneath the landfill cap.

During the Remedial Investigation, levels of PCBs greater than 50 mg/kg were identified in the wetland A & B areas of the North Landfill. These areas were further delineated on a finer grid spacing during sampling conducted in August-September 2013 to potentially reduce the total volume of sediments that would require off-site disposal. The results of the sampling established a significant reduction in the volume of sediments containing >50 mg/kg PCBs. The results were incorporated into a TSCA Removal Action Work Plan dated September 30, 2013. The work plan was approved by NYSDEC in correspondence dated October 21, 2013.

2.10 Removal Action for Wetlands A & B TSCA-Level PCBs

A Removal Action was completed in general accordance with a TSCA Removal Action Work Plan dated September 30, 2013. This work was completed in October-November 2013 and involved the excavation of sediments containing elevated concentrations (>50 mg/kg) of PCBs in Wetlands A & B on the North landfill, loading the sediment into

trucks suitable for hauling TSCA waste, transporting the sediment to an appropriate off-site landfill, and grading, covering with topsoil, seeding and mulching the excavation areas. The amount of waste removed included approximately 700 tons of PCB waste that was sent to Model City Landfill. The remaining >1 mg/kg PCB-contaminated sediments in Wetlands A and B on the North Landfill will be excavated and placed under the landfill cap area when landfill capping activities start in late 2014 or early 2015. The wetland areas will be restored at that time.

3.0 REMEDIAL DESIGN

The primary elements of the selected remedy addressed in this design report include:

- Excavation of >1 mg/kg PCB-contaminated wetlands sediment for consolidation and capping on-site.
- Waste consolidation on the North Landfill and South Landfill to create a 50-foot buffer zone between the South Landfill and Ley Creek, 30-foot buffer zones between the landfills and on-site wetlands and a buffer zone between the landfills and Seventh North Street.
- Engineered cap systems for both landfills designed and constructed in conformance with the substantive requirements for landfill caps set forth in 6 NYCRR Part 360.
- Restoration of excavated wetlands and buffer zones.

3.1 Permitting Requirements

3.1.1 ACOE/NYSDEC Joint NOI

The Joint Application Form was submitted to the ACOE and NYSDEC on July 29, 2013, following a pre-submittal conference call on July 16, 2013. On September 17, 2013, the ACOE issued a provisional Department of the Army Permit No. 2009-00241 Nationwide Permit No. 38 for the project (Appendix C). On September 18, 2013, the NYSDEC issued Permit Authorizations Water Quality Certification – Under Section 401 – Clean Water Act and Excavation & Fill in Navigable Water – Under Article 15, Title 5 for the project (Appendix D).

3.1.2 SWPPP

The SWPPP was submitted to the City of Syracuse and Town of Salina on May 9, 2013 for review and signature of the MS4 forms. Comments on the SWPPP were received from the City of Syracuse on June 13, 2013 and from the Town of Salina on July 10, 2013. Revised SWPPPs were submitted to the City of Syracuse and Town of Salina on September 13, 2013. Receipt of the signed MS4 forms is pending.

3.1.3 NYSDEC SPDES

A site-specific SPDES equivalent application for treated construction water disposal to Ley Creek via an engineered disposal point at each landfill was submitted to the NYSDEC on August 27, 2013. This is a contingency to the disposal option to the Onondaga County WTP (see section 3.1.4 below).

3.1.4 Onondaga County WTP

A permit for treated water disposal to the local WWTP was granted by the Onondaga County Department of Water Environment Protection in October of 2012 for the Hot Spot Removal Project. This permit expired on December 31, 2012. A similar permit will be sought for treated water disposal during the landfill construction project. The permit process required approximately 15 working days.

3.2 Preliminary Requirements for Support Facilities

The South Landfill Field Office will be located near the entry gate until this space is needed for reconstruction. At that point in time, the field office can be relocated across 7th North Street at the North Landfill entrance. Staging areas will be selected on the north half of the South Landfill near the entrance for work in the south half of the landfill. Once the buffer zones are re-graded, these areas may be used for stockpiling materials. Due to the size of the landfill, adequate staging area will be available on the South Landfill footprint until the project is 80% complete. If the final 20% of construction requires a staging area, the North Landfill will be used as necessary.

3.3 Work Around Existing Utilities

South Landfill

- A natural gas line located along the southern edge of 7th North Street. This line is outside the area of construction and is not considered further.
- A 36-inch water line which runs west to east along the northern boundary. This line will remain undisturbed by the landfill reconstruction. At the eastern edge of the landfill, the water line crosses the corner diagonally (Sheet 1 – Appendix E). Construction details on Sheet 8 indicate the means of moving soils near the water line to the central cap area and terminating the landfill cap sufficiently away from the water line.
- Five electric utility poles are located along the eastern edge of the South Landfill. The southern three within the Wetland C Stream B sediment removal area (Sheet 3B), one is located within the TP-12 excavation cell (Sheet 3A), and one is located within the landfill area to be capped (Sheet 3A). The four utility poles outside the landfill cap area will have silt fence placed at a 10-foot radius surrounding the utility pole and the included area will remain undisturbed. The utility pole inside the landfill cap area will have a LDPE boot applied per the penetration detail on Sheet 8.
- No other utilities lie within the South Landfill reconstruction area.

North Landfill

- A natural gas line and a sanitary force main are located along the northern edge of 7th North Street. These lines are outside the area of construction and are not considered further.
- Ten electric utility poles are located along the eastern half of the North Landfill. Six lie within areas outside the cap and will have silt fence placed at a 10-foot radius surrounding the utility pole and the included area will remain undisturbed. The four utility poles inside the landfill cap area will have a LDPE boot applied per the penetration detail on Sheet 8.
- No other utilities lie within the North Landfill reconstruction area.

3.4 Excavation Operations

3.4.1 Clearing and Grubbing

Areas where waste is to be removed and relocated will be cleared and grubbed to facilitate these operations. Site clearing of both landfills took place in 2012. The details of additional clearing and grubbing are contained in specification section 31160 – Site Clearing (Appendix F). Referenced specification sections are contained in a separate attachment to this report. All cleared and grubbed vegetation will be chipped and used as mulch on site.

3.4.2 Truck Access Ramps and Roads

Access to all areas of the South and North Landfills with heavy equipment is possible using existing access roads. However, approaches to the wetlands will require prepared access. Included in the written excavation plan will be the contractor's planned equipment use and methods for equipment entry into the wetlands. Selected equipment will match site conditions for the proposed work. Based on the contractor equipment needs, temporary access routes will be placed with temporary planking or roadway mats into the wetlands areas for ingress and egress of dump trucks and excavation equipment. The contractor will sequence excavation and restoration from the perimeter inwards towards the landfill cap area, moving from higher elevations to lower elevations.

3.4.3 Community Air Monitoring Plan

The community air monitoring plan (CAMP) is included as Appendix D in the Site Management Plan and is the generic CAMP provided as Appendix 1A of DER-10.

3.4.4 Excavation Work

Subsequent to clearing and grubbing, the existing waste mass will be excavated and non-hazardous materials will be relocated to the respective landfills. These materials will be graded and subsequently capped under the proposed closure system. Earthwork operations associated with the construction of the proposed landfill closure will include the removal and relocation of waste in wetlands and buffer zones. Estimated contaminated sediment and waste excavation volumes and production rates are developed as follows:

South Landfill

- North Boundary Water Main Easement – Sheet 1 and Table 1
- 50-Foot Buffer From Edge of Ley Creek – Sheet 2 and Table 2
- 30-Foot Buffer From Edge of Wetland C – Sheet 3A and Table 3A
- Wetland C and Stream B – Sheet 3B and Table 3B

North Landfill

- South Boundary – Sheet 5 and Table 5
- 30-Foot Buffer From Edge of Wetland A – Sheet 6A and Table 6A
- Wetland A and Stream A – Sheet 6B and Table 6B
- Wetland A Surface Soils – Sheet 6C and Table 6C
- 30-Foot Buffer From Edge of Wetland B – Sheet 7A and Table 7A

- Wetland B – Sheet 7B and Table 7B

The tables are included in this report document. The sheets (Appendix E) are full size drawings and are available as a separate attachment upon request. Each table is followed by the test pit logs or available test boring logs which are the basis for determining the target excavation depths. The logs are also used to estimate how much excavated soil will be exported to the central landfill cap area. Production rates expected for each area are included at the bottom of each table.

The sequence of excavation and backfilling operations is intended to minimize the generation of construction water that will require treatment and disposal. Subsequent to clearing and grubbing, the existing waste mass will be excavated and non-hazardous materials will be relocated to the main section of the landfill. These materials will be covered with daily cover and subsequently capped under the proposed closure system. Excavation sequencing is indicated on the Design Drawings. The contractor will submit a written excavation plan, updated on a weekly basis, for approval by the engineer. The weather and time of year along with current site conditions will be considered in approving the plan.

3.4.5 Excavation Along Ley Creek Bank

To protect Ley Creek, a five-foot wide strip of soil along the bank will be undisturbed. Excavation along Ley Creek will be stabilized on a daily basis to prevent bank failure. The use of silt curtains, sheet pilings, and coffer dams for sediment and water drainage control is not expected to be required.

3.4.6 Horizontal and Vertical Control of Excavations

Reference points on the site perimeter will be surveyed in to provide control of excavation activities. The Engineer on-site during excavation will verify with the contractor the target excavation depth and dimensions for a particular cell. If native peat is encountered in the buffer zone waste removal areas, the elevation of this finding will be noted and the excavation depth terminated. Each excavation cell will be marked by the Engineer and off-set control points staked to control the limits of excavation.

3.4.7 Wetlands Post-Excavation Sampling

The termination depths and included areas at the wetland and stream excavation cells were conservatively selected such that any residual contamination is expected to be below the standard set for the project. Base of excavation samples will be apportioned at 900-square foot intervals as indicated in DER-10(5.4)(b)(5.)(iii). Wall samples will be collected along cuts greater than 4 feet. The base of excavation samples are presumed to be an adequate indicator of residual contamination at cuts less than 4 feet deep. Samples will be field located on 30+ feet grids, equally spaced across excavation cell areas, and the locations recorded using a GPS device at the time of sample collection. Confirmatory PCB sampling locations are indicated on Sheets 3B, 6B, and 7B.

In some of the deeper sediment excavation areas, it may not be practical or feasible to reach the design base of excavation due to stability concerns. In these areas, upon

consultation with the NYSDEC Project Manager, the residual sediment contamination will be left in place and covered with a two-foot thick cover of clean fill.

3.5 Consolidation Plan of Wastes

Wastes will be removed from the buffer zones, wetlands, streams, and boundary areas, and placed in the center of the landfill cap areas. Rough grading and compaction will occur using bulldozers and rolling or sheep foot compactors as determined by the Contractor and approved by the Engineer, based on the waste characteristics.

Wetland sediment dewatering will occur at dewatering pads established at contractor selected locations where construction water will be collected for batch treatment followed by permitted disposal. Sediments exported to the landfill cap area will be stabilized by mixing with soils if necessary. No imported stabilization amendments are planned.

The upper 6-inches of graded waste is to be free of materials greater than ¾-inch in diameter that could puncture the liner. This can be accomplished by raking final surface grade or by covering municipal waste with foundry sand or wetlands sediments that possess these characteristics.

3.6 Water Management

Site plans for water collection infrastructure include buffer zones and boundary swales which will direct storm water to the on-site wetlands and streams. No conveyance pipes for water are required at either landfill. Sheets 4, 8, 9, and 13 indicate the locations and details for the water management structures at the South and North Landfills.

3.6.1 Stormwater Management Plan

Stormwater management is included in the Stormwater Pollution Prevention Plan (SWPPP), which is a separate attachment to this report. The volume of stormwater requiring management will be minimized by the excavation and backfill sequence, with reconstruction and re-vegetation occurring over the peripheral areas such that these areas will be capable of retaining stormwater from the central landfill cap area during construction and upon completion. High precipitation and winter shut-down operations are included in the SWPPP, including control of disturbed area, regular inspection of silt fence perimeters, and prompt correction and repair of stormwater controls.

The buffer zones will be excavated first as they are at the highest elevations and will thus be made “clean” such that stormwater contacting and collecting in them subsequently will not require treatment. The buffer zones will be backfilled and graded as v-shaped swales sloped to contain the 90% annual stormwater runoff volume (Water Quality Volume = WQ_V) as required by Section 4.2 of the New York State Stormwater Management Design Manual. The volume for containment is calculated for each buffer zone using the proportioned drainage area from each landfill cap. The calculations are contained in Table 9.

During landfill cap construction, temporary swales will be graded along the landfill cap perimeter sized to contain the WQ_V for the disturbed area within the cap. Silt fence will be placed along the perimeter of the disturbed area.

3.6.2 Ley Creek Flooding During the Construction Season

The excavation sequence along Ley Creek will be completed to increase water storage capacity on the site over the time period of construction. Sufficient silt fence and other sediment barriers will be placed so that floodwater will not carry any site soils off-site. The SWPPP requires grading, seeding, and mulching of disturbed areas after 7 days.

3.6.3 Soil Erosion and Sediment Control Measures

Silt fences will be used to locally confine water and sediments to the immediate area of sediment and waste removal areas. Soil erosion and sediment control measures are contained in specification section 31240 – Erosion and Sediment Control which includes the Stormwater Pollution Prevention Plan.

3.6.4 Surface Water Base Flow Diversion to Ley Creek

All surface water base flow will be directed to the on-site wetlands with subsequent drainage to Ley Creek during flood conditions. Adequate sediment control structures will be placed along Ley Creek to prevent any movement of site soils into the creek.

3.6.5 Construction Water Collection and Treatment

Construction water includes any water that has come into contact with exposed contaminated sediments or wastes and which is generated by pumping from excavations and holding basins. Construction water also includes any water generated from sediment dewatering. Any water that collects in an open excavation that has been demonstrated clean by post-excavation sampling will not be considered construction water and can be pumped around an active work area.

Silt fencing around the site perimeter and local to excavation activities will used to control erosion and filter sediments from moving with construction water. Pumping and other water handling will be as needed at the contractor's selection and will not cause any sediments to be relocated in the wetland, stream, or buffer zones.

A construction water containment and treatment system will be used to collect and treat all construction water. Temporary water storage vessels will be brought on site to accommodate the expected water volumes accumulated for batch treatment prior to disposal. The portable vessels will be moved across the site as necessary for construction. Treated water disposal will be to the sanitary sewer under permit from the Onondaga County Water Environment Protection for final treatment at the local WWTP. A force main manhole is available along the north side of 7th North Street for this purpose. As an option, discharge of treated water may occur to Ley Creek under a SPDES equivalent permit.

3.6.6 Dewatering Pads

Existing decontamination pads at the landfill entrances and dewatering pads constructed for the North Landfill 2012 Hot Spot Removal project are shown on Figure 4. Details for the decontamination pads are shown on Figure 5. Details for the dewatering pads are shown on Figure 6. Additional dewatering pads will be placed on site according to the phasing of the excavations as determined by the construction sequence and expected weather conditions.

3.7 Backfilling and Consolidation Operations

Clean backfill will be brought in for placement in the following areas:

South Landfill

- The North Boundary Water Main Easement will be filled with clean fill and sloped west to east to drain water to Stream B.
- The 50-Foot Buffer will be filled with clean fill to elevation 365 (approximate) and be sloped as a drainage swale to direct water from north to south to Wetland C and Stream B.
- The 30-Foot Buffer will be sloped away from the central landfill cap area to carry water to Wetland C and Stream B.
- Wetland Surface Soil Area will be covered with topsoil. Stream B and adjacent portions of Wetland C will not be backfilled to provide open water environment portion of the reconstructed wetlands. The exception would be areas that are too deep or unstable to remove all contaminated sediments. In these areas a two-foot thick soil cover will be placed as a cap over residual PCBs >1 ppm.

North Landfill

- The North Boundary zone will be graded to a double swale to direct water to Wetland A and Wetland B. Vinyl sheeting will be installed along the boundary.
- The South Boundary zone will be filled with clean fill to elevations to match the off-site soils and be sloped as drainage swales to direct water to Stream A and Wetland B.
- The 30-Foot Buffer Zones along the wetlands will be sloped away from the central landfill cap area to carry water to Wetlands A and B as applicable.
- The Wetland Surface Soil Area will be covered with topsoil.

3.7.1 Backfill Layers, Thicknesses, and Material Specifications

Backfill layers and thicknesses are indicated on the Design Drawings. Material specifications are included in specification section 31230 – Trenching and Backfilling

3.7.2 Potential Backfill Material Sources

Potential commercial backfill material sources include:

- Hanson Aggregates New York LLC
  PO Box 513
  4800 Jamesville Road
  Jamesville, NY 13078

- Riccelli Enterprises, Inc.
  6131 E. Taft Road
  Syracuse, NY

- WF Saunders & Sons, Inc.
  5126 South Onondaga Road
  Nedrow, NY

- Mill Creek Products and Supplies
  6414 East Taft Road
  East Syracuse, NY

- Van Slyke Trucking, Inc.
  5096 South Onondaga Road
  Nedrow, NY

Material staging areas, construction support areas, site access limitations, and temporary road requirements are discussed above.

3.7.3 Backfill Sequencing and Coordination with Excavation

To stabilize excavations along Ley Creek, backfilling will be done by the end of the work day to the extent necessary. The Engineer will direct the contractor to have sufficient backfill material available to place as stabilization is needed. The written excavation plan will include the backfill sequencing, will be approved by the Engineer, and be updated weekly based on weather and site conditions.

3.7.4 Consolidation Plan of Wastes

Wastes will be removed from the buffer zones, wetlands, streams, and boundary areas, and placed in the center of the landfill cap area. Rough grading and compaction will occur using bulldozers and rolling or sheep foot compactors as determined by the Contractor and approved by the Engineer, based on the waste characteristics

3.8 Landfill Cap

3.8.1 Preliminary Site Plan

Sheets 10 and 13 indicate the proposed landfill footprint, property lines, stormwater drainage systems, streams and water courses, roads, and structures for the South Landfill. Sheets 11 and 13 indicate the proposed landfill footprint, property lines, stormwater drainage systems, streams and water courses, roads, and structures for the North Landfill.

3.8.2 Landfill Configuration and Preliminary Grading Plan

Sheets 10, 11, and 13 indicate the required buffer zones, consolidation of excavated sediments from wetlands and wastes from the buffer zones, and considerations of end use.

3.8.3 Isolation of North Landfill Waste From Plaza East Wastes

Test pits completed in 2012 within the Plaza East property adjacent to the north edge of the North Landfill indicated continuity in waste and fill layering across the property boundary. Two options were evaluated to handle this boundary and the toe of the landfill cap. One option included creating separation by waste consolidation which would require consolidation on Plaza East property as well and the second option included isolation of wastes by installing vertical wall/sheet piling between the two landfills. Based on an economic analysis of the two options it was decided that sheet piling was the lower cost option.

Vinyl sheet piling will be used along the North Landfill property boundary to isolate the North Landfill waste from the Plaza East waste and provide a termination point for the North Landfill cap. Grass-lined drainage swales graded on both the North Landfill and the Plaza East properties will drain to the southeast and northwest. North Landfill drainage will enter either Wetland A or Wetland B. If grading on the Plaza East Landfill property to achieve desired drainage exposes wastes, a one foot thick soil cover will be provided over exposed waste areas.

3.8.4 Landfill Gas Generation and Venting

Landfill gas surveys conducted on both the North and South Landfills revealed small amounts of landfill gas present sporadically across both landfills. In addition, the placement of wetlands sediments on both landfills has the potential to generate methane gas from decomposition. Passive gas venting will be installed in both landfill caps. The gas venting layer will consist of a layer of geocomposite drainage netting installed immediately beneath the geomembrane. Gas venting risers will be spaced at a maximum separation of one vent per acre. The gas venting layer is supplemented with a perimeter and deck gas collector trench. A landfill gas design support memo is included as Appendix G.

3.8.5 Evaluation of Barrier System Options

The barrier system at both the North and South Landfills will conform to 6 NYCRR Part 360 with modifications technically justified by the site conditions, using a Geomembrane Cover System, consisting of from top to bottom:

- Minimum 4%, maximum 33% slope
- 6” of topsoil, seeded and mulched per specifications
- A 12” thick barrier protection layer of clean fill meeting project specifications. Soil cover stability calculations are provided in Appendix H
- A 6-ounce non-woven geotextile layer factory-applied above and below a 250 ml geocomposite drainage layer
- A 60 mil LDPE geomembrane layer
- 250 ml geocomposite drainage netting installed beneath the geomembrane as a gas venting layer, with horizontal perforated piping running uphill to each vertical vent to convey any venting gas
- A 6 ounce non-woven geotextile layer

- Prepared, graded, and compacted existing or imported solid waste and residual soil cover material

Component layer placement verification is detailed in the component specifications (Appendix F) and will be recorded as part of the CQA plan.

3.8.6 Landfill Cover System Drainage Elements

The landfill cap will terminate at the toe with a geomembrane cover system tie in detail shown on Sheet 8. The toe detail meets a grass lined drainage swale at all locations with the exception of the North Landfill North Boundary. The toe detail to grass lined swale directs surface sheet flow to an on-site wetland or stream. No landfill cap drainage flows directly into Ley Creek. At the North Landfill North Boundary, a sheet pile wall is used to separate the North Landfill waste from the Plaza East property waste. The sheet pile wall provides a termination anchor for the North Landfill cap system. A drainage design support memo is included as Appendix I.

3.8.7 Post-Closure Construction

The landfill cover cap barrier protection and topsoil layers are designed to be integrated into the site plan for post-closure construction. The Ley Creek floodplain will limit post-closure land use, but recreational and wildlife reserve uses are possible.

3.8.8 Preliminary Stormwater Features

The vegetated grass landfill cap will be sloped to drain to perimeter grassed swales which are outside the landfill caps. The cap surfaces will be periodically mowed to defeat deep rooted vegetation. The grassed swales however, can be left to grow taller grasses and other vegetation that will selectively thrive based on the soil moisture content. The taller grasses and vegetation will encourage more wildlife species variation in the adjacent wetlands and streams. The swales will drain into the adjacent wetlands and streams, rather than directly into Ley Creek.

3.8.9 Evaluation of Flood Protection

The landfill cap design at each landfill causes a net movement of lowland soils, wastes, and wetland sediments, to the highest elevation at each landfill. The wetland sediments will not be backfilled, except with sufficient topsoil to sustain emergent wetland vegetation. The stream excavations will not be backfilled except along the edges, where wetland topsoil will be added at the water line to sustain emergent wetland vegetation. The buffer zones along the landfill cap edges have lowered finished surface elevations to provide controlled drainage from the landfill caps to the adjacent wetlands and streams. All of these features increase the flood water storage capacity for the site by approximately 8.6 million gallons and decrease the threat of flood waters to the landfill caps (Table 10).

3.9 Site Restoration

3.9.1 Historical and Current Wetland and Stream Conditions

The Notice of Intent includes as an appendix the 2006 Wetland Delineation Report which details the historical conditions of the wetlands and streams. In 2012, the vegetation in the wetland areas was mowed to a 6-inch height to facilitate the aerial survey to be used for the landfill cap design. The current wetland and stream conditions are further exhibited in the photographs attached to the NYSDEC/ACOE Joint Application and Appendix B of the SWPPP.

3.9.2 Wetland Restoration

The North and South Landfills each contain streams and wetlands with contaminated sediments that will be relocated to the center landfill cap areas. Each wetland and stream will be restored as follows:

- The wetlands restoration details and plant species (Sheet 8) were selected to match those for emergent wetland reconstruction as required by the state of NY.
- Wetland A in the North Landfill will be restored to an emergent wetland to match its current state.
- Stream A in the North Landfill will be restored to an open water stream with an emergent wetland bank to match its current state.
- Wetland B in the North Landfill will be restored to an emergent wetland to match its current state.
- Stream B in the South Landfill will be restored to an open water stream with an emergent wetland bank to match its current state.
- Wetland C in the South Landfill will be restored to an emergent wetland to match its current state.

The buffer zones surrounding the landfill caps will be initially restored as grassed swales to conduct surface water flow to the adjacent wetlands in an orderly sheet manner to avoid erosion. Silt fences will be left in place at swale terminations to keep any sediment from entering the wetlands and streams. Over time vegetation will thicken in the swale areas and the water retention capacity of the swales will increase. This will further protect the wetlands from eroded sediment.

4.0 PROJECT SCHEDULE – 2014

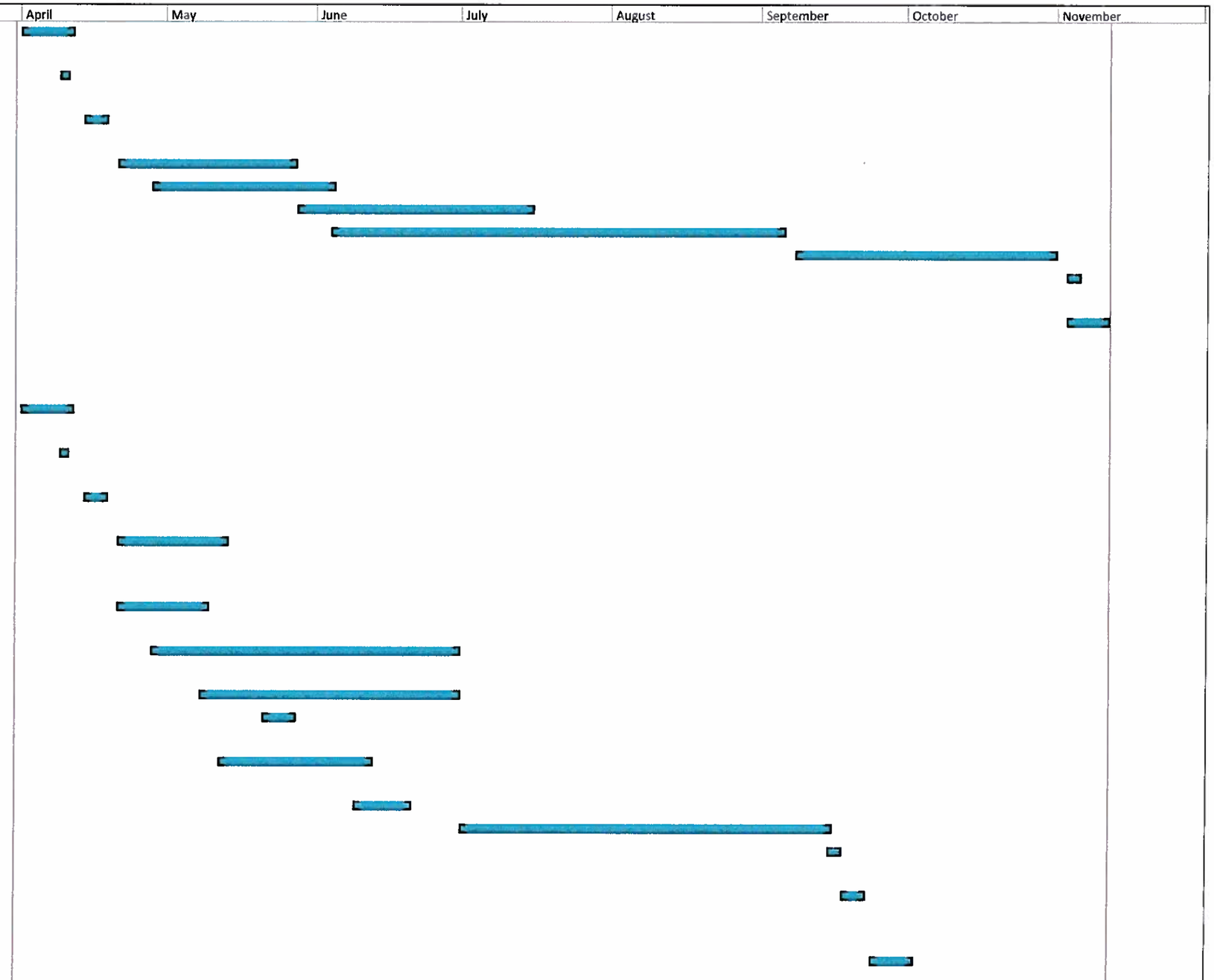
The Owner currently expects to complete the landfill reconstruction project at both the North and South Landfills in 2014. A project schedule for each landfill follows this page.

- A Microsoft project schedule for the South Landfill is included on the top one-half a single 11X17 sheet.

- A Microsoft project schedule for the North Landfill is included on the bottom half of a single 11X17 sheet.

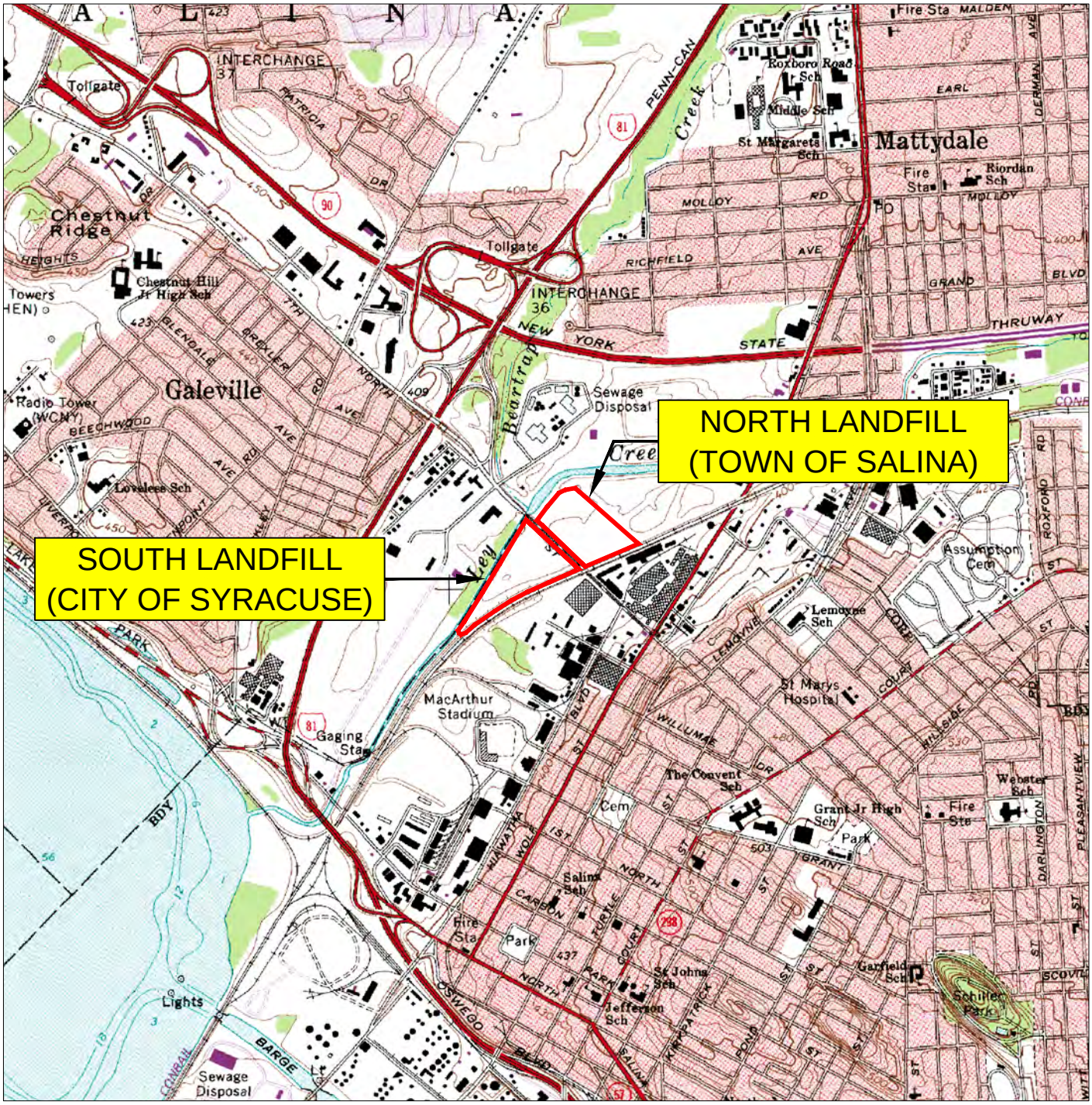
One contractor may complete the work at both landfills, or each landfill may be completed by a separate contractor.

ID	Task Name	Duration	Start	Finish
1	Mobilization South Landfill (SL)	9 days	Tue 4/1/14	Fri 4/11/14
2	SL Environmental & Safety Controls	2 days	Wed 4/9/14	Thu 4/10/14
3	SL On-Site Access Road Stabilization	5 days	Mon 4/14/14	Fri 4/18/14
4	SL North Boundary ROW	27 days	Mon 4/21/14	Tue 5/27/14
5	SL Ley Creek Buffer Zone	28 days	Mon 4/28/14	Wed 6/4/14
6	SL Wetland C Buffer	35 days	Wed 5/28/14	Tue 7/15/14
7	SL Wetland C Sediment	68 days	Wed 6/4/14	Fri 9/5/14
8	South Landfill Cap	40 days	Mon 9/8/14	Fri 10/31/14
9	South Landfill Cap Gas Monitoring Probes	3 days	Mon 11/3/14	Wed 11/5/14
10	Demobilization South Landfill (SL)	7 days	Mon 11/3/14	Tue 11/11/14
11				
12	Mobilization North Landfill (NL)	9 days	Tue 4/1/14	Fri 4/11/14
13	NL Environmental & Safety Controls	2 days	Wed 4/9/14	Thu 4/10/14
14	NL On-Site Access Road Stabilization	5 days	Mon 4/14/14	Fri 4/18/14
15	NL North Boundary and Plaze East Sheet Pile Installation	17 days	Mon 4/21/14	Tue 5/13/14
16	NL South Property Boundary Buffer Zone	15 days	Mon 4/21/14	Fri 5/9/14
17	NL Wetland A Buffer Zone	46 days	Mon 4/28/14	Mon 6/30/14
18	NL Wetland A Sediment	38 days	Thu 5/8/14	Mon 6/30/14
19	Cells SED-98 and 99 Sediment	5 days	Wed 5/21/14	Tue 5/27/14
20	NL Wetland B Buffer Zone	24 days	Mon 5/12/14	Thu 6/12/14
21	NL Wetland B Sediment	10 days	Mon 6/9/14	Fri 6/20/14
22	North Landfill Cap	55 days	Tue 7/1/14	Mon 9/15/14
23	North Landfill Cap Gas Monitoring Probes	3 days	Mon 9/15/14	Wed 9/17/14
24	North Landfill Cap Groundwater Monitoring Wells	3 days	Thu 9/18/14	Mon 9/22/14
25	Demobilization North Landfill (NL)	7 days	Wed 9/24/14	Thu 10/2/14



Project: 02062014 Both Landfill Schedule.mpp
Date: Mon 2/10/14

Task		Project Summary		Inactive Milestone		Manual Summary Rollup		Deadline	
Split		External Tasks		Inactive Summary		Manual Summary		Progress	
Milestone		External Milestone		Manual Task		Start-only			
Summary		Inactive Task		Duration-only		Finish-only			



National Geodetic Vertical Datum of 1929
Contour Interval 10 Feet

SCALE
0 5000
FEET

QUADRANGLE LOCATION

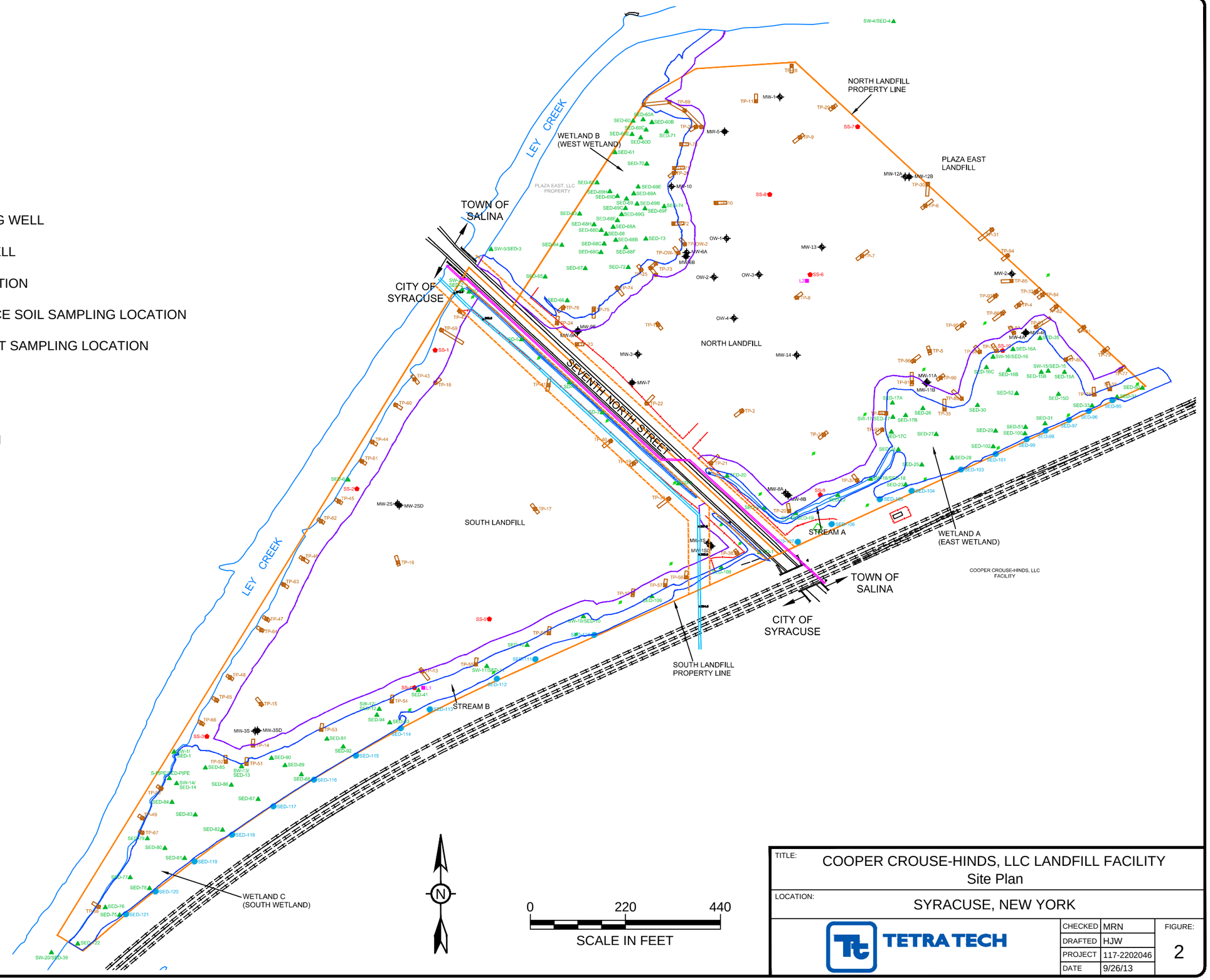
COOPER CROUSE-HINDS, LLC LANDFILL FACILITY SYRACUSE, NEW YORK	DATE: 8/1/12
	DESIGNED: HJW
	CHECKED: MRN
Site Location Map	APPROVED: MRN
	DRAWN: HJW
	PROJ.: 117-2202046
TETRA TECH	Figure 1

Base map from U.S.G.S. 7.5' SYRACUSE WEST, NEW YORK topographic quadrangle map.

S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\TSCA\WORK PLAN\FIG1 - SITE LOCATION MAP.DWG

EXPLANATION

MW-3S	SHALLOW AQUIFER MONITORING WELL
MW-3SD	DEEP AQUIFER MONITORING WELL
SS-1	SURFACE SOIL SAMPLING LOCATION
SED-95	SURFACE SOIL AND SUBSURFACE SOIL SAMPLING LOCATION
SW-1/SED-1	SURFACE WATER AND SEDIMENT SAMPLING LOCATION
SED-27	SEDIMENT SAMPLING LOCATION
TP-48	TEST PIT LOCATION
L1	LEACHATE SAMPLING LOCATION
	WETLAND BOUNDARY
	LEY CREEK / WETLAND BUFFER
	PROPERTY BOUNDARY
	EASEMENT
	WATER MAIN
	GAS MAIN
	EXISTING CHAIN LINK FENCE
	ELECTRIC UTILITY POLE

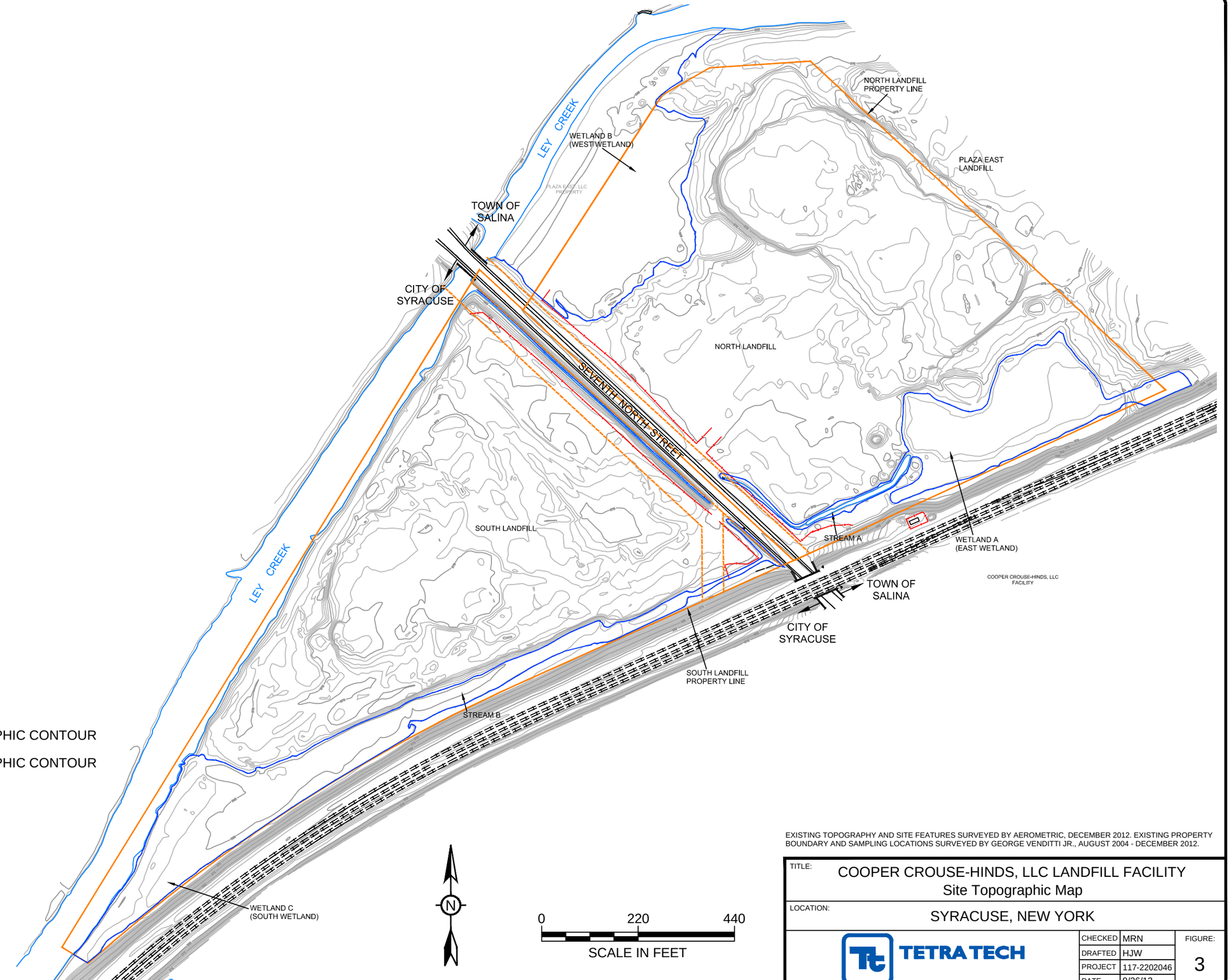


TITLE:	COOPER CROUSE-HINDS, LLC LANDFILL FACILITY Site Plan
LOCATION:	SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN	FIGURE:
DRAFTED	HJW	2
PROJECT	117-2202046	
DATE	9/26/13	

S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\TSCA\WORK PLAN\FIG2 - SITE PLAN.DWG



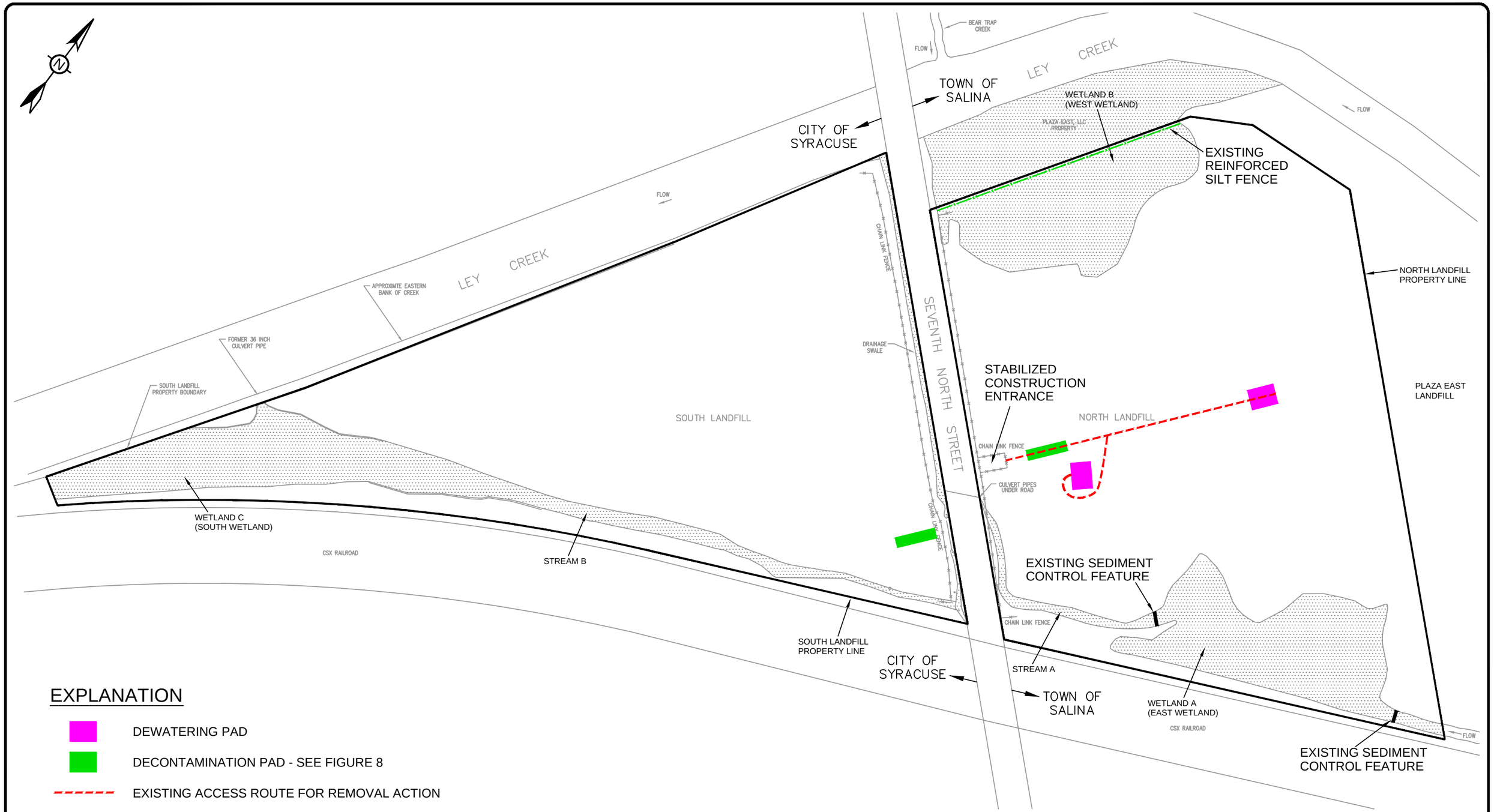
EXPLANATION

- PROPERTY BOUNDARY
- EASEMENT
- EXISTING CHAIN LINK FENCE
- WETLAND BOUNDARY
- 5-FOOT INTERVAL TOPOGRAPHIC CONTOUR
- 1-FOOT INTERVAL TOPOGRAPHIC CONTOUR

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

TITLE: COOPER CROUSE-HINDS, LLC LANDFILL FACILITY Site Topographic Map			
LOCATION: SYRACUSE, NEW YORK			
TETRA TECH	CHECKED	MRN	FIGURE:
	DRAFTED	HJW	3
	PROJECT	117-2202046	
	DATE	9/26/13	

S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\TSCA\WORK PLAN\FIG3 - SITE TOPOGRAPHIC MAP.DWG



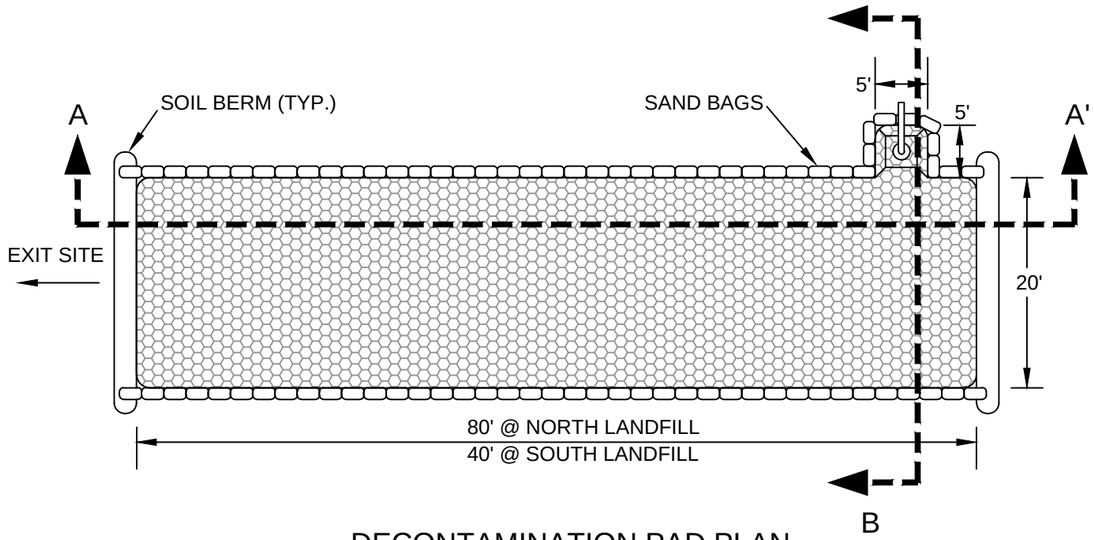
TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
Removal Action Decon and Dewatering Pad Locations

LOCATION: SYRACUSE, NEW YORK

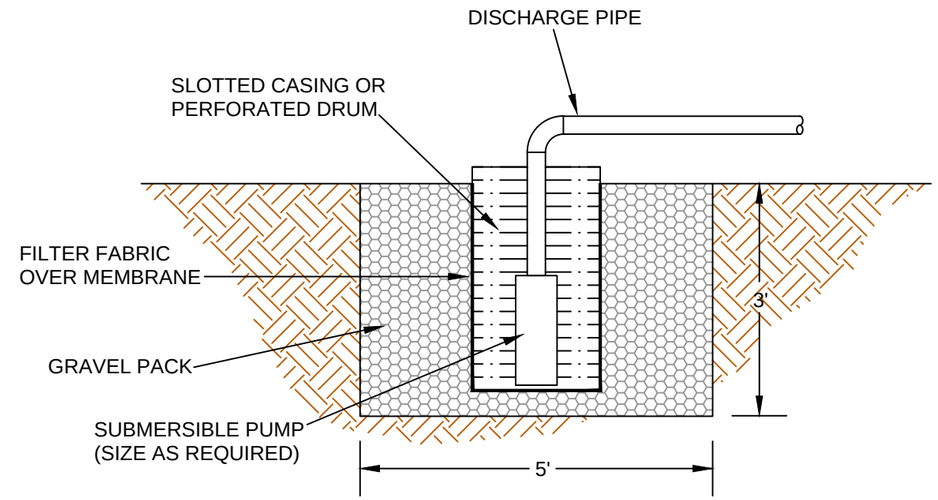
TETRA TECH

CHECKED	MRN	FIGURE:
DRAFTED	HJW	4
PROJECT	117-2202046	
DATE	9/25/12	

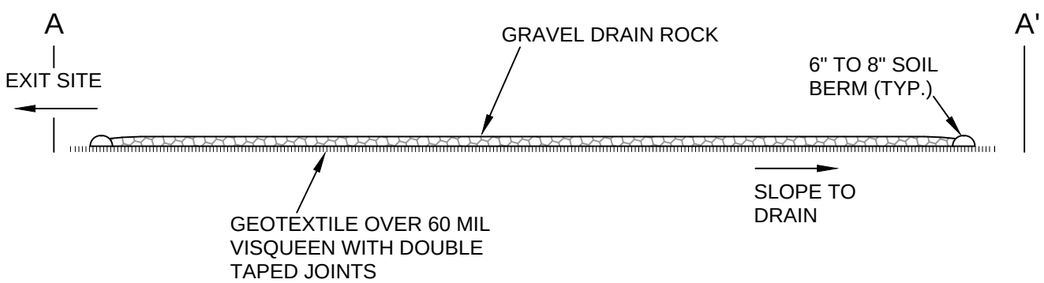
S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\TSCA\WORK PLAN\FIG7 - DECON PAD LOCATIONS.DWG



DECONTAMINATION PAD PLAN



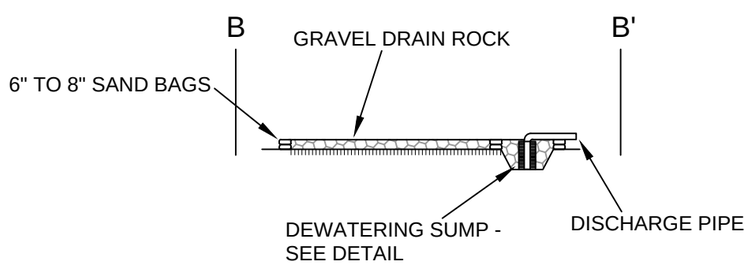
DECONTAMINATION PAD SUMP DETAIL



DECONTAMINATION PAD PROFILE

NOTES:

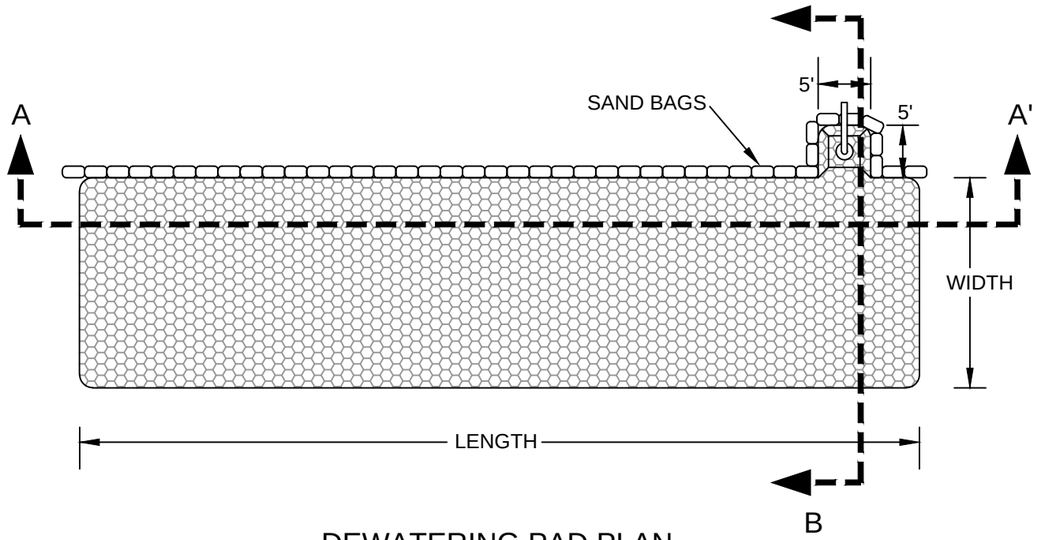
1. GRAVEL TO BE SLIGHTLY CROWNED TO ENCOURAGE SURFACE WATER RUN-OFF.
2. DECONTAMINATION PAD GRAVEL - 100% PASSING 4" SIEVE, 5% PASSING 2" SIEVE, 1% PASSING NO.4 SIEVE.
3. LOCATE SUMP AT PAD LOWEST ELEVATION.



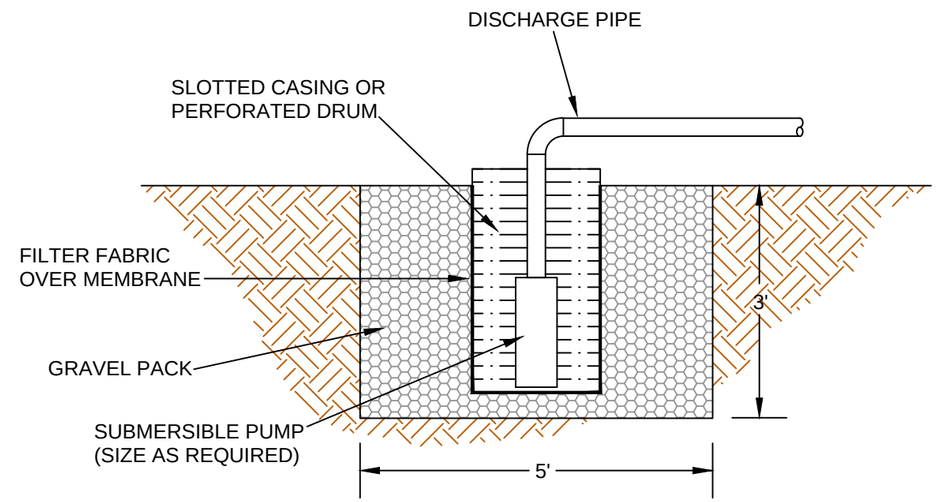
DECONTAMINATION PAD SUMP SECTION

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY Decontamination Pad Detail (as-built)			
LOCATION: SYRACUSE, NEW YORK			
TETRA TECH	CHECKED	MRN	FIGURE:
	DRAFTED	HJW	5
	PROJECT	117-2202046	
	DATE	9/25/13	

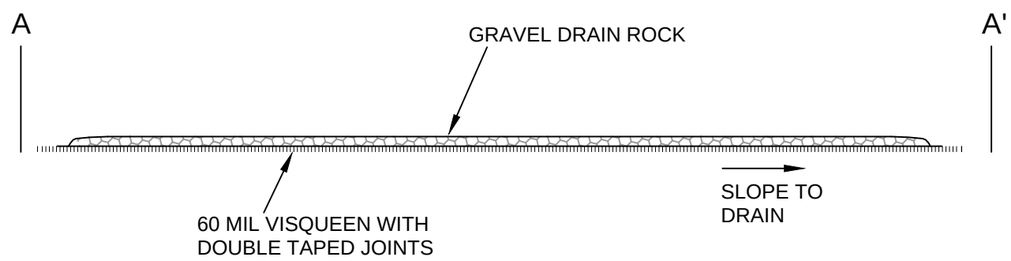
S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\TSCA\WORK PLAN\FIG8 - DECON PAD DETAILS.DWG



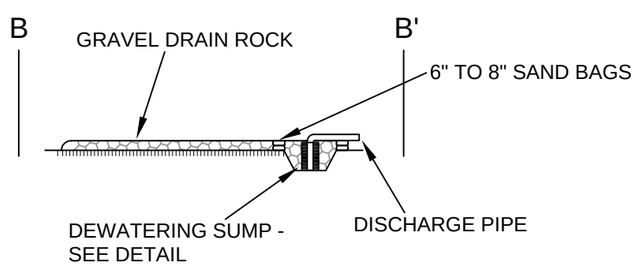
DEWATERING PAD PLAN



DEWATERING PAD SUMP DETAIL



DEWATERING PAD PROFILE



DEWATERING PAD SUMP SECTION

NOTES:

1. GRAVEL TO BE SLIGHTLY CROWNED TO ENCOURAGE SURFACE WATER RUN-OFF.
2. DECONTAMINATION PAD GRAVEL - 100% PASSING 4" SIEVE, 5% PASSING 2" SIEVE, 1% PASSING NO.4 SIEVE.
3. LOCATE SUMP AT PAD LOWEST ELEVATION.
4. USE SANDBAGS IF NECESSARY TO DIRECT FLOW.
5. ADJUST LENGTH AND WIDTH TO SUIT EXCAVATION SIZE AND EQUIPMENT REACH.

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY Dewatering Pad Detail (as-built)			
LOCATION: SYRACUSE, NEW YORK			
TETRA TECH	CHECKED	MRN	FIGURE:
	DRAFTED	HJW	6
	PROJECT	117-2202046	
	DATE	9/25/13	

S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\TSCA\WORK PLAN\FIG9 - DEWATERING PAD DETAILS.DWG

Table 1. South Landfill - North Boundary Water Main Easement

24-Sep-13

117-2202246

Design Notes on South Landfill - North Boundary Water Main Easement Cut and Fill

Available Test Pit Logs Used to Determine Depth of Excavation Cut

Existing Surface from Topo Map

Sample Location	Excavation Sequence	Base of Excavation Elevation	Calculated Cut Volume	Calculated Cut Volume	Estimated Fill Volume	Area	Estimated Topsoil Volume	Estimated Seed Mix Mulch
Test Pit/ Name		(FT MSL)	(CUFT)	(CUYD)	(CUYD)	(SQFT)	(CUYD)	(SQYD)
NWC	101	354.8	7,905	293	147	533	10	59
TP-41	102	361	52,527	1,945	975	6,526	121	725
TP-40	103	358	37,423	1,386	694	3,086	57	343
TP-19	104	362	21,845	809	405	2,222	41	247
TP-39	105	353	56,201	2,082	1,043	3,037	56	337
NE STRIP	106	357	32,316	1,197	600	2,381	44	265
NEC	107	354.3	88,291	3,270	1,643	5,617	104	624
Total			296,508	10,982	5,507	23,402	433	2,600

Calculated Imported Volume (CY) Needed
for Level North Boundary Elevation 365' = 5,507
This is based on calculated 5,475 CY of soil currently above
Elevation 365' in North Boundary Area
Excavation production rate is estimated at 60 CY/Hour for this zone

INTEGREYTED INTERNATIONAL, LLC

TEST PIT LOG

BORING NO.: TP-19

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
INTEGREYTED PROJECT NO: 0310025P						
EXCAVATION METHOD: Backhoe						
						DATE: 6-8-04
CONTRACTOR: PEC					INSPECTOR: Mark J Schumacher	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0	Brown, Silt and Clay with some Fill (household refuse, glass metal cans, paper, plastic), dry	
1.0						
						Sample TP-19 1'-8.0'
2.0						
3.0						
4.0						
5.0				0		
6.0						
7.0						
8.0				0		
					End Excavation 8.0'	
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-39

PROJECT: Crouse-Hinds — Sheet 1 of 2

CLIENT: Cooper Industries, Inc.

DELTA PROJECT NO: 0310025P

EXCAVATION METHOD: Backhoe

DATE: 10-26-05

CONTRACTOR: PEC

INSPECTOR: Jennifer L. Hull

DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Brown, Topsoil, damp 0.8'	
1.0						
				0.0	Brown, fine, Sand with some red-brown Clay, damp	
2.0						
3.0					3.0'	
				1.8	Black, fine, Foundry Sand with some fill (plastic and metal debris), dry, degraded petroleum odor	
4.0						
5.0						
6.0						
7.0						
8.0						
9.0						
10.0						
				0.0	Same as above	
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0				0.0	Wet at 17.5'	

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-39

PROJECT: Crouse-Hinds

CLIENT: Cooper Industries, Inc.

DELTA PROJECT NO: 0310025P

EXCAVATION METHOD: Backhoe

DATE: 10-26-05

CONTRACTOR: PEC

INSPECTOR: Jennifer L. Hull

DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
19.0						
20.0					20.0'	
				0.0	Brown, Peat, damp 20.5'	
21.0					Excavation terminated at 20.5'	
22.0						
23.0						
24.0						
25.0						
26.0						
27.0						
28.0						
29.0						
30.0						
31.0						
32.0						
33.0						
34.0						
35.0						
36.0						

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-40

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 0310025P						
EXCAVATION METHOD: Backhoe						
						DATE: 10-26-05
CONTRACTOR: PEC					INSPECTOR: Jennifer L. Hull	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Brown, Topsoil, damp 0.5'	
1.0				0.0	Fill (plastic, wood and ceramic tile debris) with some brown, clay, moist	
2.0						
3.0						
4.0						
5.0						TP-40 sampled 1'-11'
6.0					6.0'	
				2.3	Black, fine, Foundry Sand, dry,slight degraded petroleum odor	
7.0						
8.0						
9.0						
10.0						
11.0						
12.0					12.0'	
				0.0	Black, Peat, damp 12.5'	
13.0					Excavation terminated at 12.5'	
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-41

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 0310025P						
EXCAVATION METHOD: Backhoe						
						DATE: 10-26-05
CONTRACTOR: PEC					INSPECTOR: Jennifer L. Hull	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Brown, Topsoil, moist 0.5'	
1.0				0.0	Brown, Clay and fine, Sand, moist	
2.0						
3.0						
4.0					4.0'	
				2.3	Fill (glass, paper, rubber, metal, etc.) with some black, fine foundry sand, wet, slight degraded petroleum odor, slight oily sheen on water seeping into hole	
5.0						
6.0						
7.0						
8.0					8.0'	
				0.0	Black, Peat, damp 8.5'	
9.0					Excavation terminated at 8.5'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

Table 2. 50-Foot Buffer From Edge of Ley Creek

24-Sep-13 117-2202246

Design Notes on South Landfill - 50 Foot Buffer Zone Along Ley Creek

Available Test Pit Logs Used to Determine Depth of Excavation Cut

Existing Surface from Topo Map

	Excavation Sequence	Base of Excavation Elevation (FT MSL)	Calculated Cut Volume (CUFT)	Calculated Cut Volume (CUYD)	Estimated Fill Volume (CUYD)	Area (SQFT)	Estimated Topsoil Volume (CUYD)	Estimated Seed Mix Mulch (SQYD)	COMMENT
Test Pit									
TP-42	201	354.8	40,947	1,517	838	2,953	55	328	
TP-59	202	363.5	18,019	667	369	3,345	62	372	EDGE OF FILL @ 47.5' FROM CREEK
TP-43	203	363	25,499	944	522	5,396	100	600	FILL 3' THICK AT CREEK EDGE
TP-60	204	363	16,384	607	335	3,929	73	437	EDGE OF FILL @ 5' FROM CREEK
TP-44	205	358	29,272	1,084	599	3,795	70	422	FILL 7' THICK AT CREEK EDGE
TP-61	206	362.7	17,486	648	358	3,454	64	384	EDGE OF FILL @ 7' FROM CREEK
TP-45	207	360	32,354	1,198	662	4,204	78	467	FILL 4' THICK AT CREEK EDGE
TP-62	208	361.7	19,881	736	407	3,559	66	395	EDGE OF FILL @ 6' FROM CREEK
TP-46	209	359.8	28,189	1,044	577	4,248	79	472	FILL 5' THICK AT CREEK EDGE
TP-63	210	362.7	13,818	512	283	3,471	64	386	EDGE OF FILL @ 7.5' FROM CREEK
TP-47	211	360.6	17,215	638	352	2,982	55	331	FILL 4' THICK AT CREEK EDGE
TP-64	212	362.1	17,106	634	350	3,831	71	426	EDGE OF FILL @ 2' FROM CREEK
TP-48	213	360.3	34,600	1,281	708	4,847	90	539	FILL 3' THICK AT CREEK EDGE
TP-65	214	362.2	18,018	667	369	3,160	59	351	FILL 0.5' THICK AT CREEK EDGE
TP-66	215	361.8	21,177	784	433	3,969	74	441	EDGE OF FILL @ 2.5' FROM CREEK
Total			349,965	12,962	7,162	57,143	1,058	6,349	

Calculated Imported Volume (CY) Needed
for Level 50' Buffer at Elevation 365' = 7,162
This is based on calculated 5800 CY of soil
above Elevation 365' in Buffer Zone
Excavation production rate is estimated at 60 CY/Hour for this zone

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-42

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 0310025P						
EXCAVATION METHOD: Backhoe						
						DATE: 10-26-05
CONTRACTOR: PEC					INSPECTOR: Jennifer L. Hull	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Brown, Topsoil, moist 0.5'	
1.0				0.0	Brown-gray, medium, Sand and Gravel fill with some plastic and glass debris, no odors	
2.0						
3.0						
4.0						
5.0					5.0'	
				2.5	Black, fine, Foundry Sand with some fill (plastic and glass debris), dry, slight degraded petroleum odor	
6.0						
7.0						
8.0						TP-42 sampled 6'-15'
9.0						
10.0						
11.0						
12.0				3.7	Wet at 11.5'	
13.0						
14.0					14.0'	
				3.7	Gray and black, Clay, wet, degraded petroleum odor	
15.0					15.0'	
				0.0	Black, Peat, damp 15.5'	
16.0					Excavation terminated at 15.5'	
17.0						
18.0						

DELTA CONSULTANTS
TEST PIT LOG
TEST PIT NO.: TP-59

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 8E0708524P						
EXCAVATION METHOD: Excavator						
						DATE: 06-02-08
CONTRACTOR: PEC					INSPECTOR: Joseph F. King	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Brown silt with sand. dry, no odor.	
1.0						
						Sample TP-59
2.0						4.0-5.0'
3.0						
4.0						
					Water seeping into hole at 4.5' 4.0'	
5.0				0.3	Fill (household refuse, glass, plastic, paper). Wet, no odor.	Fill begins 47.5'
					5.0'	from Ley Creek
6.0						edge and
					Black peat. Wat, no odor.	thickens
7.0						towards SE to a
						maximum
8.0						thickness of 1.0'
						at end of test
9.0						pit (56.5' from
						Ley Creek
10.0						edge).
11.0						
12.0						
					End Excavation 12.0'	
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-43

PROJECT: Crouse-Hinds — Sheet 1 of 1

CLIENT: Cooper Industries, Inc.

DELTA PROJECT NO: 0310025P

EXCAVATION METHOD: Backhoe

DATE: 10-26-05

CONTRACTOR: PEC

INSPECTOR: Jennifer L. Hull

DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Brown, Topsoil, moist 0.5'	
1.0				2.8	Black, fine, Foundry Sand and Fill (glass, plastic, paper and metal debris), damp, slight degraded petroleum odor	
2.0						
3.0						Fill was 3' thick at edge of creek and thickened east into landfill
				2.5	Wet at 3.0'	
4.0						
5.0						
6.0					6.0'	
				0.0	Black, Peat, damp 6.5'	
7.0					Excavation terminated at 6.6'	
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST PIT LOG
TEST PIT NO.: TP-60

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 8E0708524P						
EXCAVATION METHOD: Excavator						
						DATE: 06-02-08
CONTRACTOR: PEC					INSPECTOR: Joseph F. King	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Fill (household refuse, glass, paper, metal). Moist, no odor.	
1.0						
						Sample TP-60
2.0						0.0-3.0'
3.0						
					3.0'	
4.0					Black peat. Moist, no odor.	
5.0						Fill begins 5'
						from Ley Creek
6.0						edge and
					6.0'	thickens
7.0					End Excavation 6.0'	towards SE to a
						maximum
8.0						thickness of
						3.0' at end of
9.0						test pit (18' from
						Ley Creek edge).
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-44

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 0310025P						
EXCAVATION METHOD: Backhoe						
						DATE: 10-26-05
CONTRACTOR: PEC					INSPECTOR: Jennifer L. Hull	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Brown, Topsoil, moist	
1.0					1.0'	
				0.0	Brown, Clay, moist	
2.0						
3.0					3.0'	
				0.0	Fill (glass, metal, paper debris), moist	TP-44 sampled 7'-9'
4.0						
5.0					5.0'	
				4.8	Black, fine, Foundry Sand, with some fill (glass, plastic, metal, paper and plastic debris), wet, degraded petroleum odor	Fill was 7' thick at edge of creek and thickened east into landfill
6.0						
7.0						
8.0						
9.0					9.0'	
				0.0	Black, Peat, damp 9.5'	
10.0					Excavation terminated at 9.5'	
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST PIT LOG
TEST PIT NO.: TP-61

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 8E0708524P						
EXCAVATION METHOD: Excavator						
						DATE: 06-02-08
CONTRACTOR: PEC					INSPECTOR: Joseph F. King	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Overburden - sandy silt. Dry, no odor.	
1.0						
						Sample TP-61 2.5-3.5'
2.0						
3.0				0.5	Fill (household refuse - glass, paper, plastic). Water entering pit 2.5' from this interval. No sheen on water, no odor.	
4.0					3.5' Black peat. Wet, no odor.	
5.0						Fill begins 7' from Ley Creek edge and thickens towards SE to a maximum thickness of 1.0' at end of test pit (14.5' from Ley Creek edge).
6.0					End Excavation 6.0'	
7.0						
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-45

PROJECT: Crouse-Hinds — Sheet 1 of 1

CLIENT: Cooper Industries, Inc.

DELTA PROJECT NO: 0310025P

EXCAVATION METHOD: Backhoe

DATE: 10-26-05

CONTRACTOR: PEC

INSPECTOR: Jennifer L. Hull

DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Black, Topsoil, moist	
1.0					1.0'	
				3.2	Black, fine, Foundry Sand with some fill (red-brown sand, metal plastic, glass and paper debris), moist, degraded petroleum odor	
2.0						
3.0					3.5	
				3.5	Black, fine, Foundry Sand, wet, degraded petroleum odor	TP-45 sampled 2'-5'
4.0						
5.0						
6.0					6.0'	
				0.0	Black, Peat, damp	
7.0					7.0'	Fill was 4' thick at edge of creek and thickened east into landfill
					Excavation terminated at 7.0'	
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST PIT LOG
TEST PIT NO.: TP-62

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 8E0708524P						
EXCAVATION METHOD: Excavator						
						DATE: 06-02-08
CONTRACTOR: PEC					INSPECTOR: Joseph F. King	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Overburden - silty sand. Dry, no odor.	
1.0						
						Sample TP-62
2.0						2.0-3.5'
					2.0'	
3.0				0.0	Fill (household refuse - glass, paper, plastic). Wet, no odor.	
4.0					3.5'	
					Black peat. Wet, no odor.	
5.0						Fill bagins 6'
					Gray clay, dense. Moist, no odor. 5.0'	from Ley Creek
6.0					5.5'	adge and
					End Excavation 5.5'	thickens
7.0						towards SE to a
						maximum
8.0						thickness of
						1.5' at end of
9.0						test pit (15' from
						Ley Creek edge).
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-46

PROJECT: Crouse-Hinds — Sheet 1 of 1

CLIENT: Cooper Industries, Inc.

DELTA PROJECT NO: 0310025P

EXCAVATION METHOD: Backhoe

DATE: 10-26-05

CONTRACTOR: PEC

INSPECTOR: Jennifer L. Hull

DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Brown, Topsoil, moist	
1.0					1.0'	
				1.2	Black, fine, Foundry Sand with some fill (paper, plastic, metal, rubber and glass debris), moist, slight degraded petroleum odor	
2.0						
3.0						
4.0						
				0.0	Wet at 4.0'	
5.0						
6.0					6.5'	
				0.0	Black peat, damp 7.0'	
7.0					Excavation terminated at 7.0'	
8.0						Fill was 5' thick at edge of creek and thickened east into landfill
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST PIT LOG
TEST PIT NO.: TP-63

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 8E0708524P						
EXCAVATION METHOD: Excavator						
						DATE: 06-02-08
CONTRACTOR: PEC					INSPECTOR: Joseph F. King	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Overburden - silty sand. Dry, no odor.	
1.0						
						Sample TP-63 2.0-3.0'
2.0						
					2.0'	
3.0				0.0	Fill (household refuse - glass, paper, plastic). Wat, no odor.	
					3.0'	
4.0						
					Black peat. Wet, no odor. Water entering pit from this interval.	
5.0						Fill begins 7.5'
					Gray clay, dense. Moist, no odor. 5.0'	from Ley Creek
6.0					End Excavation 5.0'	edge and
						thickens
7.0						towards SE to a
						maximum
8.0						thickness of
						1.0' at and of
9.0						test pit (19.5'
						from Ley Creek
10.0						edga).
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-47

PROJECT: Crouse-Hinds — Sheet 1 of 1

CLIENT: Cooper Industries, Inc.

DELTA PROJECT NO: 0310025P

EXCAVATION METHOD: Backhoe

DATE: 10-26-05

CONTRACTOR: PEC

INSPECTOR: Jennifer L. Hull

DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION		REMARKS
				0.0	Brown, Topsoil, moist	0.5'	
1.0				0.0	Fill (glass, paper, metal, rubber and plastic debris) with trace black, fine, foundry sand, moist, slight petroleum odor, red and brown staining throughout		
2.0							
3.0							
4.0							
5.0						5.5'	
6.0				0.0	Black, Peat, damp	6.0'	
					Excavation terminated at 6.0'		
7.0							Fill was 4' thick at edge of creek and thickened east into landfill
8.0							
9.0							
10.0							
11.0							
12.0							
13.0							
14.0							
15.0							
16.0							
17.0							
18.0							

DELTA CONSULTANTS
TEST PIT LOG
TEST PIT NO.: TP-64

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 8E0708524P						
EXCAVATION METHOD: Excavator						
						DATE: 06-02-08
CONTRACTOR: PEC					INSPECTOR: Joseph F. King	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Overburden - silty sand. Dry, no odor.	
1.0						
						Sample TP-64 2.5-4.0'
2.0						
3.0				0.0	2.5'	
					Fill (household refuse - glass, paper, plastic, some small pieces of metal). Wet, no odor. Water entering pit from base of this layer.	
4.0						
5.0						Fill begins 2' from Ley Creek edge and thickens towards SE to a maximum thickness of 2.5' at end of test pit (21.5' from Ley Creek edge).
					5.0'	
6.0					Black peat. Wet, no odor.	
					6.0'	
7.0					End Excavation 6.0'	
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-48

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 0310025P						
EXCAVATION METHOD: Backhoe						
						DATE: 10-26-05
CONTRACTOR: PEC					INSPECTOR: Jennifer L. Hull	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Brown, Topsoil, moist 0.5'	
1.0				2.5	Black, fine, Foundry Sand and Fill (glass, paper, plastic, rubber), moist, slight degraded petroleum odor	
2.0						
3.0						TP-48 sampled 1'-5.5'
4.0						
5.0				0.0	Wet at 4.5'	
6.0					6.0'	
				0.0	Brown, Peat, damp 6.5'	
7.0					Excavation terminated at 6.5'	
8.0						Fill was 3' thick at edge of creek and thickened east into landfill
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST PIT LOG
TEST PIT NO.: TP-65

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 8E0708524P						
EXCAVATION METHOD: Excavator						
						DATE: 06-02-08
CONTRACTOR: PEC					INSPECTOR: Joseph F. King	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Overburden - Silty sand with surficial fill (glass, plastic) to creek edge.	
1.0						
						Sample TP-65 2.5-6.0'
2.0						
3.0				0.0	Fill (household refuse - glass, paper, plastic) mixed with brown sand. Surficial fill to creek edge. Wet, no odor.	
4.0						
5.0						Fill begins at Ley Creek edge as a thin layer and thickens towards SE to a maximum thickness of 2.0' at end of test pit (19.5' from Ley Creek edge).
6.0						
					6.0' Black peat. Wet, no odor.	
7.0						
8.0						
					8.0' End Excavation 8.0'	
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST PIT LOG
TEST PIT NO.: TP-66

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 8E0708524P						
EXCAVATION METHOD: Excavator						
						DATE: 06-02-08
CONTRACTOR: PEC					INSPECTOR: Joseph F. King	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Overburden - Silty sand. Moist, no odor.	
1.0						
						Sample TP-66 2.0-5.0'
2.0						
					2.0'	
3.0				0.0	Fill (household refuse - glass, paper, plastic) mixed with brown sand. Wet, no odor. Water entering pit at base of this interval.	
4.0						
5.0						Fill begins 2.5' from Ley Creek edge and thickens towards SE to a maximum thickness of 3.0' at end of test pit (18.5' from Ley Creek edge).
					5.0'	
6.0						
7.0					Black peat. Wet, no odor.	
8.0						
9.0					8.5'	
					End Excavation 8.5'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

Table 3A. 30-Foot Buffer From Edge of Wetland C

24-Sep-13

117-2202246

Design Notes on South Landfill - 30 Foot Buffer Zone Along Wetland C and Stream B

Available Test Pit Logs Used to Determine Depth of Excavation Cut

Existing Surface from Topo Map

	Excavation Sequence	Base of Excavation Elevation	Calculated Cut Volume	Calculated Cut Volume	Estimated Fill Volume	Area	Estimated Topsoil Volume	Estimated Seed Mix Mulch
Test Pit		(FT MSL)	(CUFT)	(CUYD)	(CUYD)	(SQFT)	(CUYD)	(SQYD)
TP-38	301	354.3	40,250	1491	793	2,709	50	301
TP-58	303	357	34,372	1273	678	2,589	48	288
TP-57	304	360	38,826	1438	765	3,403	63	378
TP-12	305	361.5	81,326	3012	1,603	8,629	160	959
TP-56	307	361	61,767	2288	1,218	6,035	112	671
TP-55	308	360	46,902	1737	925	4,621	86	513
TP-13	309	359	32,509	1204	641	2,957	55	329
TP-54	310	359.5	43,687	1618	861	4,238	78	471
TP-53	311	359.5	51,827	1920	1,022	5,581	103	620
TP-51	313	360.5	24,780	918	488	3,410	63	379
TP-52	315	360.1	19,091	707	376	2,421	45	269
Total			456246	16898	8994	44172	818	4908

Calculated Imported Volume (CY)
Needed for Sloped 30' Buffer at Elevation 365' = 8994
This is based on calculated 7904 CY of soil currently
above Elevation 365' in Buffer Zone
Excavation production rate is estimated at 60 CY/Hour for this zone

INTEGREYTED INTERNATIONAL, LLC

TEST PIT LOG

BORING NO.: TP-12

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
INTEGREYTED PROJECT NO: 0310025P						
EXCAVATION METHOD: Backhoe						
						DATE: 6-8-04
CONTRACTOR: PEC					INSPECTOR: Mark J Schumacher	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				10	Black, Fill (foundry sand, tr. wood, , tr. core butts, metal debris), oily odors, moist	
1.0						
						Sample TP-12 1' -11.0'
2.0				17		
3.0						
4.0						
				17		
5.0						
6.0						
7.0						
8.0						
9.0						
10.0						
					10.5'	
11.0				0	Peat	
					End Excavation 11.5'	
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

INTEGREYTED INTERNATIONAL, LLC

TEST PIT LOG

BORING NO.: TP-13

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
INTEGREYTED PROJECT NO: 0310025P						
EXCAVATION METHOD: Backhoe						DATE: 6-8-04
CONTRACTOR: PEC					INSPECTOR: Mark J Schumacher	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0	Tan, F. Sand and Fill (household refuse, glass, metal cans, paper ,plastic), tr. Core butts, metal debris, dry	
1.0						Sample TP-13 and TP-13-WC 1' -12.0'
2.0						
3.0				2		
4.0						
5.0				0		
6.0						
7.0						
8.0				0		
9.0						
10.0						
11.0						
12.0				0	wet	
13.0					End Excavation 13.0'	
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-38

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 0310025P						
EXCAVATION METHOD: Backhoe						
						DATE: 10-26-05
CONTRACTOR: PEC					INSPECTOR: Jennifer L. Hull	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Brown, Topsoil, damp 0.5'	
1.0				0.0	Black, fine, Foundry Sand with trace wood debris, damp, slight degraded petroleum odor	
2.0						
						TP-38 sampled 2'-16'
3.0				0.0	Dry at 2.5'	
4.0						
5.0						
6.0						
7.0						
8.0						
9.0						
10.0						
				0.0	Same as above	
11.0						
12.0						
13.0						
14.0						
15.0						
16.0					16.0'	
				0.0	Brown, Peat, damp 16.5'	
17.0					Excavation terminated at 16.5'	
18.0						

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-51

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 0310025P						
EXCAVATION METHOD: Backhoe						
						DATE: 10-27-05
CONTRACTOR: PEC					INSPECTOR: Jennifer L. Hull	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Dark brown, Topsoil, moist 0.5'	
1.0				2.8	Black, fine, Foundry Sand with trace fill (glass and metal debris), moist, degraded petroleum odor	
2.0						
				0.0	Wet at 2.0'	
3.0						
4.0						
5.0					5.0'	
				0.0	Brown, Peat, damp 5.5'	
6.0					Excavation terminated at 5.5'	
7.0						
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-52

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 0310025P						
EXCAVATION METHOD: Backhoe						
						DATE: 10-27-05
CONTRACTOR: PEC					INSPECTOR: Jennifer L. Hull	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Dark brown, organic soil, moist 0.5'	
1.0				1.7	Black, fine, Foundry Sand, moist, slight degraded petroleum odor	
2.0						Fill extended into wetland
				1.7	Wet at 2.0'	
3.0						
4.0					4.0'	
				0.0	Dark brown, Peat, damp 4.5'	
5.0					Excavation terminated at 4.5'	
6.0						
7.0						
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-53

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 0310025P						
EXCAVATION METHOD: Backhoe						
						DATE: 10-27-05
CONTRACTOR: PEC					INSPECTOR: Jennifer L. Hull	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Dark brown, Topsoil, moist 0.8'	
1.0						
				0.8	Black, fine, Foundry Sand with fill (glass, plastic, paper and wood debris), moist, slight degraded petroleum odor	
2.0						
				0.0	Wet at 2.0'	
3.0						
4.0						
5.0						TP-53 sampled 1'-6'
6.0					6.0'	
				0.0	Black, Peat, damp 6.5'	
7.0					Excavation terminated at 6.5'	
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-54

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 0310025P						
EXCAVATION METHOD: Backhoe						
						DATE: 10-27-05
CONTRACTOR: PEC					INSPECTOR: Jennifer L. Hull	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Dark brown, Topsoil, moist	
1.0					1.0'	
				2.8	Black, fine, Foundry Sand with some fill (glass, paper, plastic,	
2.0					rubber), moist, slight degraded petroleum odor	
						Fill extended
3.0						into wetland;
				1.8	Wet, petroleum sheen on water seeping into hole	Fill was 5' thick
4.0						in wetland and
						thickened north
5.0						into landfill
6.0						
7.0						
8.0						
				0.0	Saturated at 8.0'	
9.0						
10.0						
11.0						
12.0					12.0'	
				0.0	Brown, Peat, damp 12.5'	
13.0					Excavation terminated at 12.5'	
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-55

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 0310025P						
EXCAVATION METHOD: Backhoe						
						DATE: 10-27-05
CONTRACTOR: PEC					INSPECTOR: Jennifer L. Hull	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Brown, Topsoil, moist 0.5'	
1.0				0.0	Fill (glass, wood, paper, plastic and metal debris) with some black, fine, foundry sand and gray clay, wet, slight degraded petroleum odor	
2.0						
3.0						
4.0					4.0'	
				1.7	Black, fine, Foundry Sand, wet, slight degraded petroleum odor	Fill extended into wetland; Fill was 4' thick in wetland and thickened north into landfill
5.0						
6.0						
7.0						
8.0						
9.0						
10.0						TP-55 sampled 2'-13.5'
11.0						
12.0						
13.0						
14.0					14.0'	
				0.0	Brown, Peat, damp 14.5'	
15.0					Excavation terminated at 14.5'	
16.0						
17.0						
18.0						

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-56

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 0310025P						
EXCAVATION METHOD: Backhoe						
						DATE: 10-27-05
CONTRACTOR: PEC					INSPECTOR: Jennifer L. Hull	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Brown, Topsoil, moist 0.5'	
1.0				3.8	Black, fine, Foundry Sand with some fill (metal, glass and plastic debris), wet, slight petroleum odor	
2.0						
3.0						
4.0						
5.0						Fill extended into wetland; Fill was 3' thick in wetland and thickened north into landfill
6.0						
				0.0	Same as above	
7.0						
8.0						
9.0						
10.0						
11.0						
12.0					12.0'	
				0.0	Brown, Peat, damp 12.5'	
13.0					Excavation terminated at 12.5'	
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-57

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 0310025P						
EXCAVATION METHOD: Backhoe						
						DATE: 10-27-05
CONTRACTOR: PEC					INSPECTOR: Jennifer L. Hull	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Black, Topsoil, moist 0.5'	
1.0				1.7	Black, fine, Foundry Sand with trace fill (wood and glass debris), wet, slight degraded petroleum odor	
2.0						
3.0						
4.0						
5.0						
				1.7	Same as above	
6.0						
7.0						
8.0						
9.0						
10.0					10.0'	
				0.0	Brown, Peat, damp 10.5'	
11.0					Excavation terminated at 10.5'	
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-58

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 0310025P						
EXCAVATION METHOD: Backhoe						
						DATE: 10-27-05
CONTRACTOR: PEC					INSPECTOR: Jennifer L. Hull	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Black, Topsoil, moist	0.5'
1.0				1.0	Black, fine, Foundry Sand with some red-brown, fine, sand fill, wet, slight degraded petroleum odor	
2.0						
3.0						
4.0						
5.0						TP-58 sampled 1'-12'
				1.2	Same as above	
6.0						
7.0						Fill extended to edge of drainage ditch
8.0						
9.0						
10.0						
11.0						
12.0					12.0'	
				0.0	Brown, Peat, damp 12.5'	
13.0					Excavation terminated at 12.5'	
14.0						
15.0						
16.0						
17.0						
18.0						

Table 3B. Wetland C and Stream B

24-Sep-13

117-2202246

Design Notes on South Landfill - Wetland C and Stream B Sediment Removal

Available SED Logs Used to Determine Depth of Excavation Cut

Existing Surface from Topo Map

	Excavation Sequence	Base of Excavation Elevation (FT MSL)	Calculated Cut Volume (CUFT)	Calculated Cut Volume (CUYD)	Area (SQFT)	Number Bottom Confirmation Samples	Approx. Depth of Cut (FT)	Number Wall Confirmation Samples	Estimated Soil Amendment Wetland Seed Mix Mulch (SQYD)
SAMPLE ZONE									
K	302	364.5	4,699	174	927	5	3	0	103
J	306	364.5	20,728	768	5,844	6	3	0	649
I	312	356	381,389	14,126	33,280	37	8	0	3,698
H	314	362.5	74,598	2,763	16,725	19	2	0	1,858
G	316	357	52,321	1,938	6,313	7	7	2	701
F	317	364	16,251	602	10,284	11	2	0	1,143
E	318	363	15,009	556	6,307	7	2	0	701
D	319	363.5	62,457	2,313	22,745	25	4	5	2,527
C	320	364	6,068	225	3,132	3	1	0	348
B	321	363	15,421	571	5,678	6	3	0	631
A	322	362.5	8,011	297	2,455	3	3	0	273
Total			656952	24,332	113,690	129		7	12,632

No Reusable Sediments
Imported Volume Limited to
Necessary Wetland Topsoil
Excavation production rate is estimated at 50 CY/Hour for this zone

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-10

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:7/1/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		2.6		Brown, Peat and Organics mixture	
1.0					1.0'	
					Black, Foundry Sand, oily odor and sheen	
2.0						
3.0						
	2		2.4		Same as above	
4.0						
5.0						
6.0						
	3		2.7		Same as above	
7.0					6.6'	
					Brown, Peat with shells	
8.0						
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-11

DELTA

PROJECT: RI/FS								Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds								
DELTA PROJECT NO: 8E0708524P								
DRILLING METHOD: DP					SAMPLER	BIT SIZE	CORE	CASING
DRILLING RIG: Geoprobe					3' Macro Core	2" OD	NA	NA
DRILLER: Paragon					INSPECTOR: Mark Schumacher			

DATE:7/1/08

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		2.0		Organics mixture	
1.0					0.8"	
					Black, Sand with Silt, oily odor	
2.0						
3.0						
	2		2.8		Same as above with sheen	
4.0						
5.0						
6.0						
	3		2.8		Same as above	
7.0						
8.0					7.75'	
					Brown, Peat with shells	
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-12

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:7/1/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION		REMARKS
	1		1.7		Organics mixture	0.5'	
1.0					Black, Sand and Silt, oily odor, sheen		
2.0							
3.0							
	2				Same as above		
4.0							
5.0							
6.0							
	3				Same as above		
7.0							
						7.25'	
8.0					Brown, Peat		
9.0						9.0'	
					Boring Terminated @ 9'		
10.0							
11.0							
12.0							
13.0							
14.0							
15.0							
16.0							
17.0							
18.0							

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-40

DELTA

PROJECT: RI/FS						Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds						
DELTA PROJECT NO: 8E0708524P						
DRILLING METHOD: DP		SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG: Geoprobe		3' Macro Core	2" OD	NA	NA	DATE:7/1/08
DRILLER: Paragon		INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		1.6		Organics mixture	
1.0						
2.0					2.0"	
					Foundary Sand with Silt	
3.0						
	2		1.8		Same as above with oily odor, sheen	
4.0						
5.0						
6.0						
	3		2.6		Same as above	
7.0						
8.0					8.0'	
					Brown, Peat	
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-41

DELTA

PROJECT: RI/FS						Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds						
DELTA PROJECT NO: 8E0708524P						
DRILLING METHOD: DP		SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG: Geoprobe		3' Macro Core	2" OD	NA	NA	DATE:7/1/08
DRILLER: Paragon		INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		1.8		Organics mixture	
1.0						
					1.5"	
2.0					Black, Sand, oily odor	
3.0					3.0'	
	2		2.0		Black, Foundary Sand with Silt and Clay, oily odor and sheen	
4.0						
5.0						
6.0						
	3		2.8		Same as above	
7.0						
8.0					8.0'	
					Brown, Peat	
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-75

DELTA

PROJECT: RI/FS							Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds							
DELTA PROJECT NO: 8E0708524P							
DRILLING METHOD: DP				SAMPLER	BIT SIZE	CORE	CASING
DRILLING RIG: Geoprobe				3' Macro Core	2" OD	NA	NA	DATE:7/1/08
DRILLER: Paragon				INSPECTOR: Mark Schumacher			

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		2.6		Dark Brown, Silty Sand and Organics mixture	
1.0						
2.0						
3.0						
	2		2.9		Same as above with sulfur odor	
4.0						
5.0						
6.0						
	3		2.9		Same as above	
7.0						
					Same as above, Light Brown	
8.0						
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-76

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:7/1/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		2.7		Sand with Gravel, Silt and Organics	
1.0						
2.0						
3.0						
	2		2.9		Same as above	
4.0					4.0'	
					Dark to Light Brown, Peat, sulfur odor	
5.0						
6.0						
	3		2.9		Same as above 6.5'	
7.0					Light Brown, Silt with Sand, Organics and Shells	
8.0					7.75'	
					Dark Brown, Peat	
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-77

DELTA

PROJECT: RI/FS								Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds								
DELTA PROJECT NO: 8E0708524P								
DRILLING METHOD: DP					SAMPLER	BIT SIZE	CORE	CASING
DRILLING RIG: Geoprobe					3' Macro Core	2" OD	NA	NA	DATE:7/1/08
DRILLER: Paragon					INSPECTOR: Mark Schumacher			
DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION			REMARKS
	1		2.5		Dark Brown, Sand, Silt and Organics mixture			
1.0								
2.0								
3.0							3.0'	
	2		2.8		Dark Brown, Sand and Peat, sulfur odor			
4.0								
5.0								
6.0							6.0'	
	3		2.8		Dark Brown grading to Light Brown, Peat and Silty Sand, sulfur odor			
7.0								
8.0								
9.0							9.0'	
					Boring Terminated @ 9'			
10.0								
11.0								
12.0								
13.0								
14.0								
15.0								
16.0								
17.0								
18.0								

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-78

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:7/1/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		2.8		Sand with Gravel and Silt	
1.0					1.0'	
					Dark Brown, Sand with Silt, dry	
2.0						
3.0					3.0'	
	2		2.1		Dark Brown, Peat, sulfur odor, damp	
4.0						
5.0						
6.0						
	3		2.7			
7.0					7.0'	
					Light Gray to Brown, Sand with Silt and Shells	
8.0						
					8.75'	
9.0					Brown, Peat, wet 9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-79

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:7/2/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		2.6		Sand with Gravel and Organics	
1.0					1.2'	
					Brown to Dark Brown, Sand with Silt and Clay, damp	
2.0					2.0'	
					Black, Sand with Silt and Organics	
3.0					3.0'	
	2		2.0		Black, Peat	
4.0						
5.0						
6.0					Same as above, Light Gray to Brown with Shells, sulfur odor, damp	
	3		2.2		Same as above, saturated	
7.0						
8.0						
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-80

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:7/2/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		2.9		Sand with Gravel, Silt and Organics	
1.0					1.0'	
					Dark Brown, Sand with Silt and Peat, damp to moist	
2.0						
3.0					3.0'	
	2		2.8		Black, Peat, sulfur odor, moist to wet	
4.0						
5.0						
6.0					Same as above, saturated	
	3		2.6		Same as above	
7.0						
8.0						
					Same as above, damp	
9.0					Same as above, Light Gray to Brown, Shells, sulfur odor 9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-81

DELTA

PROJECT: RI/FS								Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds								
DELTA PROJECT NO: 8E0708524P								
DRILLING METHOD: DP					SAMPLER	BIT SIZE	CORE	CASING
DRILLING RIG: Geoprobe					3' Macro Core	2" OD	NA	NA
DRILLER: Paragon					INSPECTOR: Mark Schumacher			

DATE:7/2/08

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		2.8		Sand with Gravel and Organics	
1.0					0.8'	
					Dark Brown, Sand with Peat, damp	
2.0						
3.0					3.0'	
	2		2.6		Dark Brown, Peat, sulfur odor, wet	
4.0						
5.0						
6.0						
	3		2.1		Same as above	
7.0					7.0'	
					Light Gray to Brown, Organics with Shells, moist to wet	
8.0						
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-82

DELTA

PROJECT: RI/FS						Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds						
DELTA PROJECT NO: 8E0708524P						
DRILLING METHOD: DP		SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG: Geoprobe		3' Macro Core	2" OD	NA	NA	DATE:7/2/08
DRILLER: Paragon		INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		2.0		Dark Brown to Black, Sand with Silt and Organics, damp to moist	
1.0						
2.0						
3.0					3.0'	
	2		1.8		Black, Peat, saturated	
4.0						
5.0						
					Same as above, damp to moist, sulfur odor	
6.0						
	3		2.4		Same as above, Dark Brown, moist	
7.0						
8.0						
					Same as above, Light Brown to Gray, Shells, sulfur odor	
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-83

DELTA

PROJECT: RI/FS									Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds									
DELTA PROJECT NO: 8E0708524P									
DRILLING METHOD: DP					SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG: Geoprobe					3' Macro Core	2" OD	NA	NA	DATE:7/2/08
DRILLER: Paragon					INSPECTOR: Mark Schumacher				
DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION				REMARKS
	1		1.6		Dark Brown, Sand with Silt, damp				
1.0									
2.0									
3.0									
	2		0.6		Same as above, wet				
4.0									
5.0									
6.0								6.0'	
	3		2.5		Brown, Peat				
7.0									
					Same as above, Gray, Shells				
8.0									
								8.64'	
9.0					Clay			9.0'	
					Boring Terminated @ 9'				
10.0									
11.0									
12.0									
13.0									
14.0									
15.0									
16.0									
17.0									
18.0									

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-84

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:7/2/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		1.6		Dark Brown, Sand with Silt and Organics, damp	
1.0						
2.0						
3.0						
	2		1.5		Same as above	
4.0						
5.0						
					Same as above, Black, damp to moist	
6.0					6.0'	
	3		1.8		Black, Peat	
7.0						
					Same as above, Gray, Shells	
8.0						
9.0					Same as above, Light Gray to Brown, Shells 9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-85

DELTA

PROJECT: RI/FS						Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds						
DELTA PROJECT NO: 8E0708524P						
DRILLING METHOD: DP		SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG: Geoprobe		3' Macro Core	2" OD	NA	NA	DATE:7/2/08
DRILLER: Paragon		INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		2.1		Dark Brown grading to Black, Sand with Silt and Organics, damp to saturated, oily odor, sheen on water	
1.0						
2.0						
3.0					3.0'	
	2		2.4		Black, Silt, Sand and Clay	
4.0						
5.0						
					5.5'	
6.0					Brown, Peat, moist	
	3		2.3		Same as above, Dark Brown	
7.0						
8.0					Same as above, Light Gray to Brown, saturated, oily odor	
9.0					Same as above with Shells, sulfur odor 9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-86

DELTA

PROJECT: RI/FS						Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds						
DELTA PROJECT NO: 8E0708524P						
DRILLING METHOD: DP		SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG: Geoprobe		3' Macro Core	2" OD	NA	NA	DATE:7/3/08
DRILLER: Paragon		INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		2.4		Dark Brown grading to Black, Sand with Silt and Organics, damp	
1.0						
2.0						
3.0					3.0'	
	2		1.8		Black, Peat, saturated	
4.0						
5.0					Same as above, moist	
6.0						
	3		2.2		Same as above	
7.0					Same as above with Shells, Light Gray to Brown, sulfur odor, wet	
8.0						
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-87

DELTA

PROJECT: RI/FS						Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds						
DELTA PROJECT NO: 8E0708524P						
DRILLING METHOD: DP		SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG: Geoprobe		3' Macro Core	2" OD	NA	NA	DATE:7/3/08
DRILLER: Paragon		INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		2.5		Dark Brown grading to Black, Sand with Silt and Organics	
1.0						
2.0						
3.0					3.0'	
	2		2.2		Brown, Peat, saturated graduating to moist	
4.0						
5.0						
6.0						
	3		2.7		Same as above	
7.0						
8.0						
					Same as above with Shells, Light Brown to Gray, sulfur odor	
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-88

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:7/3/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		2.2		Dark Brown, Sand with Silt and Organics, damp to wet	
1.0						
2.0						
3.0						
	2		2.6		Same as above, saturated	
4.0						
5.0						
					5.5'	
6.0					Brown, Peat, damp to moist	
	3		2.1		Same as above, Dark Brown, sulfur odor, wet	
7.0						
8.0						
9.0					Same as above with Shells, Light Gray to Brown 9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-89

DELTA

PROJECT: RI/FS								Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds								
DELTA PROJECT NO: 8E0708524P								
DRILLING METHOD: DP					SAMPLER	BIT SIZE	CORE	CASING
DRILLING RIG: Geoprobe					3' Macro Core	2" OD	NA	NA	DATE:7/3/08
DRILLER: Paragon					INSPECTOR: Mark Schumacher			
DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION			REMARKS
	1		2.4		Dark Brown, Sand with Silt and Organics, wet			
1.0								
2.0								
3.0					3.0'			
	2		1.9		Brown, Peat, saturated			
4.0								
5.0								
6.0					Same as above, Dark Brown, wet			
	3		2.0		Same as above			
7.0								
8.0								
					Same as above with Shells, Light Gray to Brown, sulfur odor			
9.0					9.0'			
					Boring Terminated @ 9'			
10.0								
11.0								
12.0								
13.0								
14.0								
15.0								
16.0								
17.0								
18.0								

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-90

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:7/3/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		1.7		Dark Brown, Sand with Silt and Organics, oily odor, wet to saturated	
1.0						
2.0						
3.0						
	2		2.3		Same as above, Black	
4.0						
5.0						
6.0						
	3		2.2		Same as above with a sheen	
7.0						
					7.5'	
8.0					Dark Brown to Light Brown, Peat with Shells, sulfur odor	
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-91

DELTA

PROJECT: RI/FS						Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds						
DELTA PROJECT NO: 8E0708524P						
DRILLING METHOD: DP		SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG: Geoprobe		3' Macro Core	2" OD	NA	NA	DATE:7/8/08
DRILLER: Paragon		INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		1.0		Clay	
1.0						
2.0						
3.0						
	2		3.0		Same as above, Gray to Black, septic odor	
4.0						
5.0						
6.0					6.0'	
	3		3.0		Black, F. Sand, oily odor 6.3'	
7.0					Black, Clay	
8.0					8.3'	
					Brown, Peat	
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-92

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:7/8/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		1.5		Sand and Organic mixture	
1.0						
2.0						
3.0					3.0'	
	2		1.5		Brown, Peat, saturated	
4.0						
5.0						
6.0						
	3		1.8		Same as above	
7.0						
					7.83'	
8.0					Brown, Peat with Shells, H_2S odor	
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-93

DELTA

PROJECT: RI/FS						Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds						
DELTA PROJECT NO: 8E0708524P						
DRILLING METHOD: DP		SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG: Geoprobe		3' Macro Core	2" OD	NA	NA	DATE:7/8/08
DRILLER: Paragon		INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		1.5		Silt and Organic mixture	
1.0						
2.0						
3.0					3.0'	
	2		1.7		Brown, Peat, wet	
4.0						
5.0						
6.0						
	3		1.6		Same as above	
7.0						
8.0						
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-94

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:7/8/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		1.6		Silt and Organic mixture	
1.0						
2.0						
					2.62'	
3.0					Black, Foundary Sand, oily odor	
	2		3.0		Same as above 3.5'	
4.0					Black to Gray, Clay	
5.0						
					5.5'	
6.0					Brown, Peat	
	3		3.0		Same as above	
7.0						
8.0						
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

Table 5. North Landfill South Boundary

24-Sep-13

117-2202246

Design Notes on North Landfill - South Boundary 30-Foot Buffer

Available Tets Pit Logs Used to Determine Depth of Excavation Cut

Existing Surface from Topo Map

	Excavation Sequence	Base of Excavation Elevation	Calculated Cut Volume	Calculated Cut Volume	Estimated Fill Volume	Area	Estimated Topsoil Volume	Estimated Seed Mix Mulch
Test Pit		(FT MSL)	(CUFT)	(CUYD)	(CUYD)	(SQFT)	(CUYD)	(SQYD)
TP-23	501	360	39,978	1,481	1,481	5,135	95	571
TP-22	502	356.2	120,615	4,467	4,467	9,581	177	1,065
Total			160,593	5,948	5,948	14,716	273	1,635

Calculated Imported Volume (CY)
Needed for Sloped 30' Buffer at Elevation
369' to 370' = 5,948

Excavation production rate is estimated at 60 CY/Hour for this zone

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-22

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 0310025P						
EXCAVATION METHOD: Backhoe						
						DATE: 10-24-05
CONTRACTOR: PEC					INSPECTOR: Jennifer L. Hull	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Brown, Topsoil, moist 0.8'	
1.0						
				0.0	Black, fine, Foundry Sand, moist, degraded petroleum odor	
2.0						
3.0						
4.0						
5.0						
				0.0	Same as above	
6.0						
7.0						
8.0						
9.0						
10.0						
				0.0	Wet at 10.0'	
11.0						
12.0						
13.0					13.0'	
				0.0	Brown, Peat, damp	
14.0					14.0'	
					Excavation terminated at 14.0'	
15.0						
16.0						
17.0						
18.0						

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-23

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 0310025P						
EXCAVATION METHOD: Backhoe						
						DATE: 10-24-05
CONTRACTOR: PEC					INSPECTOR: Jennifer L. Hull	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Brown, Topsoil, moist 0.5'	
1.0				4.5	Black, fine, Foundry Sand with some fill (grey debris, brick, glass and metal debris), dry, slight degraded petroleum odor	
2.0						
3.0						
4.0						
5.0						TP-23 sampled 2'-7'
6.0						
7.0						
8.0					8.0'	
				0.0	Dark brown, Peat, damp	
9.0					9.0'	
					Excavation terminated at 9.0'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

Table 6A. 30-Foot Buffer From Edge of Wetland A

2-Oct-13

117-2202246

Design Notes on North Landfill - 30 Foot Buffer Zone Along Wetland A and Stream A

Available Test Pit Logs Used to Determine Depth of Excavation Cut

Existing Surface from Topo Map

	Excavation Sequence	Base of Excavation Elevation	Calculated Cut Volume	Calculated Cut Volume	Estimated Fill Volume	Area	Estimated Topsoil Volume	Estimated Seed Mix Mulch
Test Pit		(FT MSL)	(CUFT)	(CUYD)	(CUYD)	(SQFT)	(CUYD)	(SQYD)
TP-82	601	364.4	10,570	391	361	1,686	31	187
TP-81	602	365.7	23,662	876	809	3,643	67	405
TP-79	603	366	37,744	1,398	1,291	5,051	94	561
TP-77	604	366	6,280	233	215	1,161	22	129
TP-33	606	355	15,244	565	521	1,115	21	124
TP-83	607	364.1	18,118	671	619	3,416	63	380
TP-80	608	363.1	21,497	796	735	3,121	58	347
TP-78	609	361	14,709	545	503	1,799	33	200
TP-87	611	364	12,987	481	444	2,385	44	265
TP-34	612	362.8	10,628	394	363	1,778	33	198
TP-88	618	363.2	49,918	1,849	1,707	7,465	138	829
TP-89	619	363	11,421	423	391	2,057	38	229
TP-91	627	363	40,612	1,504	1,389	5,467	101	607
TP-35	628	359.2	11,037	409	377	1,358	25	151
TP-36	630	352	44,745	1,657	1,530	2,604	48	289
TP-92	632	363.3	24,570	910	840	3,663	68	407
TP-37	635	353	86,980	3,221	2,974	5,319	99	591
TP-20	641	362	56,098	2,078	1,918	8,031	149	892
TP-21	642	355.7	47,362	1,754	1,619	4,046	75	450
Total			544,182	20,155	18,607	65,165	1,207	7,241

Calculated Imported Volume (CY) Needed
for Sloped 30' Buffer at Elevation 370' = 18,607
This is based on calculated 1548 CY of soil currently
above Elevation 370' in Buffer Zone
Excavation production rate is estimated at 60 CY/Hour for this zone

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-21

PROJECT: Crouse-Hinds

Sheet 1 of 1

CLIENT: Cooper Industries, Inc.

DELTA PROJECT NO: 0310025P

EXCAVATION METHOD: Backhoe

DATE: 10-24-05

CONTRACTOR: PEC

INSPECTOR: Jennifer L. Hull

DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Brown, Topsoil, moist 0.8'	
1.0						
				6.7	Black, fine, Foundry Sand with little fill (gray and green debris), strong degraded petroleum odor throughout	
2.0						
3.0						
4.0						
				6.7	Moist, petroleum sheen on water seeping into hole	
5.0						
6.0						
7.0						TP-21 sampled 2'-13'
8.0						
9.0						
10.0						
11.0						
				0.0	Saturated at 11.0'	
12.0						
13.0					13.0'	
				0.0	Brown, Peat, damp	
14.0					14.0'	
					Excavation terminated at 14.0'	
15.0						
16.0						
17.0						
18.0						

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-20

PROJECT: Crouse-Hinds — Sheet 1 of 1

CLIENT: Cooper Industries, Inc.

DELTA PROJECT NO: 0310025P

EXCAVATION METHOD: Backhoe

DATE: 10-24-05

CONTRACTOR: PEC

INSPECTOR: Jennifer L. Hull

DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Brown, Topsoil, moist	
1.0					1.0'	
				0.7	Black, fine, Foundry Sand, dry, degraded petroleum odor	
2.0						
3.0						
4.0						
5.0						
				0.0	Same as above	
6.0						
7.0						
8.0					8.0'	
				0.0	Brown, Peat, damp, no odors	
9.0					9.0'	
					Excavation terminated at 9.0'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-37

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 0310025P						
EXCAVATION METHOD: Backhoe						
						DATE: 10-25-05
CONTRACTOR: PEC					INSPECTOR: Jennifer L. Hull	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Brown, Topsoil, damp 0.5'	
1.0				1.7	Black, fine, Foundry Sand, moist, slight degraded petroleum odor	
2.0						
3.0						
						Fill extended to wetland
4.0						
5.0						
				0.0	Water seeping into hole at 5.0'	
6.0						
7.0						
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0				1.7	Saturated at 13.5'	
15.0						
16.0						
17.0					17.0'	
				0.0	Black, Peat, damp 17.5'	
18.0					Excavation terminated at 17.5'	

DELTA CONSULTANTS
TEST PIT LOG
TEST PIT NO.: TP-92

PROJECT: Crouse-Hinds

CLIENT: Cooper Industries, Inc.

DELTA PROJECT NO: 8E0708524P

EXCAVATION METHOD: Excavator

DATE: 06-06-08

CONTRACTOR: PEC

INSPECTOR: Joseph F. King

DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
					Brown sand with organic matter (roots). Dry, no odor.	
1.0						
					1.0'	Sample TP-92 1.0-7.0'
2.0				0.0	Black foundry sand with small rounded metal pieces. Moist, slight petroleum odor.	
3.0						
4.0						
5.0						Foundry sand interval thins out to black peat near wetland edge, approx. 13' from W edge of pit.
6.0						
7.0						
					7.0'	
8.0				0.0	Brown peat with silt. Moist, no odor.	
					8.0'	
9.0					End Excavation 8.0'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-36

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 0310025P						
EXCAVATION METHOD: Backhoe						
						DATE: 10-25-05
CONTRACTOR: PEC					INSPECTOR: Jennifer L. Hull	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Black, fine, Foundry Sand, moist, slight degraded petroleum odor	
1.0						
2.0						
3.0						
4.0						
				0.0	Water seeping into hole at 4.0'	
5.0						Fill extended into wetland; Fill was 2.5' thick in wetland and thickened west towards landfill
6.0						
7.0						
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0				1.7	Saturated at 13.5'	
15.0						
16.0						
17.0					17.0'	
				0.0	Black, Peat, damp 17.5'	
18.0					Excavation terminated at 17.5'	

DELTA CONSULTANTS
TEST PIT LOG
TEST PIT NO.: TP-91

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 8E0708524P						
EXCAVATION METHOD: Excavator						
						DATE: 06-06-08
CONTRACTOR: PEC					INSPECTOR: Joseph F. King	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
					Topsoil with organic matter. Dry, no odor.	
1.0					0.5'	
				300	Wood and metal debris. Some foundry sand interspersed throughout. Wet, strong solvent odor.	Sample TP-91 0.5-8.0'
2.0						
3.0						
4.0						
5.0						Foundry sand and debris interval thins out to black peat near wetland edge, approx. 25' from N edge of pit.
6.0						
7.0						
8.0						
					8.0'	
9.0				0.0	Brown silt. Moist, no odor.	
					9.0'	
10.0					End Excavation 9.0'	
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-35

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 0310025P						
EXCAVATION METHOD: Backhoe						
						DATE: 10-25-05
CONTRACTOR: PEC					INSPECTOR: Jennifer L. Hull	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Brown, Topsoil with some fill (plastic and wood debris), moist 0.5'	
1.0				12.4	Black, fine, Foundry Sand with some fill (plastic, metal, hardened paint (yellow) and wood debris), wet, degraded petroleum odor, oily sheen on water seeping into hole	
2.0						
3.0						
4.0						
				14.2	Saturated, oily sheen on groundwater, strong solvent-like odor	
5.0						
6.0						Fill extended into wetland; Fill was 2' thick in wetland and thickened north into landfill
7.0						
8.0					8.0'	
				0.0	Black, Peat, damp 8.5'	
9.0					Excavation terminated at 8.5'	
10.0						
11.0						TP-35 sampled at 1'-8'
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST PIT LOG
TEST PIT NO.: TP-89

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 8E0708524P						
EXCAVATION METHOD: Excavator						
						DATE: 06-06-08
CONTRACTOR: PEC					INSPECTOR: Joseph F. King	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
1.0						
				1,540	Foundry sand with metal and wood debris. Fragments of 55-gal.	Sample TP-89
2.0					drum. Wet, strong solvent glue odor. Oily sheen on water.	0.0-6.0'
3.0					Interval of large railroad ties and pocket of roof shingles located	
					20-24' from N end of pit (to a depth of approx. 4.5'). The strongest	
4.0					odors were noted from this zone.	
5.0						Foundry sand
						and debris
6.0						interval thins out
					6.0'	to black peat
7.0				0.0	Brown silt with organic matter. Wet, no odor.	near wetland
						edge, approx.
8.0					7.0'	34' from N
					End Excavation 7.0'	edge of pit.
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST PIT LOG
TEST PIT NO.: TP-88

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 8E0708524P						
EXCAVATION METHOD: Excavator						
						DATE: 06-06-08
CONTRACTOR: PEC					INSPECTOR: Joseph F. King	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
1.0						
				0.0	Foundry sand mixed with wood scraps (2"x6" - approx. 3-4' in length)	Sample TP-88
2.0					and metal banding, some plastic sheeting. Wet, slight degraded	0.0-7.5'
					oil odor.	
3.0						
					Water entering pit near bottom of this interval. Sheen on water.	
4.0						
5.0						Foundry sand
						interval thins
6.0						out near
						wetland edge,
7.0						approximately
						19' from N
8.0					7.5'	edge of pit.
				0.0	Brown silt with fine sand. Moist, no odor.	
9.0						
					9.0'	
10.0					End Excavation 9.0'	
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-34

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 0310025P						
EXCAVATION METHOD: Backhoe						
						DATE: 10-25-05
CONTRACTOR: PEC					INSPECTOR: Jennifer L. Hull	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Brown, Topsoil with some fill (plastic and wood debris), moist	
1.0						
2.0					2.0'	
				1.7	Black, fine, Foundry Sand with some fill (plastic and wood debris),	
3.0					moist, slight degraded petroleum odor	Fill extended
						into wetland;
4.0						Fill was 2' thick
				0.0	Saturated at 4.0'	in wetland and
5.0						thickened
						northwest
6.0					6.0'	into landfill
				0.0	Black, Peat, damp 6.5'	
7.0					Excavation terminated at 6.5'	
						TP-34
8.0						Sampled 2'-6'
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST PIT LOG
TEST PIT NO.: TP-87

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 8E0708524P						
EXCAVATION METHOD: Excavator						
						DATE: 06-06-08
CONTRACTOR: PEC					INSPECTOR: Joseph F. King	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
1.0						
				0.0	Foundry sand mixed with wood scraps (2"x6" - approx. 3-4' in length) and metal banding, some plastic sheeting. Wet, slight degraded oil odor.	Sample TP-87 0.0-6.0'
2.0						
3.0						
4.0						
5.0						Foundry sand interval thins out near wetland edge, approximately 20' from N edge of pit.
6.0						
					6.0'	
7.0				0.0	Black peat. Wet, slight degraded oil odor.	
8.0						
					8.0'	
9.0					End Excavation 8.0'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST PIT LOG
TEST PIT NO.: TP-83

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 8E0708524P						
EXCAVATION METHOD: Excavator						
						DATE: 06-05-08
CONTRACTOR: PEC					INSPECTOR: Joseph F. King	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
1.0				10.0	Foundry sand with small pieces of plastic, glass, paper. Wet, slight odor.	Sample TP-83 0.0-5.5'
2.0						
3.0						
4.0						Lens of foundry sand and fill at wetland edge, thickening to a total thickness of 5.5' at end of test pit (38' from wetland edge).
5.0						
6.0					5.5'	
				0.0	Black peat. Wet, no odor.	
7.0						
					7.0'	
8.0					End Excavation 7.0'	
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST PIT LOG
TEST PIT NO.: TP-80

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 8E0708524P						
EXCAVATION METHOD: Excavator						
						DATE: 06-05-08
CONTRACTOR: PEC					INSPECTOR: Joseph F. King	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
					Overburden - brown silt with sand and roots. Dry, no odor.	
1.0					0.5'	
						Sample TP-80
2.0				0.0	Fill (household waste - glass, plastic, paper). Moist, no odor.	0.5-6.0'
3.0						
4.0						Fill begins at
						edge of wetland
5.0						(4' from test pit
						front edge) and
6.0						thickens to the
					6.0'	E to a maximum
7.0				0.0	Black peat. Wet, no odor. Water entering pit at 6'.	thickness of
					7.0'	5.5' at end of
8.0					End Excavation 7.0'	test pit (17' from
						front edge).
9.0						Test pit extends
						4' into wetland.
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST PIT LOG
TEST PIT NO.: TP-78

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, inc.						
DELTA PROJECT NO: 8E0708524P						
EXCAVATION METHOD: Excavator						
						DATE: 06-04-08
CONTRACTOR: PEC					INSPECTOR: Joseph F. King	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
1.0				0.0	Fill (household waste - glass, plastic, paper, metal cans). Dry.	Sample TP-78 6.5-7.5'
2.0						
3.0						
4.0						Fill begins 4' from pit front edge (wetland) and thickens to the NE to a maximum thickness of 7.0' at end of test pit (13' from front edge).
5.0						
6.0						
7.0						
					7.0'	
8.0				0.0	Gray clay. Dense. Moist, no odor.	
					8.0'	
9.0					End Excavation 8.0'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-33

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 0310025P						
EXCAVATION METHOD: Backhoe						
						DATE: 10-25-05
CONTRACTOR: PEC					INSPECTOR: Jennifer L. Hull	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Brown, Topsoil, moist 0.5'	
1.0				0.0	Fill (wood, plastic, glass, hardened paint (yellow), paper and metal debris) mixed with some topsoil, moist, slight decay odor	
2.0						
3.0					3.0'	
				0.0	Black, Clay and fine, Foundry Sand with some fill (metal, plastic, wood, paper and glass debris), damp, slight organic decay odor, red staining in clay and sand	
4.0						
5.0						
6.0						
				4.2	Wet at 6.0'	
7.0						Fill extended into wetland; Fill was 3' thick in wetland and thickened west into landfill
8.0						
9.0						
10.0						
11.0						Black Peat underlaid fill in wetland
12.0						
13.0						
14.0						
15.0					15.0'	
				0.0	Brown-gray, Clay, wet 15.5'	
16.0					Excavation terminated at 15.5'	
17.0						
18.0						

DELTA CONSULTANTS
TEST PIT LOG
TEST PIT NO.: TP-77

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 8E0708524P						
EXCAVATION METHOD: Excavator						
						DATE: 06-04-08
CONTRACTOR: PEC					INSPECTOR: Joseph F. King	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
1.0				0.0	Fill (household waste - glass, plastic, paper, metal cans). Dry.	
2.0						Sample TP-77 8.0-8.5'
3.0						
4.0						
5.0						Fill exists at property boundary.
6.0						
7.0						
8.0						
				0.0	Foundry sand. Moist, slight degraded petroleum odor. 8.0'	
9.0					8.5'	
				0.0	Gray clay with silt. Moist, no odor.	
10.0						
					10.0'	
11.0					End Excavation 10.0'	
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST PIT LOG
TEST PIT NO.: TP-82

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 8E0708524P						
EXCAVATION METHOD: Excavator						
						DATE: 06-05-08
CONTRACTOR: PEC					INSPECTOR: Joseph F. King	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
1.0				0.0	Fill (household waste - plastic, glass, paper, rubber). Wet, no odor. Water entering test pit at base of this interval.	Sample TP-82 0.0-7.5'
2.0						
3.0						
4.0						Fill is 7.5 thick at property boundary.
5.0						
6.0						
7.0						
8.0					7.5'	
				0.0	Black peat. Moist, no odor.	
9.0						
10.0						
11.0						
					11.0'	
12.0				0.0	Marl - light gray medium to fine grained sand with silt and small shell pieces. Wet, no odor.	
13.0						
					13.0'	
14.0					End Excavation 13.0'	
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST PIT LOG
TEST PIT NO.: TP-81

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 8E0708524P						
EXCAVATION METHOD: Excavator						
						DATE: 06-05-08
CONTRACTOR: PEC					INSPECTOR: Joseph F. King	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
1.0				0.0	Fill (household waste - paper, plastic, glass). Water entering test pit from this interval, no odor.	Sample TP-81 0.0-10.0'
2.0					Newspaper with legible date contained within this interval - November 11, 1970.	
3.0						
4.0						Fill is 10' thick at property line.
5.0						
6.0						
7.0						
8.0						
9.0						
10.0						
					10.0'	
11.0				0.0	Brown silt and peat. Moist, no odor.	
12.0						
					12.0'	
13.0					Gray clay. Moist, no odor.	
					13.0'	
14.0					End Excavation 13.0'	
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST PIT LOG
TEST PIT NO.: TP-79

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 8E0708524P						
EXCAVATION METHOD: Excavator						
						DATE: 06-05-08
CONTRACTOR: PEC					INSPECTOR: Joseph F. King	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
					Overburden - brown sand with roots. Dry, no odor.	
1.0					0.5'	
						Sample TP-79
2.0				0.0	Fill (household waste - glass, plastic, paper, some scrap metal	0.5-10.0'
					pieces and tires). Moist, no odor.	
3.0						
4.0						Fill is 9.5'
						thick at property
5.0						line.
6.0						
7.0						
8.0						
9.0						
10.0						
					10.0'	
11.0				0.0	Gray silt with clay. Moist, no odor.	
12.0						
					12.0'	
13.0					End Excavation 12.0'	
14.0						
15.0						
16.0						
17.0						
18.0						

Table 6B. Wetland A and Stream A

30-Jan-14

117-2202246

Design Notes on North Landfill - Wetland A and Stream A Sediment Removal

Available SED Logs Used to Determine Depth of Excavation Cut

Existing Surface from Topo Map

	Excavation Sequence	Base of Excavation Elevation	Calculated Cut Volume	Calculated Cut Volume	Area	Number Bottom Confirmation	Approx. Depth of Cut	Number Wall Confirmation	Estimated Soil Amendment
SAMPLE ZONE		(FT MSL)	(CUFT)	(CUYD)	(SQFT)	Samples	(FT)	Samples	Wetland Seed Mix Mulch (SQYD)
V	605	367	2,023	75	1,012	1	1	0	112
U	610	366	5,407	200	1,718	2	3	0	191
O	613	362	22,680	840	4,803	5	1	0	534
Q	614	361.1	24,813	919	4,398	5	1	0	489
T	615	366.8	6,912	256	3,555	4	1	0	395
P	616	365.1	5,157	191	3,252	4	1	0	361
R	617	363.2	17,199	637	4,346	5	3	0	483
N	622	365	11,799	437	6,866	8	2	0	763
M	623	361.9	32,616	1,208	6,737	7	1	0	749
S	624	366.5	2,823	105	2,823	3	2	0	314
K	625	367.5	1,242	46	1,291	1	1	0	143
L	626	366	5,238	194	2,837	3	1	0	315
H	629	364.7	8,054	298	4,027	4	5	9	447
J	631	363.5	13,264	491	3,790	4	1	0	421
G	633	364	8,889	329	2,735	3	5	8	304
I	634	365.8	24,931	923	21,033	23	1	0	2,337
E	636	366.7	7,002	259	4,488	5	6	7	499
D	637	365	7,645	283	2,548	3	4	7	283
F	638	365.5	9,346	346	3,932	4	1	0	437
C	639	366	7,323	271	3,546	4	1	0	394
B	640	363	4,254	158	2,127	2	3	0	236
A	643	366	2,539	94	2,539	3	2	0	282
Total			231,156	8,561	94,403	105		31	10,489

No Reusable Sediments
Imported Volume Limited to
Necessary Wetland Topsoil
Excavation production rate is estimated at 50 CY/Hour for this zone

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-15

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:6/20/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1				Organic Sediments	
1.0						
2.0						
3.0					3.0'	
	2		1.5		Brown, Peat	
4.0						
5.0						
6.0					6.0'	
	3		3.0		Gray, Clay	
7.0						
8.0						
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-15A

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:6/20/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		0.0			No Recovery
1.0						
2.0						
3.0					3.0'	
	2		1.0		Organics and sand mixture	
4.0						
5.0						
6.0					6.0'	
					Boring Terminated @ 6'	
7.0						
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-15B

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:6/20/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		0.0			No Recovery
1.0						
2.0						
3.0					3.0'	
	2		1.2		Brown, Peat	
4.0						
5.0						
6.0					6.0'	
	3		3.0		Gray, Clay	
7.0						
8.0						
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-15D

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:6/20/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		0.0			No Recovery
1.0						
2.0						
3.0					3.0'	
	2		1.8		Brown, Peat	
4.0						
					4.5'	
5.0					Gray, Clay	
6.0						
	3		2.1		Same as above	
7.0						
8.0						
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-16

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:6/19/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		0.0			No Recovery
1.0						
2.0						
3.0					3.0'	
	2		3.0		Brown, Peat	
4.0						
5.0					Same as above, Tan	
6.0						
	3		3.0		Same as above	
7.0						
8.0					8.2'	
					Gray, Clay	
9.0						
	4		2.0		Same as above	
10.0						
11.0						
12.0					12.0'	
					Boring Terminated @ 12'	
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-16A

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:6/19/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		0.0			No Recovery
1.0						
2.0						
3.0						
	2		2.1		Organics and sand mixture 3.5'	
4.0					Brown, Peat	
5.0						
6.0						
	3		3.0		Same as above	
7.0						
8.0						
					8.4'	
9.0					Gray, Clay	
	4		2.6		Same as above	
10.0						
11.0						
12.0					12.0'	
					Boring Terminated @ 12'	
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-16B

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:6/19/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		0.0			No Recovery
1.0						
2.0						
3.0					3.0'	
	2		2.8		Brown, Peat	
4.0						
5.0						
6.0						
	3		1.5		Same as above	
7.0					7.0'	
					Gray, Clay	
8.0						
9.0						
	4		3.0		Same as above	
10.0						
11.0						
12.0					12.0'	
					Boring Terminated @ 12'	
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-16C

DELTA

PROJECT: RI/FS						Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds						
DELTA PROJECT NO: 8E0708524P						
DRILLING METHOD: DP		SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG: Geoprobe		3' Macro Core	2" OD	NA	NA	DATE:6/18/08
DRILLER: Paragon		INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
						No Sample Collected
1.0						
2.0						
3.0					3.0'	
	1		2.5		Brown, Peat	
4.0						
5.0						
6.0						
	2		2.5		Same as above	
7.0						
8.0						
					8.5'	
9.0					Gray, Clay	
	3		3.0		Same as above	
10.0						
11.0						
12.0					12.0'	
					Boring Terminated @ 12'	
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-17

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:6/17//08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		0.25		Organic Sediments	
1.0						
2.0						
3.0					3.0'	
	2		2.1		Brown, Peat	
4.0						
5.0						
6.0						
	3		2.0		Same as above with H_2S odor	
7.0						
8.0						
9.0						
	4		3.0		Same as above	
10.0						
					10.5'	
11.0					Gray, Clay	
12.0						
	5		2.7		Same as above	
13.0						
14.0						
15.0					15.0'	
					Boring Terminated @ 15'	
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-17A

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:6/17/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		0.0			No Recovery
1.0						
2.0						
3.0					3.0'	
	2		1.0		Brown, Peat	
4.0						
5.0						
6.0						
	3		2.6		Same as above	
7.0						
8.0						
9.0						
	4		2.9		Same as above	
10.0						
					10.65'	
11.0					Gray, Clay	
12.0					12.0'	
					Boring Terminated @ 12'	
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-17B

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:6/17/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		0.25		Organics and Sediment mixture	
1.0						
2.0						
3.0					3.0'	
	2		1.2		Brown, Peat	
4.0						
5.0						
6.0						
	3		2.0		Same as above	
7.0						
8.0						
9.0						
	4		3.0		Same as above	
10.0						
11.0					10.9'	
					Gray, Clay	
12.0						
	5		2.6		Same as above	
13.0						
14.0						
15.0					15.0'	
					Boring Terminated @ 15'	
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-17C

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:6/17//08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		0.25		Black, Foundary Sand, oily odor	
1.0						
2.0						
3.0					3.0'	
	2		1.2		Peat and Organics mixture	
4.0						
5.0						
6.0					6.0'	
	3				Brown, Peat	
7.0						
8.0						
9.0						
	4		2.5		Same as above	
10.0						
11.0						
					11.5'	
12.0					Gray Clay	
	5		2.5		Same as above	
13.0						
14.0						
15.0					15.0'	
					Boring Terminated @ 15'	
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-23

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:6/16/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		3.0		Organics and Foundry Sand mixture	
1.0						
2.0						
3.0					3.0'	
	2		1.5	0.0	Brown, Peat	
4.0						
5.0						
6.0						
	3		1.5		same as above with shells	
7.0						
8.0					8.0'	
					Gray, Clay	
9.0						
	4		1.8		same as above	
10.0						
11.0						
12.0					12.0'	
					Boring Terminated @ 12'	
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-24

DELTA

PROJECT: RI/FS						Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds						
DELTA PROJECT NO: 8E0708524P						
DRILLING METHOD: DP		SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG: Geoprobe		3' Macro Core	2" OD	NA	NA	DATE:6/16/08
DRILLER: Paragon		INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		0.1		Black, Organics and Foundry Sand mixture, oily odor	
1.0						
2.0						
3.0					3.0'	
	2		2.7		Brown, Peat	
4.0						
5.0						
6.0						
	3		2.6		Same as above	
7.0						
8.0						
9.0						
	4		2.7		Same as above	
10.0						
11.0					11.2'	
					Gray, Clay	
12.0						
	5		0.5		Same as above	
13.0						
14.0						
15.0						
	6		1.0		Same as above	
16.0						
17.0						
18.0					18.0'	
					Boring Terminated @ 18'	

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-25

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:6/17/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		1.7		Black, Organic Sediments	
1.0						
2.0					1.75'	
					Brown, Peat	
3.0						
	2		1.9		Same as above	
4.0						
5.0						
6.0						
	3		2.6		same as above with shells	
7.0						
8.0						
9.0					9.0'	
	4		2.1		Gray, Clay	
10.0						
11.0						
12.0					12.0'	
	5		3.0		Brown, F. Sand	
13.0						
14.0						
15.0					15.0'	
					Boring Terminated @ 15'	
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-26

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:6/17/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		0.2		Organics mixture	
1.0						
2.0						
3.0					3.0'	
	2		2.1		Brown, Peat	
4.0						
5.0						
6.0						
	3		2.0		Same as above	
7.0						
8.0						
9.0						
	4		2.6		Same as above	
10.0						
					10.5'	
11.0					Gray, Clay	
12.0						
	5		2.7		Same as above	
13.0						
14.0						
15.0					15.0'	
					Boring Terminated @ 15'	
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-27

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD: DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG: Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:6/17/08
DRILLER: Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		2.5		Organic Sediments	
1.0					1.15'	
					Brown, Peat	
2.0						
3.0						
	2		2.8		Same as above with trace wood debris	
4.0						
5.0						
6.0						
	3		1.0		Same as above with shells	
7.0						
8.0						
9.0					9.0'	
	4		2.5		Gray, Clay	
10.0						
11.0						
12.0						
	5		1.0		Same as above	
13.0					13.0'	
					Sand graduating to a gravel	
14.0						
15.0					15.0'	
					Boring Terminated @ 15'	
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-28

DELTA

PROJECT: RI/FS						Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds						
DELTA PROJECT NO: 8E0708524P						
DRILLING METHOD: DP		SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG: Geoprobe		3' Macro Core	2" OD	NA	NA	DATE:6/18/08
DRILLER: Paragon		INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		0.25		Organics 0.5'	
1.0					Brown, Peat	
2.0						
3.0						
	2		3.0		Same as above	
4.0						
5.0						
6.0						
	3		1.0		Same as above	
7.0						
8.0						
9.0					9.0'	
	4		3.0		Gray, Clay	
10.0						
11.0					11.1'	
					Brown, F. Sand	
12.0					12.0'	
					Boring Terminated @ 12'	
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-29

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:6/18/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		1.7		Black, Organics and Foundry Sand mixture	
1.0						
2.0						
3.0						
	2		3.0		3.5'	
4.0					Brown, Peat	
5.0						
					5.7'	
6.0					Gray, Clay	
	3					
7.0						
8.0						
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-30

DELTA

PROJECT: RI/FS						Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds						
DELTA PROJECT NO: 8E0708524P						
DRILLING METHOD: DP		SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG: Geoprobe		3' Macro Core	2" OD	NA	NA	DATE:6/18/08
DRILLER: Paragon		INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		0.0			No Recovery
1.0						
2.0						
3.0					3.0'	
	2		2.6		Brown, Peat	
4.0						
5.0					5.0'	
					Gray, Clay	
6.0						
	3		3.0		Same as above	
7.0						
8.0						
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-31

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:6/20/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		0.0			No Recovery
1.0						
2.0						
3.0					3.0'	
	2		3.0		Brown, Peat	
4.0						
5.0						
6.0					6.0'	
	3		2.5		Gray, Clay	
7.0						
8.0						
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-33

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:6/19/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		0.0		Organics and Sand mixture	No Recovery
1.0						
2.0						
					2.5'	
3.0					Brown, Peat 3.0'	
	2		1.4		Gray, Clay	
4.0						
5.0						
6.0					6.0'	
					Boring Terminated @ 6'	
7.0						
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-34

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:6/20/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		0.0			No Recovery
1.0						
2.0						
3.0					3.0'	
	2		3.0		Gray, Clay	
4.0						
5.0						
6.0						
	3		3.0		Same as above	
7.0						
8.0						
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-35

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:6/19/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		0.0			No Recovery
1.0						
2.0						
3.0					3.0'	
	2		1.4		Brown, Peat	
4.0						
5.0						
6.0						
	3		2.0		Same as above with shells	
7.0						
8.0						
					8.5'	
9.0					Gray, Clay	
	4		1.5		Same as above	
10.0						
11.0						
12.0					12.0'	
					Boring Terminated @ 12'	
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-50

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:6/20/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		1.5		Organics and Sand mixture	
1.0						
2.0						
					2.5'	
3.0					Gray, Clay	
	2		3.0		Same as above	
4.0						
5.0						
6.0					6.0'	
					Boring Terminated @ 6'	
7.0						
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-51

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:6/19/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		2.0		Organics and Foundry Sand mixture	
1.0						
2.0					2.0'	
					Brown, Peat	
3.0						
	2		1.0		Same as above	
4.0						
5.0						
6.0					5.8'	
	3		3.0		Gray, Clay	
7.0						
8.0						
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-52

DELTA

PROJECT: RI/FS

CLIENT: Cooper Crouse-Hinds

DELTA PROJECT NO: 8E0708524P

DRILLING METHOD:	DP	SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG:	Geoprobe	3' Macro Core	2" OD	NA	NA	DATE:6/19/08
DRILLER:	Paragon	INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1				Black, Organics and Foundry Sand mixture	
1.0						
2.0						
3.0						
	2		2.6		Same as above	
4.0					4.0'	
					Brown, Peat	
5.0						
6.0						
	3		3.0		6.0'	
7.0					Gray, Clay	
8.0						
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

Table 6C. North Landfill Wetland A Surface Soils

2-Oct-13

117-2202246

Design Notes on North Landfill - Wetland A Surface Soils

No SED Logs Found for Test Pits SED-98 and SED-99

Existing Surface from Topo Map

	Excavation Sequence	Base of Excavation Elevation	Calculated Cut Volume	Calculated Cut Volume	Area	Estimated Topsoil Volume	Estimated Seed Mix Mulch
Test Pit		(FT MSL)	(CUFT)	(CUYD)	(SQFT)	(CUYD)	(SQYD)
SED-98	620	366.2	4,124	153	1,293	24	144
SED-99	621	368.2	1,459	54	1,132	21	126
Total			5,583	207	2,425	45	269

No Reuseable Sediments

Imported Volume Limited to
Necessary Topsoil
Excavation production rate is estimated at 50 CY/Hour for this zone

Table 7A. 30-Foot Buffer From Edge of Wetland B

4-Dec-13

117-2202246

Design Notes on North Landfill - 30 Foot Buffer Zone Along Wetland B

Available Test Pit Logs Used to Determine Depth of Excavation Cut

Existing Surface from Topo Map

	Excavation Sequence	Base of Excavation Elevation (FT MSL)	Calculated Cut Volume (CUFT)	Calculated Cut Volume (CUYD)	Estimated Fill Volume (CUYD)	Area (SQFT)	Estimated Topsoil Volume (CUYD)	Estimated Seed Mix Mulch (SQYD)
Test Pit								
TP-69	701	361	118,288	4,381	3,866	16,836	312	1,871
TP-27	702	359	14,813	549	484	2,110	39	234
TP-70	703	361.3	16,111	597	527	2,621	49	291
TP-26	704	360	38,088	1,411	1,245	5,331	99	592
TP-72	705	361.1	18,743	694	613	3,127	58	347
TP-OW-2	706	360.7	5,424	201	177	931	17	103
TP-OW-1	707	360.3	11,410	423	373	1,754	32	195
TP-73	708	364	8,382	310	274	2,716	50	302
TP-25	709	360	13,220	490	432	2,005	37	223
TP-74	710	361.4	19,006	704	621	3,170	59	352
TP-75	711	361.8	13,255	491	433	3,079	57	342
TP-24	712	360.5	26,568	984	868	4,764	88	529
Total			303,308	11,234	9,914	48,444	897	5,383

Calculated Imported Volume (CY)
Needed for Sloped 30' Buffer at Elevation 367' = 9,914
This is based on calculated 1,320 CY of soil
currently above Elevation 367' in Buffer Zone
Excavation production rate is estimated at 60 CY/Hour for this zone

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-24

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 0310025P						
EXCAVATION METHOD: Backhoe						
						DATE: 10-24-05
CONTRACTOR: PEC					INSPECTOR: Jennifer L. Hull	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Dark Brown, Topsoil, moist 0.4'	
1.0				15.7	Black, fine, Foundry Sand with little fill (hardened paint, concrete castes, and slag), moist, moderate degraded petroleum odor	
2.0						
3.0						
4.0						
				15.0	Same as above	
5.0						
6.0					6.0'	
				0.0	Brown, Peat, damp	
7.0					7.0'	
					Excavation terminated at 7.0'	
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST PIT LOG
TEST PIT NO.: TP-75

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 8E0708524P						
EXCAVATION METHOD: Excavator						
						DATE: 06-04-08
CONTRACTOR: PEC					INSPECTOR: Joseph F. King	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Black silt with roots. Moist, no odor.	
1.0						
					1.0'	Sample TP-75 1.5-3.5'
2.0				0.0	Black foundry sand with pockets of brown foundry sand. Moist, no odors.	
3.0				0.0	Pocket of light tan fine grained ash material with fine sand 8'-12' from front edge of pit (wetland edge) at a depth of 1.0'-4.0'. Dry, no odors.	
4.0					Black peat. Moist, no odors. 3.5'	
					4.0'	Fill begins 8' from pit front edge (wetland side) with ash material and transitions into foundry sand to the south. Foundry sand total depth is 3.5' from ground surface.
5.0					End Excavation 4.0'	
6.0						
7.0						
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST PIT LOG
TEST PIT NO.: TP-74

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 8E0708524P						
EXCAVATION METHOD: Excavator						
						DATE: 06-04-08
CONTRACTOR: PEC					INSPECTOR: Joseph F. King	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Black silt with roots. Moist, no odor.	
1.0						
					1.0'	Sample TP-74 1.0-4.5'
2.0				0.0	Black foundry sand with pockets of brown foundry sand. Moist, no odors.	
3.0						
				0.0	Pocket of light tan to gray ash material with fine sand 15' from front edge of pit (wetland edge) at a depth of 1.0'-2.5'.	
4.0						
5.0					Black peat. Wet, no odors 4.5'	Fill begins 14' from pit front edge (wetland side) and thickens towards S to a maximum thickness of 3.5' at end of pit (32').
					5.0'	
6.0					End Excavation 5.0'	
7.0						
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-25

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 0310025P						
EXCAVATION METHOD: Backhoe						
						DATE: 10-24-05
CONTRACTOR: PEC					INSPECTOR: Jennifer L. Hull	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Dark brown, Topsoil, moist	
1.0					1.0'	
				0.0	Black, fine, Foundry Sand with some fill (metal, glass and brick debris), dry, moderate degraded petroleum odor	
2.0					Moist at 2.0'	
3.0						
4.0						
5.0						
6.0					6.0'	
				0.0	Brown, Peat, damp	
7.0					7.0'	
					Excavation terminated at 7.0'	
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST PIT LOG
TEST PIT NO.: TP-73A

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 8E0708524P						
EXCAVATION METHOD: Excavator						
						DATE: 06-04-08
CONTRACTOR: PEC					INSPECTOR: Joseph F. King	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Brown silt with fine sand. Surficial waste (small pieces of metal, plastic) entire length of pit (16'). Dry, no odor.	
1.0						
					1.0'	Fill was not encountered at depth in original proposed pit orientation (N-S). Excavator was repositioned at end of pit (16' - opposite wetland) and pit was continued to the east, perpendicular of original orientation (N-S). East extension of pit was renamed TP-73B.
2.0					Black peat. Wet, no odor	
3.0						
4.0						
5.0					4.5'	
					End Excavation 4.5'	
6.0						
7.0						
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST PIT LOG
TEST PIT NO.: TP-73B

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 8E0708524P						
EXCAVATION METHOD: Excavator						
						DATE: 06-04-08
CONTRACTOR: PEC					INSPECTOR: Joseph F. King	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Black peat with roots. Dry, no odor.	
1.0						Sample TP-73 1.5-3.5'
2.0					1.5'	
				0.0	Black foundry sand with few pockets of light brown foundry sand.	Test pit is oriented E-W, perpendicular to original proposed location. Pit was 28' long.
3.0					Moist, no odor.	
4.0					3.5'	
					Black peat. Moist, no odor.	
5.0						
6.0						
					6.0'	
7.0					End Excavation 6.0'	
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

SURFACE ELEVATION: 3683

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-OW-1

PROJECT: Crouse-Hinds — Sheet 1 of 1

CLIENT: Cooper Industries, Inc.

DELTA PROJECT NO: 0310025P

EXCAVATION METHOD: Backhoe

DATE: 10-24-05

CONTRACTOR: PEC

INSPECTOR: Jennifer L. Hull

DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Dark brown, Topsoil, moist 0.5'	
1.0				0.0	Black, fine, Foundry Sand, damp, slight degraded petroleum odor	
2.0						
3.0						
4.0						
5.0						
6.0						
				0.0	Saturated at 6.0'	
7.0						
8.0					8.0'	
					Excavation terminated at 8.0'	
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

SURFACE ELEVATION: 368.7

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-OW-2

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 0310025P						
EXCAVATION METHOD: Backhoe						
						DATE: 10-24-05
CONTRACTOR: PEC					INSPECTOR: Jennifer L. Hull	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Dark brown, Topsoil, moist 0.5'	
1.0				9.7	Black, fine, Foundry Sand with some fill (hardened paint, metal, rubber, brick and wood debris), moist, degraded petroluem odor	
2.0						
3.0						
4.0						TP-OW-2 sampled 1'-8'
5.0						
6.0						
				8.9	Saturated at 6.0'	
7.0						
8.0					8.0'	
					Excavation terminated at 8.0'	
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST PIT LOG
TEST PIT NO.: TP-72

PROJECT: Crouse-Hinds — Sheet 1 of 1
CLIENT: Cooper Industries, Inc.
DELTA PROJECT NO: 8E0708524P
EXCAVATION METHOD: Excavator
DATE: 06-04-08
CONTRACTOR: PEC
INSPECTOR: Joseph F. King

DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Black peat. Moist, no odor. 0.5'	
1.0					Surfical waste (plastic, small metal scraps) begins 13' from front end of pit (wetland side).	Sample TP-72 0.5-2.0'
2.0				105	Foundry sand with plastic, metal pieces. Moist, slight degraded oil odor. 2.0'	
3.0					Empty 55-gal. drum 19' from front end of pit at 1' depth.	
4.0					Black peat with organic material. Moist, no odor. 4.0'	
5.0					End Excavation 4.0'	Fill begins 13' from wetland edge and thickens eastward to a maximum thickness of 2.0' at end of test pit (24' from wetland edge).
6.0						
7.0						
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-26

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 0310025P						
EXCAVATION METHOD: Backhoe						
						DATE: 10-24-05
CONTRACTOR: PEC					INSPECTOR: Jennifer L. Hull	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Dark brown, Topsoil, moist	
1.0					1.0'	
				4.3	Black, fine, Foundry Sand with some fill (metal, wood, glass and plastic debris), damp, moderate degraded petroleum odor	
2.0						
3.0						TP-26 sampled 1'-6.5'
4.0						
5.0						
6.0						
7.0					7.0'	
				0.0	Brown, Peat, damp	
8.0					8.0'	
					Excavation terminated at 8.0'	
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST PIT LOG
TEST PIT NO.: TP-70

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 8E0708524P						
EXCAVATION METHOD: Excavator						
						DATE: 06-03-08
CONTRACTOR: PEC					INSPECTOR: Joseph F. King	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Black peat. Dry, no odor.	
1.0						
					1.0'	Sample TP-70 3.5-4.5'
2.0					Brown silt with fine sand. Moist, no odor.	
3.0						
4.0				21.6	Foundry sand with pieces of plastic and glass. 3.5'	
					Wet, slight degraded oil odor.	Fill begins 5' from wetland edge and thickens eastward to a maximum thickness of 1.0' at end of test pit (22' from wetland edge).
5.0					4.5'	
					End Excavation 4.5'	
6.0						
7.0						
8.0						
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA ENVIRONMENTAL CONSULTANTS, INC.

TEST PIT LOG

TEST PIT NO.: TP-27

PROJECT: Crouse-Hinds						Sheet 1 of 1
CLIENT: Cooper Industries, Inc.						
DELTA PROJECT NO: 0310025P						
EXCAVATION METHOD: Backhoe						
						DATE: 10-24-05
CONTRACTOR: PEC					INSPECTOR: Jennifer L. Hull	
DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Brown, Topsoil, moist 0.5'	
1.0				1.7	Black, fine, Foundry Sand with some fill (wood and metal debris), dry, degraded petroluem odor	
2.0						
3.0						
				1.2	Moist at 3.0'	
4.0						
5.0						
6.0						
7.0					7.5'	
8.0				0.0	Brown, Peat, damp 8.0'	
					Excavation terminated at 8.0'	
9.0						
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST PIT LOG
TEST PIT NO.: TP-69

PROJECT: Crouse-Hinds — Sheet 1 of 1
CLIENT: Cooper Industries, Inc.
DELTA PROJECT NO: 8E0708524P
EXCAVATION METHOD: Excavator
DATE: 06-03-08
CONTRACTOR: PEC
INSPECTOR: Joseph F. King

DEPTH IN FT.				PID (ppm)	SOIL DESCRIPTION	REMARKS
				0.0	Black peat with organic material - roots, decaying wood. Moist, no odor.	
1.0						
						Sample TP-69 2.0-7.0'
2.0						
					2.0'	
3.0						
				10.8	Foundry sand with small bits of metal and terra cotta pieces. Moist, slight degraded oil odor.	
4.0						
						Fill begins 155' from wetland edge and thickens eastward to a maximum thickness of 5.0' at end of test pit (170' from wetland edge).
5.0						
6.0						
7.0						
					7.0'	
8.0					End Excavation 7.0'	
9.0						
10.0						
11.0						Front edge of test pit (wetland side) is oriented N-S, but at approximately 70' from wetland the pit curved to follow property line (E-W).
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

Table 7B. Wetland B

30-Jan-14

117-2202246

Design Notes on North Landfill - Wetland B Sediment Removal

Available SED Logs Used to Determine Depth of Excavation Cut

Existing Surface from Topo Map

	Excavation Sequence	Base of Base of Excavation Elevation (FT MSL)	Calculated Cut Volume (CUFT)	Calculated Cut Volume (CUYD)	Area (SQFT)	Number Bottom Confirmation Samples	Estimated Soil Amendment Wetland Seed Mix Mulch (SQYD)
SAMPLE ZONE							
I	713	363.7	17,301	641	14,302	16	1,589
H	714	364	15,911	589	15,911	18	1,768
D	715	362.8	2,241	83	1,509	2	168
E	716	363.7	628	23	628	1	70
F	717	362.7	1,323	49	889	1	99
G	718	363.6	2,322	86	3,259	4	362
A	719	361.3	9,508	352	4,754	5	528
C	720	363.6	1,026	38	1,454	2	162
B	721	363.6	54,891	2,033	52,500	58	5,833
Total			105,151	3,894	95,206	106	10,578

No Reusable Sediments
Imported Volume Limited to
Necessary Wetland Topsoil
Excavation production rate is estimated at 50 CY/Hour for this zone

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-60

DELTA

PROJECT: RI/FS								Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds								
DELTA PROJECT NO: 8E0708524P								
DRILLING METHOD: DP					SAMPLER	BIT SIZE	CORE	CASING
DRILLING RIG: Geoprobe					3' Macro Core	2" OD	NA	NA	DATE:6/25/08
DRILLER: Paragon					INSPECTOR: Mark Schumacher			
DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION			REMARKS
	1		3.0		Topsoil			0.7'
1.0					Brown, Peat with organics			
2.0								
3.0								
	2		3.0		Same as above			
4.0								
5.0								
6.0					Light tan, H_2S odor			
	3		3.0		Same as above			
7.0								
8.0								
9.0								9.0'
					Boring Terminated @ 9'			
10.0								
11.0								
12.0								
13.0								
14.0								
15.0								
16.0								
17.0								
18.0								

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-61

DELTA

PROJECT: RI/FS									Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds									
DELTA PROJECT NO: 8E0708524P									
DRILLING METHOD: DP					SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG: Geoprobe					3' Macro Core	2" OD	NA	NA	DATE:6/25/08
DRILLER: Paragon					INSPECTOR: Mark Schumacher				
DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION				REMARKS
	1		2.3		Organics and Peat mixture				
1.0									
2.0									
3.0									
	2		2.3		Same as above				
4.0									
5.0					Light tan, H_2S odor				
6.0									
	3		3.0		Same as above				
7.0									
8.0					Brown				
9.0								9.0'	
					Boring Terminated @ 9'				
10.0									
11.0									
12.0									
13.0									
14.0									
15.0									
16.0									
17.0									
18.0									

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-62

DELTA

PROJECT: RI/FS								Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds								
DELTA PROJECT NO: 8E0708524P								
DRILLING METHOD: DP					SAMPLER	BIT SIZE	CORE	CASING
DRILLING RIG: Geoprobe					3' Macro Core	2" OD	NA	NA	DATE:6/25/08
DRILLER: Paragon					INSPECTOR: Mark Schumacher			

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		3.0		Organics and Peat mixture	
1.0						
2.0						
3.0					3.0'	
	2		2.8		Brown, Peat	
4.0						
5.0					Tan	
6.0					6.0'	
	3		1.8		Gray, Clay	
7.0						
8.0						
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-63

DELTA

PROJECT: RI/FS						Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds						
DELTA PROJECT NO: 8E0708524P						
DRILLING METHOD: DP		SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG: Geoprobe		3' Macro Core	2" OD	NA	NA	DATE:6/25/08
DRILLER: Paragon		INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		2.4		Organics and Peat mixture	
1.0						
2.0						
3.0					3.0'	
	2		2.8		Brown, Peat	
4.0						
5.0						
6.0					6.4'	
	3		2.5		Gray, Clay	
7.0						
8.0						
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-64

DELTA

PROJECT: RI/FS								Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds								
DELTA PROJECT NO: 8E0708524P								
DRILLING METHOD: DP					SAMPLER	BIT SIZE	CORE	CASING
DRILLING RIG: Geoprobe					3' Macro Core	2" OD	NA	NA
DRILLER: Paragon					INSPECTOR: Mark Schumacher			

DATE:6/25/08

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION		REMARKS
	1		3.0		Organics and Sediment mixture	0.5'	
1.0					Organics and Peat mixture		
2.0							
3.0						3.0'	
	2		2.2		Brown, Peat		
4.0							
5.0							
6.0						6.3'	
	3		1.9		Gray, Clay		
7.0							
8.0							
9.0						9.0'	
					Boring Terminated @ 9'		
10.0							
11.0							
12.0							
13.0							
14.0							
15.0							
16.0							
17.0							
18.0							

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-65

DELTA

PROJECT: RI/FS								Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds								
DELTA PROJECT NO: 8E0708524P								
DRILLING METHOD: DP					SAMPLER	BIT SIZE	CORE	CASING
DRILLING RIG: Geoprobe					3' Macro Core	2" OD	NA	NA	DATE:6/25/08
DRILLER: Paragon					INSPECTOR: Mark Schumacher			

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		3.0		Organics and Peat mixture	
1.0						
2.0						
3.0					3.0'	
	2		3.0		Brown, Peat	
4.0						
5.0					5.1'	
					Gray, Clay	
6.0						
	3				Same as above	
7.0						
8.0						
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-66

DELTA

PROJECT: RI/FS								Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds								
DELTA PROJECT NO: 8E0708524P								
DRILLING METHOD: DP					SAMPLER	BIT SIZE	CORE	CASING
DRILLING RIG: Geoprobe					3' Macro Core	2" OD	NA	NA
DRILLER: Paragon					INSPECTOR: Mark Schumacher			

DATE:6/26/08

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION		REMARKS
	1		3.0		Organics and Peat mixture	0.5'	
1.0					Sediment		
2.0							
						2.5'	
3.0					Brown, Peat	3.0'	
	2		2.8		Sediment		
4.0						4.0'	
					Brown, Peat		
5.0							
					Same as above with shells		
6.0						6.0'	
	3		2.8		Brown, Peat		
7.0					Same as above with shells		
8.0							
9.0						9.0'	
					Boring Terminated @ 9'		
10.0							
11.0							
12.0							
13.0							
14.0							
15.0							
16.0							
17.0							
18.0							

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-67

DELTA

PROJECT: RI/FS								Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds								
DELTA PROJECT NO: 8E0708524P								
DRILLING METHOD: DP					SAMPLER	BIT SIZE	CORE	CASING
DRILLING RIG: Geoprobe					3' Macro Core	2" OD	NA	NA	DATE:6/26/08
DRILLER: Paragon					INSPECTOR: Mark Schumacher			

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION		REMARKS
	1		3.0		Organics and Peat mixture	0.5'	
1.0					Brown, Peat		
2.0							
3.0							
	2		3.0		Same as above		
4.0							
5.0							
6.0							
	3		2.6		Same as above		
7.0							
8.0							
						8.5'	
9.0					Gray, Clay	9.0'	
					Boring Terminated @ 9'		
10.0							
11.0							
12.0							
13.0							
14.0							
15.0							
16.0							
17.0							
18.0							

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-68

DELTA

PROJECT: RI/FS								Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds								
DELTA PROJECT NO: 8E0708524P								
DRILLING METHOD: DP					SAMPLER	BIT SIZE	CORE	CASING
DRILLING RIG: Geoprobe					3' Macro Core	2" OD	NA	NA
DRILLER: Paragon					INSPECTOR: Mark Schumacher			

DATE:6/26/08

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION		REMARKS
	1		3.0		Organics and Peat mixture	0.5'	
1.0					Brown, Peat		
2.0							
3.0							
	2		3.0		Same as above		
4.0							
5.0							
6.0							
	3		3.0		Same as above, Tan		
7.0							
8.0							
9.0						9.0'	
					Boring Terminated @ 9'		
10.0							
11.0							
12.0							
13.0							
14.0							
15.0							
16.0							
17.0							
18.0							

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-69

DELTA

PROJECT: RI/FS									Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds									
DELTA PROJECT NO: 8E0708524P									
DRILLING METHOD: DP					SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG: Geoprobe					3' Macro Core	2" OD	NA	NA	DATE:6/26/08
DRILLER: Paragon					INSPECTOR: Mark Schumacher				
DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION				REMARKS
	1		3.0		Organics and Peat mixture				
1.0									
2.0									
3.0								3.0'	
	2		2.7		Brown, Peat				
4.0									
5.0									
6.0									
	3		2.6		Same as above				
7.0									
8.0					Same as above, Tan				
9.0								9.0'	
					Boring Terminated @ 9'				
10.0									
11.0									
12.0									
13.0									
14.0									
15.0									
16.0									
17.0									
18.0									

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-70

DELTA

PROJECT: RI/FS								Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds								
DELTA PROJECT NO: 8E0708524P								
DRILLING METHOD: DP					SAMPLER	BIT SIZE	CORE	CASING
DRILLING RIG: Geoprobe					3' Macro Core	2" OD	NA	NA	DATE:6/26/08
DRILLER: Paragon					INSPECTOR: Mark Schumacher			
DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION			REMARKS
	1				Organics and Peat mixture			
1.0								
2.0								
3.0							3.0'	
	2		2.8		Brown, Peat			
4.0								
5.0					Same as above, Tan			
6.0								
	3		2.1		Same as above			
7.0							7.0'	
					Gray, Clay			
8.0								
9.0							9.0'	
					Boring Terminated @ 9'			
10.0								
11.0								
12.0								
13.0								
14.0								
15.0								
16.0								
17.0								
18.0								

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-71

DELTA

PROJECT: RI/FS									Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds									
DELTA PROJECT NO: 8E0708524P									
DRILLING METHOD: DP					SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG: Geoprobe					3' Macro Core	2" OD	NA	NA	DATE:6/26/08
DRILLER: Paragon					INSPECTOR: Mark Schumacher				
DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION				REMARKS
	1		3.0		Organics and Peat mixture				
1.0									
2.0									
3.0								3.0'	
	2		2.6		Brown, Peat				
4.0									
5.0									
					Same as above, Tan				
6.0					Same as above				
	3		2.4					6.4'	
7.0					Gray, Clay				
8.0									
9.0								9.0'	
					Boring Terminated @ 9'				
10.0									
11.0									
12.0									
13.0									
14.0									
15.0									
16.0									
17.0									
18.0									

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-72

DELTA

PROJECT: RI/FS								Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds								
DELTA PROJECT NO: 8E0708524P								
DRILLING METHOD: DP					SAMPLER	BIT SIZE	CORE	CASING
DRILLING RIG: Geoprobe					3' Macro Core	2" OD	NA	NA	DATE:6/26/08
DRILLER: Paragon					INSPECTOR: Mark Schumacher			

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		3.0		Organics and Sediment mixture	
1.0						
2.0						
3.0					3.0'	
	2		3.0		Brown, Peat	
4.0						
5.0						
					Same as above, Tan	
6.0					Same as above	
	3		3.0			
7.0						
					7.7'	
8.0					Gray, Clay	
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-73

DELTA

PROJECT: RI/FS						Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds						
DELTA PROJECT NO: 8E0708524P						
DRILLING METHOD: DP		SAMPLER	BIT SIZE	CORE	CASING	
DRILLING RIG: Geoprobe		3' Macro Core	2" OD	NA	NA	DATE:6/26/08
DRILLER: Paragon		INSPECTOR: Mark Schumacher				

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		2.4		Peat, Organics and Sediment mixture	
1.0						
2.0						
3.0					3.0'	
	2		3.0		Brown, Peat	
4.0						
5.0						
6.0					Same as above	
	3		3.0			
7.0						
					7.8'	
8.0					Gray, Clay	
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

DELTA CONSULTANTS
TEST BORING LOG
BORING NO.: SED-74

DELTA

PROJECT: RI/FS						Sheet 1 of 1
CLIENT: Cooper Crouse-Hinds						
DELTA PROJECT NO: 8E0708524P						
DRILLING METHOD: DP			SAMPLER	BIT SIZE	CORE	CASING
DRILLING RIG: Geoprobe			3' Macro Core	2" OD	NA	NA	DATE:6/26/08
DRILLER: Paragon			INSPECTOR: Mark Schumacher			

DEPTH IN FT.	SAMPLE NO.	BLOWS PER 6"	REC.	PID READING (ppm)	SOIL DESCRIPTION	REMARKS
	1		3.0		Peat, Organics and Sediment mixture	
1.0						
2.0						
3.0					3.0'	
	2		3.0		Brown, Peat	
4.0						
5.0						
6.0					Same as above	
	3		2.0			
7.0					7.3'	
					Gray, Clay	
8.0						
9.0					9.0'	
					Boring Terminated @ 9'	
10.0						
11.0						
12.0						
13.0						
14.0						
15.0						
16.0						
17.0						
18.0						

Table 8. Landfill Volumes Summary

South Landfill				
EXPORT VOLUME LOCATION	VOLUME (CU. FT.)			
TP-42	40,947			
TP-59	18,019			
TP-43	25,499			
TP-60	16,384			
TP-44	29,272			
TP-61	17,486			
TP-45	32,354			
TP-62	19,881			
TP-46	28,189			
TP-63	13,818			
TP-47	17,215			
TP-64	17,106			
TP-48	34,600			
TP-65	18,018	CF SUM	CY SUM	
TP-66	21,177	349,965	12,962	
TP-52	19,091			
TP-51	24,780			
TP-53	51,827			
TP-54	43,687			
TP-13	32,509			
TP-55	46,902			
TP-56	61,767			
TP-12	81,326			
TP-57	38,826			
TP-58	34,372	CF SUM	CY SUM	
TP-38	40,250	475,337	17,605	
A	8,011			
B	15,421			
C	6,068			
D	62,457			
E	15,009			
F	16,251			
G	52,321			
H	74,598			
I	381,389			
J	20,728	CF SUM	CY SUM	
K	4,699	656,952	24,332	
NWC	7,905			
TP-41	52,527			
TP-40	37,423			
TP-19	21,845			IMPORT
TP-39	56,201			FILL
NE STRIP	32,316	CF SUM	CY SUM	CY SUM
NEC	88,291	296,508	10,982	41,549
EXPORT VOLUME TOTAL	1,778,762			
PRESENT CAP VOLUME ABOVE ELEVATION 370'	891,784			
SUM TOTAL VOLUME UNDER CAP at 370' (CU.FT.)	2,670,546			
CAP AREA (SQ.FT.)	431,590	SQYD	47954	
CAP MATERIAL VOLUME AT 1.5-FOOT THICKNESS (CU.FT.)	647,385			
SUM TOTAL VOLUME INCLUDING CAP MATERIAL VOLUME (CU.FT.)	3,317,931			
CAP HEIGHT (FT) IF VOL = (1/3*AREA *H)	23			
AVERAGE SLOPE WITH RADIUS = 270 FT. (4% < SLOPE< 33%)	9%			
IF BASE ELEVATION LOWERED TO ELEVATION 369' ADDED VOLUME (CU.FT.)	431,590			
NEW HEIGHT (FT)	26			
NEW SLOPE	10%			
IF BASE ELEVATION LOWERED TO ELEVATION 368' ADDED VOLUME (CU.FT.)	431,590			
NEW HEIGHT (FT)	29			
NEW SLOPE	11%			

Cap Height of 29'
(368' + 29' = 397') Used in AutoCAD
To Generate Finish Cap Surface Contours

North Landfill					
EXPORT VOLUME LOCATION	VOLUME (CU. FT.)				
TP-21	47,362				
TP-20	56,098				
TP-37	86,980				
TP-92	24,570				
TP-36	44,745				
TP-91	40,612				
TP-35	11,037				
TP-89	11,421				
TP-88	49,918				
TP-34	10,628				
TP-87	12,987				
TP-83	18,118				
TP-80	21,497				
TP-78	14,709				
TP-33	15,244				
TP-77	6,280				
TP-82	10,570				
TP-81	23,662	CF SUM	CY SUM		
TP-79	37,744	544,182	20,155		
TP-24	26,568				
TP-75	13,255				
TP-74	19,006				
TP-25	13,220				
TP-73	8,382				
TP-OW-1	11,410				
TP-OW-2	5,424				
TP-72	18,743				
TP-26	38,088				
TP-70	16,111				
TP-27	14,813	CF SUM	CY SUM		
TP-69	45,474	230,494	8,537		
TP-28	0				
TP-29	0	Replaced With			
TP-30	0	Sheet Pile			
TP-94	0				
TP-32	0				
TP-23	39,978	CF SUM	CY SUM		
TP-22	120,615	160,593	5,948		
A (WL B)	9,508				
B	54,891				
C	1,026				
D	2,241				
E	628				
F	1,323				IMPORT
G	2,322				FILL
H	15,911	CF SUM	CY SUM		CY SUM
I	17,301	105,151	3,894		34,846
SED-98	4,124	CF SUM	CY SUM		
SED-99	1,459	5,583	207		
A (WL A)	2,539				
B	4,254				
C	7,323				
D	7,645				
E	7,002				
F	9,346				
G	8,889				
H	8,054				
I	24,931				
J	13,264				
K	1,242				
L	5,238				
M	32,616				
N	11,799				
O	22,680				
P	5,157				
Q	24,813				
R	17,199				
S	2,823				
T	6,912				
U	5,407	CF SUM	CY SUM		
V	2,023	231,156	8,561		
EXPORT VOLUME TOTAL	1,277,159				
LESS TSCA OFF SITE CELLS	0	TSCA Cells Removed Prior			
EXPORT CAP TOTAL	1,277,159				
PRESENT CAP VOLUME ABOVE ELEVATION 369'	2,589,218				
SUM TOTAL VOLUME UNDER CAP (CU.FT.)	3,866,377				
CAP AREA (SQ.FT.)	541,513	SQYD	60168		
CAP MATERIAL VOLUME AT 1.5-FOOT THICKNESS (CU.FT.)	812,270				
SUM TOTAL VOLUME INCLUDING CAP MATERIAL VOLUME (CU.FT.)	4,678,647				
CAP HEIGHT (FT) IF VOL = (1/3*AREA *H)	26	Cap Height of 26' Used in AutoCAD To Generate Finish Cap Surface Contours			
AVERAGE SLOPE WITH MAX RADIUS = 542 FT. (4% < SLOPE< 33%)	4.8%				
PER CURRENT DRAWING, MINIMUM SLOPE WITH RADIUS = 508 FT	5%				
PER CURRENT DRAWING, MAXIMUM SLOPE WITH RADIUS = 280 FT	9%				

APPENDIXA

2012 TRAFFIC SURVEY MEMORANDUM

TETRA TECH

MEMO

To:	Dan Morgan
Cc:	
From:	Drew Lent
Date:	Thursday, December 06, 2012
Subject:	Cooper Crouse Hinds, Syracuse New York Construction Traffic Analysis Tetra Tech, Inc. Project # 194-8168

This memorandum provides the results of the construction traffic analysis conducted at the Cooper Crouse Hinds inactive hazardous waste site located at 635 North 7th Street, in Syracuse, New York. The analysis was requested by Dan Morgan on October 31, 2012. The field evaluation portion of the construction traffic analysis was conducted on Thursday, November 15, 2012 and Monday, December 3, 2012 in general accordance with Task 7 of the subject Scope of Work with one exception. The height of the bridge at North 7th Street east of the Site was not measured since large trucks regularly pass beneath this bridge. An independent traffic analysis was being conducted by the New York State Department of Transportation at the intersection of North 7th Street (County Route 45) and Hiawatha Boulevard east of the Site on November 15, 2012.

A morning peak traffic vehicle count was conducted on Thursday, November 15th from 7:05 A.M. to 9:05 A.M. at the North Landfill construction entrance. The weather was sunny and cold with a temperature in the 20's during the count. A total of 153 trucks and buses and 1,414 passenger vehicles passed the construction entrance on North 7th Street during the study interval. A grand total of 1,567 vehicles crossed the North Landfill construction entrance, which corresponds to a morning peak traffic rate of approximately 13.1 vehicles a minute. A majority of the traffic was travelling eastbound on North 7th Street during the study interval. One bicycle and two pedestrians also crossed the construction entrance during the analysis.

An afternoon peak traffic vehicle count was conducted on Monday, December 3rd from 4:00 P.M. to 6:00 P.M. at the North Landfill construction entrance. The weather was sunny and mild with a temperature in the upper 40's during the analysis. A total of 58 trucks and buses and 1,815 passenger vehicles passed the construction entrance on North 7th Street during the study interval. A grand total of 1,873 vehicles crossed the North Landfill construction entrance, which corresponds to an afternoon peak traffic rate of approximately 15.6 vehicles a minute. A majority of the traffic was travelling westbound on North 7th Street during the study interval. Two bicycles and one pedestrian also crossed the construction entrance during the analysis.

Tetra Tech, Inc.
1000 Pittsford-Victor Road, Pittsford, NY 14534
Tel 585.899.6183 ext. 224 Fax 585.899.6184 www.tetratech.com

The nearest divided highway to the Site is Interstate 81 located approximately 1,500 feet west of the North Landfill construction entrance. There are two traffic control structures between the North Landfill construction entrance and Interstate 81. The first traffic control structure is a traffic light at the intersection of North 7th Street and Terminal Road approximately 1,000 feet west of the Site. A photograph of the traffic light is provided below.

Traffic light at Terminal Road and North 7th Street

The next traffic control feature is a traffic light at the intersection of the Interstate 81 ramp and North 7th Street. This intersection maintains a turning lane for traffic entering or exiting Interstate 81. A photograph of the traffic light is provided below.

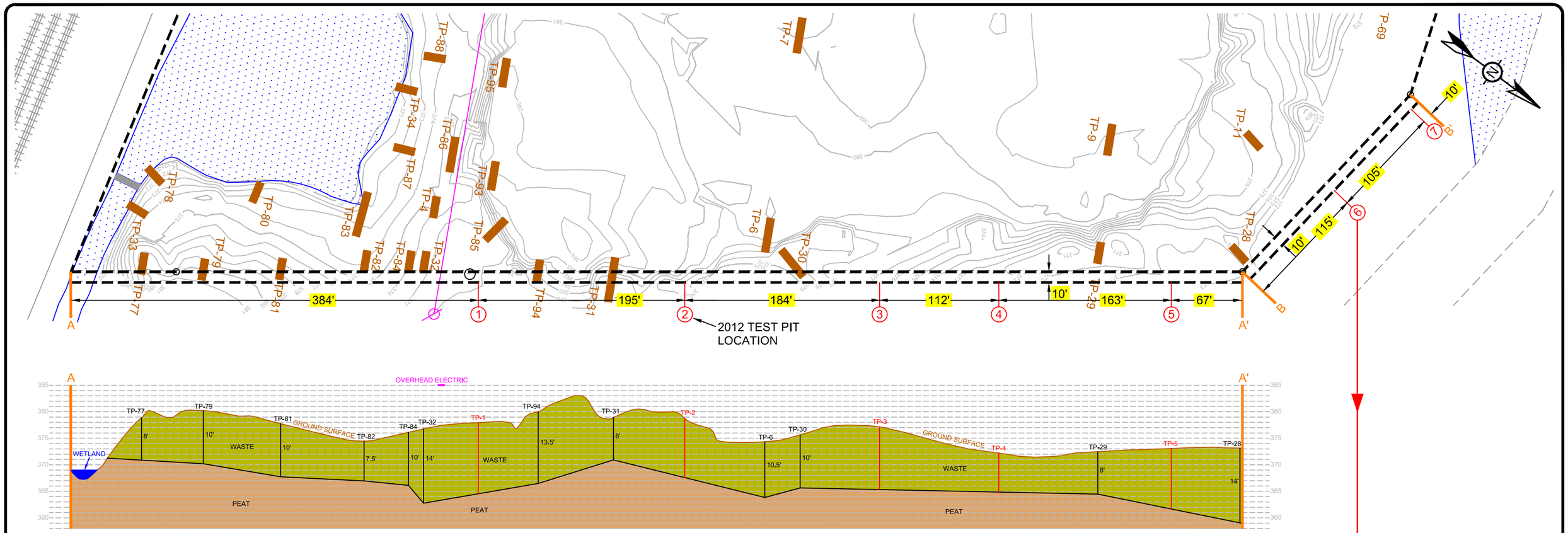
Traffic light at North 7th Street and Interstate 81

The nearest bridge to the Site is the CSX/Amtrak railroad bridge located immediately to the east. There are no markings on the bridge indicating it clearance height. During the waste removal effort I observed many vehicles passing beneath this bridge without difficulty. Attached is a photograph of a garbage truck passing beneath the CSX/Amtrak Bridge.

CSX/Amtrak Bridge East of the Site

APPENDIX B

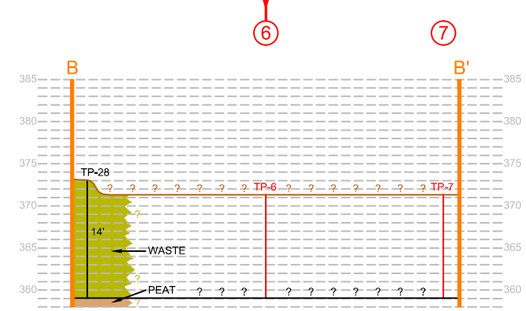
2012 PLAZA EAST TEST PITS
ALONG NORTH LANDFILL BOUNDARY



NOTES:

①-⑦: DIG 2012 TEST PITS 10' NORTH OF PROPERTY BOUNDARY AT LOCATIONS SHOWN.

RECORD A - DEPTH OF COVER SOIL
B - DEPTH (THICKNESS) OF WASTE
C - DEPTH TO PEAT LAYER SURFACE



0 90 180

SCALE IN FEET

5x VERTICAL EXAGGERATION

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY WASTE PROFILES

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN	FIGURE:
DRAFTED	HJW	1
PROJECT	117-2202046	
DATE	11/19/12	

S:\CAD\COOPER\SYRACUSE\11-14-12\WASTE PROFILE.DWG

TETRA TECH, INC.
TEST PIT/TRENCH LOG

Project: Cooper Crouse Hinds North Landfill: Syracuse NY

Project Number 194-8168

Test Pit No.: PETP-1

Start Time: 0850

End Time: 0920

Weather: Cloudy 30's

Date: November 27, 2012

Final Length: 20 feet

Water Seepage (ft) 7'

Surface Conditions: Rough cleared

Geologist: Drew Lent

Final Depth: 8.3 feet

Pit Orientation:

Final Width: 3 feet

S

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Depth in Feet	Description of Material	PID/ FID
0 – 1.5	Mostly black with little sulfur yellow and gray patches well sorted, rounded foundry sand, little wood, trace wire cable and a mountain dew soda can - Fill Material	Foundry Sand Fill material from 0-5' PID 0.7ppm
1.5 – 3		
3 – 4.5		
4.5 – 6	Loose and stiff red-brown Clay some silt, trace sand - Relocated lodgement till	Landfill Cover Material from 5-7'
6 – 7.5	Municipal Solid Waste containing glass, plastic paper and other solid waste, wet	Municipal Solid Waste from 7-8' Newspaper dated 11/5/70 in waste
7.5 – 9	Dark Brown-Black Peat	Native Peat moist at 8' PID 0.3ppm
9 – 10.5		

VERTICAL SCALE Depth in Feet

FT. 4 8 12 16 20

HORIZONTAL SCALE

Notes:

Base of test pit completed at 8.3 feet. Test pit completed 10 - 31.5' north of North landfill property boundry on Plaza East property

TETRA TECH, INC.
TEST PIT/TRENCH LOG

Project: Cooper Crouse Hinds North Landfill: Syracuse NY

Project Number 194-8168

Test Pit No.: PETP-2

Start Time: 0925

End Time: 0950

Weather: Cloudy 30's

Date: November 27, 2012

Final Length: 20 feet

Water Seepage (ft): 6

Surface Conditions: Rough cleared

Geologist: Drew Lent

Final Depth: 14 feet

Pit Orientation:

Final Width: 3 feet

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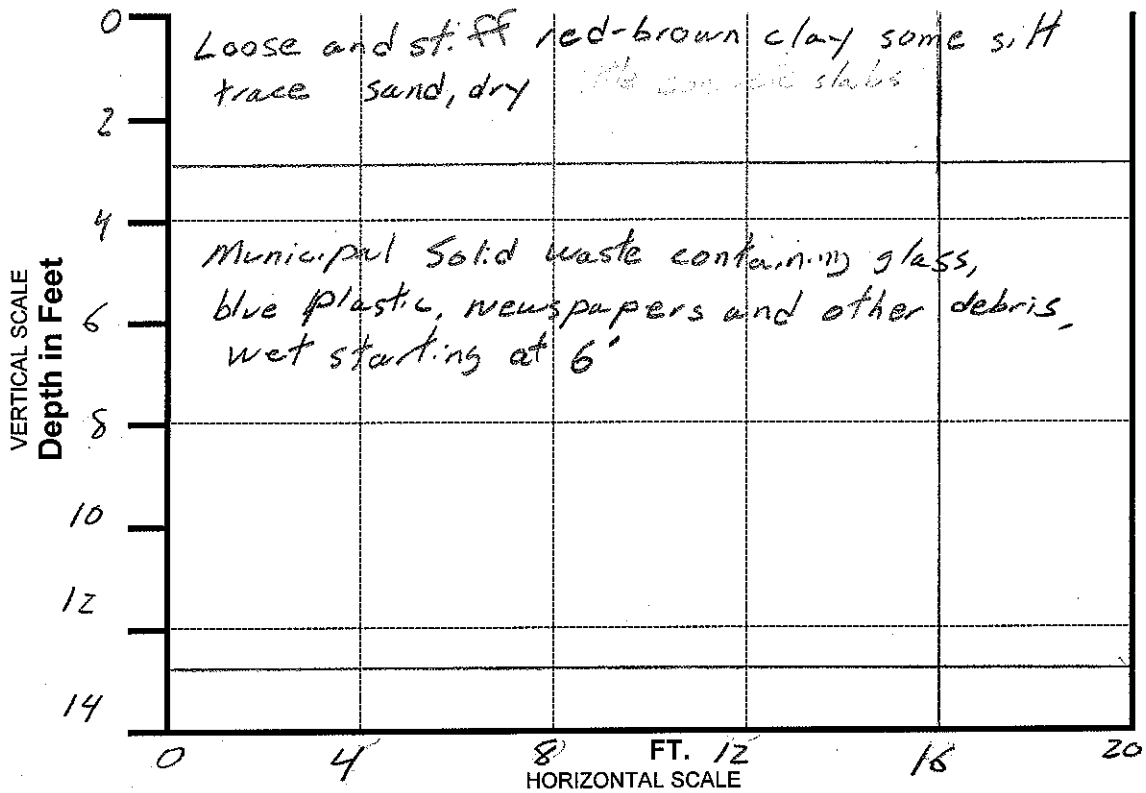

Description of Material	PID/ FID
0-3' Landfill Cover Material	0.1ppm
3-13' Black Municipal Solid Waste Newspaper dated 11/9/69 in waste	0.1ppm
@13' Dark Brown - Grayish Black Peat	<0.1ppm

Notes:

Test pit completed 10-30' north of the North Landfill property line.
Base of test pit completed to 14 feet

TETRA TECH, INC.
TEST PIT/TRENCH LOG

Project: Cooper Crouse Hinds North Landfill: Syracuse NY

Project Number 194-8168

Test Pit No.: PETP-3

Start Time: 1000

End Time: 1040

Weather: Cloudy 30's

Date: November 27, 2012

Final Length: 20 feet

Water Seepage (ft): 8

Surface Conditions: Rough cleared

Geologist: Drew Lent

Final Depth: 13 feet

Pit Orientation:

Final Width: 3 feet

S

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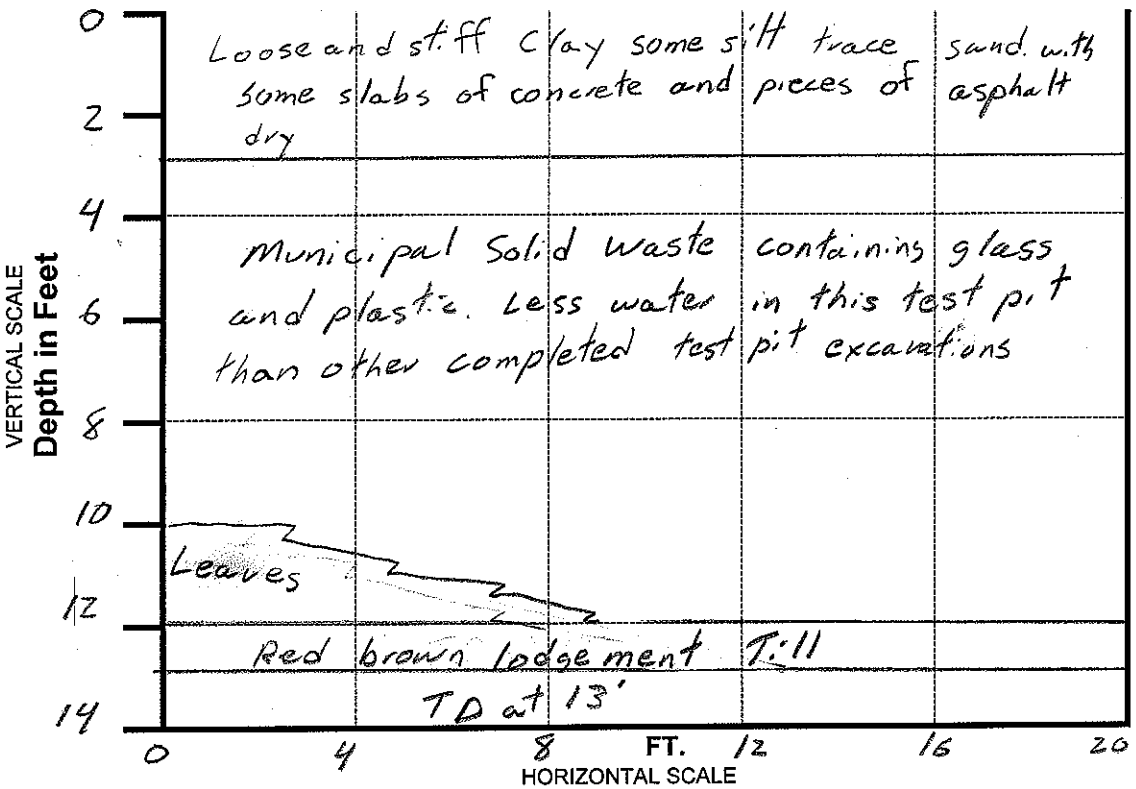

Description of Material	PID/ FID
0-3' Landfill cover material	
3-12' Black Municipal Solid waste	1.2ppm
@12' Reddish-Brown, very stiff Clay little medium sand (greenish), trace cobble - Lodgement Till	0.2ppm

Notes:

Test pit completed ~10-30' north of the North Landfill property line.
Base of test pit completed at 13 feet.

TETRA TECH, INC.
TEST PIT/TRENCH LOG

Project: Cooper Crouse Hinds North Landfill: Syracuse NY

Project Number 194-8168

Test Pit No.: PETP-4

Date November 27, 2012

Geologist: Drew Lent

Pit Orientation:

Start Time: 1045

Final Length: 20 feet

Final Depth: 12 feet

Final Width: 3 feet

End Time: 1115

Water Seepage (ft) 9

Weather: Cloudy 30's

Surface Conditions: Rough cleared

S N

VERTICAL SCALE Depth in Feet

0 2 4 6 8 10 12 14

Red-brown Clay some silt trace fine sand. Landfill Cover Material

Municipal Solid Waste containing glass, plastic, metal, wood, a tire and a refridgerator

Very stiff, mottled Red-gray Clay trace medium sand (greenish) dry

0 4 8 FT. 12 16 20

HORIZONTAL SCALE

Description of Material	PID/ FID
0-2.8 feet Red-brown Clayey Landfill Cover Material	
2.8-11.5 feet Municipal Solid Waste	0.1ppm
@11.5' Native Clay, dry	0.1ppm

Notes: Test pit excavation completed 10-30' north of the north landfill property line. The metal refridgerator was removed from the waste and placed in the scrap metal pile. Test pit completed to a depth of 12'

TETRA TECH, INC.
TEST PIT/TRENCH LOG

Project: Cooper Crouse Hinds North Landfill: Syracuse NY

Project Number 194-8168

Test Pit No.: PETP-5

Start Time: 1120

End Time: 1145

Weather: Cloudy 30's

Date: November 27, 2012

Final Length: 20 feet

Water Seepage (ft) 3'

Surface Conditions: Rough cleared

Geologist: Drew Lent

Final Depth:

Pit Orientation:

Final Width: 3 feet

S

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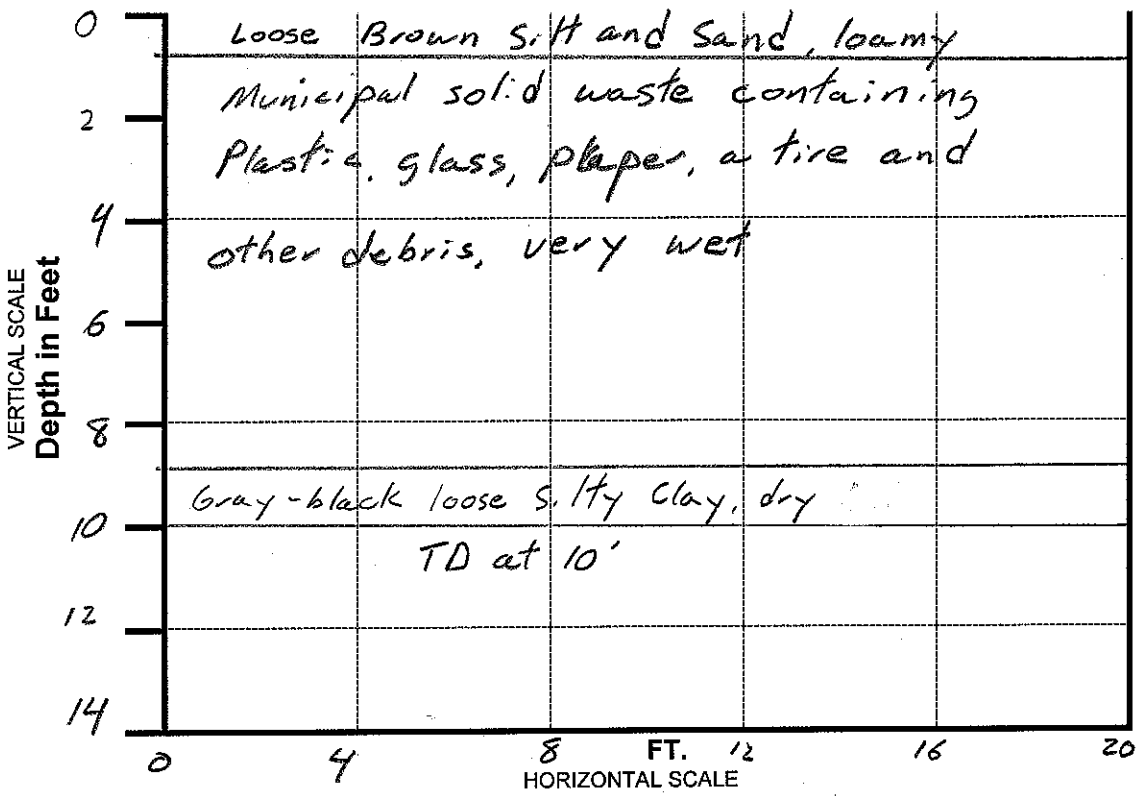


Description of Material	PID/ FID
0-1 feet Landfill Cover Loam	
1-9 feet Black Municipal Solid waste very wet	0.1 ppm
@ 9' Native Silty Clay, dry	

Notes:

Test pit excavation completed 10-30 feet north of the north landfill property line. Test pit completed to a depth of 10'

TETRA TECH, INC.
TEST PIT/TRENCH LOG

Project: Cooper Crouse Hinds North Landfill: Syracuse NY

Project Number 194-8168

Test Pit No.: PETP-6

Date November 27, 2012

Geologist: Drew Lent

Pit Orientation:

Start Time: 1150

Final Length: 20 feet

Final Depth: 4 feet

Final Width: 3 feet

End Time: 1205

Water Seepage (ft) 4'

Weather: Cloudy 30's

Surface Conditions: Rough cleared

S | N

VERTICAL SCALE Depth in Feet: 0, 1, 2, 3, 4, 5, 6, 7

0-2.3' Loose, stiff Red-brown mottled clay little silt, trace fine sand - Landfill Cover material

2.3-3.3' Loose Brown Sand little clay with roots - Fill Material

4-6.5' Black Municipal Solid Waste with glass, plastic, paper and other debris, wet - Newspaper dated 4/21/69

@6.5' Native Steel Gray-Black Silty Clay, loose

FT. 0, 4, 8, 12, 16, 20

HORIZONTAL SCALE

Description of Material	PID/ FID
0-2.3' Landfill Cover Material	
2.3-3.3' Brown sandy fill; maybe an older generation cover material	0.2ppm
4-6.5' Black Municipal Solid Waste wet.	0.2ppm
@6.5' Native silty Clay, moist	0.1ppm

Notes:

Test pit completed 0-20 feet north of the North Landfill property line

Test pit completed to a depth of 7 feet.

TETRA TECH, INC.
TEST PIT/TRENCH LOG

Project: Cooper Crouse Hinds North Landfill: Syracuse NY

Project Number 194-8168

Test Pit No.: PETP-7

Date: November 27, 2012

Geologist: Drew Lent

Pit Orientation:

Start Time: 1210

Final Length: 20 feet

Final Depth:

Final Width: 3 feet

End Time: 1230

Water Seepage (ft)

Weather: Cloudy 30's

Surface Conditions: Rough cleared

S

N

VERTICAL SCALE
Depth in Feet

0 1 2 3 4 5 6 7

Loose Red-brown Clayey Silt, dry - Landfill Cover

Municipal Solid waste containing glass, plastic paper and other debris, dry

Light black Clayey peat with roots and organic matter, moist Snail shell encountered

TD at 6.5 feet

0 4 8 12 16 20

FT.

HORIZONTAL SCALE

Description of Material	PID/ FID
0-1' Landfill Cover Material	
1-5.5' Municipal Solid Waste	0.1ppm
@ 5.5' Native Clayey Peat	0.1ppm

Notes:

Test pit excavation completed 0-20' North of the North Landfill property line. Test pit excavation completion depth is 6.5 feet.

APPENDIX C

SEPTEMBER 17, 2013 ACOE LETTER, NWP 38, AND COMPLIANCE CERTIFICATION

DEPARTMENT OF THE ARMY
BUFFALO DISTRICT, CORPS OF ENGINEERS
1776 NIAGARA STREET
BUFFALO, NEW YORK 14207-3199

PLEASE SIGN AND SUBMIT THE COMPLETION FORM ATTACHED TO THIS PERMIT

September 17, 2013

Regulatory Branch

SUBJECT: Transmittal of PROVISIONAL Department of the Army Permit No 2009-00241, Nationwide Permit No. 38 as Published in the Federal Register, Volume 77, No. 34, on Tuesday, February 21, 2012, New York State Department of Environmental Conservation No. 7-3148-00002/00081

Cooper Crouse Hinds Landfills
Wolf and 7th North Streets
Syracuse, New York 13221
Attn: Dan Morgen

Dear Mr. Morgen:

This pertains to your application for a Department of the Army permit to conduct remediation activities at the Cooper Crouse-Hinds Landfill 635 North 7th Street, Syracuse, Onondaga County, New York.

Approximately 118,378 cubic yards of contaminated material is proposed for removal. The New York State Department of Environmental Conservation (NYSDEC) has approved the plan and will oversee remediation activities and the disposal of the contaminated material.

The U.S. Army Corps of Engineers (USACE) regulatory responsibilities under Section 404 of the Clean Water Act (CWA) establish jurisdiction over the discharge of dredged or fill material into waters of the United States (WOUS), including wetlands. Further, the USACE has regulatory responsibilities for structures placed in, over, and under navigable waters as identified in Section 10 of the Rivers and Harbors Act (RHA).

I have determined that your project satisfies the terms and conditions of the attached Nationwide Permit (NWP). However, your project may not conform to all conditions contained in the New York State Department of Environmental Conservation (NYSDEC) Water Quality Certification (WQC) associated with this NWP.

Before you can commence work under this NWP you must obtain an activity specific WQC from the following NYSDEC Regional Office:

Regulatory Branch
SUBJECT: Application No. 2009-00241, Nationwide Permit No. 38 as Published in the Federal Register, Volume 77, No. 34, on Tuesday, February 21, 2012, New York State Department of Environmental Conservation No. 7-3148-00002/00081

Regional Permit Administrator
New York State Department of Environmental Conservation
Region 7
615 Erie Boulevard West
Syracuse, New York 13204
315-426-7438

Once you have successfully completed the State process, **you must forward a copy of the project specific WQC to this office**. Conditions contained in the project specific WQC will supersede the WQC conditions included in the attached NWP. If the project remains unchanged you may commence work under the attached NWP without any further coordination with this office. However, if your project is modified during the NYSDEC review you will need to contact this office to determine if the modified project is still authorized by the attached NWP. If this situation arises, you may need to furnish a revised permit application, and you may not commence work until you receive Department of the Army authorization.

This affirmation is limited to the attached NWP and associated WQC, and does not obviate the need to obtain any other project specific federal, state, or local authorization. Specifically, you may need to obtain Article 15 (Protection of Water), Article 24 (Freshwater Wetland), and/or Article 34 (Coastal Erosion Management) authorization from the NYSDEC.

Verification of the applicability of this NWP is valid until March 19, 2017 unless the NWP is modified, suspended, revoked, or the activity complies with any subsequent permit modification. Please note in accordance with 33 CFR part 330.6(b), that if you commence or are under contract to commence an activity in reliance of the permit prior to the date this Nationwide permit expires, is suspended or revoked, or is modified such that the activity no longer complies with the terms and conditions, you have twelve months from the date of permit modification, expiration, or revocation to complete the activity under the present terms and conditions of the permit, unless the permit has been subject to the provisions of discretionary authority.

It is your responsibility to remain informed of changes to the NWP program. A public notice announcing any changes will be issued when they occur and will be available for viewing at our website: http://www.lrb.usace.army.mil/Missions/Regulatory.aspx. Finally, note that if your activity is not undertaken within the defined period or the project specifications have changed, you must immediately notify this office to determine the need for further approval or reverification.

A Preliminary Jurisdictional Determination (JD) that confirmed the location and boundaries of waterbodies identified within the project boundary was issued on April 8, 2009.

A copy of this letter has been sent to Michael Noel, Tetra Tech.

Regulatory Branch
SUBJECT: Application No. 2009-00241, Nationwide Permit No. 38 as Published in the Federal Register, Volume 77, No. 34, on Tuesday, February 21, 2012, New York State Department of Environmental Conservation No. 7-3148-00002/00081

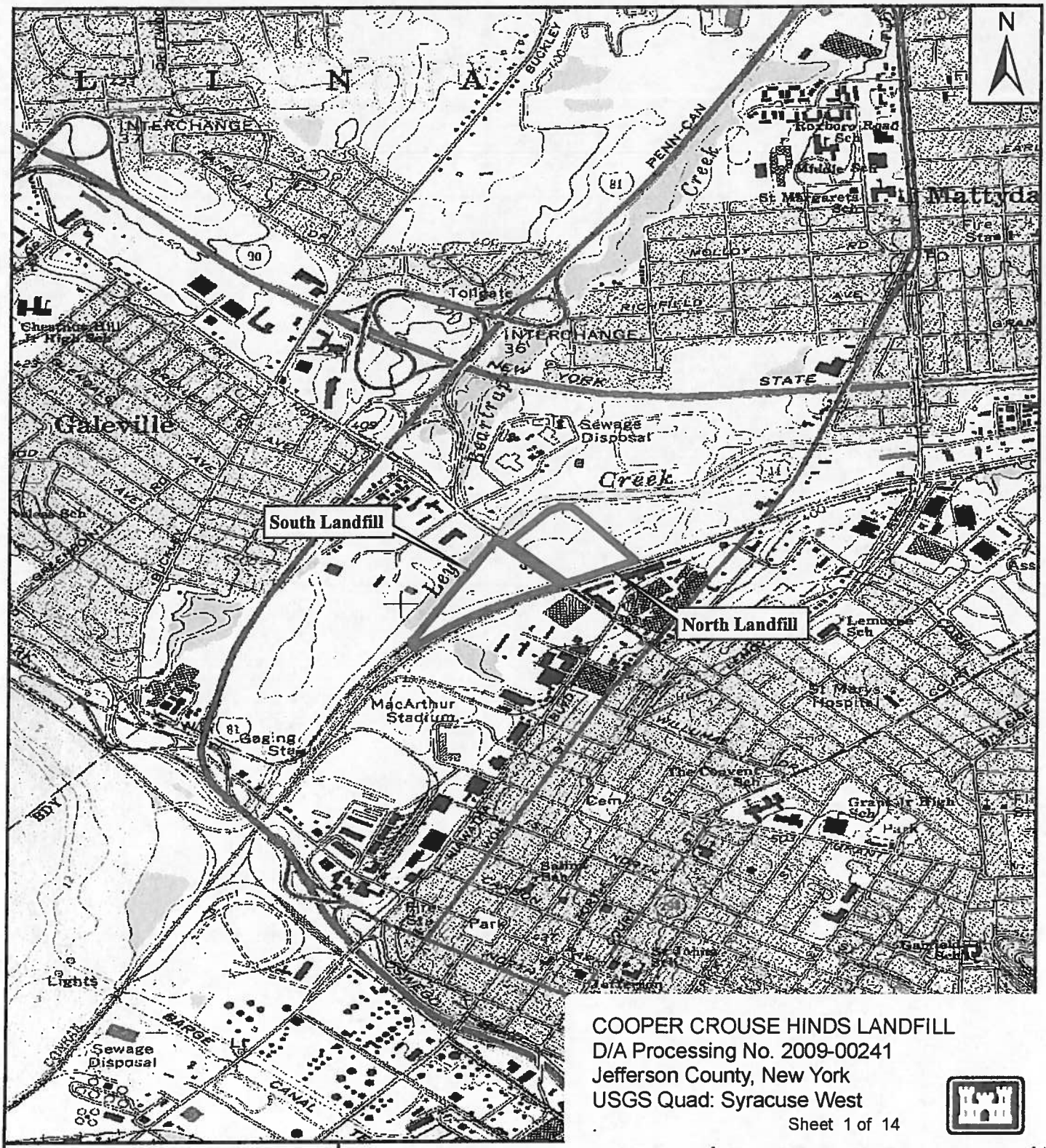
Questions pertaining to this matter should be directed to me at 315-704-0255, by writing to the following address: U.S. Army Corps of Engineers, 7413 County House Road, Auburn, New York 13021, or at judy.a.robinson@usace.army.mil

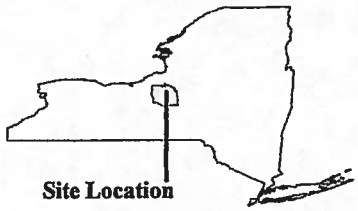
Sincerely,

SIGNED

Judy A. Robinson
Biologist

Enclosures





Source: USDA/NRCS - National Cartography & Geospatial Center; USDA-NRCS-NCGC Digital Raster Graphic MrSID Mosaic for Onondaga County, NY. Project Area on Syracuse West Quad.

Legend

Project Boundary

0 1,000 2,000 Feet

0 240 480 Meters

Figure 1. Project Location Map for the Cooper Crouse-Hinds North Landfill and South Landfill Project, Town of Salina, Onondaga County New York.

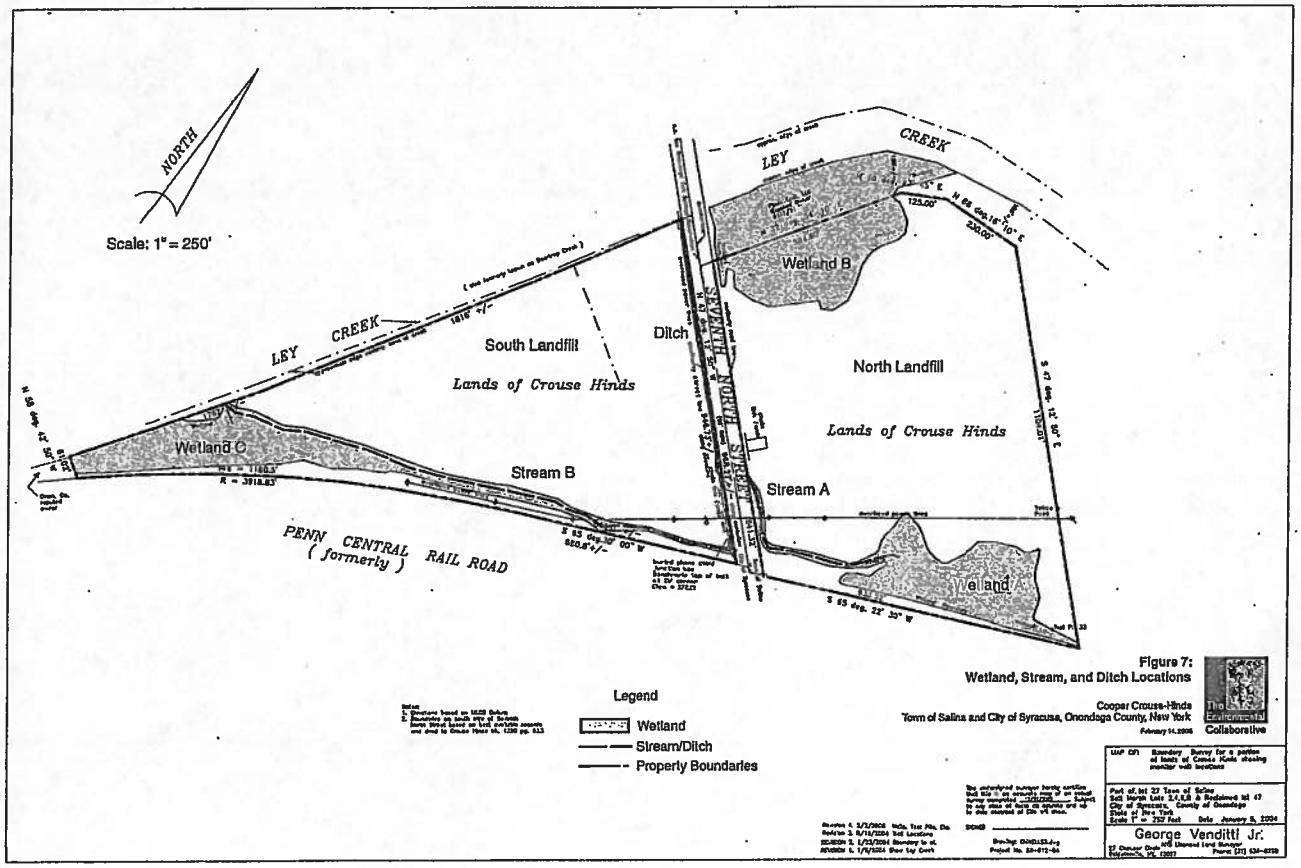
Prepared For: **Cooper Crouse-Hinds, LLC**

Prepared By: TETRA TECH

Date: **2/2013**

P:\GIS\Projects\112\C04844-Cooper\MXD\Figure1.

Wetland Delineation Map



COOPER CROUSE HINDS LANDFILL
D/A Processing No. 2009-00241
Jefferson County, New York
USGS Quad: Syracuse West

EXPLANATION

MW-3S — EXISTING SHALLOW AQUIFER MONITORING WELL. INSTALL STRAW BALES TO SURROUND WELL WITH ORANGE TRAFFIC CONES ON TOP - 2 CONES PER WELL. ABANDON / RECONSTRUCT AS DIRECTED BY ENGINEER

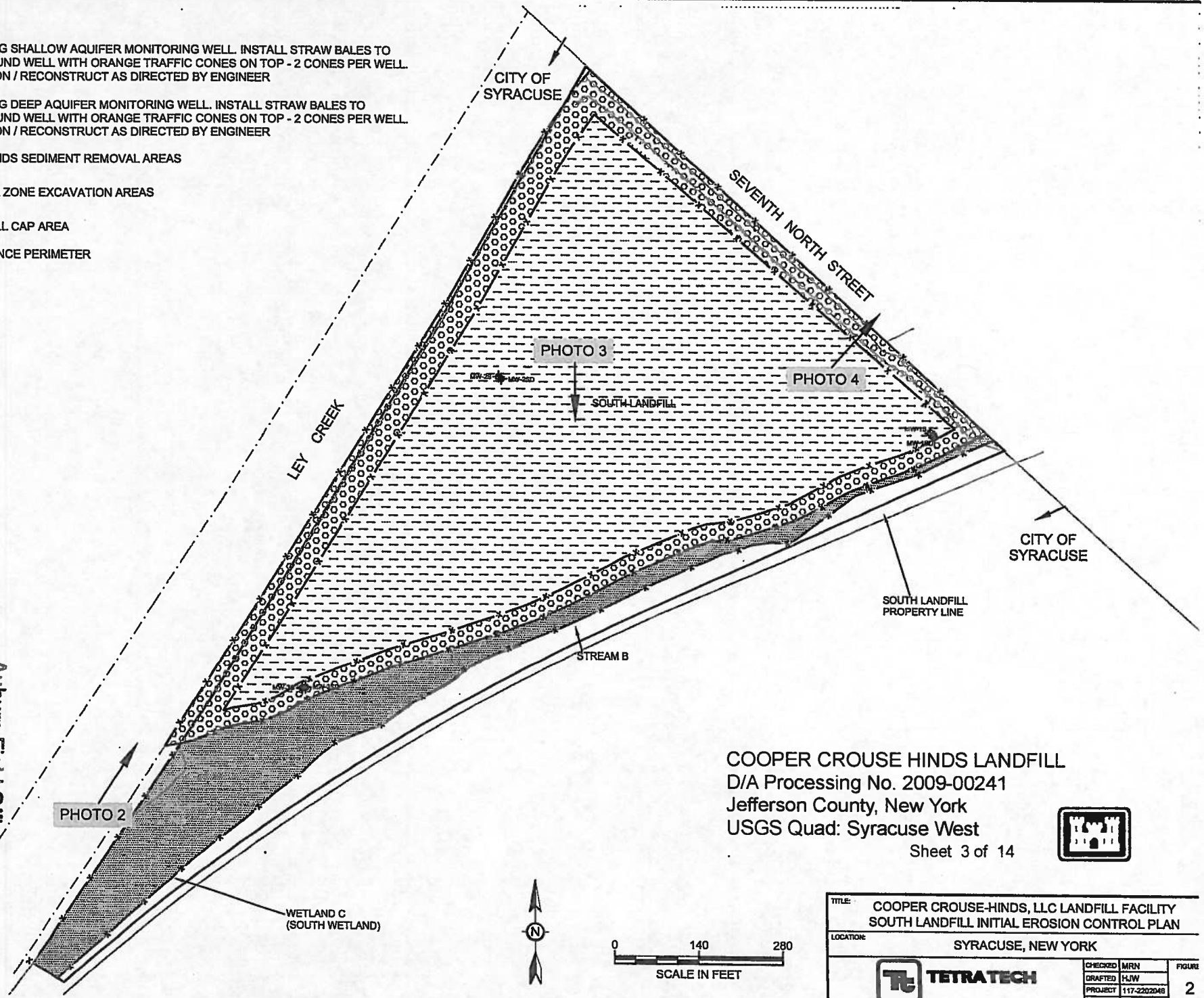
MW-3SD — EXISTING DEEP AQUIFER MONITORING WELL. INSTALL STRAW BALES TO SURROUND WELL WITH ORANGE TRAFFIC CONES ON TOP - 2 CONES PER WELL. ABANDON / RECONSTRUCT AS DIRECTED BY ENGINEER

WETLANDS SEDIMENT REMOVAL AREAS

BUFFER ZONE EXCAVATION AREAS

LANDFILL CAP AREA

-x-x-x-x- SILT FENCE PERIMETER



COOPER CROUSE HINDS LANDFILL
D/A Processing No. 2009-00241
Jefferson County, New York
USGS Quad: Syracuse West
Sheet 3 of 14

Auburn Field Office
Received
AUG 13 2013
USACE

TITLE: COOPER CROUSE-HINDS, LLC LANDFILL FACILITY
SOUTH LANDFILL INITIAL EROSION CONTROL PLAN

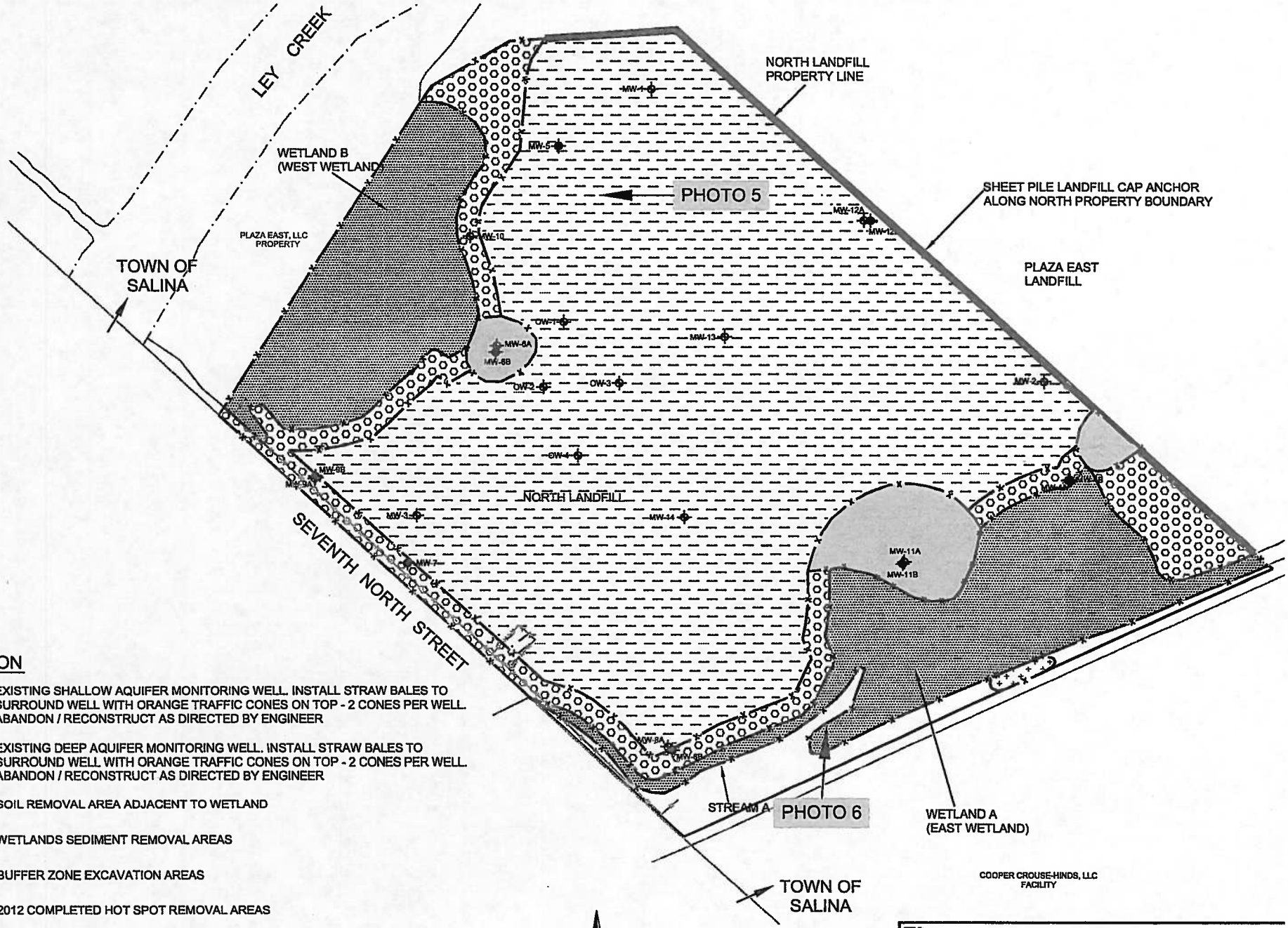
LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN	FIGURE
DRAFTED	HJW	2
PROJECT	117-2202048	
DATE	7/15/13	

S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\USACE\COE FIG3A.DWG

COOPER CROUSE HINDS LANDFILL
D/A Processing No. 2009-00241
Jefferson County, New York
USGS Quad: Syracuse West
Sheet 4 of 14



EXPLANATION

MW-3S — EXISTING SHALLOW AQUIFER MONITORING WELL. INSTALL STRAW BALES TO SURROUND WELL WITH ORANGE TRAFFIC CONES ON TOP - 2 CONES PER WELL. ABANDON / RECONSTRUCT AS DIRECTED BY ENGINEER

MW-3SD — EXISTING DEEP AQUIFER MONITORING WELL. INSTALL STRAW BALES TO SURROUND WELL WITH ORANGE TRAFFIC CONES ON TOP - 2 CONES PER WELL. ABANDON / RECONSTRUCT AS DIRECTED BY ENGINEER

SOIL REMOVAL AREA ADJACENT TO WETLAND

WETLANDS SEDIMENT REMOVAL AREAS

BUFFER ZONE EXCAVATION AREAS

2012 COMPLETED HOT SPOT REMOVAL AREAS

LANDFILL CAP AREA

-x-x-x-x- SILT FENCE PERIMETER

N

0 120 240
SCALE IN FEET

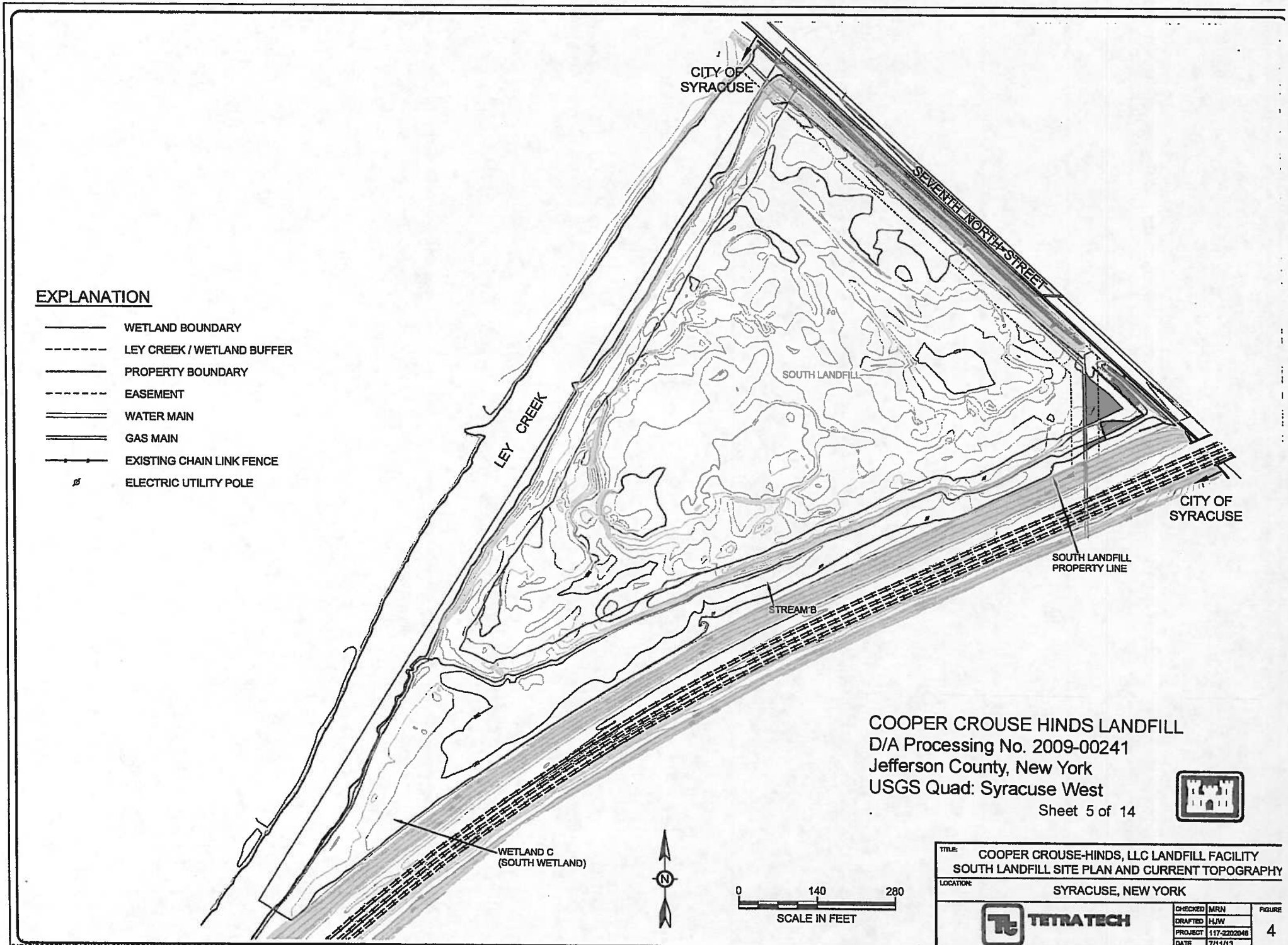
TITLE: COOPER CROUSE-HINDS, LLC LANDFILL FACILITY
NORTH LANDFILL INITIAL EROSION CONTROL PLAN

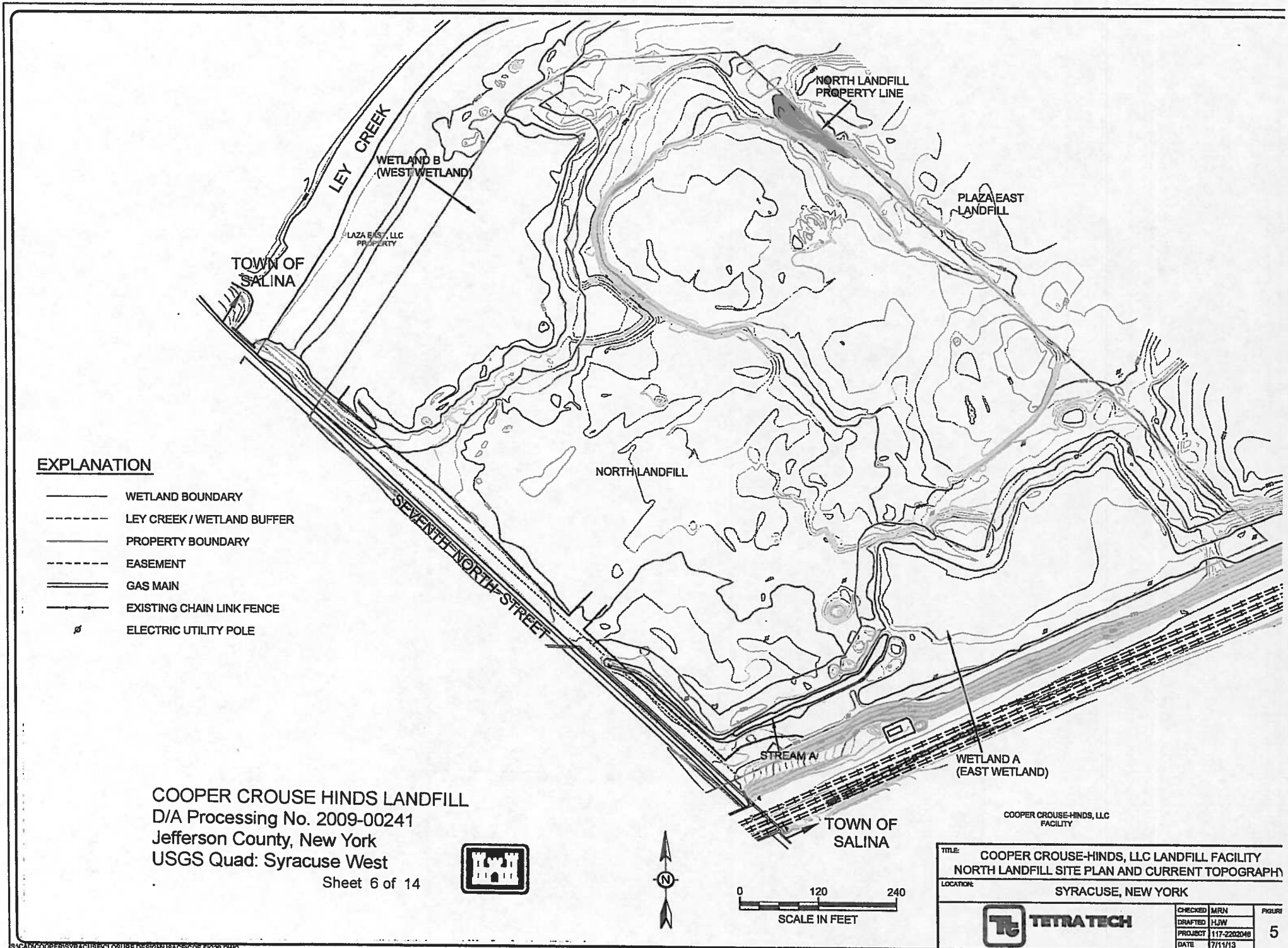
LOCATION: SYRACUSE, NEW YORK

TETRATECH

CHECKED	MRN	FIGURE
DRAFTED	HJW	3
PROJECT	117-2202046	
DATE	7/15/13	

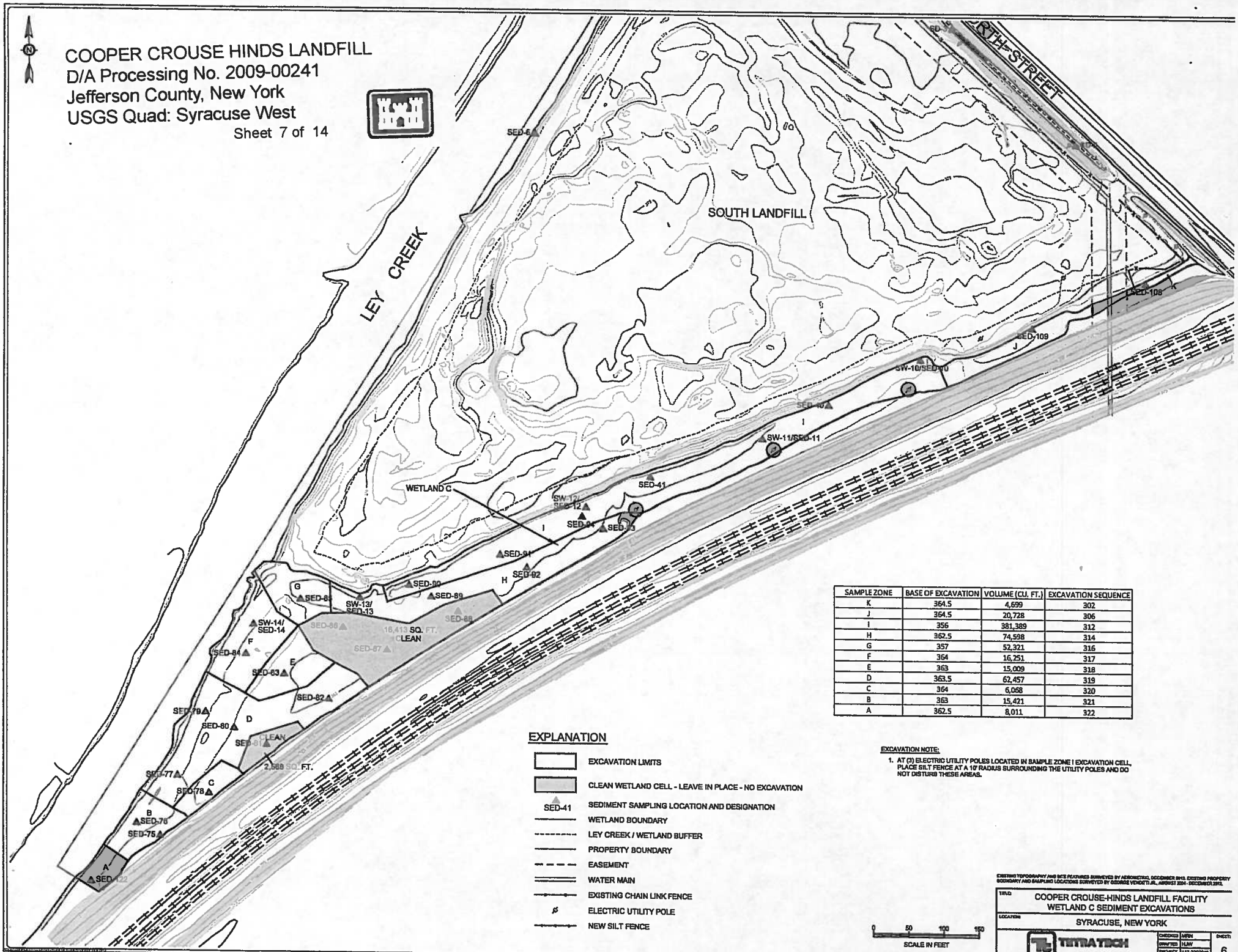
S:\CAD\COOPER\SYRACUSE\CLOSURE\DESIGN\USACE\CDF_FIG3B.DWG


EXPLANATION
WETLAND BOUNDARY
LEY CREEK / WETLAND BUFFER
PROPERTY BOUNDARY
EASEMENT
WATER MAIN
GAS MAIN
EXISTING CHAIN LINK FENCE
ELECTRIC UTILITY POLE
CITY OF SYRACUSE
SEVENTH NORTH STREET
SOUTH LANDFILL
LEY CREEK
CITY OF SYRACUSE
SOUTH LANDFILL PROPERTY LINE
STREAM B
WETLAND C (SOUTH WETLAND)
N
0
140
280
SCALE IN FEET
COOPER CROUSE HINDS LANDFILL
D/A Processing No. 2009-00241
Jefferson County, New York
USGS Quad: Syracuse West
Sheet 5 of 14
TITLE: COOPER CROUSE-HINDS, LLC LANDFILL FACILITY
SOUTH LANDFILL SITE PLAN AND CURRENT TOPOGRAPHY
LOCATION: SYRACUSE, NEW YORK
TETRA TECH
CHECKED MRN
DRAFTED HJW
PROJECT 117-2202046
DATE 7/11/13
FIGURE 4
S:\CADD\COOPER\SYRACUSE\CLOSURE DESIGN\USACE\COE FIG2A.DWG



COOPER CROUSE HINDS LANDFILL
D/A Processing No. 2009-00241
Jefferson County, New York
USGS Quad: Syracuse West
Sheet 6 of 14

COOPER CROUSE HINDS LANDFILL
D/A Processing No. 2009-00241
Jefferson County, New York
USGS Quad: Syracuse West
Sheet 7 of 14



SAMPLE ZONE	BASE OF EXCAVATION	VOLUME (CU. FT.)	EXCAVATION SEQUENCE
K	364.5	4,699	302
J	364.5	20,728	306
I	356	381,389	312
H	362.5	74,598	314
G	357	52,321	316
F	364	16,251	317
E	363	15,009	318
D	363.5	62,457	319
C	364	6,068	320
B	363	15,421	321
A	362.5	8,011	322

EXCAVATION NOTE:

1. AT (3) ELECTRIC UTILITY POLES LOCATED IN SAMPLE ZONE I EXCAVATION CELL, PLACE SILT FENCE AT A 10' RADIUS SURROUNDING THE UTILITY POLES AND DO NOT DISTURB THESE AREAS.

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2013. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDETTI JR., AUGUST 2004 - DECEMBER 2013.

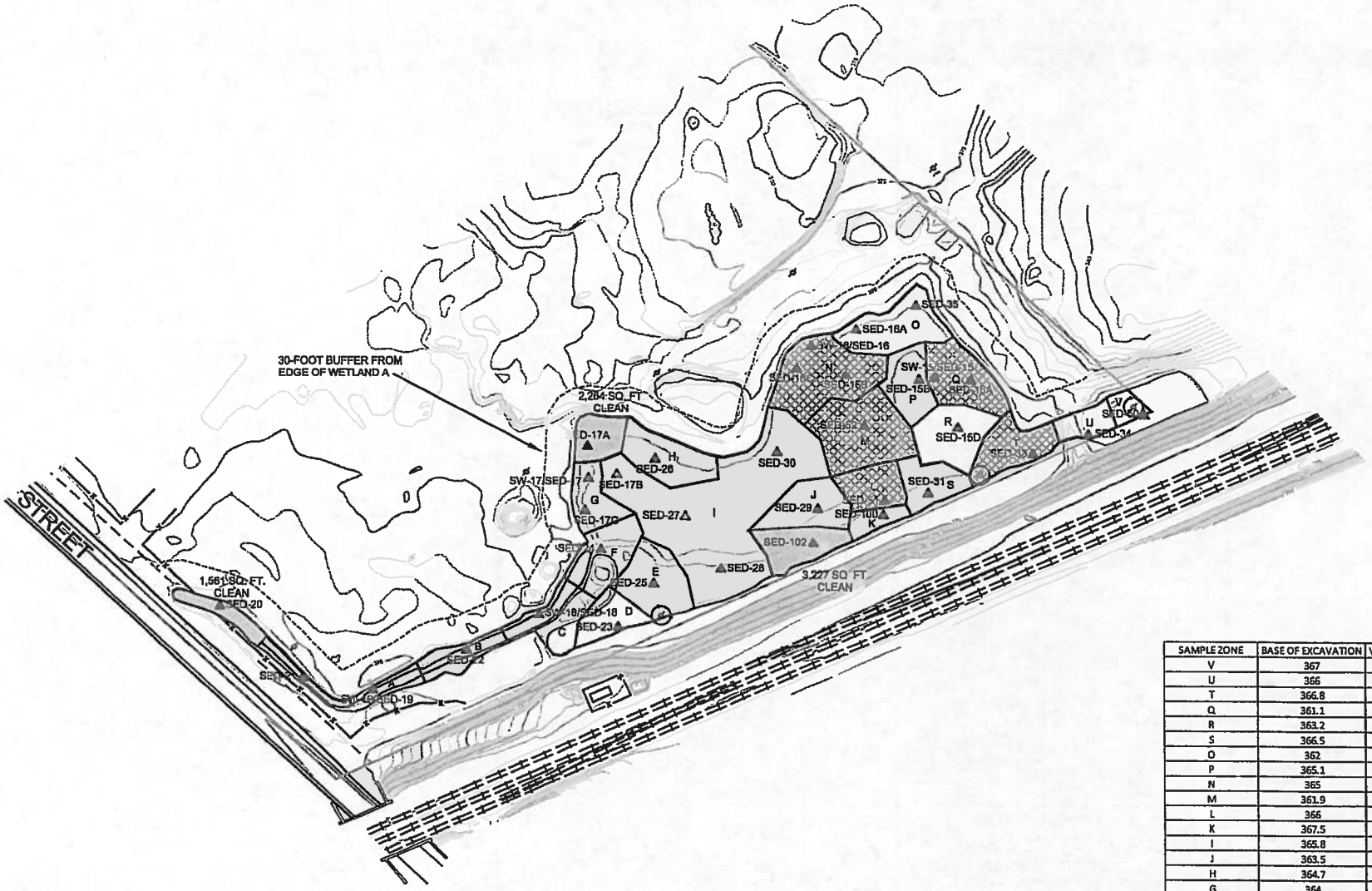
TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
WETLAND C SEDIMENT EXCAVATIONS

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED: MRN
DRAFTED: HJW
PROJECT: 117-2202049
DATE: 7/18/13

SHEET: 6



SAMPLE ZONE	BASE OF EXCAVATION	VOLUME (CU. FT.)	EXCAVATION SEQUENCE
V	367	2,023	605
U	366	5,407	607
T	366.8	7,111	609
Q	361.1	26,387	611
R	363.2	17,383	612
S	366.5	2,823	613
O	362	24,017	617
P	365.1	6,504	618
N	365	13,733	621
M	361.9	33,687	622
L	366	5,673	623
K	367.5	1,291	624
I	365.8	24,931	628
J	363.5	13,264	629
H	364.7	8,054	631
G	364	8,889	633
F	365.5	9,346	635
E	366.7	7,002	636
D	365	7,645	637
C	366	7,323	639
B	365	4,254	640
A	366	2,539	642

EXPLANATION

- EXCAVATION LIMITS
- CLEAN WETLAND CELL - LEAVE IN PLACE - NO EXCAVATION
- EXCAVATED SOILS TO BE TRANSPORTED OFF-SITE
- NOVEMBER 2012 HOT SPOT EXCAVATION
- SED-41 SEDIMENT SAMPLING LOCATION AND DESIGNATION
- WETLAND BOUNDARY
- LEY CREEK / WETLAND BUFFER
- PROPERTY BOUNDARY
- EASEMENT
- EXISTING CHAIN LINK FENCE
- ELECTRIC UTILITY POLE
- NEW SILT FENCE

EXCAVATION NOTE:

1. AT (3) ELECTRIC UTILITY POLES LOCATED IN SAMPLE ZONES E,T,V EXCAVATION CELLS, PLACE SILT FENCE AT A 10' RADIUS SURROUNDING THE UTILITY POLES AND DO NOT DISTURB THESE AREAS.

COOPER CROUSE HINDS LANDFILL
D/A Processing No. 2009-00241
Jefferson County, New York
USGS Quad: Syracuse West

Sheet 8 of 14

0 50 100 150
SCALE IN FEET

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AERIOMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2014 - DECEMBER 2012.

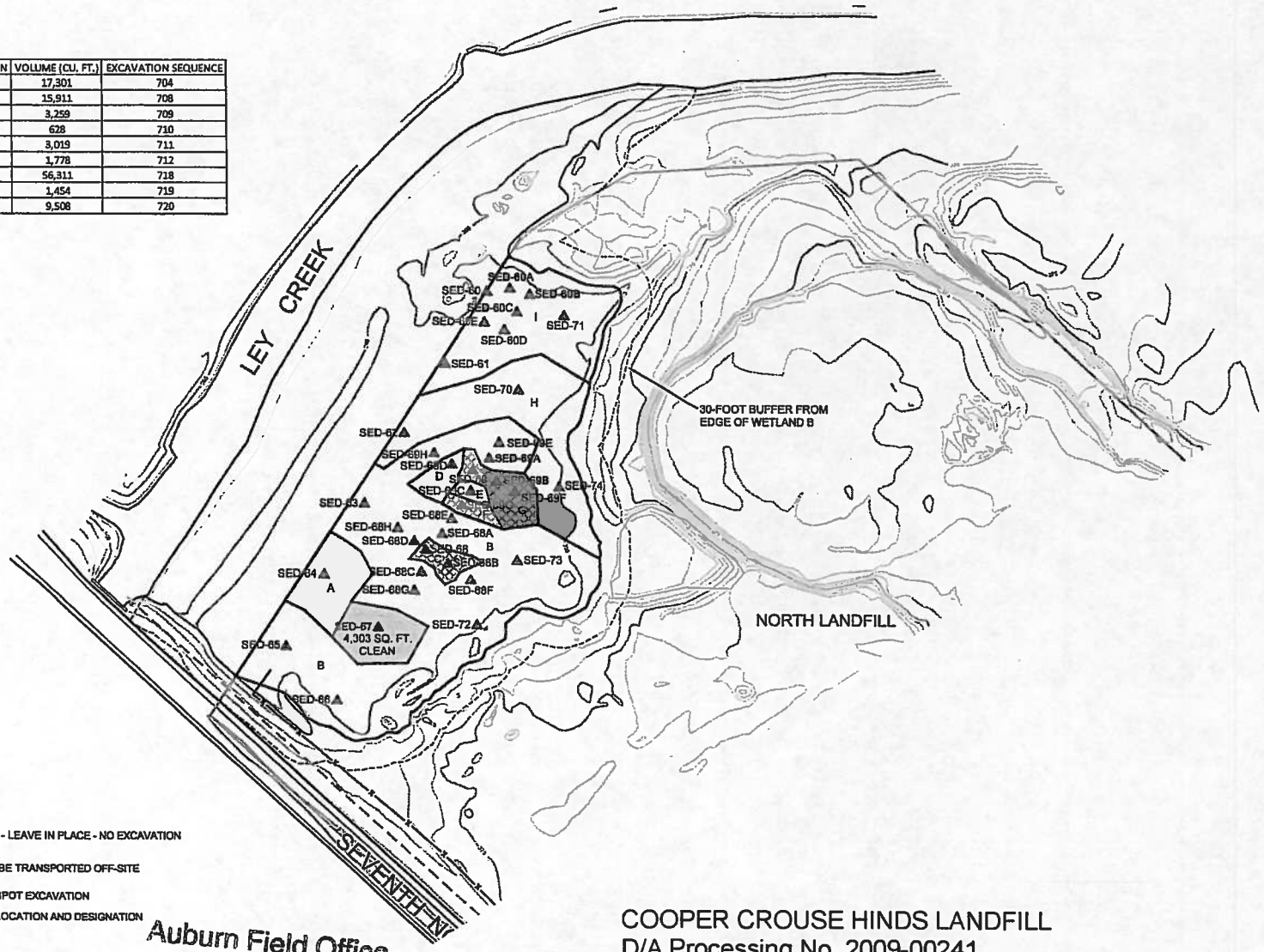
TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY WETLAND A SEDIMENT EXCAVATIONS

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

SHEET 7

SAMPLE ZONE	BASE OF EXCAVATION	VOLUME (CU. FT.)	EXCAVATION SEQUENCE
I	363.7	17,301	704
H	364	15,911	708
G	363.6	3,259	709
E	363.7	628	710
D	362.8	3,019	711
F	362.7	1,778	712
B	363.6	56,311	718
C	363.6	1,454	719
A	363.1	9,508	720



EXPLANATION

- EXCAVATION LIMITS
- CLEAN WETLAND CELL - LEAVE IN PLACE - NO EXCAVATION
- EXCAVATED SOILS TO BE TRANSPORTED OFF-SITE
- NOVEMBER 2012 HOT SPOT EXCAVATION
- SED-41 SEDIMENT SAMPLING LOCATION AND DESIGNATION
- WETLAND BOUNDARY
- LEY CREEK / WETLAND BUFFER
- PROPERTY BOUNDARY
- EASEMENT
- EXISTING CHAIN LINK FENCE

Auburn Field Office
Received
AUG 13 2013
USACE

COOPER CROUSE HINDS LANDFILL
D/A Processing No. 2009-00241
Jefferson County, New York
USGS Quad: Syracuse West

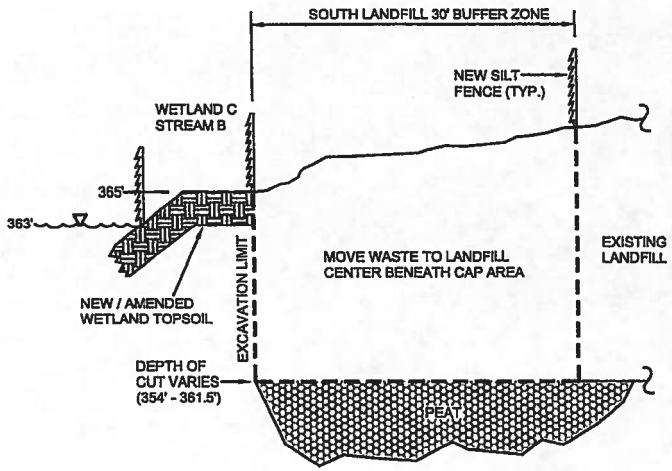
0 50 100 150
SCALE IN FEET

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
WETLAND B SEDIMENT EXCAVATIONS

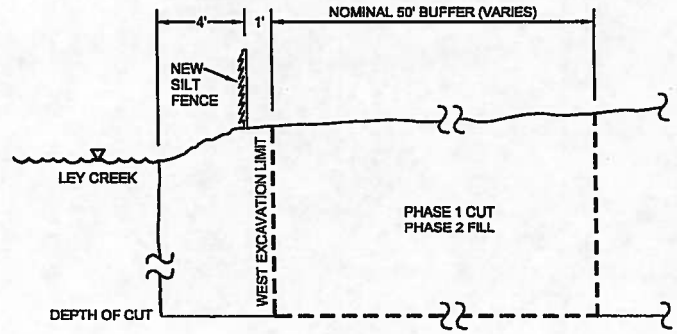
LOCATION: SYRACUSE, NEW YORK

TETRA TECH

SHEET 8



SOUTH LANDFILL 30' BUFFER ZONE
EXCAVATION CUT DETAIL



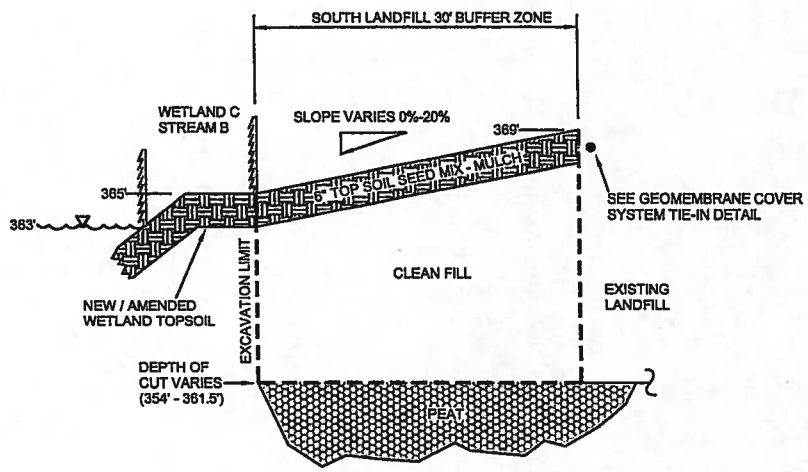
NOTES:

1. SET SILT FENCE AT 4' FROM EDGE OF LEY CREEK.
2. COMPLETE PHASE I CUT AS DIRECTED BY ENGINEER TO WESTERN LIMIT OF WASTE.
3. BALLAST WEST EXCAVATION WALL WITH CLEAN / RECYCLED FILL AS NECESSARY.
4. BACKFILL WEST EXCAVATION WALL TO POINT OF STABILITY AT END OF EACH WORKING DAY..

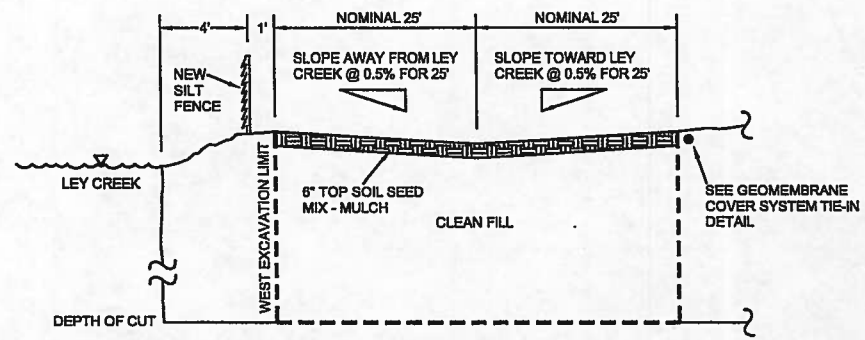
SOUTH LANDFILL 50' BUFFER ZONE
EXCAVATION CUT DETAIL

GENERAL NOTE:

1. ALL SILT FENCE TO REMAIN IN PLACE FOR 3 YEARS.



SOUTH LANDFILL 30' BUFFER
EXCAVATION FILL DETAIL



NOTE:

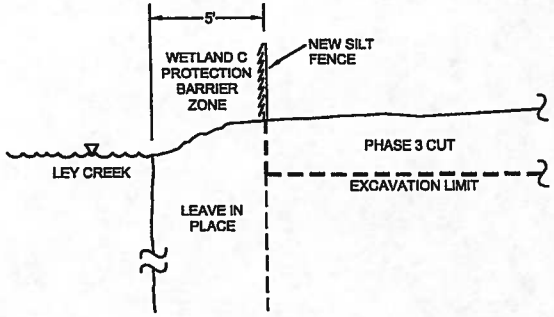
1. SLOPE 50' BUFFER ZONE FROM NORTH TO SOUTH, TO DRAIN TO WETLAND C. SLOPE @ 0.46%

TH LANDFILL 50' BUFFER ZONE
EXCAVATION FILL DETAIL

COOPER CROUSE HINDS LANDFILL
D/A Processing No. 2009-00241
Jefferson County, New York
USGS Quad: Syracuse West

Sheet 10 of 14

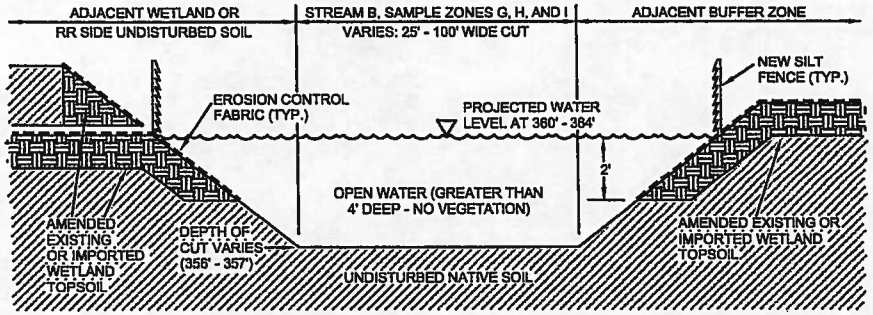
TITLE:	COOPER CROUSE-HINDS LANDFILL FACILITY LANDFILL DETAILS A
LOCATION:	SYRACUSE, NEW YORK
TETRA TECH	SHEET 9



NOTES:

1. SET SILT FENCE ALONG LEY CREEK AT 5' SETBACK.
2. REMOVE WETLAND SEDIMENT TO INDICATED DEPTH (PHASE 3 CUT).
3. TEST / AMEND TOP 12 INCHES OF SOIL BENEATH CUT TO MEET TABLE SPECIFICATIONS OF WETLAND TOPSOIL, OR PROVIDE IMPORTED WETLAND TOPSOIL TO PROVIDE 12-INCH THICKNESS (PHASE 4 FILL) (TYPICAL ALL WETLANDS).
4. USE 5' WETLAND C PROTECTION BARRIER ALONG SOUTH EDGE OF SAMPLE ZONE A EXCAVATION.
5. APPLY EMERGENT WETLAND SEED MIX - MULCH.
6. WETLAND C PROTECTION BARRIER ZONE SLOPE TO BE STABILIZED AT END OF EACH WORKING DAY.

SOUTH LANDFILL AT WETLAND C EXCAVATION CUT DETAIL



NOTES:

1. SLOPE CUT AT STREAM CELL PERIMETER TO 1:1.
2. AMEND EXISTING OR PLACE IMPORTED WETLAND TOPSOIL FROM 2 FEET BELOW PROJECTED WATER LEVEL UP SLOPE TO MEET ADJACENT WETLAND OR 5 HORIZONTAL FEET TO MEET UNDISTURBED RR SIDE SOIL OR 30' BUFFER ZONE SOIL. WETLAND TOPSOIL THICKNESS = 12".
3. APPLY EMERGENT WETLAND SEED MIX, MULCH, EROSION CONTROL FABRIC, AND SILT FENCE TO ALL PERIMETER SLOPES.

STREAM B CUT AND RESTORE DETAIL

GENERAL NOTE:

1. ALL SILT FENCE TO REMAIN IN PLACE FOR 3 YEARS.

NOTES:

1. SEED MIX ON CHART BELOW.
2. ANY EQUIPMENT USED FOR SEEDING SHALL BE CLEANED PRIOR TO APPLYING SEED.
3. SEEDING WILL OCCUR IN THE SPRING BETWEEN MARCH 15 - JUNE 1. SEEDING WILL NOT OCCUR DURING PERIODS OF GROUND SATURATION, WINDY PERIODS, OR WHEN GROUND IS TOO DRY FOR SEEDS TO GERMINATE.
4. SEEDING WILL OBTAIN 100% COVERAGE ON ALL EXPOSED SOIL.
5. A BONDED FIBER MATRIX (BFM) WILL BE USED TO ACHIEVE 100% COVERAGE OF SEEDED AREAS.

WETLAND TOPSOIL NOTES:

1. THE CONTRACTOR WILL FURNISH AND INSTALL A SUITABLE SILT LOAM, AMENDED AS NECESSARY TO MEET THE SPECIFICATIONS IN THE TABLE BELOW.
2. REGARDLESS OF SOURCE, THE TOPSOIL SHALL BE APPLIED AT A MINIMUM OF 12" IN DEPTH THROUGHOUT THE WETLAND CREATION AREA.

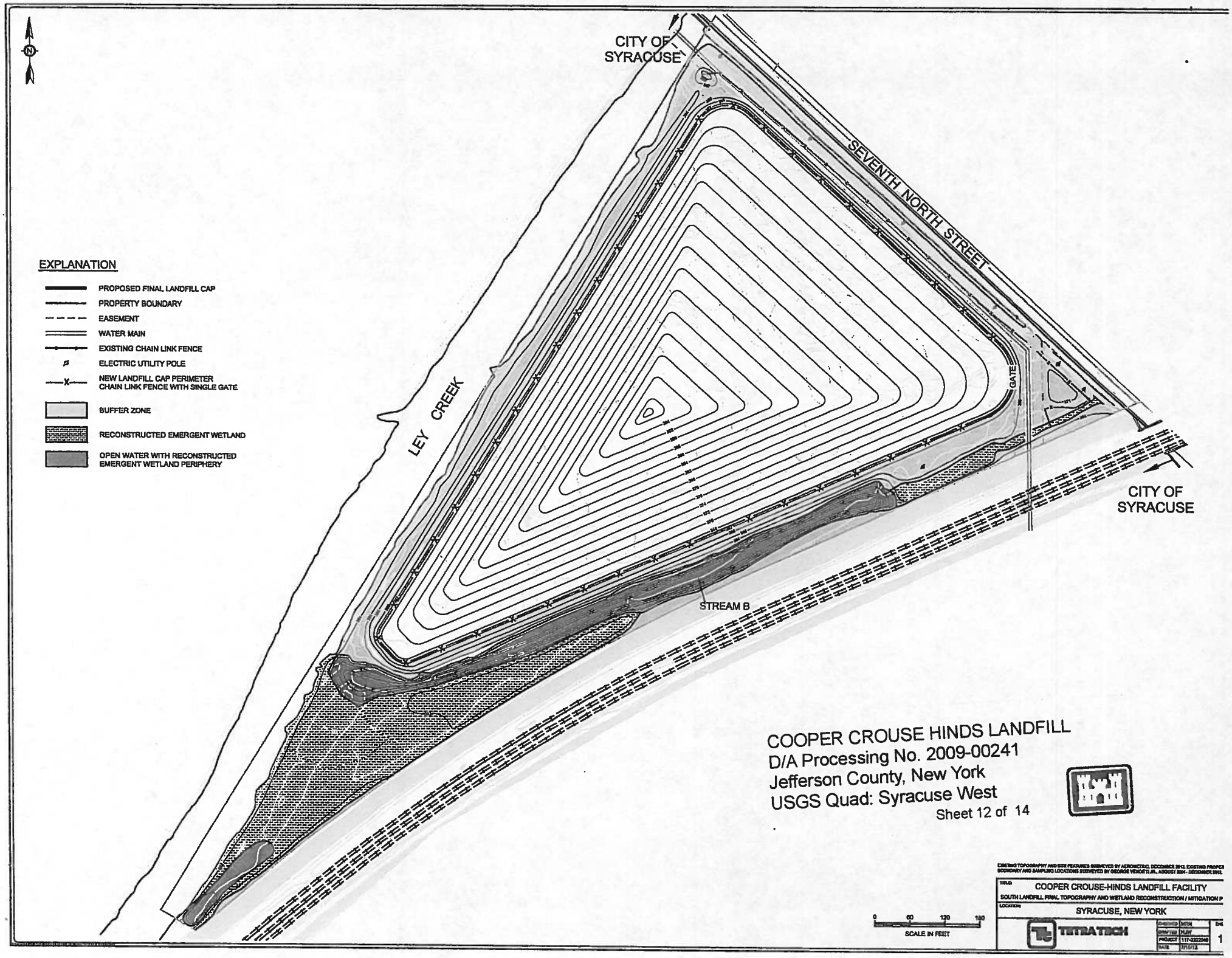
COMMON PARAMETERS AND VALUES OF MINERAL HYDRIC SOILS	
PARAMETER	VALUE
ORGANIC CONTENT	≥10% - ≤20%
ORGANIC CARBON	≥12% - ≤20%
pH	CIRCUMNEUTRAL
BULK DENSITY	HIGH
POROSITY	LOW (45-55%)
HYDRAULIC CONDUCTIVITY	HIGH
WATER HOLDING CAPACITY	LOW
NUTRIENT AVAILABILITY	GENERALLY HIGH
CATION EXCHANGE CAPACITY	LOW-DOMINATED BY MAJOR CATIONS

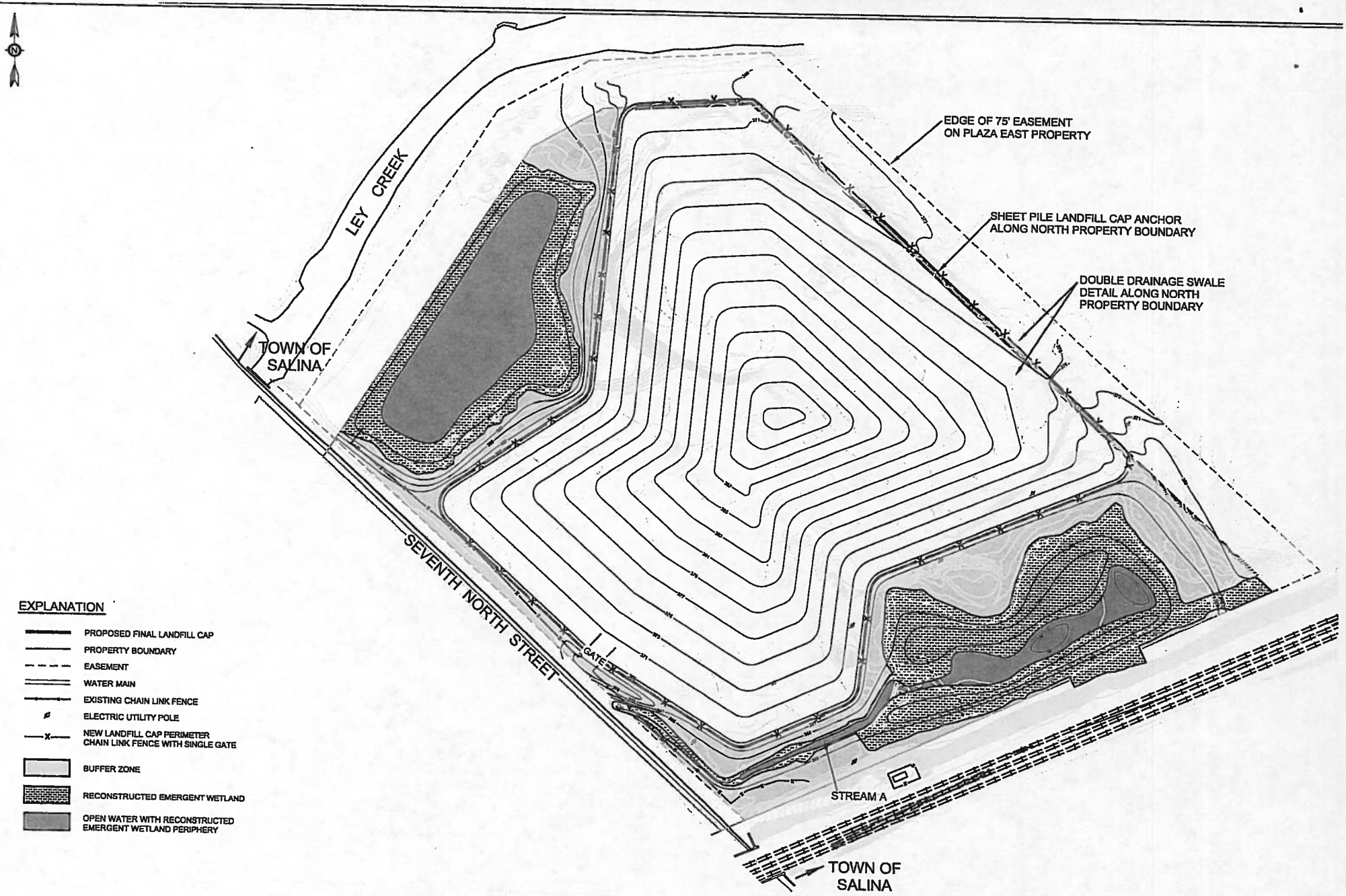
SPECIES PLANTING LIST - WETLAND SEED MIX B			
SCIENTIFIC NAME	COMMON NAME	QTY PER ACRE	20 LBS PER ACRE
AGROSTIS STOLONIFERA	CREEPING BENTGRASS	4.00 LBS	20%
ALOPECURUS PRATENSIS	MEADOW FOXTAIL	4.00 LBS	20%
POA TRIVAILIS	ROUGH BLUEGRASS	4.00 LBS	20%
ELYMUS VIRGINICUS	VIRGINIA WILD RYE	4.00 LBS	20%
ANICUM CLANDESTINUM	DEER TONGUE	9.6 OZ	3%
ARGANIUM CURYCARPUM	GIANT BUR-REED	9.6 OZ	3%
SCIRPUS ATROVIRENS	GREEN BULRUSH	9.6 OZ	3%
BIDENS ARISTOSA	SHOWY TICKSEED SUNFLOWER	9.6 OZ	3%
SCIRPUS AMERICANUS	COMMON THREE-SQUARE	6.4 OZ	2%
SCIRPUS CYPERINUS	WOOLGRASS	6.4 OZ	2%
SCIRPUS VALIDUS	SOFT STEM BULRUSH	6.4 OZ	2%
OLIDAGO GRAMINIFOLIA	GRASS LEAF GOLDENROD	6.4 OZ	2%

TYPICAL EMERGENT WETLAND DETAIL

COOPER CROUSE HINDS LANDFILL
D/A Processing No. 2009-00241
Jefferson County, New York
USGS Quad: Syracuse West

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY LANDFILL DETAILS B
LOCATION: SYRACUSE, NEW YORK
TETRA TECH
CHECKED MRM
DRAWN HJW
PROJECT 117-2202048
DATE 7/10/13
SHEET 10


CITY OF SYRACUSE
SEVENTH NORTH STREET
LEY CREEK
GATE
CITY OF SYRACUSE
STREAM B
EXPLANATION
PROPOSED FINAL LANDFILL CAP
PROPERTY BOUNDARY
EASEMENT
WATER MAIN
EXISTING CHAIN LINK FENCE
ELECTRIC UTILITY POLE
NEW LANDFILL CAP PERIMETER CHAIN LINK FENCE WITH SINGLE GATE
BUFFER ZONE
RECONSTRUCTED EMERGENT WETLAND
OPEN WATER WITH RECONSTRUCTED EMERGENT WETLAND PERIPHERY
COOPER CROUSE HINDS LANDFILL
D/A Processing No. 2009-00241
Jefferson County, New York
USGS Quad: Syracuse West
Sheet 12 of 14
0 60 120 180
SCALE IN FEET
COOPER CROUSE-HINDS LANDFILL FACILITY
SYRACUSE, NEW YORK
TETRA TECH



COOPER CROUSE HINDS LANDFILL
D/A Processing No. 2009-00241
Jefferson County, New York
USGS Quad: Syracuse West

Sheet 13 of 14

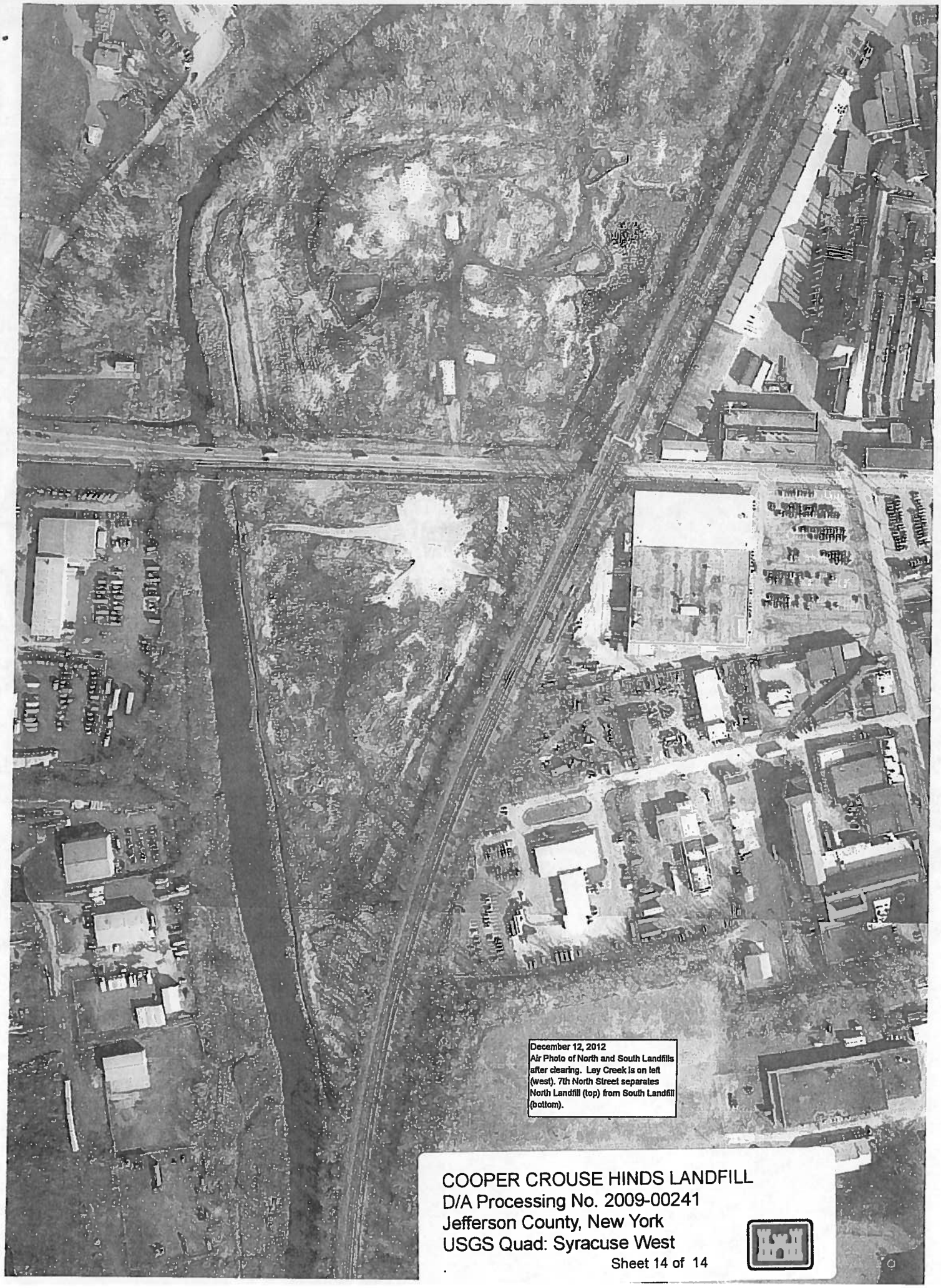
EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
NORTH LANDFILL FINAL TOPOGRAPHY AND WETLAND RECONSTRUCTION / MITIGATION PLAN

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

SHEET: 12



December 12, 2012
Air Photo of North and South Landfills after clearing. Ley Creek is on left (west). 7th North Street separates North Landfill (top) from South Landfill (bottom).

COOPER CROUSE HINDS LANDFILL
D/A Processing No. 2009-00241
Jefferson County, New York
USGS Quad: Syracuse West

ACTIVITIES AUTHORIZED BY 2012 NATIONWIDE PERMIT WITHIN THE STATE OF NEW YORK

Expiration March 18, 2017

B. Nationwide Permits

38. Cleanup of Hazardous and Toxic Waste. Specific activities required to effect the containment, stabilization, or removal of hazardous or toxic waste materials that are performed, ordered, or sponsored by a government agency with established legal or regulatory authority. Court ordered remedial action plans or related settlements are also authorized by this NWP. This NWP does not authorize the establishment of new disposal sites or the expansion of existing sites used for the disposal of hazardous or toxic waste.

Notification: The permittee must submit a pre-construction notification to the district engineer prior to commencing the activity. (See general condition 31.) (Sections 10 and 404)

Note: Activities undertaken entirely on a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) site by authority of CERCLA as approved or required by EPA, are not required to obtain permits under Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act.

Buffalo District Only Permit-specific Regional Conditions: None

New York District Only Permit-specific Regional Conditions:

a. For those activities that are located within Essential Fish Habitat waters as defined in Section G-D.8. below, to the maximum extent practicable, no in-water work shall occur between March 1 and June 30.

b. For those activities that would impact more than 0.5 acres of waters of the United States, and are located within Essential Fish Habitat waters as defined in Section G-D.8. below, a complete copy of any PCN submitted to the Corps of Engineers shall also be forwarded by the applicant, directly to the National Marine Fisheries Service (NMFS) Habitat Conservation Division, 212 Rogers Avenue, Milford, Connecticut 06460. The applicant must provide evidence to the Corps that this has been accomplished. The Corps of Engineers will coordinate review of the PCN with the NMFS pursuant to the requirements of the Magnuson Stevens Fishery Conservation and Management Act.

Section 401 Water Quality Certification:
The New York State Department of Environmental Conservation (NYSDEC) has denied Section 401 Water Quality Certification in New York State for this Nationwide Permit. Any party conducting the activities authorized by this NWP must apply for and obtain an individual Section 401 Water Quality Certification from the New York State Department of Environmental Conservation.

New York State Department of State Coastal Zone Management Consistency Determination:
Pursuant to 15 CFR Part 930.41, the New York State Department of State (NYSDOS) concurs with the USACE consistency determination for this NWP with which all general and all Buffalo and New York District regional conditions are complied.

C. Nationwide Permit General Conditions

Note: To qualify for NWP authorization, the prospective permittee must comply with the following general conditions, as applicable, in addition to any regional or case-specific conditions imposed by the division engineer or district engineer. Prospective permittees should contact the appropriate Corps district office to determine if regional conditions have been imposed on an NWP. Prospective permittees should also contact the appropriate Corps district office to determine the status of Clean Water Act Section 401 water quality certification and/or Coastal Zone Management Act consistency for an NWP. Every person who may wish to obtain permit authorization under one or more NWPs, or who is currently relying on an existing or prior permit authorization under one or more NWPs, has been and is on notice that all of the provisions of 33 CFR §§ 330.1 through 330.6 apply to every NWP authorization. Note especially 33 CFR § 330.5 relating to the modification, suspension, or revocation of any NWP authorization.

1. Navigation. (a) No activity may cause more than a minimal adverse effect on navigation.

(b) Any safety lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, must be installed and maintained at the permittee's expense on authorized facilities in navigable waters of the United States.

(c) The permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structure or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable waters, the permittee will be required, upon due notice from the Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

2. Aquatic Life Movements. No activity may substantially disrupt the necessary life cycle movements of those species of aquatic life indigenous to the waterbody, including those species that normally migrate through the area, unless the activity's primary purpose is to impound water. All permanent and temporary crossings of waterbodies shall be suitably culverted, bridged, or otherwise designed and constructed to maintain low flows to sustain the movement of those aquatic species.

3. Spawning Areas. Activities in spawning areas during spawning seasons must be avoided to the maximum extent practicable. Activities that result in the physical destruction (e.g., through excavation, fill, or downstream smothering by substantial turbidity) of an important spawning area are not authorized.

4. Migratory Bird Breeding Areas. Activities in waters of the United States that serve as breeding areas for migratory birds must be avoided to the maximum extent practicable.

5. Shellfish Beds. No activity may occur in areas of concentrated shellfish populations, unless the activity is directly related to a shellfish harvesting activity authorized by NWPs 4 and 48, or is a shellfish seeding or habitat restoration activity authorized by NWP 27.

6. Suitable Material. No activity may use unsuitable material (e.g., trash, debris, car bodies, asphalt, etc.). Material used for construction or discharged must be free from toxic pollutants in toxic amounts (see Section 307 of the Clean Water Act).

7. Water Supply Intakes. No activity may occur in the proximity of a public water supply intake, except where the activity is for the repair or improvement of public water supply intake structures or adjacent bank stabilization.

8. Adverse Effects From Impoundments. If the activity creates an impoundment of water, adverse effects to the aquatic system due to accelerating the passage of water, and/or restricting its flow must be minimized to the maximum extent practicable.

9. Management of Water Flows. To the maximum extent practicable, the pre-construction course, condition, capacity, and location of open waters must be maintained for each activity, including stream channelization and storm water management activities, except as provided below. The activity must be constructed to withstand expected high flows. The activity must not restrict or impede the passage of normal or high flows, unless the primary purpose of the activity is to impound water or manage high flows. The activity may alter the pre-construction course, condition, capacity, and location of open waters if it benefits the aquatic environment (e.g., stream restoration or relocation activities).

10. Fills Within 100-Year Floodplains. The activity must comply with applicable FEMA-approved state or local floodplain management requirements.

11. Equipment. Heavy equipment working in wetlands or mudflats must be placed on mats, or other measures must be taken to minimize soil disturbance.

12. Soil Erosion and Sediment Controls. Appropriate soil erosion and sediment controls must be used and maintained in effective operating condition during construction, and all exposed soil and other fills, as well as any work below the ordinary high water mark or high tide line, must be permanently stabilized at the earliest practicable date. Permittees are encouraged to perform work within waters of the United States during periods of low-flow or no-flow.

13. Removal of Temporary Fills. Temporary fills must be removed in their entirety and the affected areas returned to pre-construction elevations. The affected areas must be revegetated, as appropriate.

14. Proper Maintenance. Any authorized structure or fill shall be properly maintained, including maintenance to ensure public safety and compliance with applicable NWP general conditions, as well as any activity-specific conditions added by the district engineer to an NWP authorization.

15. Single and Complete Project. The activity must be a single and complete project. The same NWP cannot be used more than once for the same single and complete project.

16. Wild and Scenic Rivers. No activity may occur in a component of the National Wild and Scenic River System, or in a river officially designated by Congress as a "study river" for possible inclusion in the system while the river is in an official study status, unless the appropriate Federal agency with direct management responsibility for such river, has determined in writing that the proposed activity will not adversely affect the Wild and Scenic River designation or study status. Information on Wild and Scenic Rivers may be obtained from the appropriate Federal land management agency responsible for the designated Wild and Scenic River or study river (e.g., National Park Service, U.S. Forest Service, Bureau of Land Management, U.S. Fish and Wildlife Service).

17. Tribal Rights. No activity or its operation may impair reserved tribal rights, including, but not limited to, reserved water rights and treaty fishing and hunting rights.

18. Endangered Species. (a) No activity is authorized under any NWP which is likely to directly or indirectly jeopardize the continued existence of a threatened or endangered species or a species proposed for such designation, as identified under the Federal Endangered Species Act (ESA), or which will directly or indirectly destroy or adversely modify the critical habitat of such species. No activity is authorized under any NWP which "may affect" a listed species or critical habitat, unless Section 7 consultation addressing the effects of the proposed activity has been completed.

(b) Federal agencies should follow their own procedures for complying with the requirements of the ESA. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will review the documentation and determine whether it is sufficient to address ESA compliance for the NWP activity, or whether additional ESA consultation is necessary.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, and shall not begin work on the activity until notified by the district engineer that the requirements of the ESA have been satisfied and that the activity is authorized. For activities that might affect Federally-listed endangered or threatened species or designated critical habitat, the pre-construction notification must include the name(s) of the endangered or threatened species that might be affected by the proposed work or that utilize the designated critical habitat that might be affected by the proposed work. The district engineer will determine whether the proposed activity "may affect" or will have "no effect" to listed species and designated critical habitat and will notify the non-Federal applicant of the Corps' determination within 45 days of receipt of a complete pre-construction notification. In cases where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the project, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification the proposed activities will have "no effect" on listed species or critical habitat, or until Section 7 consultation has been completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(d) As a result of formal or informal consultation with the FWS or NMFS the district engineer may add species-specific regional endangered species conditions to the NWPs.

(e) Authorization of an activity by a NWP does not authorize the "take" of a threatened or endangered species as defined under the ESA. In the absence of separate authorization (e.g., an ESA Section 10 Permit, a Biological Opinion with "incidental take" provisions, etc.) from the U.S. FWS or the NMFS, The Endangered Species Act prohibits any person subject to the jurisdiction of the United States to take a listed species, where "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct. The word "harm" in the definition of "take" means an act which actually kills or injures wildlife. Such an act may include significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.

(f) Information on the location of threatened and endangered species and their critical habitat can be obtained directly from the offices of the U.S. FWS and NMFS or their world wide web pages at http://www.fws.gov/ or http://www.fws.gov/ipac and http://www.noaa.gov/fisheries.html respectively.

19. Migratory Birds and Bald and Golden Eagles. The permittee is responsible for obtaining any "take" permits required under the U.S. Fish and Wildlife Service's regulations governing compliance with the Migratory Bird Treaty Act or the Bald and Golden Eagle Protection Act. The permittee should contact the appropriate local office of the U.S. Fish and Wildlife Service to determine if such "take" permits are required for a particular activity.

20. Historic Properties. (a) In cases where the district engineer determines that the activity may affect properties listed, or eligible for listing, in the National Register of Historic Places, the activity is not authorized, until the requirements of Section 106 of the National Historic Preservation Act (NHPA) have been satisfied.

(b) Federal permittees should follow their own procedures for complying with the requirements of Section 106 of the National Historic Preservation Act. Federal permittees must provide the district engineer with the appropriate documentation to demonstrate compliance with those requirements. The district engineer will review the documentation and determine whether it is sufficient to address section 106 compliance for the NWP activity, or whether additional section 106 consultation is necessary.

(c) Non-federal permittees must submit a pre-construction notification to the district engineer if the authorized activity may have the potential to cause effects to any historic properties listed on, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places, including previously unidentified properties. For such activities, the pre-construction notification must state which historic properties may be affected by the proposed work or include a vicinity map indicating the location of the historic properties or the potential for the presence of historic properties. Assistance regarding information on the location of or potential for the presence of historic resources can be sought from the State Historic Preservation Officer or Tribal Historic Preservation Officer, as appropriate, and the National Register of Historic Places (see 33 CFR 330.4(g)). When reviewing pre-construction notifications, district engineers will comply with the current procedures for addressing the requirements of Section 106 of the National Historic Preservation Act. The district engineer shall make a reasonable and good faith effort to carry out appropriate identification efforts, which may include background research, consultation, oral history interviews, sample field investigation, and field survey. Based on the information submitted and these efforts, the district engineer shall determine whether the proposed activity has the potential to cause an effect on the historic properties. Where the non-Federal applicant has identified historic properties on which the activity may have the potential to cause effects and so notified the Corps, the non-Federal applicant shall not begin the activity until notified by the district engineer either that the activity has no potential to cause effects or that consultation under Section 106 of the NHPA has been completed.

(d) The district engineer will notify the prospective permittee within 45 days of receipt of a complete pre-construction notification whether NHPA Section 106 consultation is required. Section 106 consultation is not required when the Corps determines that the activity does not have the potential to cause effects on historic properties (see 36 CFR §800.3(a)). If NHPA section 106 consultation is required and will occur, the district engineer will notify the non-Federal applicant that he or she cannot begin work until Section 106 consultation is completed. If the non-Federal applicant has not heard back from the Corps within 45 days, the applicant must still wait for notification from the Corps.

(e) Prospective permittees should be aware that section 110k of the NHPA (16 U.S.C. 470h-2(k)) prevents the Corps from granting a permit or other assistance to an applicant who, with intent to avoid the requirements of Section 106 of the NHPA, has intentionally significantly adversely affected a historic property to which the permit would relate, or having legal power to prevent it, allowed such significant adverse effect to occur, unless the Corps, after consultation with the Advisory Council on Historic Preservation (ACHP), determines that circumstances justify granting such assistance despite the adverse effect created or permitted by the applicant. If circumstances justify granting the assistance, the Corps is required to notify the ACHP and provide documentation specifying the circumstances, the degree of damage to the integrity of any historic properties affected, and proposed mitigation. This documentation must include any views obtained from the applicant, SHPO/THPO, appropriate Indian tribes if the undertaking occurs on or affects historic properties on tribal lands or affects properties of interest to those tribes, and other parties known to have a legitimate interest in the impacts to the permitted activity on historic properties.

21. Discovery of Previously Unknown Remains and Artifacts. If you discover any previously unknown historic, cultural or archeological remains and artifacts while accomplishing the activity authorized by this permit, you must immediately notify the district engineer of what you have found, and to the maximum extent practicable, avoid construction activities that may affect the remains and artifacts until the required coordination has been completed. The district engineer will initiate the Federal, Tribal and state coordination required to determine if the items or remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

22. Designated Critical Resource Waters. Critical resource waters include, NOAA-managed marine sanctuaries and marine monuments, and National Estuarine Research Reserves. The district engineer may designate, after notice and opportunity for public comment, additional waters officially designated by a state as having particular environmental or ecological significance, such as outstanding national resource waters or state natural heritage sites. The district engineer may also designate additional critical resource waters after notice and opportunity for public comment.

(a) Discharges of dredged or fill material into waters of the United States are not authorized by NWPs 7, 12, 14, 16, 17, 21, 29, 31, 35, 39, 40, 42, 43, 44, 49, 50, 51, and 52 for any activity within, or directly affecting, critical resource waters, including wetlands adjacent to such waters.

(b) For NWPs 3, 8, 10, 13, 15, 18, 19, 22, 23, 25, 27, 28, 30, 33, 34, 36, 37, and 38, notification is required in accordance with general condition 31, for any activity proposed in the designated critical resource waters including wetlands adjacent to those waters. The district engineer may authorize activities under these NWPs only after it is determined that the impacts to the critical resource waters will be no more than minimal.

23. Mitigation. The district engineer will consider the following factors when determining appropriate and practicable mitigation necessary to ensure that adverse effects on the aquatic environment are minimal:

(a) The activity must be designed and constructed to avoid and minimize adverse effects, both temporary and permanent, to waters of the United States to the maximum extent practicable at the project site (i.e., on site).

(b) Mitigation in all its forms (avoiding, minimizing, rectifying, reducing, or compensating for resource losses) will be required to the extent necessary to ensure that the adverse effects to the aquatic environment are minimal.

(c) Compensatory mitigation at a minimum one-for-one ratio will be required for all wetland losses that exceed 1/10-acre and require pre-construction notification, unless the district engineer determines in writing that either some other form of mitigation would be more environmentally appropriate or the adverse effects of the proposed activity are minimal, and provides a project-specific waiver of this requirement. For wetland losses of 1/10-acre or less that require pre-construction notification, the district engineer may determine on a case-by-case basis that compensatory mitigation is required to ensure that the activity results in minimal adverse effects on the aquatic environment. Compensatory mitigation projects provided to offset losses of aquatic resources must comply with the applicable provisions of 33 CFR part 332.

(1) The prospective permittee is responsible for proposing an appropriate compensatory mitigation option if compensatory mitigation is necessary to ensure that the activity results in minimal adverse effects on the aquatic environment.

(2) Since the likelihood of success is greater and the impacts to potentially valuable uplands are reduced, wetland restoration should be the first compensatory mitigation option considered.

(3) If permittee-responsible mitigation is the proposed option, the prospective permittee is responsible for submitting a mitigation plan. A conceptual or detailed mitigation plan may be used by the district engineer to make the decision on the NWP verification request, but a final mitigation plan that addresses the applicable requirements of 33 CFR 332.4(c)(2) – (14) must be approved by the district engineer before the permittee begins work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation (see 33 CFR 332.3(k)(3)).

(4) If mitigation bank or in-lieu fee program credits are the proposed option, the mitigation plan only needs to address the baseline conditions at the impact site and the number of credits to be provided.

(5) Compensatory mitigation requirements (e.g., resource type and amount to be provided as compensatory mitigation, site protection, ecological performance standards, monitoring requirements) may be addressed through conditions added to the NWP authorization, instead of components of a compensatory mitigation plan.

(d) For losses of streams or other open waters that require pre-construction notification, the district engineer may require compensatory mitigation, such as stream rehabilitation, enhancement, or preservation, to ensure that the activity results in minimal adverse effects on the aquatic environment.

(e) Compensatory mitigation will not be used to increase the acreage losses allowed by the acreage limits of the NWPs. For example, if an NWP has an acreage limit of 1/2-acre, it cannot be used to authorize any project resulting in the loss of greater than 1/2-acre of waters of the United States, even if compensatory mitigation is provided that replaces or restores some of the lost waters. However, compensatory mitigation can and should be used, as necessary, to ensure that a project already meeting the established acreage limits also satisfies the minimal impact requirement associated with the NWPs.

(f) Compensatory mitigation plans for projects in or near streams or other open waters will normally include a requirement for the restoration or establishment, maintenance, and legal protection (e.g., conservation easements) of riparian areas next to open waters. In some cases, riparian areas may be the only compensatory mitigation required. Riparian areas should consist of native species. The width of the required riparian area will address documented water quality or aquatic habitat loss concerns. Normally, the riparian area will be 25 to 50 feet wide on each side of the stream, but the district engineer may require slightly wider riparian areas to address documented water quality or habitat loss concerns. If it is not possible to establish a riparian area on both sides of a stream, or if the waterbody is a lake or coastal waters, then restoring or establishing a riparian area along a single bank or shoreline may be sufficient. Where both wetlands and open waters exist on the project site, the district engineer will determine the appropriate compensatory mitigation (e.g., riparian areas and/or wetlands compensation) based on what is best for the aquatic environment on a watershed basis. In cases where riparian areas are determined to be the most appropriate form of compensatory mitigation, the district engineer may waive or reduce the requirement to provide wetland compensatory mitigation for wetland losses.

(g) Permittees may propose the use of mitigation banks, in-lieu fee programs, or separate permittee-responsible mitigation. For activities resulting in the loss of marine or estuarine resources, permittee-responsible compensatory mitigation may be environmentally preferable if there are no mitigation banks or in-lieu fee programs in the area that have marine or estuarine credits available for sale or transfer to the permittee. For permittee-responsible mitigation, the special conditions of the NWP verification must clearly indicate the party or parties responsible for the implementation and performance of the compensatory mitigation project, and, if required, its long-term management.

(h) Where certain functions and services of waters of the United States are permanently adversely affected, such as the conversion of a forested or scrub-shrub wetland to a herbaceous wetland in a permanently maintained utility line right-of-way, mitigation may be required to reduce the adverse effects of the project to the minimal level.

24. Safety of Impoundment Structures. To ensure that all impoundment structures are safely designed, the district engineer may require non-Federal applicants to demonstrate that the structures comply with established state dam safety criteria or have been designed by qualified persons. The district engineer may also require documentation that the design has been independently reviewed by similarly qualified persons, and appropriate modifications made to ensure safety.

25. Water Quality. Where States and authorized Tribes, or EPA where applicable, have not previously certified compliance of an NWP with CWA Section 401, individual 401 Water Quality Certification must be obtained or waived (see 33 CFR 330.4(c)). The district engineer or State or Tribe may require additional water quality management measures to ensure that the authorized activity does not result in more than minimal degradation of water quality.

26. Coastal Zone Management. In coastal states where an NWP has not previously received a state coastal zone management consistency concurrence, an individual state coastal zone management consistency concurrence must be obtained, or a presumption of concurrence must occur (see 33 CFR 330.4(d)). The district engineer or a State may require additional measures to ensure that the authorized activity is consistent with state coastal zone management requirements.

27. Regional and Case-By-Case Conditions. The activity must comply with any regional conditions that may have been added by the Division Engineer (see 33 CFR 330.4(e)) and with any case specific conditions added by the Corps or by the state, Indian Tribe, or U.S. EPA in its section 401 Water Quality Certification, or by the state in its Coastal Zone Management Act consistency determination.

28. Use of Multiple Nationwide Permits. The use of more than one NWP for a single and complete project is prohibited, except when the acreage loss of waters of the United States authorized by the NWPs does not exceed the acreage limit of the NWP with the highest specified acreage limit. For example, if a road crossing over tidal waters is constructed under NWP 14, with associated bank stabilization authorized by NWP 13, the maximum acreage loss of waters of the United States for the total project cannot exceed 1/3-acre.

29. Transfer of Nationwide Permit Verifications. If the permittee sells the property associated with a nationwide permit verification, the permittee may transfer the nationwide permit verification to the new owner by submitting a letter to the appropriate Corps district office to validate the transfer. A copy of the nationwide permit verification must be attached to the letter, and the letter must contain the following statement and signature:

"When the structures or work authorized by this nationwide permit are still in existence at the time the property is transferred, the terms and conditions of this nationwide permit, including any special conditions, will continue to be binding on the new owner(s) of the property. To validate the transfer of this nationwide permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below."

_____

(Transferee)

_____

(Date)

30. Compliance Certification. Each permittee who receives an NWP verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and any required compensatory mitigation. The success of any required permittee-responsible mitigation, including the achievement of ecological performance standards, will be addressed separately by the district engineer. The Corps will provide the permittee the certification document with the NWP verification letter. The certification document will include:

(a) A statement that the authorized work was done in accordance with the NWP authorization, including any general, regional, or activity-specific conditions;

(b) A statement that the implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, the certification must include the documentation required by 33 CFR 332.3(l)(3) to confirm that the permittee secured the appropriate number and resource type of credits; and

(c) The signature of the permittee certifying the completion of the work and mitigation.

31. Pre-Construction Notification. (a) Timing. Where required by the terms of the NWP, the prospective permittee must notify the district engineer by submitting a pre-construction notification (PCN) as early as possible. The district engineer must determine if the PCN is complete within 30 calendar days of the date of receipt and, if the PCN is determined

to be incomplete, notify the prospective permittee within that 30 day period to request the additional information necessary to make the PCN complete. The request must specify the information needed to make the PCN complete. As a general rule, district engineers will request additional information necessary to make the PCN complete only once. However, if the prospective permittee does not provide all of the requested information, then the district engineer will notify the prospective permittee that the PCN is still incomplete and the PCN review process will not commence until all of the requested information has been received by the district engineer. The prospective permittee shall not begin the activity until either:

(1) He or she is notified in writing by the district engineer that the activity may proceed under the NWP with any special conditions imposed by the district or division engineer; or

(2) 45 calendar days have passed from the district engineer's receipt of the complete PCN and the prospective permittee has not received written notice from the district or division engineer. However, if the permittee was required to notify the Corps pursuant to general condition 18 that listed species or critical habitat might be affected or in the vicinity of the project, or to notify the Corps pursuant to general condition 20 that the activity may have the potential to cause effects to historic properties, the permittee cannot begin the activity until receiving written notification from the Corps that there is "no effect" on listed species or "no potential to cause effects" on historic properties, or that any consultation required under Section 7 of the Endangered Species Act (see 33 CFR 330.4(f)) and/or Section 106 of the National Historic Preservation (see 33 CFR 330.4(g)) has been completed. Also, work cannot begin under NWPs 21, 49, or 50 until the permittee has received written approval from the Corps. If the proposed activity requires a written waiver to exceed specified limits of an NWP, the permittee may not begin the activity until the district engineer issues the waiver. If the district or division engineer notifies the permittee in writing that an individual permit is required within 45 calendar days of receipt of a complete PCN, the permittee cannot begin the activity until an individual permit has been obtained. Subsequently, the permittee's right to proceed under the NWP may be modified, suspended, or revoked only in accordance with the procedure set forth in 33 CFR 330.5(d)(2).

(b) Contents of Pre-Construction Notification: The PCN must be in writing and include the following information:

(1) Name, address and telephone numbers of the prospective permittee;

(2) Location of the proposed project;

(3) A description of the proposed project; the project's purpose; direct and indirect adverse environmental effects the project would cause, including the anticipated amount of loss of water of the United States expected to result from the NWP activity, in acres, linear feet, or other appropriate unit of measure; any other NWP(s), regional general permit(s), or individual permit(s) used or intended to be used to authorize any part of the proposed project or any related activity. The description should be sufficiently detailed to allow the district engineer to determine that the adverse effects of the project will be minimal and to determine the need for compensatory mitigation. Sketches should be provided when necessary to show that the activity complies with the terms of the NWP. (Sketches usually clarify the project and when provided results in a quicker decision. Sketches should contain sufficient detail to provide an illustrative description of the proposed activity (e.g., a conceptual plan), but do not need to be detailed engineering plans);

(4) The PCN must include a delineation of wetlands, other special aquatic sites, and other waters, such as lakes and ponds, and perennial, intermittent, and ephemeral streams, on the project site. Wetland delineations must be prepared in accordance with the current method required by the Corps. The permittee may ask the Corps to delineate the special aquatic sites and other waters on the project site, but there may be a delay if the Corps does the delineation, especially if the project site is large or contains many waters of the United States. Furthermore, the 45 day period will not start until the delineation has been submitted to or completed by the Corps, as appropriate;

(5) If the proposed activity will result in the loss of greater than 1/10-acre of wetlands and a PCN is required, the prospective permittee must submit a statement describing how the mitigation requirement will be satisfied, or explaining why the adverse effects are minimal and why compensatory mitigation should not be required. As an alternative, the prospective permittee may submit a conceptual or detailed mitigation plan.

(6) If any listed species or designated critical habitat might be affected or is in the vicinity of the project, or if the project is located in designated critical habitat, for non-Federal applicants the PCN must include the name(s) of those endangered or threatened species that might be affected by the proposed work or utilize the designated critical habitat that may be affected by the proposed work. Federal applicants must provide documentation demonstrating compliance with the Endangered Species Act; and

(7) For an activity that may affect a historic property listed on, determined to be eligible for listing on, or potentially eligible for listing on, the National Register of Historic Places, for non-Federal applicants the PCN must state which historic property may be affected by the proposed work or include a vicinity map indicating the location of the historic property. Federal applicants must provide documentation demonstrating compliance with Section 106 of the National Historic Preservation Act.

(c) Form of Pre-Construction Notification: The standard individual permit application form (Form ENG 4345) may be used, but the completed application form must clearly indicate that it is a PCN and must include all of the information required in paragraphs (b)(1) through (7) of this general condition. A letter containing the required information may also be used.

(d) Agency Coordination: (1) The district engineer will consider any comments from Federal and state agencies concerning the proposed activity's compliance with the terms and conditions of the NWPs and the need for mitigation to reduce the project's adverse environmental effects to a minimal level.

(2) For all NWP activities that require pre-construction notification and result in the loss of greater than 1/2-acre of waters of the United States, for NWP 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52 activities that require pre-construction notification and will result in the loss of greater than 300 linear feet of stream bed, and for all NWP 48 activities that require pre-construction notification, the district engineer will immediately provide (e.g., via e-mail, facsimile transmission, overnight mail, or other expeditious manner) a copy of the complete PCN to the appropriate Federal or state offices (U.S. FWS, state natural resource or water quality agency, EPA, State Historic Preservation Officer (SHPO) or Tribal Historic Preservation Office (THPO), and, if appropriate, the NMFS). With the exception of NWP 37, these agencies will have 10 calendar days from the date the material is transmitted to telephone or fax the district engineer notice that they intend to provide substantive, site-specific comments. The comments must explain why the agency believes the adverse effects will be more than minimal. If so contacted by an agency, the district engineer will wait an additional 15 calendar days before making a decision on the pre-construction notification. The district engineer will fully consider agency comments received within the specified time frame concerning the proposed activity's compliance with the terms and conditions of the NWPs, including the need for mitigation to ensure the net adverse environmental effects to the aquatic environment of the proposed activity are minimal. The district engineer will provide no response to the resource agency, except as provided below. The district engineer will indicate in the administrative record associated with each pre-construction notification that the resource agencies' concerns were considered. For NWP 37, the emergency watershed protection and rehabilitation activity may proceed immediately in cases where there is an unacceptable hazard to life or a significant loss of property or economic hardship will occur. The district engineer will consider any comments received to decide whether the NWP 37 authorization should be modified, suspended, or revoked in accordance with the procedures at 33 CFR 330.5.

(3) In cases of where the prospective permittee is not a Federal agency, the district engineer will provide a response to NMFS within 30 calendar days of receipt of any Essential Fish Habitat conservation recommendations, as required by Section 305(b)(4)(B) of the Magnuson-Stevens Fishery Conservation and Management Act.

(4) Applicants are encouraged to provide the Corps with either electronic files or multiple copies of pre-construction notifications to expedite agency coordination.

D. District Engineer's Decision

1. In reviewing the PCN for the proposed activity, the district engineer will determine whether the activity authorized by the NWP will result in more than minimal individual or cumulative adverse environmental effects or may be contrary to the public interest. For a linear project, this determination will include an evaluation of the individual crossings to determine whether they individually satisfy the terms and conditions of the NWP(s), as well as the cumulative effects caused by all of the crossings authorized by NWP. If an applicant requests a waiver of the 300 linear foot limit on impacts to intermittent or ephemeral streams or of an otherwise applicable limit, as provided for in NWPs 13, 21, 29, 36, 39, 40, 42, 43, 44, 50, 51 or 52, the district engineer will only grant the waiver upon a written determination that the NWP activity will result in minimal adverse effects. When making minimal effects determinations the district engineer will consider the direct and indirect effects caused by the NWP activity. The district engineer will also consider site specific factors, such as the environmental setting in the vicinity of the NWP activity, the type of resource that will be affected by the NWP activity, the functions provided by the aquatic resources that will be affected by the NWP activity, the degree or magnitude to which the aquatic resources perform those functions, the extent that aquatic resource functions will be lost as a result of the NWP activity (e.g., partial or complete loss), the duration of the adverse effects (temporary or permanent), the importance of the aquatic resource functions to the region (e.g., watershed or ecoregion), and mitigation required by the district engineer. If an appropriate functional assessment method is available and practicable to use, that assessment method may be used by the district engineer to assist in the minimal adverse effects determination. The district engineer may add case-specific special conditions to the NWP authorization to address site-specific environmental concerns.

2. If the proposed activity requires a PCN and will result in a loss of greater than 1/10-acre of wetlands, the prospective permittee should submit a mitigation proposal with the PCN. Applicants may also propose compensatory mitigation for projects with smaller impacts. The district engineer will consider any proposed compensatory mitigation the applicant has included in the proposal in determining whether the net adverse environmental effects to the aquatic environment of the proposed activity are minimal. The compensatory mitigation proposal may be either conceptual or detailed. If the district engineer determines that the activity complies with the terms and conditions of the NWP and that the adverse effects on the aquatic environment are minimal, after considering mitigation, the district engineer will notify the permittee and include any activity-specific conditions in the NWP verification the district engineer deems necessary. Conditions for compensatory mitigation requirements must comply with the appropriate provisions at 33 CFR 332.3(k). The district engineer must approve the final mitigation plan before the permittee commences work in waters of the United States, unless the district engineer determines that prior approval of the final mitigation plan is not practicable or not necessary to

ensure timely completion of the required compensatory mitigation. If the prospective permittee elects to submit a compensatory mitigation plan with the PCN, the district engineer will expeditiously review the proposed compensatory mitigation plan. The district engineer must review the proposed compensatory mitigation plan within 45 calendar days of receiving a complete PCN and determine whether the proposed mitigation would ensure no more than minimal adverse effects on the aquatic environment. If the net adverse effects of the project on the aquatic environment (after consideration of the compensatory mitigation proposal) are determined by the district engineer to be minimal, the district engineer will provide a timely written response to the applicant. The response will state that the project can proceed under the terms and conditions of the NWP, including any activity-specific conditions added to the NWP authorization by the district engineer.

3. If the district engineer determines that the adverse effects of the proposed work are more than minimal, then the district engineer will notify the applicant either: (a) That the project does not qualify for authorization under the NWP and instruct the applicant on the procedures to seek authorization under an individual permit; (b) that the project is authorized under the NWP subject to the applicant's submission of a mitigation plan that would reduce the adverse effects on the aquatic environment to the minimal level; or (c) that the project is authorized under the NWP with specific modifications or conditions. Where the district engineer determines that mitigation is required to ensure no more than minimal adverse effects occur to the aquatic environment, the activity will be authorized within the 45-day PCN period, with activity-specific conditions that state the mitigation requirements. The authorization will include the necessary conceptual or detailed mitigation or a requirement that the applicant submit a mitigation plan that would reduce the adverse effects on the aquatic environment to the minimal level. When mitigation is required, no work in waters of the United States may occur until the district engineer has approved a specific mitigation plan or has determined that prior approval of a final mitigation plan is not practicable or not necessary to ensure timely completion of the required compensatory mitigation.

E. Further Information

1. District Engineers have authority to determine if an activity complies with the terms and conditions of an NWP.
2. NWPs do not obviate the need to obtain other federal, state, or local permits, approvals, or authorizations required by law.
3. NWPs do not grant any property rights or exclusive privileges.
4. NWPs do not authorize any injury to the property or rights of others.
5. NWPs do not authorize interference with any existing or proposed Federal project.

F. Definitions

Best management practices (BMPs): Policies, practices, procedures, or structures implemented to mitigate the adverse environmental effects on surface water quality resulting from development. BMPs are categorized as structural or non-structural.

Compensatory mitigation: The restoration (re-establishment or rehabilitation), establishment (creation), enhancement, and/or in certain circumstances preservation of aquatic resources for the purposes of offsetting unavoidable adverse impacts which remain after all appropriate and practicable avoidance and minimization has been achieved.

Currently serviceable: Useable as is or with some maintenance, but not so degraded as to essentially require reconstruction.

Direct effects: Effects that are caused by the activity and occur at the same time and place.

Discharge: The term "discharge" means any discharge of dredged or fill material.

Enhancement: The manipulation of the physical, chemical, or biological characteristics of an aquatic resource to heighten, intensify, or improve a specific aquatic resource function(s). Enhancement results in the gain of selected aquatic resource function(s), but may also lead to a decline in other aquatic resource function(s). Enhancement does not result in a gain in aquatic resource area.

Ephemeral stream: An ephemeral stream has flowing water only during, and for a short duration after, precipitation events in a typical year. Ephemeral stream beds are located above the water table year-round. Groundwater is not a source of water for the stream. Runoff from rainfall is the primary source of water for stream flow.

Establishment (creation): The manipulation of the physical, chemical, or biological characteristics present to develop an aquatic resource that did not previously exist at an upland site. Establishment results in a gain in aquatic resource area.

High Tide Line: The line of intersection of the land with the water's surface at the maximum height reached by a rising tide. The high tide line may be determined, in the absence of actual data, by a line of oil or scum along shore objects, a more or less continuous deposit of fine shell or debris on the foreshore or berm, other physical markings or characteristics, vegetation lines, tidal gages, or other suitable means that delineate the general height reached by a rising tide. The line encompasses spring high tides and other high tides that occur with periodic frequency but does not include storm surges in which there is a departure from the normal or predicted reach of the tide due to the piling up of water against a coast by strong winds such as those accompanying a hurricane or other intense storm.

Historic Property: Any prehistoric or historic district, site (including archaeological site), building, structure, or other object included in, or eligible for inclusion in, the National Register of Historic Places maintained by the Secretary of the Interior. This term includes artifacts, records, and remains that are related to and located within such properties. The term includes properties of traditional religious and cultural importance to an Indian tribe or Native Hawaiian organization and that meet the National Register criteria (36 CFR part 60).

Independent utility: A test to determine what constitutes a single and complete non-linear project in the Corps regulatory program. A project is considered to have independent utility if it would be constructed absent the construction of other projects in the project area. Portions of a multi-phase project that depend upon other phases of the project do not have independent utility. Phases of a project that would be constructed even if the other phases were not built can be considered as separate single and complete projects with independent utility.

Indirect effects: Effects that are caused by the activity and are later in time or farther removed in distance, but are still reasonably foreseeable.

Intermittent stream: An intermittent stream has flowing water during certain times of the year, when groundwater provides water for stream flow. During dry periods, intermittent streams may not have flowing water. Runoff from rainfall is a supplemental source of water for stream flow.

Loss of waters of the United States: Waters of the United States that are permanently adversely affected by filling, flooding, excavation, or drainage because of the regulated activity. Permanent adverse effects include permanent discharges of dredged or fill material that change an aquatic area to dry land, increase the bottom elevation of a waterbody, or change the use of a waterbody. The acreage of loss of waters of the United States is a threshold measurement of the impact to jurisdictional waters for determining whether a project may qualify for an NWP; it is not a net threshold that is calculated after considering compensatory mitigation that may be used to offset losses of aquatic functions and services. The loss of stream bed includes the linear feet of stream bed that is filled or excavated. Waters of the United States temporarily filled, flooded, excavated, or drained, but restored to pre-construction contours and elevations after construction, are not included in the measurement of loss of waters of the United States. Impacts resulting from activities eligible for exemptions under Section 404(f) of the Clean Water Act are not considered when calculating the loss of waters of the United States.

Non-tidal wetland: A non-tidal wetland is a wetland that is not subject to the ebb and flow of tidal waters. The definition of a wetland can be found at 33 CFR 328.3(b). Non-tidal wetlands contiguous to tidal waters are located landward of the high tide line (i.e., spring high tide line).

Open water: For purposes of the NWPs, an open water is any area that in a year with normal patterns of precipitation has water flowing or standing above ground to the extent that an ordinary high water mark can be determined. Aquatic vegetation within the area of standing or flowing water is either non-emergent, sparse, or absent. Vegetated shallows are considered to be open waters. Examples of "open waters" include rivers, streams, lakes, and ponds.

Ordinary High Water Mark: An ordinary high water mark is a line on the shore established by the fluctuations of water and indicated by physical characteristics, or by other appropriate means that consider the characteristics of the surrounding areas (see 33 CFR 328.3(e)).

Perennial stream: A perennial stream has flowing water year-round during a typical year. The water table is located above the stream bed for most of the year. Groundwater is the primary source of water for stream flow. Runoff from rainfall is a supplemental source of water for stream flow.

Practicable: Available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.

Pre-construction notification: A request submitted by the project proponent to the Corps for confirmation that a particular activity is authorized by nationwide permit. The request may be a permit application, letter, or similar document that includes information about the proposed work and its anticipated environmental effects. Pre-construction notification may be required by the terms and conditions of a nationwide permit, or by regional conditions. A pre-construction notification may be voluntarily submitted in cases where pre-construction notification is not required and the project proponent wants confirmation that the activity is authorized by nationwide permit.

Preservation: The removal of a threat to, or preventing the decline of, aquatic resources by an action in or near those aquatic resources. This term includes activities commonly associated with the protection and maintenance of aquatic resources through the implementation of appropriate legal and physical mechanisms. Preservation does not result in a gain of aquatic resource area or functions.

Re-establishment: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former aquatic resource. Re-establishment results in rebuilding a former aquatic resource and results in a gain in aquatic resource area and functions.

Rehabilitation: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of repairing natural/historic functions to a degraded aquatic resource. Rehabilitation results in a gain in aquatic resource function, but does not result in a gain in aquatic resource area.

Restoration: The manipulation of the physical, chemical, or biological characteristics of a site with the goal of returning natural/historic functions to a former or degraded aquatic resource. For the purpose of tracking net gains in aquatic resource area, restoration is divided into two categories: re-establishment and rehabilitation.

Riffle and pool complex: Riffle and pool complexes are special aquatic sites under the 404(b)(1) Guidelines. Riffle and pool complexes sometimes characterize steep gradient sections of streams. Such stream sections are recognizable by their hydraulic characteristics. The rapid movement of water over a course substrate in riffles results in a rough flow, a turbulent surface, and high dissolved oxygen levels in the water. Pools are deeper areas associated with riffles. A slower stream velocity, a streaming flow, a smooth surface, and a finer substrate characterize pools.

Riparian areas: Riparian areas are lands adjacent to streams, lakes, and estuarine-marine shorelines. Riparian areas are transitional between terrestrial and aquatic ecosystems, through which surface and subsurface hydrology connects riverine, lacustrine, estuarine, and marine waters with their adjacent wetlands, non-wetland waters, or uplands. Riparian areas provide a variety of ecological functions and services and help improve or maintain local water quality. (See general condition 23.)

Shellfish seeding: The placement of shellfish seed and/or suitable substrate to increase shellfish production. Shellfish seed consists of immature individual shellfish or individual shellfish attached to shells or shell fragments (i.e., spat on shell). Suitable substrate may consist of shellfish shells, shell fragments, or other appropriate materials placed into waters for shellfish habitat.

Single and complete linear project: A linear project is a project constructed for the purpose of getting people, goods, or services from a point of origin to a terminal point, which often involves multiple crossings of one or more waterbodies at separate and distant locations. The term "single and complete project" is defined as that portion of the total linear project proposed or accomplished by one owner/developer or partnership or other association of owners/developers that includes all crossings of a single water of the United States (i.e., a single waterbody) at a specific location. For linear projects crossing a single or multiple waterbodies several times at separate and distant locations, each crossing is considered a single and complete project for purposes of NWP authorization. However, individual channels in a braided stream or river, or individual arms of a large, irregularly shaped wetland or lake, etc., are not separate waterbodies, and crossings of such features cannot be considered separately.

Single and complete non-linear project: For non-linear projects, the term "single and complete project" is defined at 33 CFR 330.2(i) as the total project proposed or accomplished by one owner/developer or partnership or other association of owners/developers. A single and complete non-linear project must have independent utility (see definition of "independent utility"). Single and complete non-linear projects may not be "piecemealed" to avoid the limits in an NWP authorization.

Stormwater management: Stormwater management is the mechanism for controlling stormwater runoff for the purposes of reducing downstream erosion, water quality degradation, and flooding and mitigating the adverse effects of changes in land use on the aquatic environment.

Stormwater management facilities: Stormwater management facilities are those facilities, including but not limited to, stormwater retention and detention ponds and best management practices, which retain water for a period of time to control runoff and/or improve the quality (i.e., by reducing the concentration of nutrients, sediments, hazardous substances and other pollutants) of stormwater runoff.

Stream bed: The substrate of the stream channel between the ordinary high water marks. The substrate may be bedrock or inorganic particles that range in size from clay to boulders. Wetlands contiguous to the stream bed, but outside of the ordinary high water marks, are not considered part of the stream bed.

Stream channelization: The manipulation of a stream's course, condition, capacity, or location that causes more than minimal interruption of normal stream processes. A channelized stream remains a water of the United States.

Structure: An object that is arranged in a definite pattern of organization. Examples of structures include, without limitation, any pier, boat dock, boat ramp, wharf, dolphin, weir, boom, breakwater, bulkhead, revetment, riprap, jetty, artificial island, artificial reef, permanent mooring structure, power transmission line, permanently moored floating vessel, piling, aid to navigation, or any other manmade obstacle or obstruction.

Tidal wetland: A tidal wetland is a wetland (i.e., water of the United States) that is inundated by tidal waters. The definitions of a wetland and tidal waters can be found at 33 CFR 328.3(b) and 33 CFR 328.3(f), respectively. Tidal waters rise and fall in a predictable and measurable rhythm or cycle due to the gravitational pulls of the moon and sun. Tidal waters end where the rise and fall of the water surface can no longer be practically measured in a predictable rhythm due to masking by other waters, wind, or other effects. Tidal wetlands are located channelward of the high tide line, which is defined at 33 CFR 328.3(d).

Vegetated shallows: Vegetated shallows are special aquatic sites under the 404(b)(1) Guidelines. They are areas that are permanently inundated and under normal circumstances have rooted aquatic vegetation, such as seagrasses in marine and estuarine systems and a variety of vascular rooted plants in freshwater systems.

Waterbody: For purposes of the NWPs, a waterbody is a jurisdictional water of the United States. If a jurisdictional wetland is adjacent – meaning bordering, contiguous, or neighboring – to a waterbody determined to be a water of the United States under 33 CFR 328.3(a)(1)-(6), that waterbody and its adjacent wetlands are considered together as a single aquatic unit (see 33 CFR 328.4(c)(2)). Examples of "waterbodies" include streams, rivers, lakes, ponds, and wetlands.

G. General Regional Conditions

These conditions apply to ALL Nationwide Permits.

G-A. Construction Best Management Practices (BMP's): Unless specifically approved otherwise through issuance of a waiver by the District Engineer, the following BMP's must be implemented to the maximum degree practicable, to minimize erosion, migration of sediments, and adverse environmental impacts. Note that at a minimum, all erosion and sediment control and stormwater management practices must be designed, installed and maintained in accordance with the latest version of the *"New York Standards and Specifications for Erosion and Sediment Control"* and the *"New York State Stormwater Management Design Manual"*. These documents are available at: http://www.dec.ny.gov/chemical/29066.html and http://www.dec.ny.gov/chemical/29072.html , respectively.

1. All synthetic erosion control features (e.g., silt fencing, netting, mats), which are intended for temporary use during construction, shall be completely removed and properly disposed of after their initial purpose has been served. Only natural fiber materials, which will degrade over time, may be abandoned in place.

2. Materials resulting from trench excavation for utility line installation or ditch reshaping activities which are temporarily sidecast or stockpiled into waters of the United States must be backfilled or removed to an upland area within 30 days of the date of deposition. Note: upland options shall be utilized prior to temporary placement within waters of the U.S., unless it can be demonstrated that it would not be practicable or if the impacts of complying with this upland option requirement would result in more adverse impacts to the aquatic environment.

3. For trenching activities in wetlands the applicant shall install impermeable trench dams or trench breakers at the wetland boundaries and every 100 feet within wetland areas to prevent inadvertent drainage of wetlands or other waters of the United States.

4. Dry stream crossing methods (e.g., diversion, dam and pump, flume, bore) shall be utilized for culvert or other pipe, or utility installations to reduce downstream impacts from turbidity and sedimentation. This may require piping or pumping the stream flow around the work area and the use of cofferdams.

5. No in-stream work shall occur during periods of high flow, except for work that occurs in dewatered areas behind temporary diversions, cofferdams or causeways.

6. Construction access shall be by means that avoid or minimize impacts to aquatic sites (e.g. upland access, floating barges, mats, etc.). Discharges of fill material associated with the construction of temporary access roads and work pads in wetlands shall be placed on filter fabric. All temporary fills shall be removed upon completion of the work and the disturbed area restored to pre-construction contours, elevations and wetland conditions.

7. All return flow from dredge material disposal areas shall not result in an increase in turbidity in the receiving water body that will cause a substantial visible contrast to natural conditions. (See NWP #16)

8. For activities involving the placement of concrete into waters of the U.S., the permittee must employ watertight forms. The forms shall be dewatered prior to the placement of the concrete. The use of tremie concrete is allowed, provided that it complies with New York State water quality standards.

9. New stormwater management facilities shall be located outside of waters of the U.S. A waiver of this requirement may be requested with the submission of a PCN. The PCN must include justification which demonstrates that avoidance and minimization efforts have been met.

10. To the maximum extent practicable, the placement of fill in wetlands must be designed to maintain pre-construction surface water flows/conditions between remaining on or off-site waters. This may require the use of culverts and/or other measures. Furthermore, the activity must not restrict or impede the passage of normal or expected high flows (unless the primary purpose of the fill is to impound waters). The activity may alter the pre-construction flows/conditions if it can be shown that it benefits the aquatic environment (i.e. wetland restoration and/or enhancement).

11. In order to ensure compliance with NWP General Condition #2 – Aquatic Life Movement and #9 Management of Water Flows, all new or replacement culverts shall be constructed/installed in accordance with the following:

General Information:

a. Use of the following requirements and recommendations alone will not satisfy the need for proper engineering and design. In particular, appropriate engineering is required to ensure structures are sized

and designed to provide adequate capacity (to pass various flood flows) and stability (bed, bed forms, footings and abutments).

b. Site specific information (i.e. stream bed slope, type and size of stream bed material, stream type, existing natural or manmade barriers, etc.) should be assessed to determine appropriate culvert design and to ensure management of water flows and aquatic life movement.

c. Before replacing a culvert or other crossing structure with a larger structure it is essential that the replacement be evaluated for its impacts on: downstream flooding, upstream and downstream habitat (in-stream habitat, wetlands), potential for erosion and headcutting, and stream stability.

d. Measures should be included in all culvert designs that will promote the safe passage of fish and other indigenous aquatic organisms.

e. The dimension, pattern, and profile of the stream above and below the stream crossing should not be permanently modified by changing the width or depth of the stream channel.

Preconstruction Notification (PCN)/Waiver Requirements:

A. A PCN is not required for projects that are designed to meet Requirements B and C, below, unless a PCN is otherwise required by the NWP regulations.

B. In order to comply with General Condition #2 Aquatic Life Movement, either a bottomless culvert or bridge must be used where practicable. If the stream cannot be spanned, the culvert must be installed with its bottom buried (embedded) below the grade of the stream bed where practicable. (Note: When not practicable to do so due to small culvert size, it is suitable to allow natural deposition to cover the interior of the culvert bed.)

   i. A minimum of three stream channel cross sections shall be taken at proximal locations to the crossing location to determine the average of the lowest points in elevation of the stream bed. This average low point shall be used to ensure low flow is maintained through the culvert and from which all embedment depths are measured.

   ii. To ensure low flow and aquatic life movement is maintained, an embedment depth of a minimum of 20 percent of the culvert vertical rise throughout the length of the culvert is recommended. Additionally, it is recommended that the culvert bed slope remain consistent with the slope of the adjacent stream channel.

C. In order to comply with General Condition #9 Management of Water Flows, bank-full flows shall be accommodated through maintenance of the existing bank-full channel cross sectional dimensions within the culvert. Bank-full width is generally considered to be the top width at the stage where a stream begins to overtop its banks and spread into the floodplain.

   i. An average of three measurements (project location and straight sections of the stream upstream and downstream) shall be used to determine appropriate opening width. If the project is a replacement of an existing structure then only upstream and downstream locations shall be used to compute the average.

   ii. To ensure bank-full flow is accommodated by the culvert, it is recommended that minimum culvert widths include a minimum of 1.25 times width of the stream channel at the ordinary high water or a 2 year design storm.

D. In summary, a PCN is required, requesting a waiver of the above requirements for projects where:

   i. both spanning the waterway and embedding are found to be not practicable;

   ii. embedding is practicable but the recommendations for embedment depth cannot be met;

   iii. bank-full flow will not be accommodated within the culvert;

   iv. less than the recommended minimum culvert width is proposed

E. In addition to the PCN requirements of General Condition #31, the PCN must include the following information:

   i. a note indicating which of the above requirements will not be met by the proposed project;

   ii. information as to why the use of such structures or measures would not be practicable;

   iii. a brief description of the stream discussing the items outlined in the above General Information section;

   iv. the cross sections of the stream used to calculate the stream bed low point and bank-full

width;

v. an evaluation of the effects the crossing would have on aquatic life movement and/or water flows; and

vi. mitigation measures that will be employed to minimize these effects.

A waiver of the requirement(s) will be issued if it can be demonstrated that the proposal would result in the least environmentally damaging practicable alternative (e.g. compliance with any of the requirement(s) would result in detrimental impacts to the aquatic system).

12. Culvert Rehabilitation Projects, not including culvert replacement projects:

a. A PCN is required for culvert rehabilitation projects which will involve pipe slip lining or other activities, including concrete invert paving and concrete lining, that raise the existing invert elevation such that it causes an impediment to the passage of low flow or aquatic life movement. A PCN is not required for projects that utilize cured-in-place pipe lining. Slip lining is defined as the insertion of a smaller diameter pipe into an existing pipe by pulling pushing, or spiral winding.

b. Culvert rehabilitation projects shall assess the existing culvert, prior to the proposed repair, for compliance with Nationwide Permit General Conditions (GC) #2 (Aquatic Life Movements) and #9 (Management of Water Flows). If an impediment is found to exist, a PCN is required for any rehabilitation project.

c. For all projects requiring PCN, the applicant must provide an evaluation of the existing culvert and proposed rehabilitation project and their effects upon aquatic life movements and low/ high flow conditions in order to show compliance with GC #2 & #9. For those culverts that will impede the movement of aquatic life and water flows, the applicant must provide information as to how they will mitigate for those deficiencies. Mitigation measures may include, but are not limited to baffles, weirs, roughened channels, and grade control structures.

G-B. No regulated activity authorized by a Nationwide Permit can cause the loss of areas classified as a bog or fen in the State of New York, as determined by the Buffalo or the New York District Corps of Engineers, due to the scarcity of this habitat in New York State and the difficulty with in-kind mitigation. The Districts will utilize the following document in the classification:

Reschke, C. 1990. *Ecological Communities of New York State*. New York Natural Heritage Program. New York State Department of Environmental Conservation. Latham, N.Y. 96p. This document is available at the following location: http://www.dec.ny.gov/animals/29389.html

G-C. National Wild and Scenic Rivers (NWSR): The Upper Delaware River has been designated as a National Wild and Scenic River from the confluence of the East and West Branches below Hancock, New York, to the existing railroad bridge immediately downstream of Cherry Island in the vicinity of Sparrow Bush, New York. Also, the portion of the Genesee River located within Letchworth Gorge State Park, beginning at the southern boundary of the park and extending downstream to the Mt. Morris Dam, was designated by Congress as a permanent Study River in the Genesee River Protection Act of 1989. In accordance with General Condition #16, no activity may occur within a NWSR, including Study Rivers, unless the National Park Service (NPS) has determined in writing that the proposed work will not adversely affect the NWSR designation or study status. Therefore, a PCN is required for any NWP which would impact the designated portions of the Genesee River or the Upper Delaware River. (Note: the applicant may not commence work under any NWP until the NPS determines in writing that the project will not adversely affect the NWSR even if 45-days have passed since receipt of the PCN package.) Information regarding NWSR may be found at: http://www.rivers.gov/wildriverslist.html

G-D. For all proposals requiring a pre-construction notification (PCN), in addition to the requirements in General Condition 31, the applicant shall also include: (Note: the application will not be considered complete until all of the applicable information is received).

1. **New York State/USACE Joint Application Form:** The application form shall be completed and signed and shall clearly indicate that the submission is a PCN.

2. **Drawings:** The PCN must include legible, black and white project drawings on 8.5" x 11" paper. Full size drawings may be submitted in addition to the 8.5" x 11" plans to aid in the application review. Three types of illustrations are needed to properly depict the work to be undertaken. These illustrations or drawings are a Vicinity Map (i.e. a location map such as a USGS topographical map), a Plan View and a Cross-Section Map. Each illustration should identify the project, the applicant, and the type of illustration (vicinity map, plan view or cross section). The Vicinity Map shall provide the location of the entire project site. In addition, each illustration should be identified with a figure or attachment number. The location map shall include the Latitude and Longitude or UTM coordinates of the project. For linear projects, the PCN shall include a map of the entire project including a delineation of all waters of the U.S. within the corridor. Aquatic resource information shall be submitted using the Cowardin Classification System mapping conventions (e.g. PFO, PEM, etc.)

3. **Color photographs:** The photos should be sufficient to accurately portray the project site, keyed to a location map and not taken when snow cover is present.

4. **Avoidance and Minimization:** The PCN must include a written narrative explaining how avoidance and minimization of temporary impacts and permanent losses of waters of the U.S. were achieved on the project site (i.e. site redesign, reduction in scope, alternate methods, etc). It should include a description of the proposed construction practices that would be implemented to perform the proposed work and a description of the reasonably foreseeable direct and indirect effects to waters of the U.S. from the proposed construction practices.

5. **Mitigation**(See General Conditions 23 & 31(b)(5)):The PCN must include at least a conceptual compensatory mitigation plan for all projects resulting in the loss of greater than 1/10th of an acre of waters of the United States; or for which a waiver of the 300 linear foot limit on intermittent and ephemeral streams is being requested. Mitigation conceptual plans submitted with the PCN must include the following information at a minimum: proposed compensation type (bank or in-lieu fee credit, restoration, creation, preservation, etc.), location and brief discussion on factors considered for site selection (i.e. soils, water source, potential for invasive species, etc.), amount proposed per resource type and a discussion of how the proposal will compensate for aquatic resource functions and services lost as a result of the project.
Note 1: All mitigation projects must comply with the Federal Regulations on compensatory mitigation (33 CFR 332) entitled "Compensatory Mitigation for Losses of Aquatic Resources: Final Rule", dated April 10, 2008, which is available at: http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=/ecfrbrowse/Title33/33cfr332_main_02.tpl, and any applicable District Guidelines.
Note 2: Although a conceptual mitigation plan may be sufficient for the purposes of a PCN submission, a detailed mitigation plan must be approved by the Corps before any jurisdictional work may occur on the project site.

6. **Nationwide Rivers Inventory:** The PCN shall indicate if a river segment listed within the National Park Service Nationwide Rivers Inventory (NRI) is located within the proposed project area. For project areas containing a listed NRI segment, the PCN shall also include a statement as to how adverse effects to the river have been avoided or mitigated. The list is available at: http://www.nps.gov/ncrc/programs/rtca/nri/states/ny.html.

7. **Historic or Cultural Resources:** In accordance with General Condition 20, a PCN is required for any non-federal activity which may have the potential to cause effects to any historic properties listed, determined to be eligible for listing on, or potentially eligible for listing on the National Register of Historic Places. Please refer to General Condition 20 for submission requirements. In addition, all PCNs must include a written statement indicating if any such properties may be affected by the proposed project. A copy of any completed survey reports shall be provided with the PCN. If a survey has not been performed, the statement shall include a list of resources checked in the determination. Copies of any available correspondence from the New York State Office of Parks, Recreation, and Historic Preservation State Historic Preservation Officer (SHPO) regarding historic properties shall be provided with the PCN. Information regarding cultural resources may be found at:
http://nysparks.state.ny.us/shpo/. In addition, assistance regarding the determination of the presence of historic or cultural resources at or near the project site should be directed to SHPO. NOTE: as stated in General Condition 20, if any listed, eligible or potentially eligible properties are present, the applicant shall not begin the activity until notified by the district engineer in writing either that the activity has no potential to cause effects or that consultation under Section 106 of the NHPA has been completed.

8. **Endangered Species** (See General Condition 18) **and Essential Fish Habitat:** The PCN must include a written statement and documentation concerning any Essential Fish Habitat (EFH) and any federally listed Threatened and Endangered (T&E) species or designated critical habitat that might be affected or is in the vicinity of the project, or

if the project is located in designated critical habitat. The PCN must include a copy of any correspondence from the U.S. Fish and Wildlife Service (USFWS) and/or National Oceanic and Atmospheric Administration Fisheries Service (NOAA-Fisheries) formerly National Marine Fisheries Service (NMFS), regarding the presence of T&E species or evidence that the applicant has utilized the USFWS T&E website: http://www.fws.gov/northeast/nyfo/es/section7.htm. Information on NOAA-Fisheries (NMFS) species (both T&E and EFH) can be found at: http://www.nero.noaa.gov/nero.
Website evidence shall include a County list of T&E species. For projects located in counties containing T&E species, the PCN shall also include a discussion of potential T&E habitat within the project site. If there is potential habitat for any Federally listed species within the project site the following should be submitted:

a. The results of any habitat surveys and presence/absence surveys. Note: all surveys should be coordinated with the USFWS and/or NOAA-Fisheries(NMFS) prior to initiation.
b. A detailed description of the proposed project, including secondary impacts and approximate proposed project construction schedule of project activities (e.g. land clearing, utilities, stormwater management).
c. A description of the natural characteristics of the property and surrounding area (e.g. forested areas, freshwater wetlands, open waters, and soils). Additionally, please include a description of surrounding land use (residential, agricultural, or commercial).
d. A description of the area to be impacted by the proposed project, including the species and number or acres of trees to be removed.
e. The location of the above referenced property and extent of any project related activities or discharges clearly indicated on a copy of a USGS 7.5 minute topographic quadrangle (quad) with the name of the quad(s) and latitude/longitude clearly labeled.
f. A description of conservation measures to avoid or minimize impacts to listed species.

Please note that there are no known threatened or endangered (T&E) species or EFH species under the jurisdiction of the NOAA-Fisheries (NMFS) within the Buffalo District. Therefore, all Buffalo District requests for information regarding the presence of T&E species should be directed to the USFWS.

General Condition #18 is emphasized, ..."In cases where the non-Federal applicant has identified listed species or critical habitat that might be affected or is in the vicinity of the project, and has so notified the Corps, the applicant shall not begin work until the Corps has provided notification the proposed work will have "no effect" on listed species or critical habitat, or until Section 7 consultation has been completed."

9. **100 Year Floodplain:** For permanent fills within waters of the United States within the 100 year floodplain, documentation of compliance with FEMA-approved state or local floodplain management requirements.

10. **Submission of Multiple Copies of PCN**:

a) One (1) additional copy of the PCN package shall be provided to USACE for coordination with National Oceanic and Atmospheric Administration (NOAA) for utility lines to be constructed or installed in navigable waters of the U.S. proposed under NWP #12, (See Note 1 of NWP #12)

b) One (1) additional copy of the PCN package shall be provided to USACE for coordination with Department of Defense Siting Clearinghouse (See NWP #12, 39, 51 & 52 Notes) for:
   i. overhead utility lines proposed under NWP #12 and
   ii. any activity that involves the construction of a wind energy generating structure, solar tower, or overhead transmission lines proposed under NWP #39, 51 or 52

c) Two (2) additional copies of the PCN package shall be provided to USACE when the project is located within the New York City Watershed, for coordination with the New York City Department of Environmental Protection.

d) Five (5) additional copies of the PCN package shall be submitted to USACE for agency coordination in accordance with General Condition # 31(d)(2) for:
   i. All NWP activities that result in the loss of greater than 1/2-acre of waters of the United States,
   ii. NWP 21, 29, 39, 40, 42, 43, 44, 50, 51, and 52 activities that will result in the loss of greater than 300 linear feet of intermittent and ephemeral stream bed,
   iii. All NWP 48 activities requiring pre-construction notification.

G- E. CRITICAL RESOURCE WATERS

In accordance with NWP General Condition (GC) #22, certain activities in Critical Resource Waters cannot be authorized under the NWP program or would require a PCN (see GC #22 for a list of the NWP activities that are either excluded or require a PCN).

Critical Resource Waters in New York State include the following:

1. **East-of-Hudson portion of the New York City Water Supply:** This area includes portions of Dutchess, Putnam and Westchester Counties as delineated on Enclosure 2.

2. **Hudson River National Estuarine Research Reserves (NERR):** The Hudson River NERR consists of four components: Piermont Marsh, Iona Island, Tivoli Bay, and Stockport Flats.

H. NYSDEC General Water Quality Certification (WQC) Conditions applicable to all NWPs for which WQC has been provided are as follows:

1. Non-contamination of Waters:
• All necessary precautions shall be taken to preclude contamination of any wetland or waterway by suspended solids, resins, sediments, fuels, solvents, lubricants, epoxy coatings, paints, concrete, leachate or any other environmentally deleterious materials associated with the project.

2. Installation and Maintenance of Culverts:
• This certification does not authorize the installation of any culverts that are not embedded beneath the existing grade of the stream channel.
• This certification does not authorize culvert rehabilitation projects that involve slip lining, invert paving, or similar treatments that can result in an impediment to the passage of aquatic life movement through the culvert.
• This certification does authorize the rehabilitation of culverts utilizing Cure in Place Pipe Lining (CIPP) or concrete spray lining for culverts which currently meet Nationwide Permit General Condition # 2 - Aquatic Life Movements.

3. Discharges and Disturbances:
• Except for Nationwide Permit # 3, 4, 20, 22, 27, 30, 33, 37, 41 and maintenance activities under Nationwide Permit 43, this certification does not authorize discharges greater than 1/4 acre in size or more than 300 feet of stream disturbance.

4. Maintenance of Water Levels:
• Except for Nationwide Permit 27, this certification does not authorize any activity that results in a permanent water level alteration in waters of the United States, such as draining or impounding.

5. Dewatering:
• Authorized dewatering is limited to immediate work areas that are cofferdammed or otherwise isolated from the larger water body or waters of the United States. Dewatering must be localized and not drain extensive areas of a water body or reduce the water level such that fish and other aquatic vertebrates are killed, or their eggs and nests are exposed to desiccation, freezing or depredation in areas outside of the immediate work site.
• Cofferdams or diversions shall not be constructed in a manner that causes or exacerbates erosion of the bed or banks of a watercourse.
• All dewatering structures must be permanently removed when construction is completed.

6. Endangered or Threatened Species:
• Applicants must certify that the proposed activity will not jeopardize the existence of an endangered species or threatened species listed in 6 NYCRR Part 182, or likely to destroy or adversely modify the habitat of such species. Information on New York State endangered or threatened species may be obtained from the NYS Department of Environmental regional offices, the New York Natural Heritage Program in Albany, New York or on the NYSDEC website at http://www.dec.ny.gov/animals/29338.html. If it is determined that there is a species of concern that may be impacted by the proposed activity, this blanket water quality certification is not applicable, and the applicant will need an individual water quality certification from the Department.

7. Prohibition Period/or In-stream Work:
Unless approved in writing by the Regional Natural Resources Supervisor or their designee, in-stream work is prohibited during the following time periods:

- in cold water trout fisheries (waters classified under Article 15 of New York's Environmental Conservation Law with a "t" or "ts" designation), beginning October 1 and ending May 31
- in perennial warm water fisheries, (non- trout waters classified under Article 15 of New York's Environmental Conservation Law as "A, B or C"), beginning March 1 and ending July 15.

To determine which prohibition period is in effect for a particular water, contact the Regional Natural Resources Supervisor in the appropriate NYSDEC regional office.

8. Significant Coastal Fish and Wildlife Habitat:
• This certification does not authorize any discharge occurring in a designated Significant Coastal Fish and Wildlife Habitat area pursuant to 19 NYCRR Part 602 ; Title 19 Chapter 13, Waterfront Revitalization and Coastal Resources.

9. Coastal Erosion Hazard Areas:
• This certification does not authorize projects in Coastal Erosion Hazard Areas, as identified in NYS Environmental Conservation Law (ECL) Article 34, and its implementing regulations, 6 NYCRR Part 505.

10. State-owned Underwater Lands:
• Prior to undertaking any Nationwide Permit activity that will involve or occupy state owned lands now or formerly under the waters of New York State, the party proposing the activity must first obtain all necessary approvals from:

NYS Office of General Services
Division of Real Estate Development
Corning Tower Building, 26th Floor
Empire State Plaza
Albany, NY 12242
Tel. (518) 474-2195

11. Tidal Wetlands:
• This authorization does not authorize any activities in tidal wetlands as defined in Article 25 of NYS ECL, with the exception of NWP # 4, 20 and 48.

12. Wild, Scenic and Recreational Rivers:
• This certification docs not authorize activities in any Wild, Scenic or Recreational River or state designated WSR corridors.

13. Floodplains:
• Authorized projects must be in compliance with State and Local Floodplain Regulations.

14. Combined use of permits:
• This authorization does not allow the stacking of NWPs so that in combination they exceed *1/4* of an acre of fill or 300 linear feet of stream disturbance. When used in combination, the most restrictive conditions apply.

15. Public Service Commission:
• This certification does not authorize activities regulated pursuant to Article VII of the New York State Public Service Law. For such projects, Section 401 Water Quality Certification is obtained from the New York State Public Service Commission.

16. Utility Projects:
• This certification does not authorize maintenance or other activities associated with hydropower projects.
• This certification does not authorize the construction of substation facilities or permanent access roads in wetlands or within the FEMA mapped 100 year floodplain.
• Excess materials resulting from trench excavation must be moved out of the wetland and contained so that they do not re-enter any waters of the United States.

I. New York State Department of State (NYSDOS) Coastal Zone Management Consistency Determination applicable to all NWPs located within or affecting the NYS Coastal Zone:

To ensure that the NWPs and activities authorized by USACE would be consistent with the NYS Coastal Management Program and approved LWRPs, the following conditions will apply to NWPS where NYSDOS has objected to the USACE consistency determination or where the project will not comply with the NYSDOS NWP specific condition(s):

The applicant will submit a request for an individual consistency determination to NYSDOS. Within thirty (30) days of receipt by NYSDOS of an applicant's submission, which should include a complete joint New York State Department of Environmental Conservation and U.S. Army Corps of Engineers Permit Application, completed Federal Consistency Assessment Form, and all information and data necessary to assess the effects of the proposed activity on and its consistency with the CMP, including location maps and photographs of the site where the activity is proposed, NYSDOS will inform the applicant and the Corps whether:

1) Necessary data and information is missing from the applicant's submission. If so, the NYSDOS will notify the applicant and the Corps of the missing necessary data and information, and state that the NYSDOS review will not commence until the date the necessary data and information is provided;

2) The activity meets the General Concurrence criteria set forth in the CMP and therefore, further review of the proposed activity by the NYSDOS, and the NYSDOS concurrence with an individual consistency certification for the proposed activity, are not required; or

3) NYSDOS review of the proposed activity and NYSDOS concurrence with the applicant's consistency certification is necessary. If NYSDOS indicates review of the activity and a consistency certification for it is necessary, the activity shall not be authorized by NWP or other form of Corps authorization unless NYSDOS concurs with an applicant's consistency certification, in accordance with 15 CFR Part 930, Subpart D, or unless NYSDOS indicates the activity meets CMP General Concurrence criteria (see item 2 above).

NYSDOS concurrence with an applicant's consistency certification shall not be presumed unless NYSDOS fails to concur with or object to an applicant's consistency certification within six (6) months of commencement of NYSDOS review of an applicant's consistency certification and all necessary data and information in accordance with 15 CFR Parts 930.62 or 930.63.

Notes:

- Unless NYSDOS issues consistency concurrence or USACE has determined that NYSDOS concurrence is presumed, NWPs are not valid within the Coastal Zone.
- Limits of the coastal zone, including the CMP special management area designations of Significant Coastal Fish and Wildlife Habitats (SCFWH), can be viewed at: http://www.dos.ny.gov/communitieswaterfronts/atlas/index.html Local Waterfront Revitalization Program information can be viewed at: http://www.dos.ny.gov/communitieswaterfronts/WFRevitalization/LWRP_status.html
- All consistency concurrence determination requests must be submitted directly to NYSDOS.
- Details regarding NYSDOS submission requirements can be obtained at: http://www.dos.ny.gov/communitieswaterfronts/consistency/federal.html

J. INFORMATION ON NATIONWIDE PERMIT VERIFICATION

Verification of the applicability of these Nationwide Permits is valid until March 19, 2017 unless the Nationwide Permit is modified, suspended revoked, or the activity complies with any subsequent permit modification.

It is the applicant's responsibility to remain informed of changes to the Nationwide Permit program. A public notice announcing any changes will be issued when they occur and will be available for viewing at our website: http://www.lrb.usace.army.mil/Missions/Regulatory.aspx.

Please note in accordance with 33 CFR part 330.6(b), that if you commence or are under contract to commence an activity in reliance of the permit prior to the date this Nationwide permit expires, is suspended or revoked, or is modified such that the activity no longer complies with the terms and conditions, you have twelve months from the date of permit modification, expiration, or revocation to complete the activity under the present terms and conditions of the permit, unless the permit has been subject to the provisions of discretionary authority.

Possession of this permit does not obviate you of the need to contact all appropriate state and/or local governmental officials to insure that the project complies with their requirements.

NOTE: This document is an excerpt of the May 30, 2012 Public Notice by USACE Buffalo & New York Districts. The above referenced Enclosures 2-4 and Appendix A are not included in this Buffalo District document as they are only applicable within the geographic boundaries of the New York District. The Public Notice is available at the USACE websites or by contacting the Districts at the addresses provided below in Section K.

K. AGENCY CONTACT INFORMATION

NYS Department of Environmental Conservation

www.dec.ny.gov

NYS DEC REGION 1
Regional Permit Administrator
SUNY @ Stony Brook
50 Circle Road
Stony Brook, NY 11790-3409
(631) 444-0365

NYS DEC REGION 2
Regional Permit Administrator
1 Hunter's Point Plaza
47-40 21st Street
Long Island City, NY 11101-5407
(718) 482-4997

NYS DEC REGION 3
Regional Permit Administrator
21 South Putt Corners Road
New Paltz, NY 12561-1620
(845) 256-3054

NYS DEC REGION 4
Regional Permit Administrator
1130 North Westcott Road
Schenectady, NY 12306-2014
(518) 357-2069

NYS DEC REGION 4 Sub-Office
Deputy Regional Permit Administrator
65561 State Hwy 10
Stamford, NY 12167-9503
(607) 652-7741

NYS DEC REGION 5
Regional Permit Administrator
PO Box 296
1115 Route 86
Ray Brook, NY 12977-0296
(518)897-1234

NYS DEC REGION 5 Sub-Office
Deputy Regional Permit Administrator
PO Box 220
232 Golf Course Rd
Warrensburg, NY 12885-0220
(518) 623-1281

NYS DEC REGION 6
Regional Permit Administrator
317 Washington Street
Watertown, NY 13601-3787
(315) 785-2245

NYS DEC REGION 6 Sub-Office
Deputy Regional Permit Administrator
207 Genesee Street
Utica, NY 13501-2885
(315) 793-2555

NYS DEC REGION 7
Regional Permit Administrator
615 Erie Blvd. West
Syracuse, NY 13204-2400
(315)426-7438

NYS DEC REGION 7 Sub-Office
Deputy Regional Permit Administrator
1285 Fisher Avenue
Cortland, NY 13045-1090
(607) 753-3095

NYS DEC REGION 8
Regional Permit Administrator
6274 E. Avon - Lima Road
Avon, NY 14414-9519
(585) 226-2466

NYS DEC REGION 9
Regional Permit Administrator
270 Michigan Avenue
Buffalo, NY 14203-2915
(716) 851-7165

NYS DEC REGION 9 Sub-Office
Deputy Regional Permit Administrator
182 East Union Street
Allegany, NY 14706-1328
(716) 372-0645

NYS Department of State

Division of Coastal Resources
Consistency Review Unit
One Commerce Plaza
99 Washington Avenue, Suite 1010
Albany, NY 12231-00001
(518) 474-6000
www.nyswaterfronts.com
PO Box 296
1115 Route 86
Ray Brook, NY 12977-0296
(518) 897-1234

US Army Corps of Engineers

www.usace.army.mil

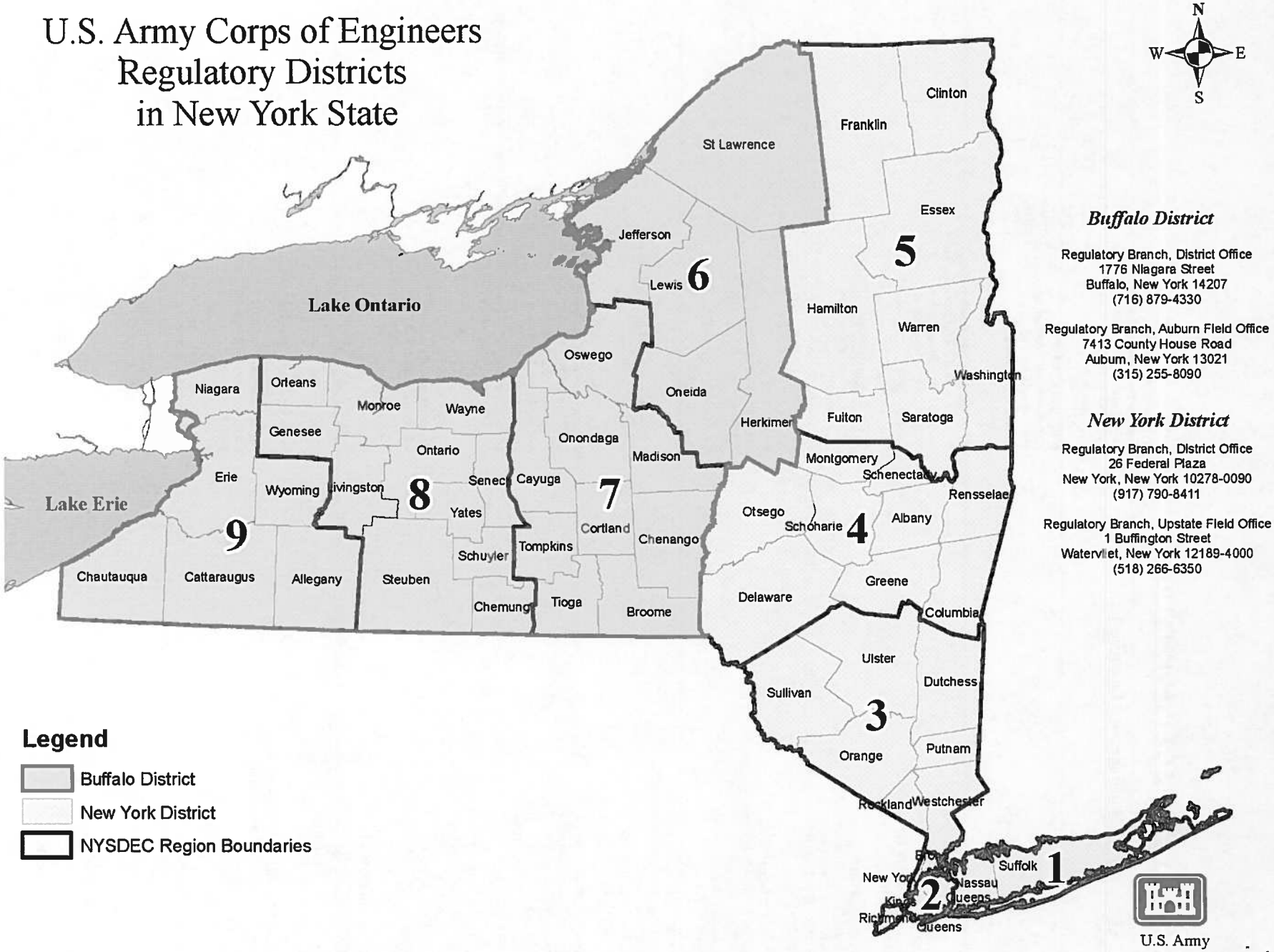
For DEC Regions 1, 2 and 3
US Army Corps of Engineers NY District
ATTN: Regulatory Branch
26 Federal Plaza, Room 1937
New York, NY 10278-0090
Email: CENAN.PublicNotice@usace.army.mil
For DEC Regions 1, 2, Westchester County and Rockland County (917) 790-8511
For the other counties of DEC Region 3 -
(917) 790-8411

For DEC Regions 4, 5
Department of the Army
ATTN: CENAN-OP-R
NY District, Corps of Engineers
1 Buffington Street
Building 10, 3rd Floor
Watervliet, NY 12189-4000
(518) 266-6350 - Permits team
(518) 266-6360 - Compliance Team

Email: cenan.rfo@usace.army.mil

For DEC Regions 6, 7, 8, 9
US Army Corps of Engineers
Buffalo District
ATTN: Regulatory Branch
1776 Niagara Street
Buffalo, NY 14207-3199
(716) 879-4330
Email: LRB.Regulatory@usace.army.mil
www.lrb.usace.army.mil

U.S. Army Corps of Engineers Regulatory Districts in New York State



Buffalo District

Regulatory Branch, District Office
1776 Niagara Street
Buffalo, New York 14207
(716) 879-4330

Regulatory Branch, Auburn Field Office
7413 County House Road
Auburn, New York 13021
(315) 255-8090

New York District

Regulatory Branch, District Office
26 Federal Plaza
New York, New York 10278-0090
(917) 790-8411

Regulatory Branch, Upstate Field Office
1 Buffington Street
Watervliet, New York 12189-4000
(518) 266-6350

U.S. Army
Corps of Engineers

ENCLOSURE 1

COMPLIANCE CERTIFICATION

Each permittee who receives a NWP verification letter from the Corps must provide a signed certification documenting completion of the authorized activity and any required compensatory mitigation.

APPLICANT:	**POINT of CONTACT:**	File Number: 2009-00241
Cooper Crouse Hinds Landfills	Tetra Tech	File Closed: 09/17/13
Wolf and 7th North Streets	175 North Corporate Drive	NWP No.: 38
Syracuse, New York 13221	Brookfield, Wisconsin 53045	
Attn: Dan Morgen	Attn: Michael Noel	

Upon completion of the activity authorized by this permit and any required compensatory mitigation sign this certification and return it to the address listed below within 30-days of project completion.

Please note that your permitted activity is subject to a compliance inspection by a U.S. Army Corps of Engineers representative. If you fail to comply with this permit you are subject to permit suspension, modification, revocation, and/or assessment of administrative penalties.

The permittee shall certify the completion of the authorized work and mitigation:

a. The authorized work was done in accordance with the NWP authorization, including any general, regional, or activity-specific conditions.

b. The implementation of any required compensatory mitigation was completed in accordance with the permit conditions. If credits from a mitigation bank or in-lieu fee program are used to satisfy the compensatory mitigation requirements, this certification must include the documentation required by 33 CFR 332.3(l)(3) to confirm that the permittee secured the appropriate number and resource type of credits.

_____ _____

Applicant Date

Permittee Telephone Number: _____

Project Location: 635 North 7th Street, Syracuse, Onondaga County, New York.

Project Description: Conduct remediation activities at the Cooper Crouse-Hinds Landfill. Work consists of excavation and clean fill replacement within WOUS.

Authorized Impacts (Waters of U.S. Impacted by Project): Wetland A (2.63 acres), Wetland B (2.61), and Wetland C (1.29 acres). In addition, excavation activities will occur along 675 linear feet of Stream A and 1825 linear feet of Stream B. Approximately 118,378 cubic yards of contaminated material is proposed for removal.

Waterway and/or Project Setting: Ley Creek – adjacent to the landfill

Return Completed form to:
Mr. David Leput
Regulatory Branch
U.S. Army Corps of Engineers
1776 Niagara Street
Buffalo, New York 14207

APPENDIX D

NYSDEC SEPTEMBER 18, 2013 PERMITS
WATER QUALITY CERTIFICATION
AND
EXCAVATION & FILL IN NAVIGABLE WATERS

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Facility DEC ID 7-3148-00002

PERMIT
Under the Environmental Conservation Law (ECL)

Permittee and Facility Information

Permit Issued To:
COOPER CROUSE-HINDS LLC
PO BOX 4999
SYRACUSE, NY 13221-4999
(315) 477-5253

Facility:
COOPER-CROUSE-HINDS LLC
WOLF & SEVENTH NORTH STS
SYRACUSE, NY 13221

Facility Location: in SALINA in ONONDAGA COUNTY
Facility Principal Reference Point: NYTM-E: 405.8 NYTM-N: 4770.6
Latitude: 43°04'56.2" Longitude: 76°09'26.1"
Project Location: Cooper Crouse-Hinds LLC "North" and "South" landfills
Authorized Activity: Sediment excavation and relocation, and other work activities, within federal wetlands and adjoining waterway(s), including Ley Creek, as necessary to implement the associated NYSDEC approved remedial action plan.

Permit Authorizations

Water Quality Certification - Under Section 401 - Clean Water Act
Permit ID 7-3148-00002/00083
New Permit Effective Date: 9/9/2013 Expiration Date: 9/1/2017
Excavation & Fill in Navigable Waters - Under Article 15, Title 5
Permit ID 7-3148-00002/00084
New Permit Effective Date: 9/9/2013 Expiration Date: 9/1/2017

NYSDEC Approval

By acceptance of this permit, the permittee agrees that the permit is contingent upon strict compliance with the ECL, all applicable regulations, and all conditions included as part of this permit.

Permit Administrator: DAVID BIMBER, Regional Permit Administrator
Address: NYSDEC REGION 7 HEADQUARTERS
615 ERIE BOULEVARD WEST
SYRACUSE, NY 13204 -2400

Authorized Signature: David L. Bimber Date 9/18/2013

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Facility DEC ID 7-3148-00002

Permit Components

NATURAL RESOURCE PERMIT CONDITIONS

WATER QUALITY CERTIFICATION SPECIFIC CONDITION

GENERAL CONDITIONS, APPLY TO ALL AUTHORIZED PERMITS

NOTIFICATION OF OTHER PERMITTEE OBLIGATIONS

NATURAL RESOURCE PERMIT CONDITIONS - Apply to the Following Permits: WATER QUALITY CERTIFICATION; EXCAVATION & FILL IN NAVIGABLE WATERS

1. **Conformance With Plans** All activities authorized by this permit must be in strict conformance with the approved plans submitted by the applicant or applicant's agent as part of the permit application. Such approved plans were prepared by Tetra Tech Inc.

2. **Work in accordance with NYSDEC approved Remedial Action Plan** All work must be in accord with NYSDEC Consent Order R7-0666-05-11 dated Aug. 29, 2011 and as outlined within the Record of Decision issued on March 31, 2011. These documents as drafted or as further revised by NYSDEC take precedence over application materials submitted in association with this permit.

3. **No Interference With Navigation** There shall be no unreasonable interference with navigation by the work herein authorized.

4. **State Not Liable for Damage** The State of New York shall in no case be liable for any damage or injury to the structure or work herein authorized which may be caused by or result from future operations undertaken by the State for the conservation or improvement of navigation, or for other purposes, and no claim or right to compensation shall accrue from any such damage.

5. **State May Order Removal or Alteration of Work** If future operations by the State of New York require an alteration in the position of the structure or work herein authorized, or if, in the opinion of the Department of Environmental Conservation it shall cause unreasonable obstruction to the free navigation of said waters or flood flows or endanger the health, safety or welfare of the people of the State, or cause loss or destruction of the natural resources of the State, the owner may be ordered by the Department to remove or alter the structural work, obstructions, or hazards caused thereby without expense to the State, and if, upon the expiration or revocation of this permit, the structure, fill, excavation, or other modification of the watercourse hereby authorized shall not be completed, the owners, shall, without expense to the State, and to such extent and in such time and manner as the Department of Environmental Conservation may require, remove all or any portion of the uncompleted structure or fill and restore to its former condition the navigable and flood capacity of the watercourse. No claim shall be made against the State of New York on account of any such removal or alteration.

6. State May Require Site Restoration If upon the expiration or revocation of this permit, the project hereby authorized has not been completed, the applicant shall, without expense to the State, and to such extent and in such time and manner as the Department of Environmental Conservation may lawfully require, remove all or any portion of the uncompleted structure or fill and restore the site to its former condition. No claim shall be made against the State of New York on account of any such removal or alteration.

7. Precautions Against Contamination of Waters All necessary precautions shall be taken to preclude contamination of any wetland or waterway by suspended solids, sediments, fuels, solvents, lubricants, epoxy coatings, paints, concrete, leachate or any other environmentally deleterious materials associated with the project.

WATER QUALITY CERTIFICATION SPECIFIC CONDITIONS

1. Water Quality Certification The NYS Department of Environmental Conservation hereby certifies that the subject project will not contravene effluent limitations or other limitations or standards under Sections 301, 302, 303, 306 and 307 of the Clean Water Act of 1977 (PL 95-217) provided that all of the conditions listed herein are met.

GENERAL CONDITIONS - Apply to ALL Authorized Permits:

1. Facility Inspection by The Department The permitted site or facility, including relevant records, is subject to inspection at reasonable hours and intervals by an authorized representative of the Department of Environmental Conservation (the Department) to determine whether the permittee is complying with this permit and the ECL. Such representative may order the work suspended pursuant to ECL 71- 0301 and SAPA 401(3).

The permittee shall provide a person to accompany the Department's representative during an inspection to the permit area when requested by the Department.

A copy of this permit, including all referenced maps, drawings and special conditions, must be available for inspection by the Department at all times at the project site or facility. Failure to produce a copy of the permit upon request by a Department representative is a violation of this permit.

2. Relationship of this Permit to Other Department Orders and Determinations Unless expressly provided for by the Department, issuance of this permit does not modify, supersede or rescind any order or determination previously issued by the Department or any of the terms, conditions or requirements contained in such order or determination.

3. Applications For Permit Renewals, Modifications or Transfers The permittee must submit a separate written application to the Department for permit renewal, modification or transfer of this permit. Such application must include any forms or supplemental information the Department requires. Any renewal, modification or transfer granted by the Department must be in writing. Submission of applications for permit renewal, modification or transfer are to be submitted to:

Regional Permit Administrator
NYSDEC REGION 7 HEADQUARTERS
615 ERIE BOULEVARD WEST
SYRACUSE, NY13204 -2400

4. **Submission of Renewal Application** The permittee must submit a renewal application at least 30 days before permit expiration for the following permit authorizations: Water Quality Certification, Excavation & Fill in Navigable Waters.

5. **Permit Modifications, Suspensions and Revocations by the Department** The Department reserves the right to exercise all available authority to modify, suspend or revoke this permit. The grounds for modification, suspension or revocation include:

a. materially false or inaccurate statements in the permit application or supporting papers;

b. failure by the permittee to comply with any terms or conditions of the permit;

c. exceeding the scope of the project as described in the permit application;

d. newly discovered material information or a material change in environmental conditions, relevant technology or applicable law or regulations since the issuance of the existing permit;

e. noncompliance with previously issued permit conditions, orders of the commissioner, any provisions of the Environmental Conservation Law or regulations of the Department related to the permitted activity.

6. **Permit Transfer** Permits are transferrable unless specifically prohibited by statute, regulation or another permit condition. Applications for permit transfer should be submitted prior to actual transfer of ownership.

NOTIFICATION OF OTHER PERMITTEE OBLIGATIONS

Item A: Permittee Accepts Legal Responsibility and Agrees to Indemnification
The permittee, excepting state or federal agencies, expressly agrees to indemnify and hold harmless the Department of Environmental Conservation of the State of New York, its representatives, employees, and agents ("DEC") for all claims, suits, actions, and damages, to the extent attributable to the permittee's acts or omissions in connection with the permittee's undertaking of activities in connection with, or operation and maintenance of, the facility or facilities authorized by the permit whether in compliance or not in compliance with the terms and conditions of the permit. This indemnification does not extend to any claims, suits, actions, or damages to the extent attributable to DEC's own negligent or intentional acts or omissions, or to any claims, suits or actions naming the DEC and arising under Article 78 of the New York Civil Practice Laws and Rules or any citizen suit or civil rights provision under federal or state laws.

Item B: Permittee's Contractors to Comply with Permit
The permittee is responsible for informing its independent contractors, employees, agents and assigns of their responsibility to comply with this permit, including all special conditions while acting as the permittee's agent with respect to the permitted activities, and such persons shall be subject to the same sanctions for violations of the Environmental Conservation Law as those prescribed for the permittee.

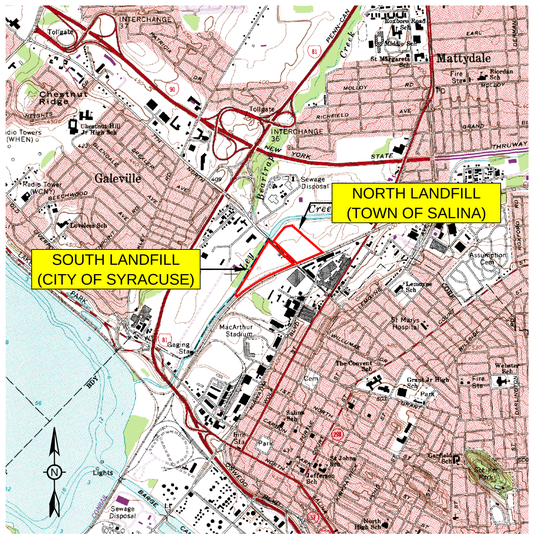
Item C: Permittee Responsible for Obtaining Other Required Permits
The permittee is responsible for obtaining any other permits, approvals, lands, easements and rights-of-way that may be required to carry out the activities that are authorized by this permit.

Item D: No Right to Trespass or Interfere with Riparian Rights
This permit does not convey to the permittee any right to trespass upon the lands or interfere with the riparian rights of others in order to perform the permitted work nor does it authorize the impairment of any rights, title, or interest in real or personal property held or vested in a person not a party to the permit.

APPENDIX E

100% DESIGN DRAWINGS

COOPER CROUSE-HINDS LANDFILL FACILITY
100% FINAL DESIGN
FEBRUARY 10, 2014

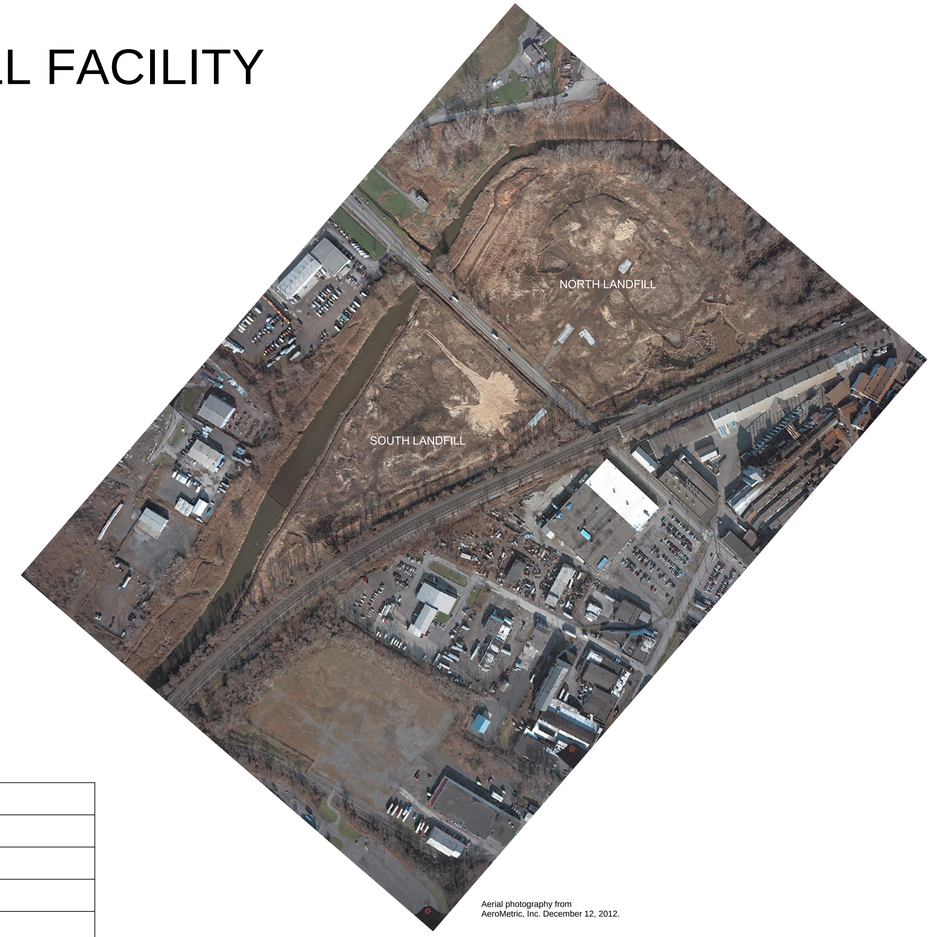


National Geodetic Vertical Datum of 1929
Contour Interval 10 Feet

Base map from U.S.G.S. 7.5'
SYRACUSE WEST, NEW YORK
topographic quadrangle map.

QUADRANGLE LOCATION

SCALE
0 5000
FEET



Aerial photography from
AeroMetric, Inc. December 12, 2012.

SHEET INDEX

1	WATER MAIN EASEMENT EXCAVATIONS
2	LEY CREEK 50' BUFFER ZONE EXCAVATIONS
3A	WETLAND C 30' BUFFER ZONE EXCAVATIONS
3B	WETLAND C SEDIMENT EXCAVATIONS
4A	NORTH LANDFILL NORTH PROPERTY BOUNDARY DOUBLE SWALE
4B	NORTH LANDFILL NORTH PROPERTY BOUNDARY SHEET PILE DETAILS
5	NORTH LANDFILL SOUTH PROPERTY BOUNDARY EXCAVATIONS
6A	WETLAND A 30' BUFFER ZONE EXCAVATIONS
6B	WETLAND A SEDIMENT EXCAVATIONS
6C	NORTH LANDFILL SURFACE SOIL EXCAVATIONS
7A	WETLAND B 30' BUFFER ZONE EXCAVATIONS
7B	WETLAND B SEDIMENT EXCAVATIONS
8	SOUTH LANDFILL DETAILS
9	NORTH LANDFILL DETAILS
10	SOUTH LANDFILL FINAL SURFACE PLAN
11	NORTH LANDFILL FINAL SURFACE PLAN
12	PERIMETER LANDFILL CAP FENCE DETAILS
13	FINAL TOPOGRAPHY AND WETLAND RECONSTRUCTION / MITIGATION PLAN

Dig Safely. New York
Call 811
before you dig

TITLE:	COOPER CROUSE-HINDS LANDFILL FACILITY SITE LOCATION AND SHEET INDEX		
LOCATION:	SYRACUSE, NEW YORK		
TETRA TECH	CHECKED	MRN	SHEET:
	DRAFTED	HJW	0
	PROJECT	117-2202046	
	DATE	2/10/14	

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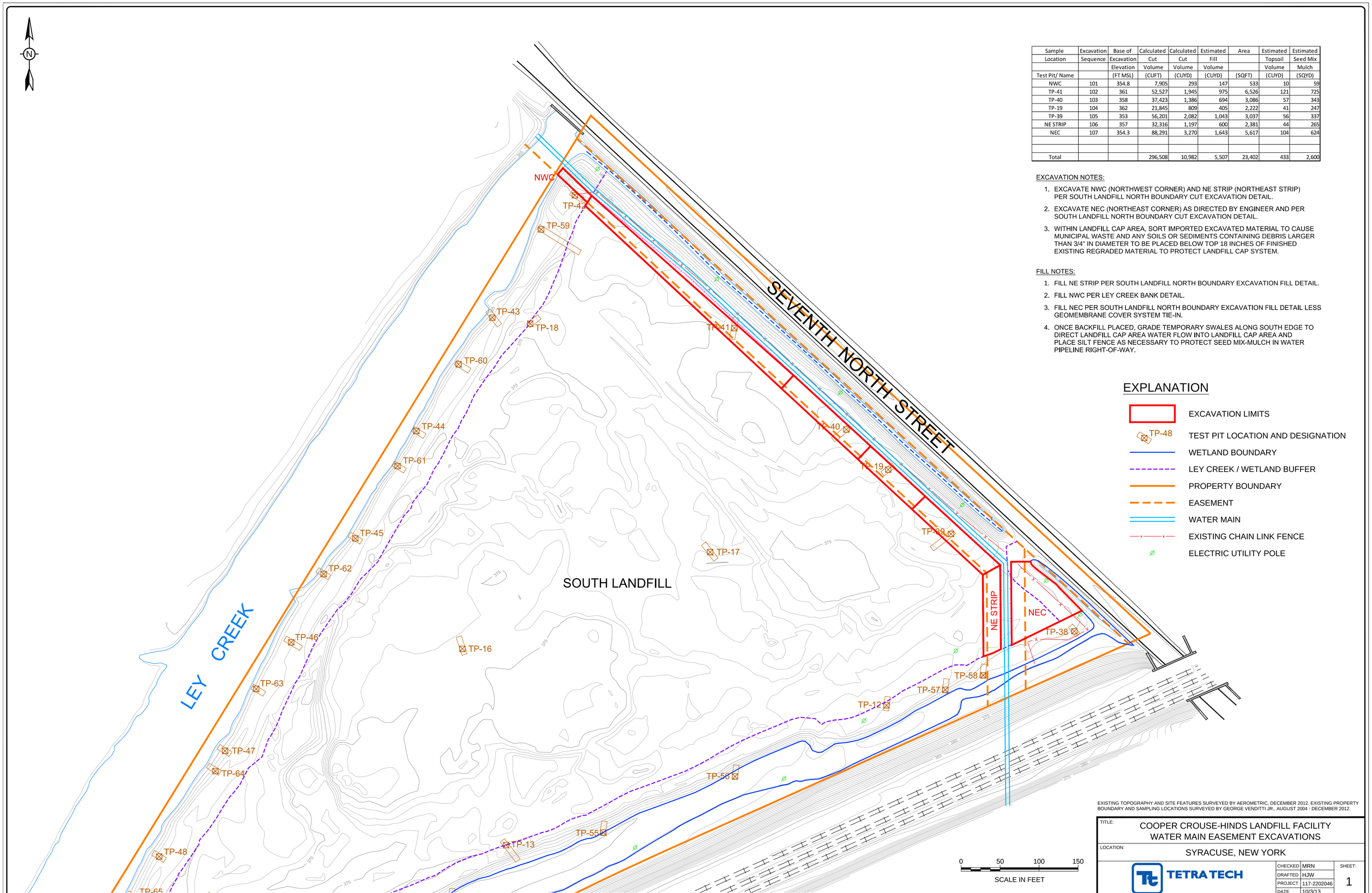


Sample Location Test Pit/ Name	Excavation Sequence	Base of Excavation Elevation (FT MSL)	Calculated Cut Volume (CUFT)	Calculated Cut Volume (CUYD)	Estimated Fill Volume (CUYD)	Area (SQFT)	Estimated Topsoil Volume (CUYD)	Estimated Seed Mix Mulch (SQYD)
NWC	101	354.8	7,905	293	147	533	10	59
TP-41	102	361	52,527	1,945	975	6,526	121	725
TP-40	103	358	37,423	1,386	694	3,086	57	343
TP-19	104	362	21,845	809	405	2,222	41	247
TP-39	105	353	56,201	2,082	1,043	3,037	56	337
NE STRIP	106	357	32,316	1,197	600	2,381	44	265
NEC	107	354.3	88,291	3,270	1,643	5,617	104	624
Total			296,508	10,982	5,507	23,402	433	2,600

EXCAVATION NOTES:

1. EXCAVATE NWC (NORTHWEST CORNER) AND NE STRIP (NORTHEAST STRIP) PER SOUTH LANDFILL NORTH BOUNDARY CUT EXCAVATION DETAIL.
2. EXCAVATE NEC (NORTHEAST CORNER) AS DIRECTED BY ENGINEER AND PER SOUTH LANDFILL NORTH BOUNDARY CUT EXCAVATION DETAIL.
3. WITHIN LANDFILL CAP AREA, SORT IMPORTED EXCAVATED MATERIAL TO CAUSE MUNICIPAL WASTE AND ANY SOILS OR SEDIMENTS CONTAINING DEBRIS LARGER THAN 3/4" IN DIAMETER TO BE PLACED BELOW TOP 18 INCHES OF FINISHED EXISTING REGRADED MATERIAL TO PROTECT LANDFILL CAP SYSTEM.

FILL NOTES:

1. FILL NE STRIP PER SOUTH LANDFILL NORTH BOUNDARY EXCAVATION FILL DETAIL.
2. FILL NWC PER LEY CREEK BANK DETAIL.
3. FILL NEC PER SOUTH LANDFILL NORTH BOUNDARY EXCAVATION FILL DETAIL LESS GEOMEMBRANE COVER SYSTEM TIE-IN.
4. ONCE BACKFILL PLACED, GRADE TEMPORARY SWALES ALONG SOUTH EDGE TO DIRECT LANDFILL CAP AREA WATER FLOW INTO LANDFILL CAP AREA AND PLACE SILT FENCE AS NECESSARY TO PROTECT SEED MIX-MULCH IN WATER PIPELINE RIGHT-OF-WAY.

EXPLANATION

- EXCAVATION LIMITS
- TP-48 TEST PIT LOCATION AND DESIGNATION
- WETLAND BOUNDARY
- LEY CREEK / WETLAND BUFFER
- PROPERTY BOUNDARY
- EASEMENT
- WATER MAIN
- EXISTING CHAIN LINK FENCE
- ELECTRIC UTILITY POLE

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
WATER MAIN EASEMENT EXCAVATIONS

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

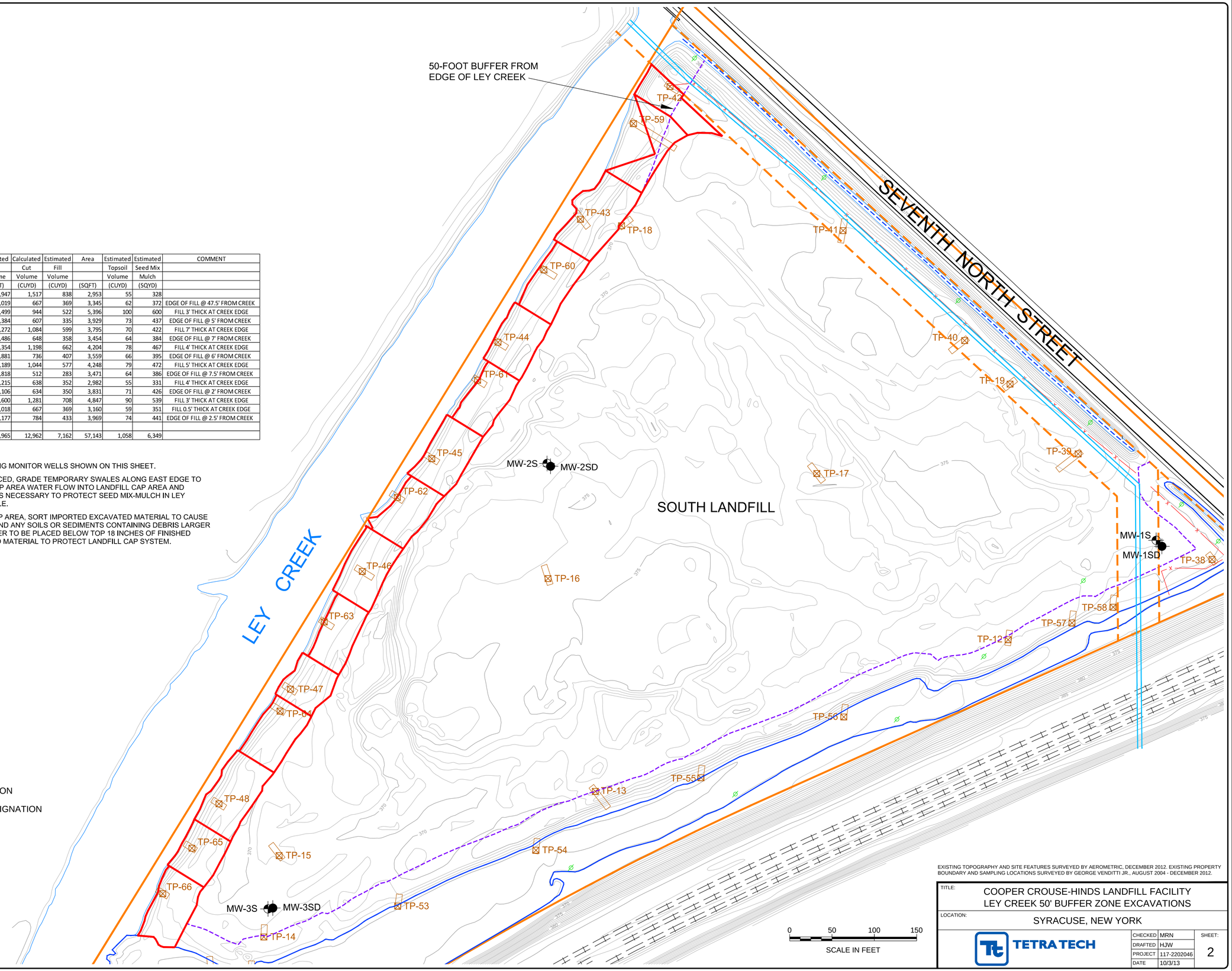
CHECKED	MRN	SHEET:
DRAFTED	HJW	1
PROJECT	117-2202046	
DATE	10/3/13	

S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\95% SUBMITTAL\SHEET 1 - WATER MAIN EASEMENT TEST PIT EXCAVATIONS.DWG

Test Pit	Excavation Sequence	Base of Excavation Elevation (FT MSL)	Calculated Cut Volume (CUFT)	Calculated Cut Volume (CUYD)	Estimated Fill Volume (CUYD)	Area (SQFT)	Estimated Topsoil Volume (CUYD)	Estimated Seed Mix Mulch (SQYD)	COMMENT
TP-42	201	354.8	40,947	1,517	838	2,953	55	328	
TP-59	202	363.5	18,019	667	369	3,345	62	372	EDGE OF FILL @ 47.5' FROM CREEK
TP-43	203	363	25,499	944	522	5,396	100	600	FILL 3' THICK AT CREEK EDGE
TP-60	204	363	16,384	607	335	3,929	73	437	EDGE OF FILL @ 5' FROM CREEK
TP-44	205	358	29,272	1,084	599	3,795	70	422	FILL 7' THICK AT CREEK EDGE
TP-61	206	362.7	17,486	648	358	3,454	64	384	EDGE OF FILL @ 7' FROM CREEK
TP-45	207	360	32,354	1,198	662	4,204	78	467	FILL 4' THICK AT CREEK EDGE
TP-62	208	361.7	19,881	736	407	3,559	66	395	EDGE OF FILL @ 6' FROM CREEK
TP-46	209	359.8	28,189	1,044	577	4,248	79	472	FILL 5' THICK AT CREEK EDGE
TP-63	210	362.7	13,818	512	283	3,471	64	386	EDGE OF FILL @ 7.5' FROM CREEK
TP-47	211	360.6	17,215	638	352	2,982	55	331	FILL 4' THICK AT CREEK EDGE
TP-64	212	362.1	17,106	634	350	3,831	71	426	EDGE OF FILL @ 2' FROM CREEK
TP-48	213	360.3	34,600	1,281	708	4,847	90	539	FILL 3' THICK AT CREEK EDGE
TP-65	214	362.2	18,018	667	369	3,160	59	351	FILL 0.5' THICK AT CREEK EDGE
TP-66	215	361.8	21,177	784	433	3,969	74	441	EDGE OF FILL @ 2.5' FROM CREEK
Total			349,965	12,962	7,162	57,143	1,058	6,349	

NOTES:

1. ABANDON (6) EXISTING MONITOR WELLS SHOWN ON THIS SHEET.
2. ONCE BACKFILL PLACED, GRADE TEMPORARY SWALES ALONG EAST EDGE TO DIRECT LANDFILL CAP AREA WATER FLOW INTO LANDFILL CAP AREA AND PLACE SILT FENCE AS NECESSARY TO PROTECT SEED MIX-MULCH IN LEY CREEK EDGE V-SWALE.
3. WITHIN LANDFILL CAP AREA, SORT IMPORTED EXCAVATED MATERIAL TO CAUSE MUNICIPAL WASTE AND ANY SOILS OR SEDIMENTS CONTAINING DEBRIS LARGER THAN 3/4" IN DIAMETER TO BE PLACED BELOW TOP 18 INCHES OF FINISHED EXISTING REGRADED MATERIAL TO PROTECT LANDFILL CAP SYSTEM.



EXPLANATION

- EXCAVATION LIMITS
- TP-48 TEST PIT LOCATION AND DESIGNATION
- MW-3S MONITOR WELL LOCATION AND DESIGNATION
- WETLAND BOUNDARY
- LEY CREEK / WETLAND BUFFER
- PROPERTY BOUNDARY
- EASEMENT
- WATER MAIN
- EXISTING CHAIN LINK FENCE
- ELECTRIC UTILITY POLE

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
LEY CREEK 50' BUFFER ZONE EXCAVATIONS

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN	SHEET: 2
DRAFTED	HJW	
PROJECT	117-2202046	
DATE	10/3/13	

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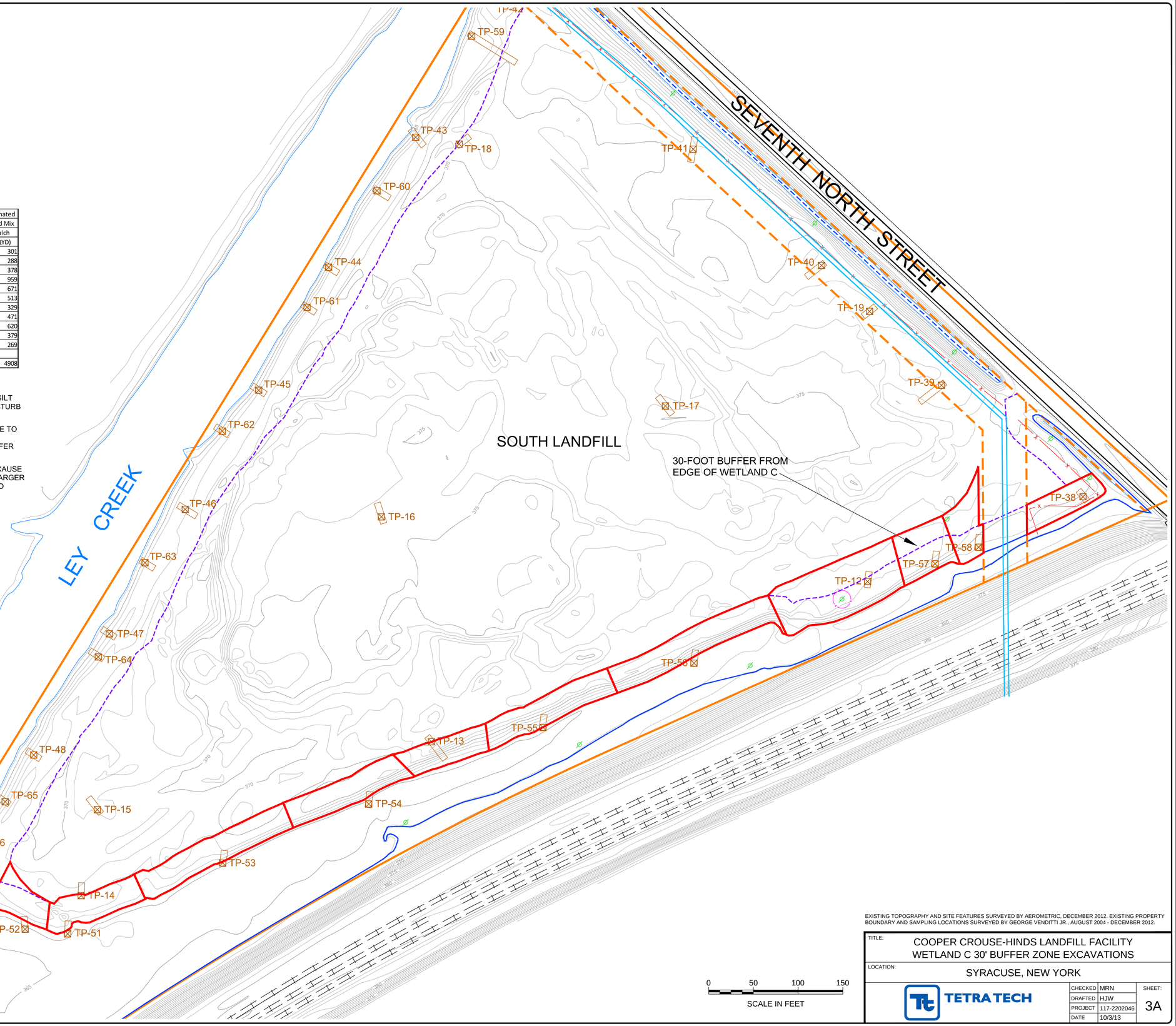
Test Pit	Excavation Sequence	Base of Excavation Elevation (FT MSL)	Calculated Cut Volume (CUFT)	Calculated Cut Volume (CUYD)	Estimated Fill Volume (CUYD)	Area (SQFT)	Estimated Topsoil Volume (CUYD)	Estimated Seed Mix Mulch (SQYD)
TP-38	301	354.3	40,250	1491	793	2,709	50	301
TP-58	303	357	34,372	1273	678	2,589	48	288
TP-57	304	360	38,826	1438	765	3,403	63	378
TP-12	305	361.5	81,326	3012	1,603	8,629	160	959
TP-56	307	361	61,767	2288	1,218	6,035	112	671
TP-55	308	360	46,902	1737	925	4,621	86	513
TP-13	309	359	32,509	1204	641	2,957	55	329
TP-54	310	359.5	43,687	1618	861	4,238	78	471
TP-53	311	359.5	51,827	1920	1,022	5,581	103	620
TP-51	313	360.5	24,780	918	488	3,410	63	379
TP-52	315	360.1	19,091	707	376	2,421	45	269
Total			456246	16898	8994	44172	818	4908

EXCAVATION NOTES:

1. AT ELECTRIC UTILITY POLE LOCATED IN TP-12 EXCAVATION CELL, PLACE SILT FENCE AT A 10' RADIUS SURROUNDING THE UTILITY POLE AND DO NOT DISTURB THIS AREA.
2. ONCE BACKFILL PLACED, GRADE TEMPORARY SWALES ALONG WEST EDGE TO DIRECT LANDFILL CAP AREA WATER FLOW INTO LANDFILL CAP AREA AND PLACE SILT FENCE AS NECESSARY TO PROTECT SEED MIX-MULCH IN BUFFER ZONE V-SWALE.
3. WITHIN LANDFILL CAP AREA, SORT IMPORTED EXCAVATED MATERIAL TO CAUSE MUNICIPAL WASTE AND ANY SOILS OR SEDIMENTS CONTAINING DEBRIS LARGER THAN 3/4" IN DIAMETER TO BE PLACED BELOW TOP 18 INCHES OF FINISHED EXISTING REGRADED MATERIAL TO PROTECT LANDFILL CAP SYSTEM.



EXPLANATION

- EXCAVATION LIMITS
- TP-48 TEST PIT LOCATION AND DESIGNATION
- WETLAND BOUNDARY
- LEY CREEK / WETLAND BUFFER
- PROPERTY BOUNDARY
- EASEMENT
- WATER MAIN
- EXISTING CHAIN LINK FENCE
- ELECTRIC UTILITY POLE
- NEW SILT FENCE

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
WETLAND C 30' BUFFER ZONE EXCAVATIONS

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN	SHEET:
DRAFTED	HJW	3A
PROJECT	117-2202046	
DATE	10/3/13	

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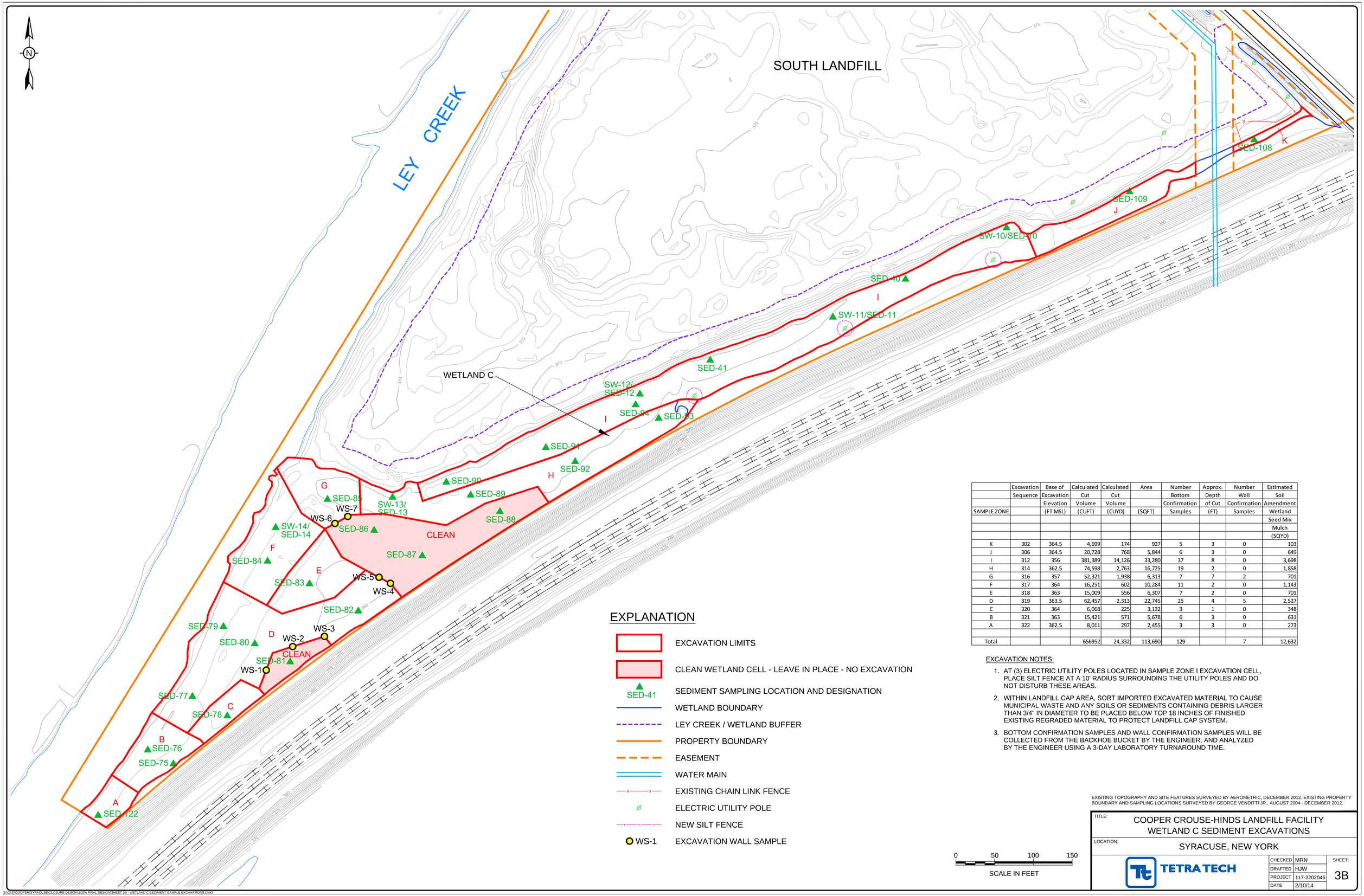

EXPLANATION

- EXCAVATION LIMITS
- CLEAN WETLAND CELL - LEAVE IN PLACE - NO EXCAVATION
- SED-41 — SEDIMENT SAMPLING LOCATION AND DESIGNATION
- WETLAND BOUNDARY
- LEY CREEK / WETLAND BUFFER
- PROPERTY BOUNDARY
- EASEMENT
- WATER MAIN
- EXISTING CHAIN LINK FENCE
- ELECTRIC UTILITY POLE
- NEW SILT FENCE
- WS-1 — EXCAVATION WALL SAMPLE

SAMPLE ZONE	Excavation Sequence	Base of Excavation Elevation (FT MSL)	Calculated Cut Volume (CUFT)	Calculated Cut Volume (CUYD)	Area (SQFT)	Number Bottom Confirmation Samples	Approx. Depth of Cut (FT)	Number Wall Confirmation Samples	Estimated Soil Amendment Wetland Seed Mix Mulch (SQYD)
K	302	364.5	4,699	174	927	5	3	0	103
J	306	364.5	20,728	768	5,844	6	3	0	649
I	312	356	381,389	14,126	33,280	37	8	0	3,698
H	314	362.5	74,598	2,763	16,725	19	2	0	1,858
G	316	357	52,321	1,938	6,313	7	7	2	701
F	317	364	16,251	602	10,284	11	2	0	1,143
E	318	363	15,009	556	6,307	7	2	0	701
D	319	363.5	62,457	2,313	22,745	25	4	5	2,527
C	320	364	6,068	225	3,132	3	1	0	348
B	321	363	15,421	571	5,678	6	3	0	631
A	322	362.5	8,011	297	2,455	3	3	0	273
Total			656952	24,332	113,690	129		7	12,632

EXCAVATION NOTES:

1. AT (3) ELECTRIC UTILITY POLES LOCATED IN SAMPLE ZONE I EXCAVATION CELL, PLACE SILT FENCE AT A 10' RADIUS SURROUNDING THE UTILITY POLES AND DO NOT DISTURB THESE AREAS.
2. WITHIN LANDFILL CAP AREA, SORT IMPORTED EXCAVATED MATERIAL TO CAUSE MUNICIPAL WASTE AND ANY SOILS OR SEDIMENTS CONTAINING DEBRIS LARGER THAN 3/4" IN DIAMETER TO BE PLACED BELOW TOP 18 INCHES OF FINISHED EXISTING REGRADED MATERIAL TO PROTECT LANDFILL CAP SYSTEM.
3. BOTTOM CONFIRMATION SAMPLES AND WALL CONFIRMATION SAMPLES WILL BE COLLECTED FROM THE BACKHOE BUCKET BY THE ENGINEER, AND ANALYZED BY THE ENGINEER USING A 3-DAY LABORATORY TURNAROUND TIME.

0 50 100 150
SCALE IN FEET

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
WETLAND C SEDIMENT EXCAVATIONS

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202046
DATE	2/10/14

SHEET: 3B

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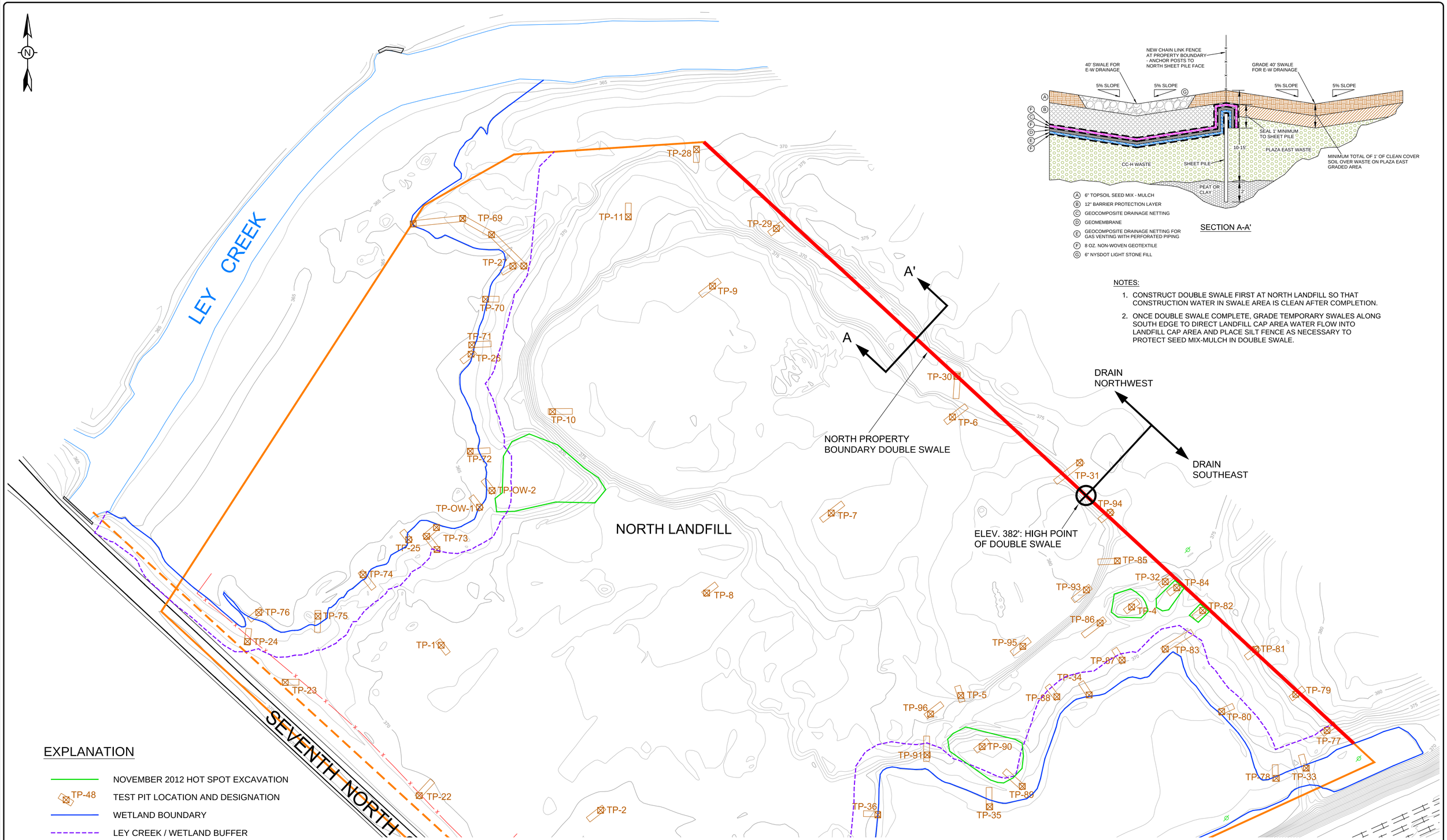

SECTION A-A'

NOTES:

1. CONSTRUCT DOUBLE SWALE FIRST AT NORTH LANDFILL SO THAT CONSTRUCTION WATER IN SWALE AREA IS CLEAN AFTER COMPLETION.
2. ONCE DOUBLE SWALE COMPLETE, GRADE TEMPORARY SWALES ALONG SOUTH EDGE TO DIRECT LANDFILL CAP AREA WATER FLOW INTO LANDFILL CAP AREA AND PLACE SILT FENCE AS NECESSARY TO PROTECT SEED MIX-MULCH IN DOUBLE SWALE.

EXPLANATION

- NOVEMBER 2012 HOT SPOT EXCAVATION
- TP-48 TEST PIT LOCATION AND DESIGNATION
- WETLAND BOUNDARY
- LEY CREEK / WETLAND BUFFER
- PROPERTY BOUNDARY
- EASEMENT
- EXISTING CHAIN LINK FENCE

0 50 100 150
SCALE IN FEET

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
NORTH LANDFILL NORTH PROPERTY BOUNDARY DOUBLE SWALE

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN	SHEET:
DRAFTED	HJW	4A
PROJECT	117-2202046	
DATE	12/11/13	

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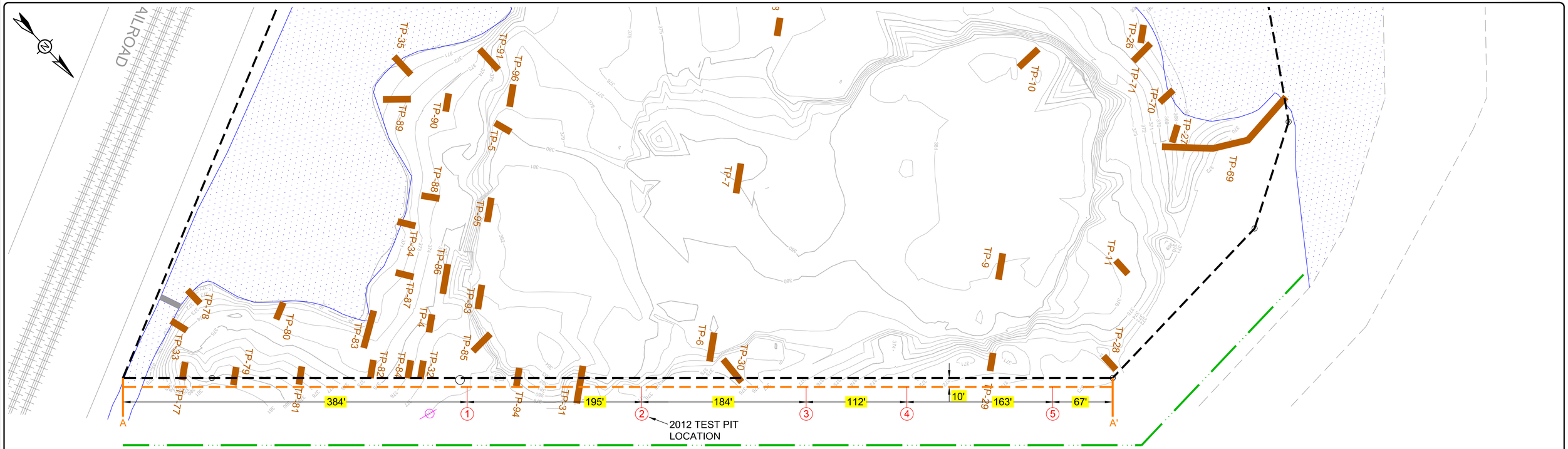
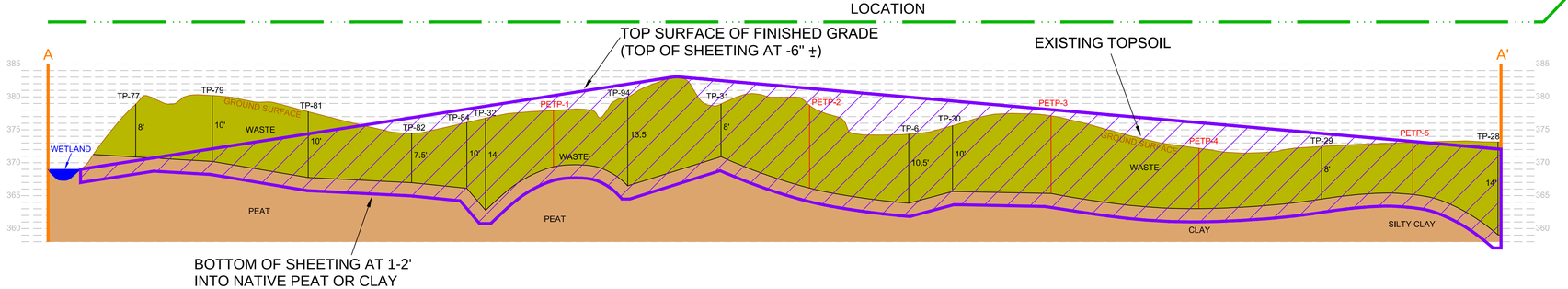


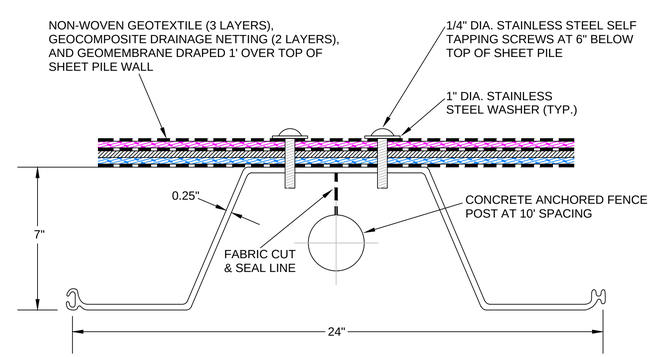


NOTES:

1. ①-⑤ REPRESENT 2012 TEST PITS 10' NORTH OF PROPERTY BOUNDARY AT LOCATIONS SHOWN.
2. BID QUANTITY FOR NORTH BOUNDARY SHEETING = 13,594 SQ. FT.
3. SHEETING HORIZONTAL LENGTH = 1,079 FT.
4. SHEETING VERTICAL LENGTH VARIES AS INDICATED.

SEQUENCE FOR SHEET PILE LANDFILL CAP TERMINATION

1. DRIVE SHEETING AND CUT TO FINAL ELEVATION AT -6"± TO FINAL TOPSOIL GRADE.
2. EXCAVATE AND ANCHOR FENCE POSTS AT INTERIOR / EXTERIOR SHEET PILE BOXES IN CONCRETE AT 10' SPACING (FIELD ADJUST TO CENTER OF BOX).
3. ROLL FABRICS TO FENCE POST, CUT AROUND POSTS AND SEAM SEAL PER MANUFACTURER'S INSTRUCTIONS.
4. EXTEND FABRICS ONE FOOT DOWN NORTH FACE OF EXTERIOR SHEET PILE BOXES AND ANCHOR AS SHOWN.
5. PLACE TOPSOIL.



SHEET PILE DETAIL

EXPLANATION

- TP-48 — HISTORICAL TEST PIT LOCATION AND DESIGNATION
- WETLAND BOUNDARY
- PROPERTY BOUNDARY
- 10' HORIZONTAL OFFSET TO NORTH ONTO PLAZA EAST EASEMENT FOR 2012 TEST PITS
- 75' EASEMENT TO NORTH ON PLAZA EAST PROPERTY
- SHEET PILE

0 50 100 150
SCALE IN FEET

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
NORTH LANDFILL NORTH PROPERTY BOUNDARY SHEET PILE DETAILS

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN	SHEET: 4B
DRAFTED	HJW	
PROJECT	117-2202046	
DATE	12/11/13	

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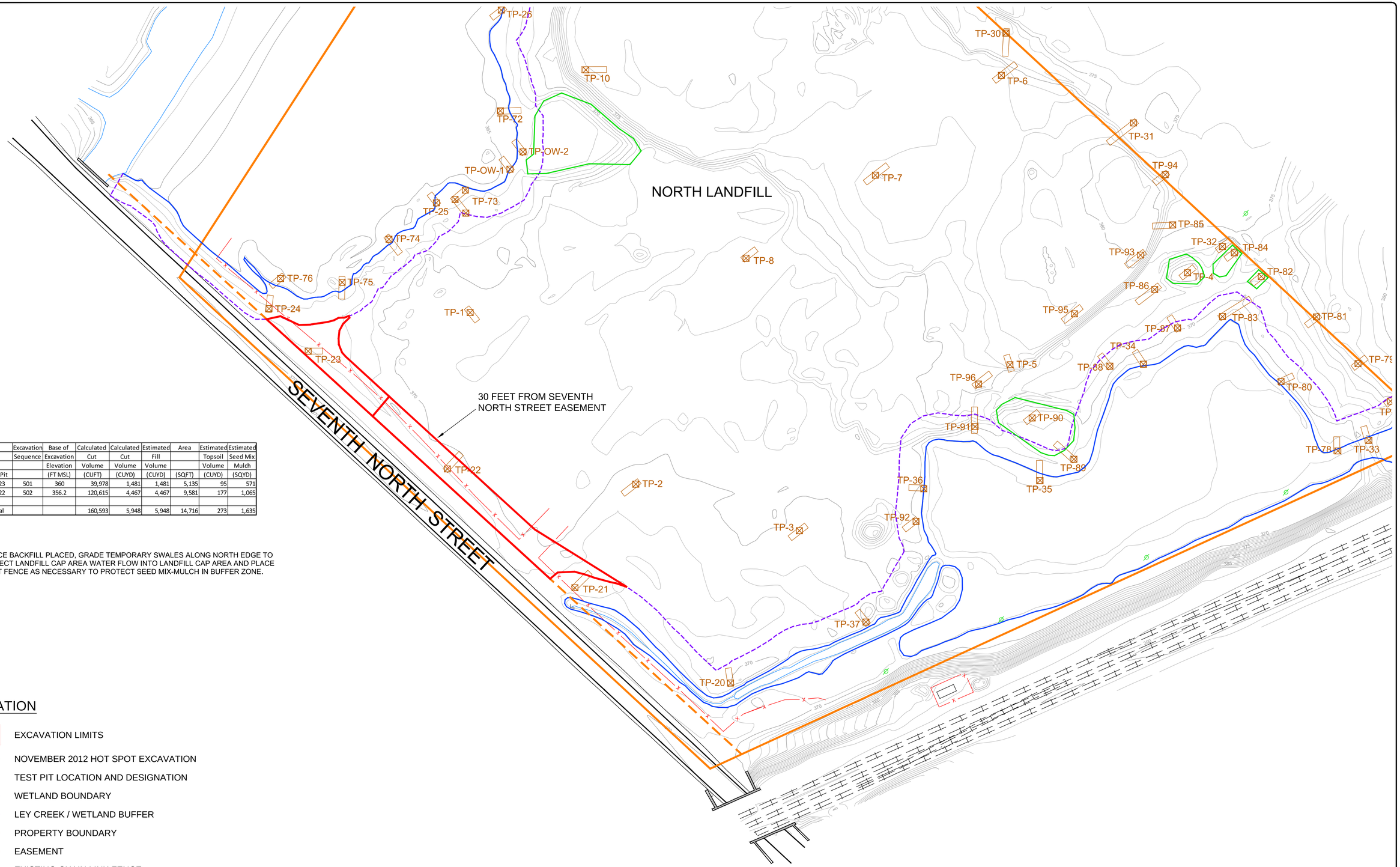

Test Pit	Excavation Sequence	Base of Excavation Elevation (FT MSL)	Calculated Cut Volume (CUFT)	Calculated Cut Volume (CUYD)	Estimated Fill Volume (CUYD)	Area (SQFT)	Estimated Topsoil Volume (CUYD)	Estimated Seed Mix Mulch (SQYD)
TP-23	501	360	39,978	1,481	1,481	5,135	95	571
TP-22	502	356.2	120,615	4,467	4,467	9,581	177	1,065
Total			160,593	5,948	5,948	14,716	273	1,635

NOTE:

1. ONCE BACKFILL PLACED, GRADE TEMPORARY SWALES ALONG NORTH EDGE TO DIRECT LANDFILL CAP AREA WATER FLOW INTO LANDFILL CAP AREA AND PLACE SILT FENCE AS NECESSARY TO PROTECT SEED MIX-MULCH IN BUFFER ZONE.

EXPLANATION

- EXCAVATION LIMITS
- NOVEMBER 2012 HOT SPOT EXCAVATION
- TP-48 TEST PIT LOCATION AND DESIGNATION
- WETLAND BOUNDARY
- LEY CREEK / WETLAND BUFFER
- PROPERTY BOUNDARY
- EASEMENT
- EXISTING CHAIN LINK FENCE

0 50 100 150
SCALE IN FEET

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
NORTH LANDFILL SOUTH PROPERTY BOUNDARY EXCAVATIONS

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202046
DATE	12/11/13

SHEET: 5

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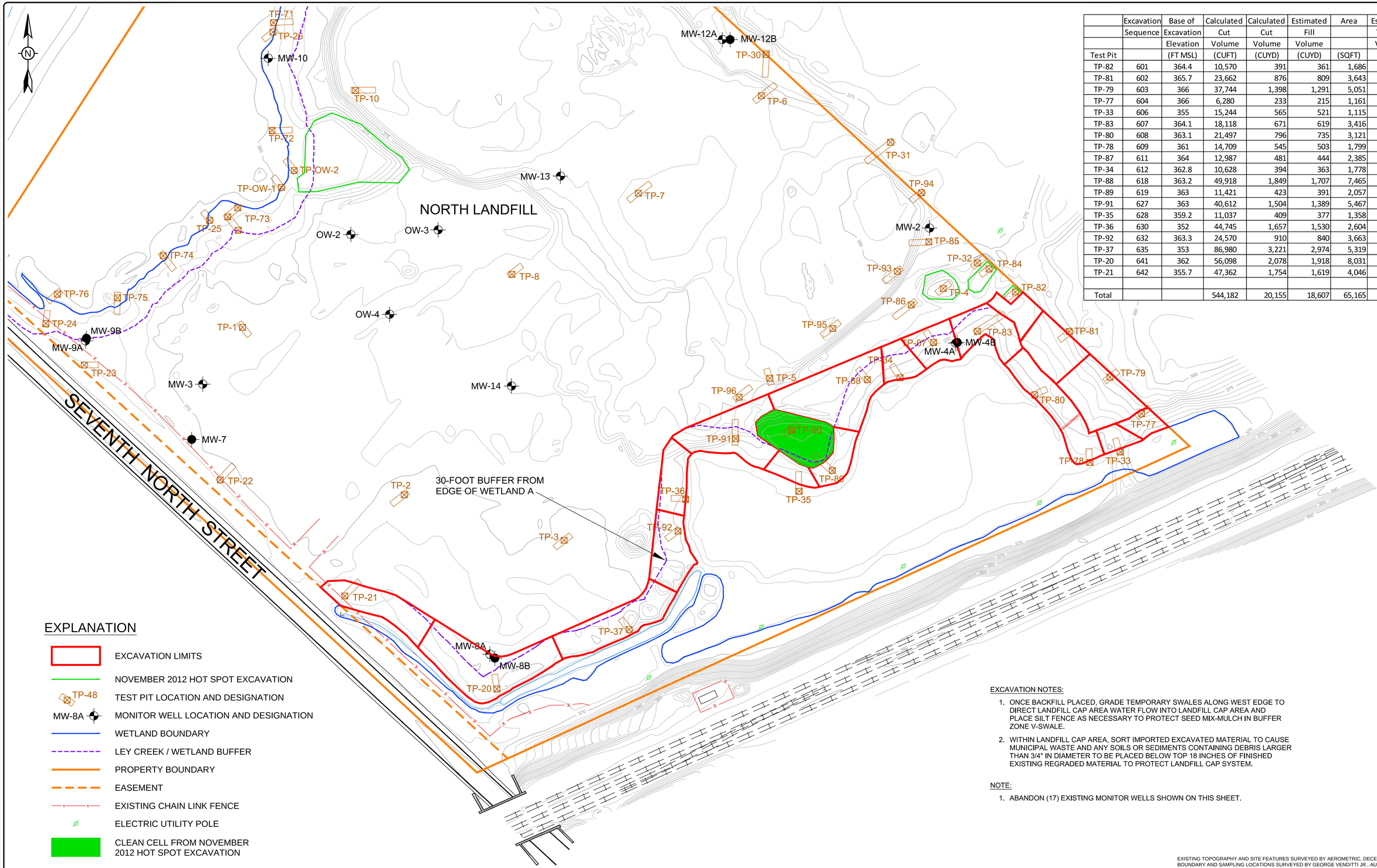

Test Pit	Excavation Sequence	Base of Excavation Elevation (FT MSL)	Calculated Cut Volume (CUFT)	Calculated Cut Volume (CUYD)	Estimated Fill Volume (CUYD)	Area (SQFT)	Estimated Topsoil Volume (CUYD)	Estimated Seed Mix Mulch (SQYD)
TP-82	601	364.4	10,570	391	361	1,686	31	187
TP-81	602	365.7	23,662	876	809	3,643	67	405
TP-79	603	366	37,744	1,398	1,291	5,051	94	561
TP-77	604	366	6,280	233	215	1,161	22	129
TP-33	606	355	15,244	565	521	1,115	21	124
TP-83	607	364.1	18,118	671	619	3,416	63	380
TP-80	608	363.1	21,497	796	735	3,121	58	347
TP-78	609	361	14,709	545	503	1,799	33	200
TP-87	611	364	12,987	481	444	2,385	44	265
TP-34	612	362.8	10,628	394	363	1,778	33	198
TP-88	618	363.2	49,918	1,849	1,707	7,465	138	829
TP-89	619	363	11,421	423	391	2,057	38	229
TP-91	627	363	40,612	1,504	1,389	5,467	101	607
TP-35	628	359.2	11,037	409	377	1,358	25	151
TP-36	630	352	44,745	1,657	1,530	2,604	48	289
TP-92	632	363.3	24,570	910	840	3,663	68	407
TP-37	635	353	86,980	3,221	2,974	5,319	99	591
TP-20	641	362	56,098	2,078	1,918	8,031	149	892
TP-21	642	355.7	47,362	1,754	1,619	4,046	75	450
Total			544,182	20,155	18,607	65,165	1,207	7,241

EXPLANATION

- EXCAVATION LIMITS
- NOVEMBER 2012 HOT SPOT EXCAVATION
- TP-48 — TEST PIT LOCATION AND DESIGNATION
- MW-8A — MONITOR WELL LOCATION AND DESIGNATION
- WETLAND BOUNDARY
- LEY CREEK / WETLAND BUFFER
- PROPERTY BOUNDARY
- EASEMENT
- EXISTING CHAIN LINK FENCE
- ELECTRIC UTILITY POLE
- CLEAN CELL FROM NOVEMBER 2012 HOT SPOT EXCAVATION

EXCAVATION NOTES:

1. ONCE BACKFILL PLACED, GRADE TEMPORARY SWALES ALONG WEST EDGE TO DIRECT LANDFILL CAP AREA WATER FLOW INTO LANDFILL CAP AREA AND PLACE SILT FENCE AS NECESSARY TO PROTECT SEED MIX-MULCH IN BUFFER ZONE V-SWALE.
2. WITHIN LANDFILL CAP AREA, SORT IMPORTED EXCAVATED MATERIAL TO CAUSE MUNICIPAL WASTE AND ANY SOILS OR SEDIMENTS CONTAINING DEBRIS LARGER THAN 3/4" IN DIAMETER TO BE PLACED BELOW TOP 18 INCHES OF FINISHED EXISTING REGRADED MATERIAL TO PROTECT LANDFILL CAP SYSTEM.

NOTE:

1. ABANDON (17) EXISTING MONITOR WELLS SHOWN ON THIS SHEET.

0 50 100 150
SCALE IN FEET

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
WETLAND A 30' BUFFER ZONE EXCAVATIONS

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202046
DATE	1/29/14

SHEET: 6A

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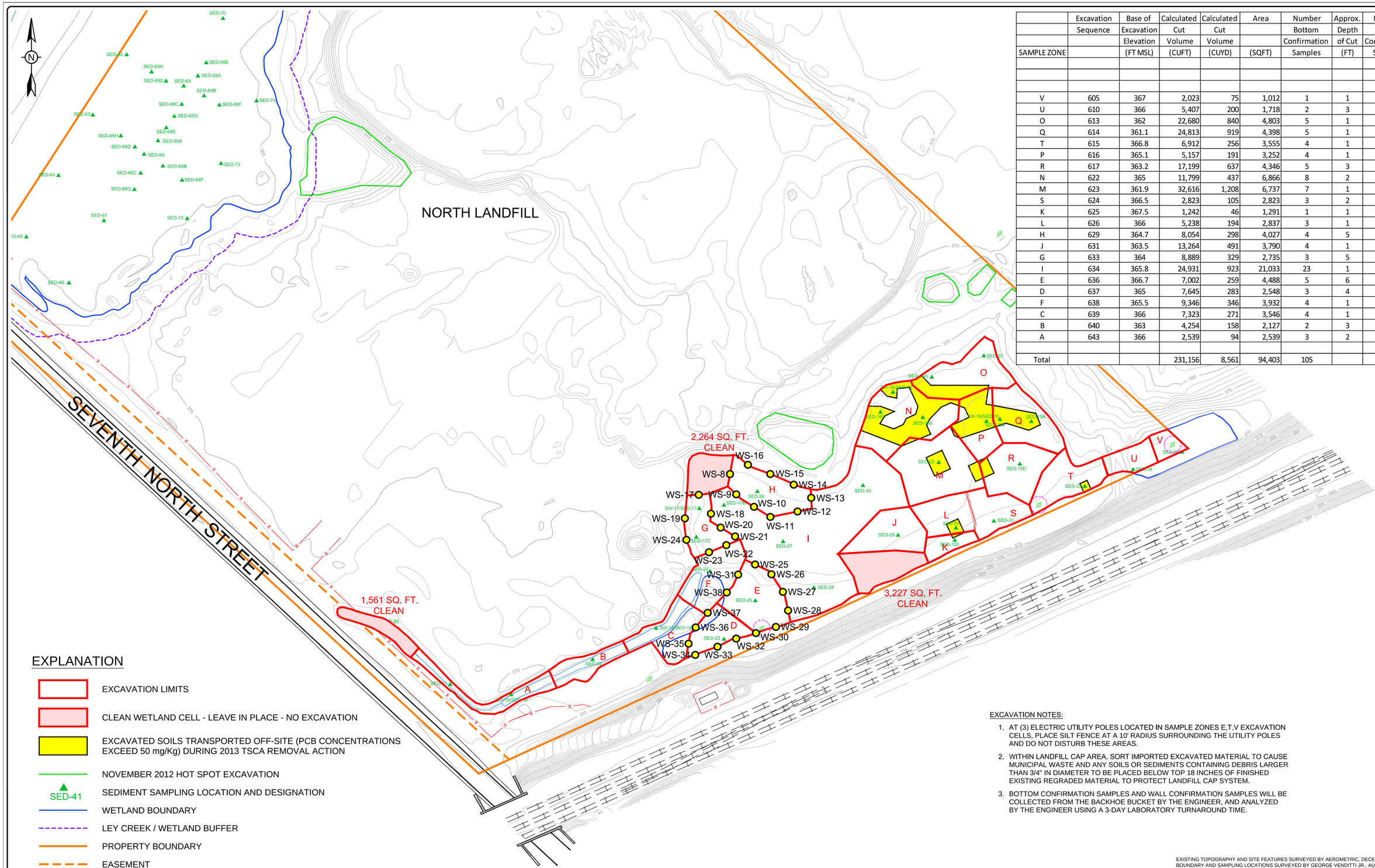

SAMPLE ZONE	Excavation Sequence	Base of Excavation Elevation (FT MSL)	Calculated Cut Volume (CUFT)	Calculated Cut Volume (CUYD)	Area (SQFT)	Number Bottom Confirmation Samples	Approx. Depth of Cut (FT)	Number Wall Confirmation Samples	Estimated Soil Amendment Wetland Seed Mix Mulch (SQYD)
V	605	367	2,023	75	1,012	1	1	0	112
U	610	366	5,407	200	1,718	2	3	0	191
O	613	362	22,680	840	4,803	5	1	0	534
Q	614	361.1	24,813	919	4,398	5	1	0	489
T	615	366.8	6,912	256	3,555	4	1	0	395
P	616	365.1	5,157	191	3,252	4	1	0	361
R	617	363.2	17,199	637	4,346	5	3	0	483
N	622	365	11,799	437	6,866	8	2	0	763
M	623	361.9	32,616	1,208	6,737	7	1	0	749
S	624	366.5	2,823	105	2,823	3	2	0	314
K	625	367.5	1,242	46	1,291	1	1	0	143
L	626	366	5,238	194	2,837	3	1	0	315
H	629	364.7	8,054	298	4,027	4	5	9	447
J	631	363.5	13,264	491	3,790	4	1	0	421
G	633	364	8,889	329	2,735	3	5	8	304
I	634	365.8	24,931	923	21,033	23	1	0	2,337
E	636	366.7	7,002	259	4,488	5	6	7	499
D	637	365	7,645	283	2,548	3	4	7	283
F	638	365.5	9,346	346	3,932	4	1	0	437
C	639	366	7,323	271	3,546	4	1	0	394
B	640	363	4,254	158	2,127	2	3	0	236
A	643	366	2,539	94	2,539	3	2	0	282
Total			231,156	8,561	94,403	105		31	10,489

EXPLANATION

- EXCAVATION LIMITS
- CLEAN WETLAND CELL - LEAVE IN PLACE - NO EXCAVATION
- EXCAVATED SOILS TRANSPORTED OFF-SITE (PCB CONCENTRATIONS EXCEED 50 mg/Kg) DURING 2013 TSCA REMOVAL ACTION
- NOVEMBER 2012 HOT SPOT EXCAVATION
- SED-41 SEDIMENT SAMPLING LOCATION AND DESIGNATION
- WETLAND BOUNDARY
- LEY CREEK / WETLAND BUFFER
- PROPERTY BOUNDARY
- EASEMENT
- EXISTING CHAIN LINK FENCE
- ELECTRIC UTILITY POLE
- NEW SILT FENCE
- WS-8 EXCAVATION WALL SAMPLE

EXCAVATION NOTES:

1. AT (3) ELECTRIC UTILITY POLES LOCATED IN SAMPLE ZONES E,T,V EXCAVATION CELLS, PLACE SILT FENCE AT A 10' RADIUS SURROUNDING THE UTILITY POLES AND DO NOT DISTURB THESE AREAS.
2. WITHIN LANDFILL CAP AREA, SORT IMPORTED EXCAVATED MATERIAL TO CAUSE MUNICIPAL WASTE AND ANY SOILS OR SEDIMENTS CONTAINING DEBRIS LARGER THAN 3/4" IN DIAMETER TO BE PLACED BELOW TOP 18 INCHES OF FINISHED EXISTING REGRADED MATERIAL TO PROTECT LANDFILL CAP SYSTEM.
3. BOTTOM CONFIRMATION SAMPLES AND WALL CONFIRMATION SAMPLES WILL BE COLLECTED FROM THE BACKHOE BUCKET BY THE ENGINEER, AND ANALYZED BY THE ENGINEER USING A 3-DAY LABORATORY TURNAROUND TIME.

0 50 100 150
SCALE IN FEET

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
WETLAND A SEDIMENT EXCAVATIONS

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202046
DATE	2/10/14

SHEET: 6B

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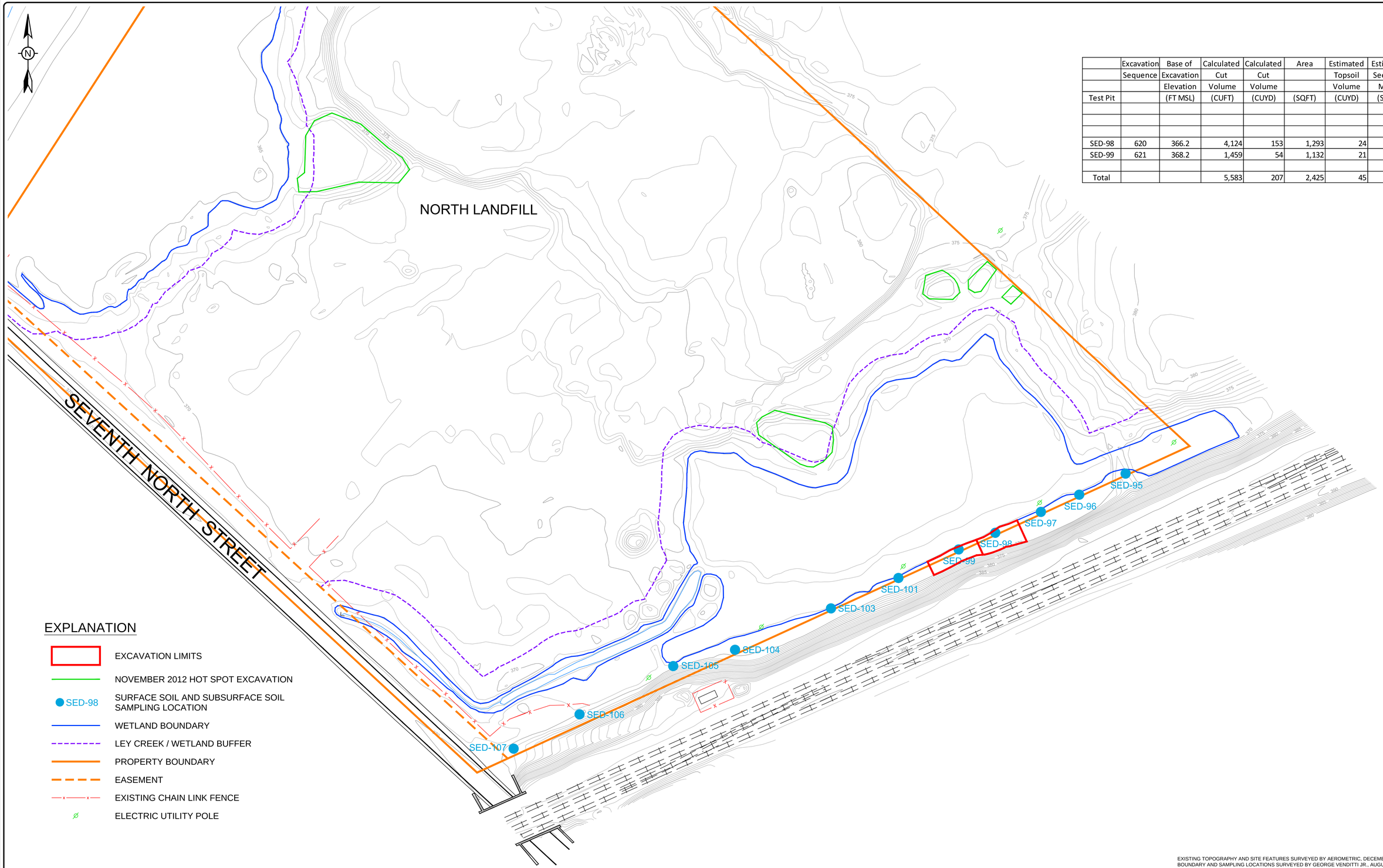
Test Pit	Excavation Sequence	Base of Excavation Elevation (FT MSL)	Calculated Cut Volume (CUFT)	Calculated Cut Volume (CUYD)	Area (SQFT)	Estimated Topsoil Volume (CUYD)	Estimated Seed Mix Mulch (SQYD)
SED-98	620	366.2	4,124	153	1,293	24	144
SED-99	621	368.2	1,459	54	1,132	21	126
Total			5,583	207	2,425	45	269



EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
NORTH LANDFILL SURFACE SOIL EXCAVATIONS

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202046
DATE	12/11/13

SHEET: 6C

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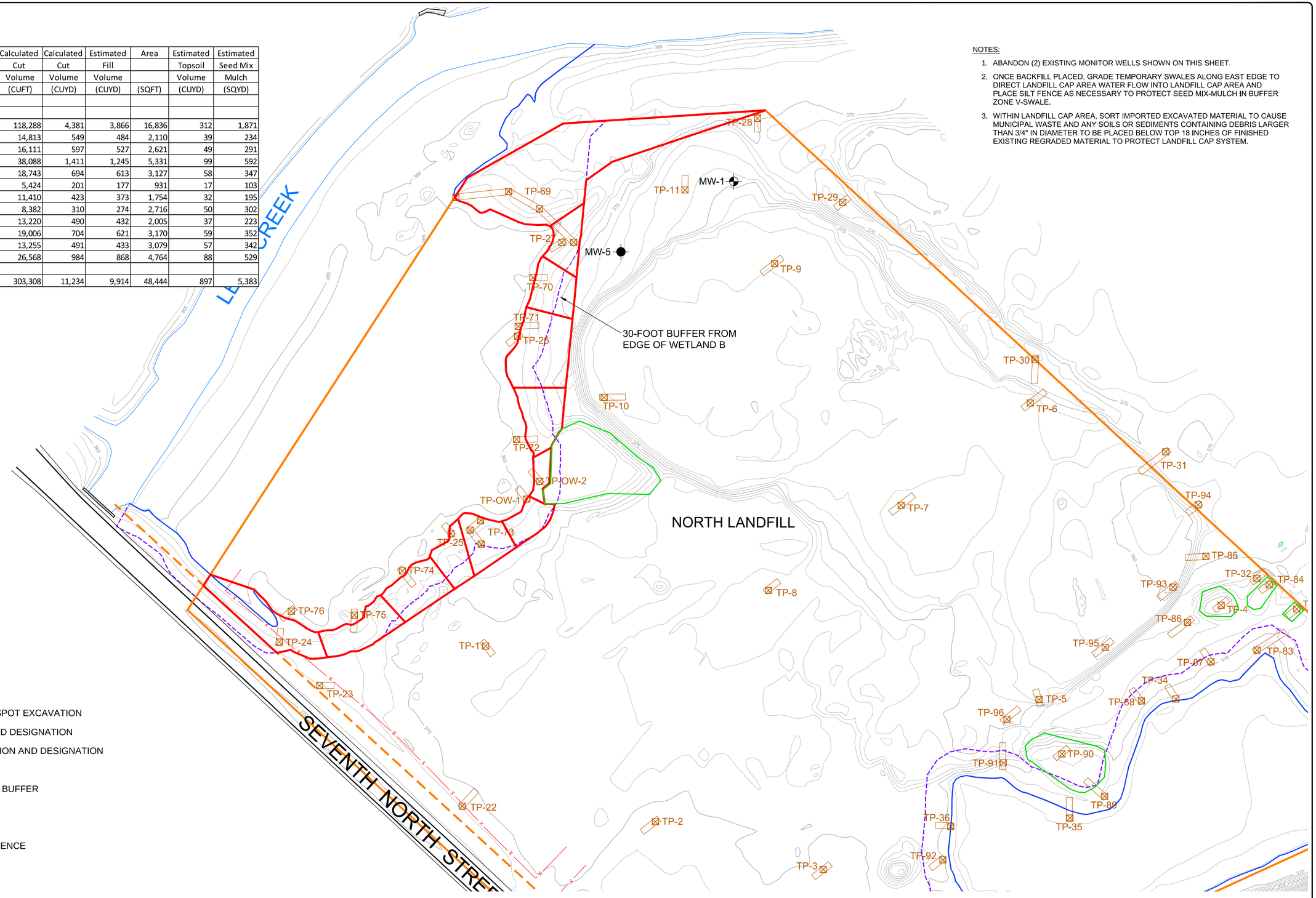
Test Pit	Excavation Sequence	Base of Excavation Elevation (FT MSL)	Calculated Cut Volume (CUFT)	Calculated Cut Volume (CUYD)	Estimated Fill Volume (CUYD)	Area (SQFT)	Estimated Topsoil Volume (CUYD)	Estimated Seed Mix Mulch (SQYD)
TP-69	701	361	118,288	4,381	3,866	16,836	312	1,871
TP-27	702	359	14,813	549	484	2,110	39	234
TP-70	703	361.3	16,111	597	527	2,621	49	291
TP-26	704	360	38,088	1,411	1,245	5,331	99	592
TP-72	705	361.1	18,743	694	613	3,127	58	347
TP-OW-2	706	360.7	5,424	201	177	931	17	103
TP-OW-1	707	360.3	11,410	423	373	1,754	32	195
TP-73	708	364	8,382	310	274	2,716	50	302
TP-25	709	360	13,220	490	432	2,005	37	223
TP-74	710	361.4	19,006	704	621	3,170	59	352
TP-75	711	361.8	13,255	491	433	3,079	57	342
TP-24	712	360.5	26,568	984	868	4,764	88	529
Total			303,308	11,234	9,914	48,444	897	5,383

NOTES:

1. ABANDON (2) EXISTING MONITOR WELLS SHOWN ON THIS SHEET.
2. ONCE BACKFILL PLACED, GRADE TEMPORARY SWALES ALONG EAST EDGE TO DIRECT LANDFILL CAP AREA WATER FLOW INTO LANDFILL CAP AREA AND PLACE SILT FENCE AS NECESSARY TO PROTECT SEED MIX-MULCH IN BUFFER ZONE V-SWALE.
3. WITHIN LANDFILL CAP AREA, SORT IMPORTED EXCAVATED MATERIAL TO CAUSE MUNICIPAL WASTE AND ANY SOILS OR SEDIMENTS CONTAINING DEBRIS LARGER THAN 3/4" IN DIAMETER TO BE PLACED BELOW TOP 18 INCHES OF FINISHED EXISTING REGRADED MATERIAL TO PROTECT LANDFILL CAP SYSTEM.



EXPLANATION

- EXCAVATION LIMITS
- NOVEMBER 2012 HOT SPOT EXCAVATION
- TP-48 TEST PIT LOCATION AND DESIGNATION
- MW-1 MONITOR WELL LOCATION AND DESIGNATION
- WETLAND BOUNDARY
- LEY CREEK / WETLAND BUFFER
- PROPERTY BOUNDARY
- EASEMENT
- EXISTING CHAIN LINK FENCE

0 50 100 150
SCALE IN FEET

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
WETLAND B 30' BUFFER ZONE EXCAVATIONS

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN	SHEET:
DRAFTED	HJW	7A
PROJECT	117-2202046	
DATE	12/11/13	

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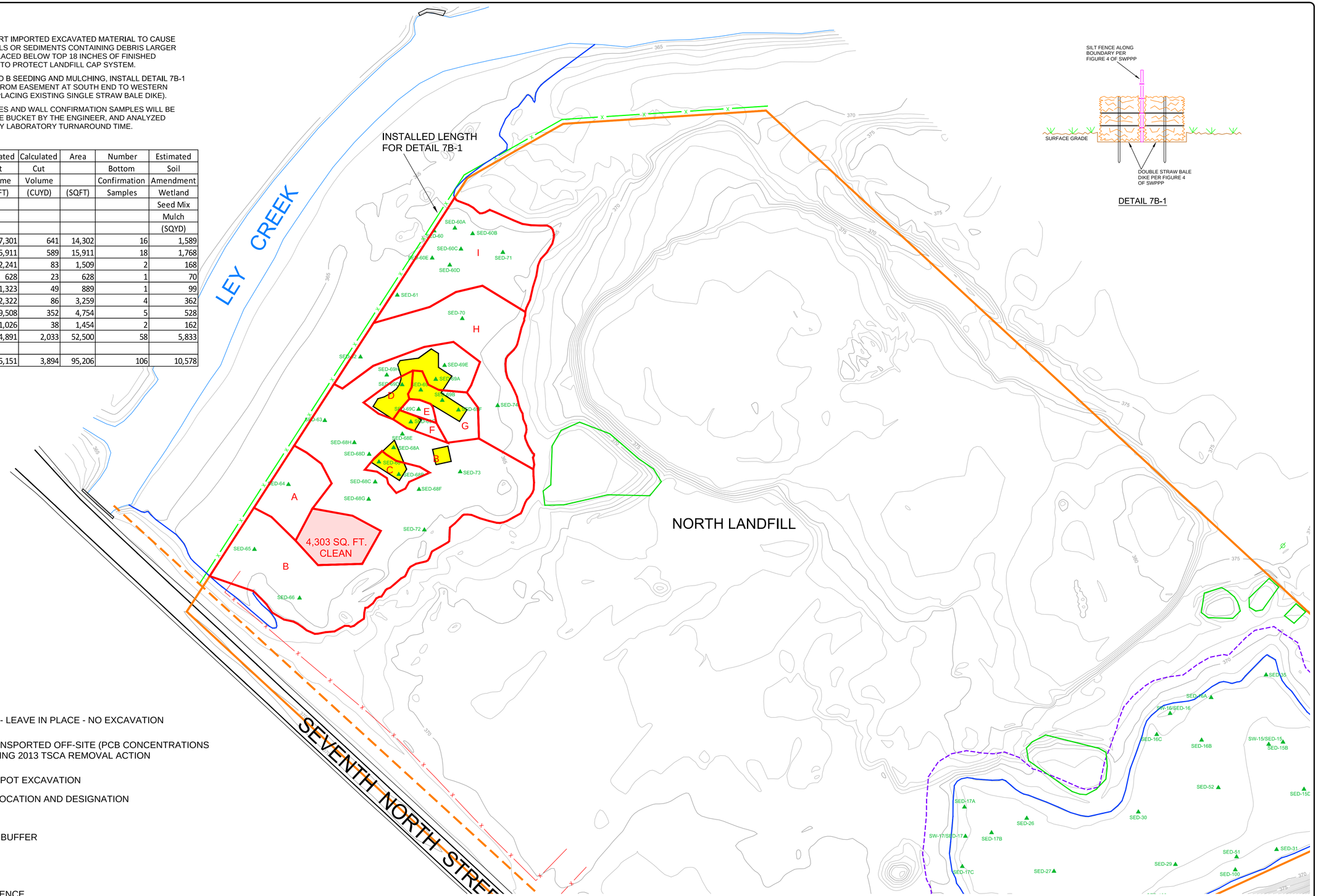
NOTES:

1. WITHIN LANDFILL CAP AREA, SORT IMPORTED EXCAVATED MATERIAL TO CAUSE MUNICIPAL WASTE AND ANY SOILS OR SEDIMENTS CONTAINING DEBRIS LARGER THAN 3/4" IN DIAMETER TO BE PLACED BELOW TOP 18 INCHES OF FINISHED EXISTING REGRADED MATERIAL TO PROTECT LANDFILL CAP SYSTEM.
2. IN CONJUNCTION WITH WETLAND B SEEDING AND MULCHING, INSTALL DETAIL 7B-1 ALONG PROPERTY BOUNDARY FROM EASEMENT AT SOUTH END TO WESTERN EDGE OF SHEET PILE WALL (REPLACING EXISTING SINGLE STRAW BALE DIKE).
3. BOTTOM CONFIRMATION SAMPLES AND WALL CONFIRMATION SAMPLES WILL BE COLLECTED FROM THE BACKHOE BUCKET BY THE ENGINEER, AND ANALYZED BY THE ENGINEER USING A 3-DAY LABORATORY TURNAROUND TIME.

SAMPLE ZONE	Excavation Sequence	Base of Excavation Elevation (FT MSL)	Calculated Cut Volume (CUFT)	Calculated Cut Volume (CUYD)	Area (SQFT)	Number Bottom Confirmation Samples	Estimated Soil Amendment Wetland Seed Mix Mulch (SQYD)
I	713	363.7	17,301	641	14,302	16	1,589
H	714	364	15,911	589	15,911	18	1,768
D	715	362.8	2,241	83	1,509	2	168
E	716	363.7	628	23	628	1	70
F	717	362.7	1,323	49	889	1	99
G	718	363.6	2,322	86	3,259	4	362
A	719	361.3	9,508	352	4,754	5	528
C	720	363.6	1,026	38	1,454	2	162
B	721	363.6	54,891	2,033	52,500	58	5,833
Total			105,151	3,894	95,206	106	10,578



DETAIL 7B-1

EXPLANATION

- EXCAVATION LIMITS
- CLEAN WETLAND CELL - LEAVE IN PLACE - NO EXCAVATION
- EXCAVATED SOILS TRANSPORTED OFF-SITE (PCB CONCENTRATIONS EXCEED 50 mg/Kg) DURING 2013 TSCA REMOVAL ACTION
- NOVEMBER 2012 HOT SPOT EXCAVATION
- SED-41 SEDIMENT SAMPLING LOCATION AND DESIGNATION
- WETLAND BOUNDARY
- LEY CREEK / WETLAND BUFFER
- PROPERTY BOUNDARY
- EASEMENT
- EXISTING CHAIN LINK FENCE

0 50 100 150
SCALE IN FEET

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
WETLAND B SEDIMENT EXCAVATIONS

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202046
DATE	2/10/14

SHEET: 7B

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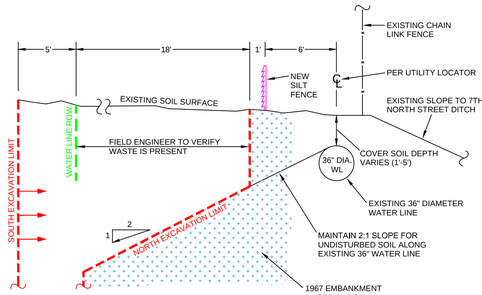
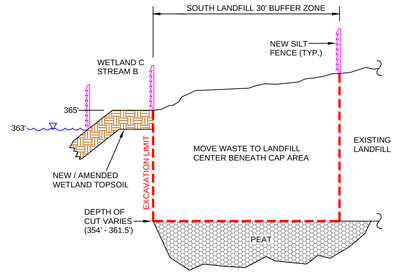


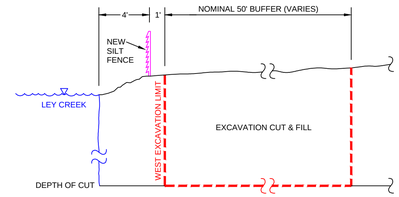
NOTES:

1. EXCAVATE NO MORE THAN 30' EAST-WEST WITHOUT PARTIALLY BACKFILLING TO STABILIZE NORTH EXCAVATION WALL
2. EXCAVATE FROM SOUTH TO NORTH (TOWARDS WATER LINE). HALT EXCAVATION AT WASTE LIMITS HORIZONTALLY AND VERTICALLY AS DIRECTED BY ENGINEER

SOUTH LANDFILL NORTH BOUNDARY
EXCAVATION CUT DETAIL



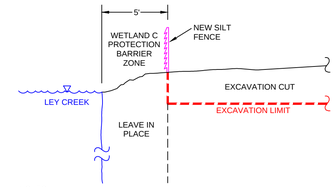
SOUTH LANDFILL 30' BUFFER ZONE
EXCAVATION CUT DETAIL



NOTES:

1. SET SILT FENCE AT 4' FROM EDGE OF LEY CREEK.
2. COMPLETE EXCAVATION CUT AS DIRECTED BY ENGINEER TO WESTERN LIMIT OF WASTE.
3. BALLAST WEST EXCAVATION WALL WITH CLEAN / RECYCLED FILL AS NECESSARY.
4. BACKFILL WEST EXCAVATION WALL TO POINT OF STABILITY AT END OF EACH WORKING DAY..

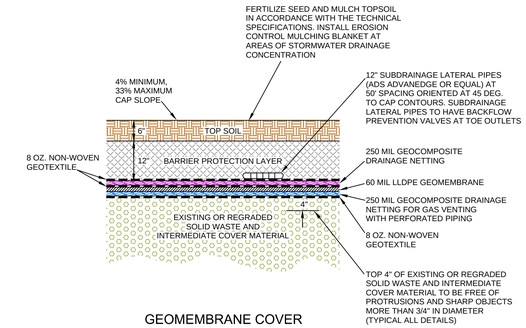
SOUTH LANDFILL 50' BUFFER ZONE
EXCAVATION CUT DETAIL



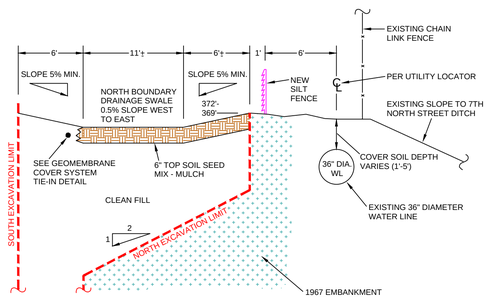
NOTES:

1. SET SILT FENCE ALONG LEY CREEK AT 5' SETBACK.
2. REMOVE WETLAND SEDIMENT TO INDICATED DEPTH.
3. TEST / AMEND TOP 12 INCHES OF SOIL BENEATH CUT TO MEET TABLE SPECIFICATIONS OF WETLAND TOPSOIL, OR PROVIDE IMPORTED WETLAND TOPSOIL TO PROVIDE 12-INCH THICKNESS (TYPICAL ALL WETLANDS).
4. USE 5' WETLAND C PROTECTION BARRIER ALONG SOUTH EDGE OF SAMPLE ZONE A EXCAVATION.
5. APPLY EMERGENT WETLAND SEED MIX - MULCH.
6. WETLAND C PROTECTION BARRIER ZONE SLOPE TO BE STABILIZED AT END OF EACH WORKING DAY.

SOUTH LANDFILL AT WETLAND C
EXCAVATION CUT DETAIL



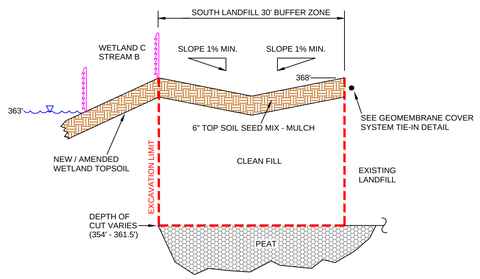
GEOMEMBRANE COVER
SYSTEM DETAIL



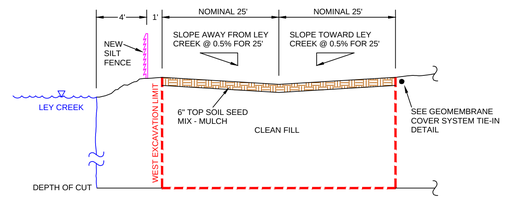
NOTE:

1. SWALE DRAINS FROM NW CORNER TO STREAM B

SOUTH LANDFILL NORTH BOUNDARY
EXCAVATION FILL DETAIL



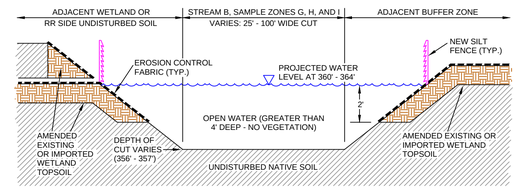
SOUTH LANDFILL 30' BUFFER
EXCAVATION FILL DETAIL



NOTE:

1. SLOPE 50' BUFFER ZONE FROM NORTH TO SOUTH, TO DRAIN TO WETLAND C, SLOPE @ 0.46%

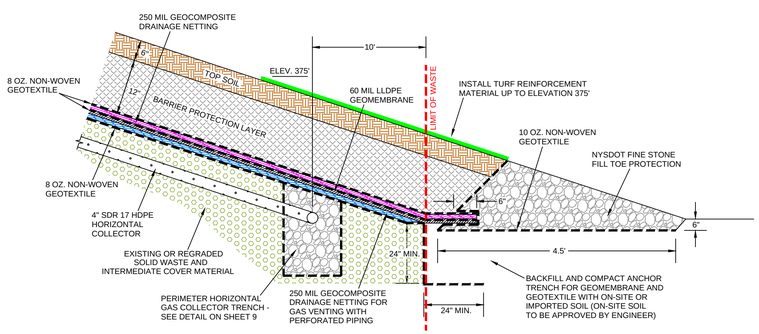
SOUTH LANDFILL 50' BUFFER ZONE
EXCAVATION FILL DETAIL



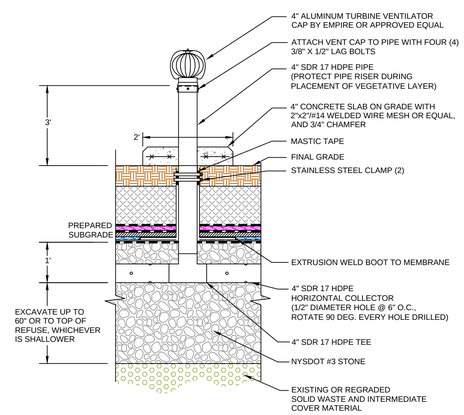
NOTES:

1. SLOPE CUT AT STREAM CELL PERIMETER TO 1:1.
2. AMEND EXISTING OR PLACE IMPORTED WETLAND TOPSOIL FROM 2 FEET BELOW PROJECTED WATER LEVEL UP SLOPE TO MEET ADJACENT WETLAND OR 5 HORIZONTAL FEET TO MEET UNDISTURBED RR SIDE SOIL OR 30' BUFFER ZONE SOIL. WETLAND TOPSOIL THICKNESS = 12".
3. APPLY EMERGENT WETLAND SEED MIX, MULCH, EROSION CONTROL FABRIC, AND SILT FENCE TO ALL PERIMETER SLOPES.

STREAM B CUT AND RESTORE DETAIL



GEOMEMBRANE COVER
SYSTEM TIE-IN DETAIL



GAS VENT RISER DETAIL

NOTES:

1. SEED MIX ON CHART BELOW.
2. ANY EQUIPMENT USED FOR SEEDING SHALL BE CLEANED PRIOR TO APPLYING SEED.
3. SEEDING WILL OCCUR IN THE SPRING BETWEEN MARCH 15 - JUNE 1. SEEDING WILL NOT OCCUR DURING PERIODS OF GROUND SATURATION, WINDY PERIODS, OR WHEN GROUND IS TOO DRY FOR SEEDS TO GERMINATE.
4. SEEDING WILL OBTAIN 100% COVERAGE ON ALL EXPOSED SOIL.
5. A BONDED FIBER MATRIX (BFM) WILL BE USED TO ACHIEVE 100% COVERAGE OF SEEDED AREAS.

WETLAND TOPSOIL NOTES:

1. THE CONTRACTOR WILL FURNISH AND INSTALL A SUITABLE SILT LOAM, AMENDED AS NECESSARY TO MEET THE SPECIFICATIONS IN THE TABLE BELOW.
2. REGARDLESS OF SOURCE, THE TOPSOIL SHALL BE APPLIED AT A MINIMUM OF 12" IN DEPTH THROUGHOUT THE WETLAND CREATION AREA.

COMMON PARAMETERS AND VALUES OF MINERAL HYDRIC SOILS	
PARAMETER	VALUE
ORGANIC CONTENT	≥10% - ≤20%
ORGANIC CARBON	≥12% - ≤20%
pH	CIRCUMNEUTRAL
BULK DENSITY	HIGH
POROSITY	LOW (45-55%)
HYDRAULIC CONDUCTIVITY	HIGH
WATER HOLDING CAPACITY	LOW
NUTRIENT AVAILABILITY	GENERALLY HIGH
CATION EXCHANGE CAPACITY	LOW-DOMINATED BY MAJOR CATIONS

SPECIES PLANTING LIST - WETLAND SEED MIX B			
SCIENTIFIC NAME	COMMON NAME	QTY PER ACRE	20 LBS PER ACRE
AGROSTIS STOLONIFERA	CREEPING BENTGRASS	4.00 LBS	20%
ALOPECURUS PRATENSIS	MEADOW FOXTAIL	4.00 LBS	20%
POA TRIVIALIS	ROUGH BLUEGRASS	4.00 LBS	20%
ELYMUS VIRGINICUS	VIRGINA WILD RYE	4.00 LBS	20%
PANICUM CLANDESTINUM	DEER TONGUE	9.6 OZ	3%
SPARGANIUM CURYCARPUM	GIANT BUR-REED	9.6 OZ	3%
SCIRPUS ATROVIRENS	GREEN BULRUSH	9.6 OZ	3%
BIDENS ARISTOSA	SHOWY TICKSEED SUNFLOWER	9.6 OZ	3%
SCIRPUS AMERICANUS	COMMON THREE-SQUARE	6.4 OZ	2%
SCIRPUS CYPERINUS	WOOLGRASS	6.4 OZ	2%
SCIRPUS VALIDUS	SOFT STEM BULRUSH	6.4 OZ	2%
SOLIDAGO GRAMINIFOLIA	GRASS LEAF GOLDENROD	6.4 OZ	2%

TYPICAL EMERGENT WETLAND DETAIL

GENERAL NOTE:

1. ALL SILT FENCE TO REMAIN IN PLACE FOR 3 YEARS.

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
SOUTH LANDFILL DETAILS

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN	SHEET:
DRAFTED	HJW	8
PROJECT	117-2202046	
DATE	1/29/14	

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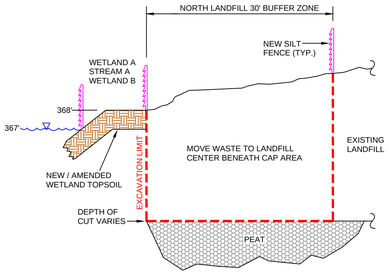
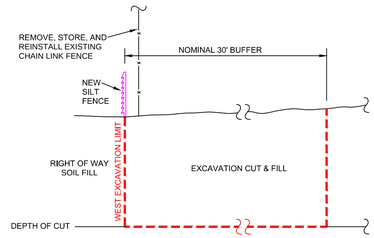


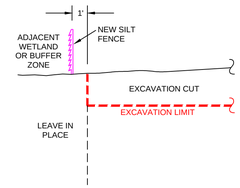
NORTH LANDFILL 30' BUFFER ZONE
EXCAVATION CUT DETAIL



NOTES:

1. SET SILT FENCE AT EDGE OF RIGHT OF WAY.
2. COMPLETE EXCAVATION CUT AS DIRECTED BY ENGINEER TO SOUTHERN LIMIT OF WASTE.
3. BALLAST SOUTH EXCAVATION WALL WITH CLEAN / RECYCLED FILL AS NECESSARY.
4. BACKFILL SOUTH EXCAVATION WALL TO POINT OF STABILITY AT END OF EACH WORKING DAY..
5. SHEET 6C EXCAVATIONS SIMILAR.

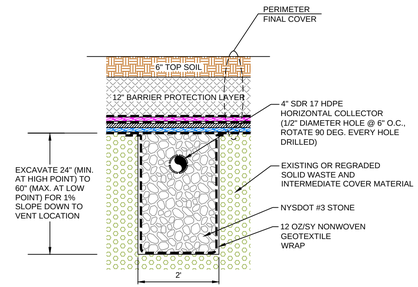
NORTH LANDFILL 30' SOUTH BOUNDARY
BUFFER ZONE EXCAVATION CUT DETAIL



NOTES:

1. SET SILT FENCE ALONG EDGE OF CUT AT 1' SETBACK.
2. REMOVE WETLAND SEDIMENT TO INDICATED DEPTH.
3. TEST / AMEND TOP 12 INCHES OF SOIL BENEATH CUT TO MEET TABLE SPECIFICATIONS OF WETLAND TOPSOIL, OR PROVIDE IMPORTED WETLAND TOPSOIL TO PROVIDE 12-INCH THICKNESS (TYPICAL ALL WETLANDS).
4. APPLY EMERGENT WETLAND SEED MIX - MULCH.

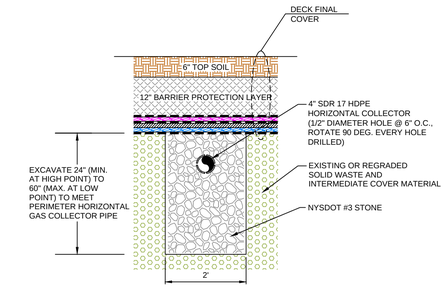
NORTH LANDFILL AT WETLAND A, STREAM A, AND
WETLAND B EXCAVATION CUT AND RESTORE DETAIL



NOTE:

1. COLLECTOR INSTALLED AFTER SUBGRADE PREPARATION AND BEFORE GEOCOMPOSITE/LINER.

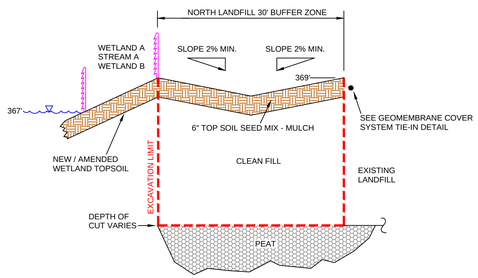
PERIMETER HORIZONTAL GAS COLLECTOR TRENCH



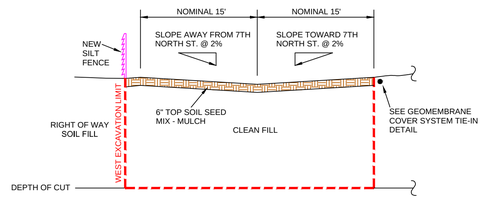
NOTE:

1. COLLECTOR INSTALLED AFTER SUBGRADE PREPARATION AND BEFORE GEOCOMPOSITE/LINER.

DECK HORIZONTAL GAS COLLECTOR TRENCH



NORTH LANDFILL 30' BUFFER ZONE
EXCAVATION FILL DETAIL



NOTES:

1. SLOPE 30' BUFFER ZONE FROM NORTH TO SOUTH, TO DRAIN TO STREAM A AND WETLAND B. SLOPE @ 0.46% FROM HIGHEST ELEVATION
2. SHEET 6C EXCAVATIONS SIMILAR.

NORTH LANDFILL 30' SOUTH BOUNDARY
BUFFER ZONE EXCAVATION FILL DETAIL

GENERAL NOTE:

1. ALL SILT FENCE TO REMAIN IN PLACE FOR 3 YEARS.

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY NORTH LANDFILL DETAILS			
LOCATION: SYRACUSE, NEW YORK			
TETRA TECH	CHECKED	MRN	SHEET:
	DRAFTED	HJW	9
	PROJECT	117-2202046	
	DATE	10/3/13	

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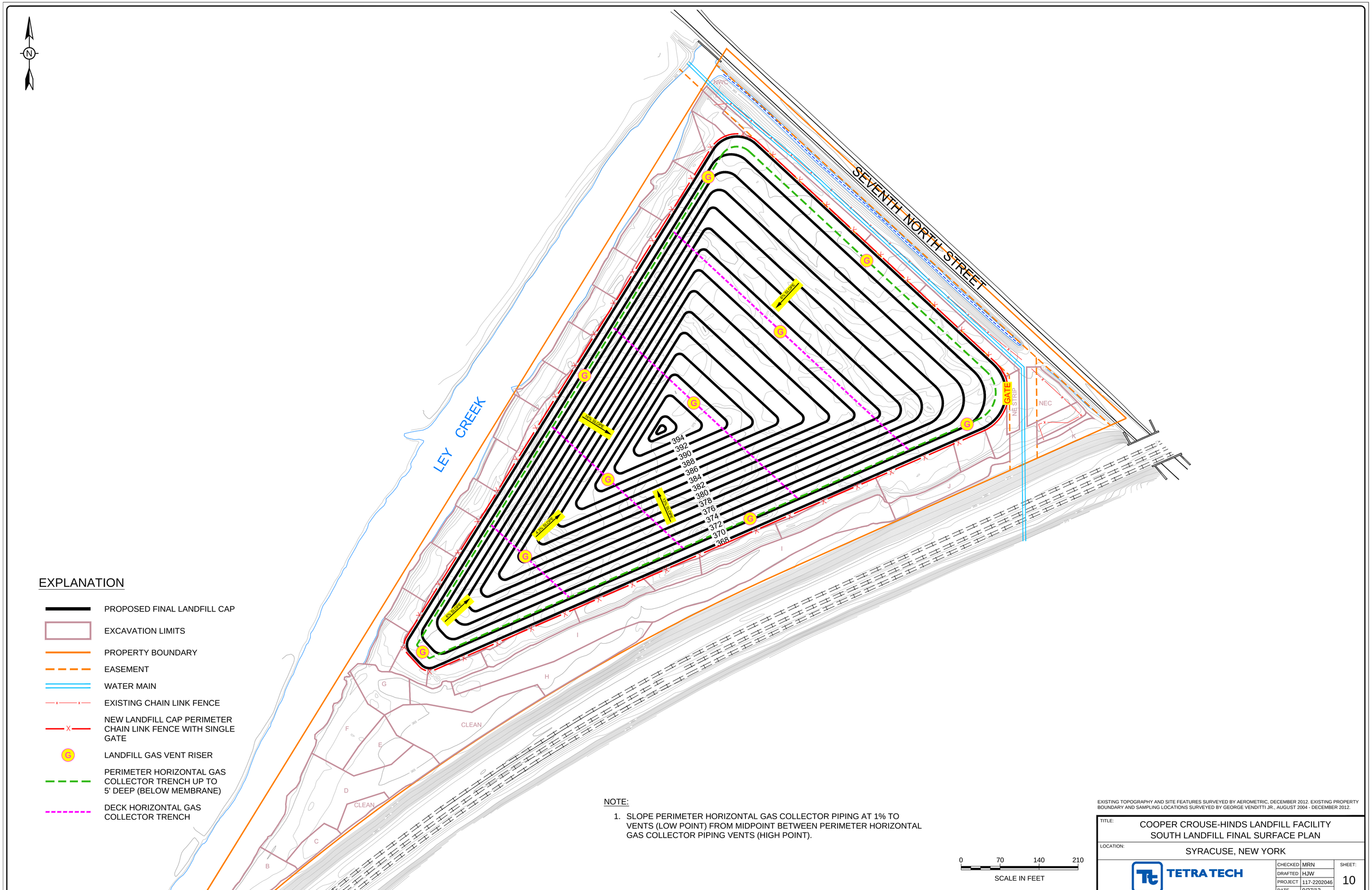

NOTE:

1. SLOPE PERIMETER HORIZONTAL GAS COLLECTOR PIPING AT 1% TO VENTS (LOW POINT) FROM MIDPOINT BETWEEN PERIMETER HORIZONTAL GAS COLLECTOR PIPING VENTS (HIGH POINT).

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY SOUTH LANDFILL FINAL SURFACE PLAN			
LOCATION: SYRACUSE, NEW YORK			
TETRA TECH	CHECKED	MRN	SHEET:
	DRAFTED	HJW	10
	PROJECT	117-2202046	
	DATE	9/27/13	

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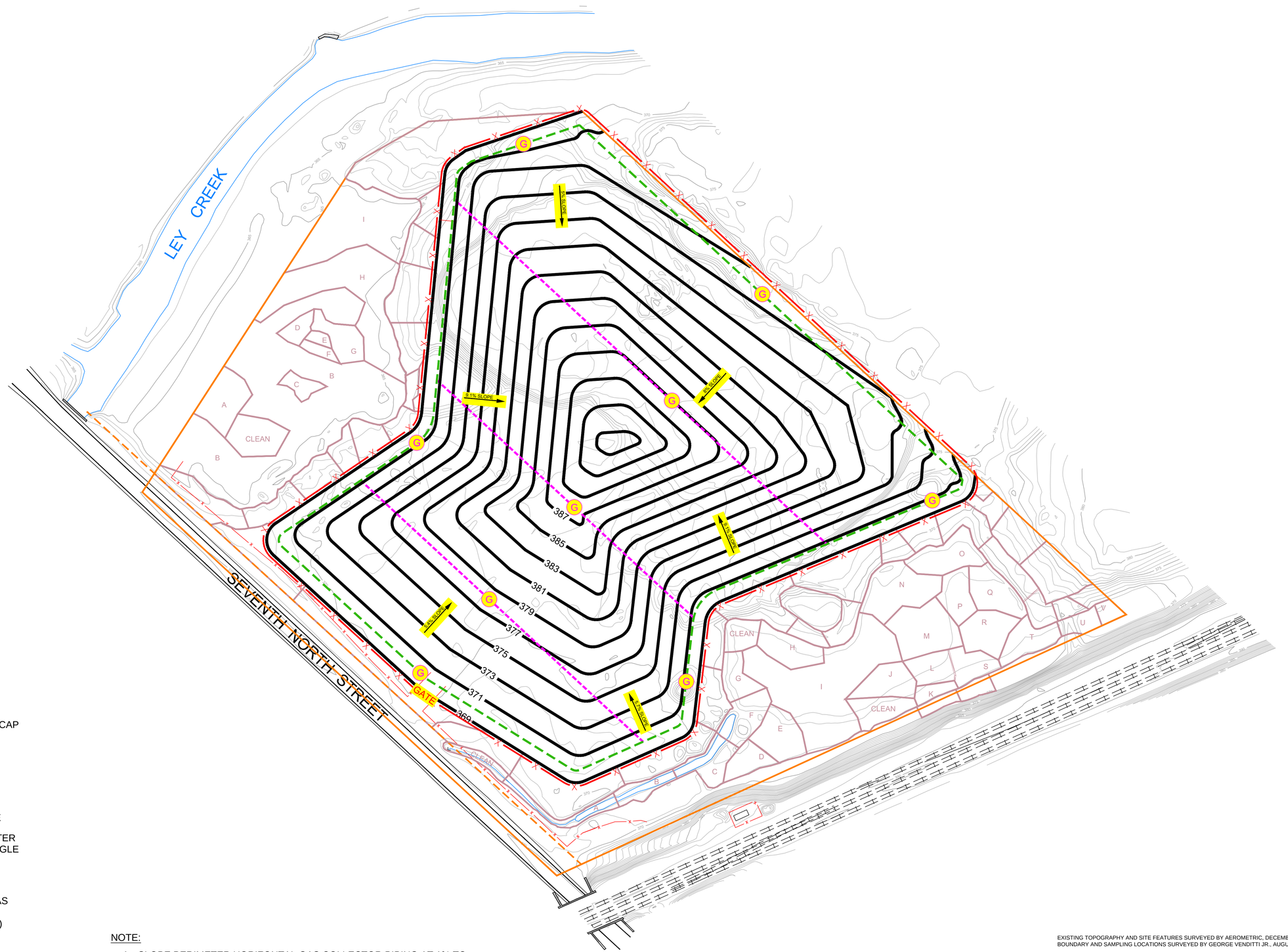

EXPLANATION

- PROPOSED FINAL LANDFILL CAP
- EXCAVATION LIMITS
- PROPERTY BOUNDARY
- EASEMENT
- EXISTING CHAIN LINK FENCE
- NEW LANDFILL CAP PERIMETER CHAIN LINK FENCE WITH SINGLE GATE
- LANDFILL GAS VENT RISER
- PERIMETER HORIZONTAL GAS COLLECTOR TRENCH UP TO 5' DEEP (BELOW MEMBRANE)
- DECK HORIZONTAL GAS COLLECTOR TRENCH

NOTE:

1. SLOPE PERIMETER HORIZONTAL GAS COLLECTOR PIPING AT 1% TO VENTS (LOW POINT) FROM MIDPOINT BETWEEN PERIMETER HORIZONTAL GAS COLLECTOR PIPING VENTS (HIGH POINT).

0 70 140 210
SCALE IN FEET

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
NORTH LANDFILL FINAL SURFACE PLAN

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202046
DATE	12/11/13

SHEET: 11

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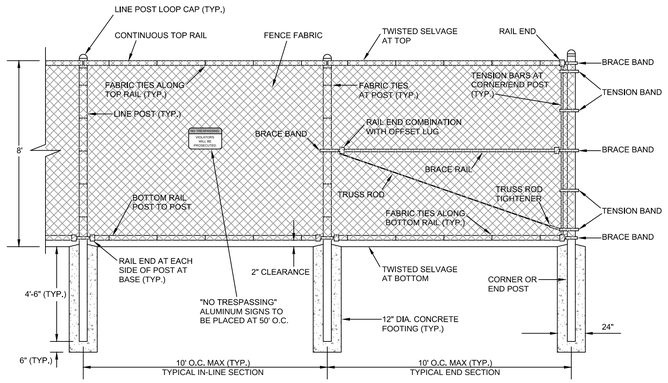
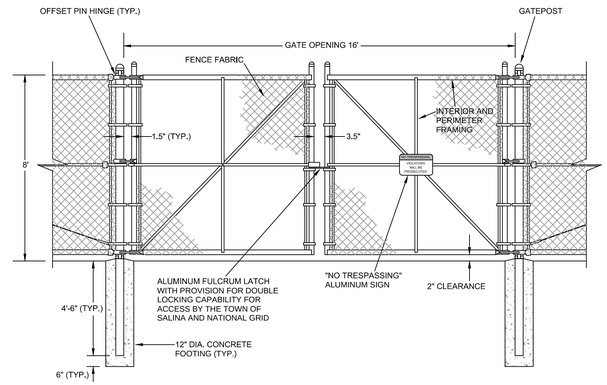


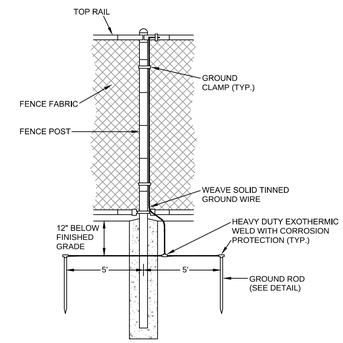
NOTE:

1. SEE FENCE SPECIFICATION FOR ALL FENCE COMPONENT DATA.

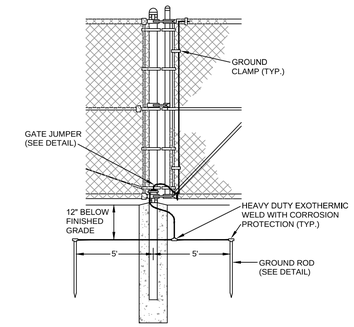
CHAIN LINK FENCE



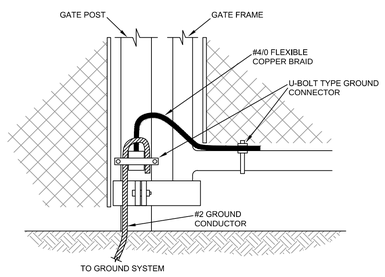
CHAIN LINK FENCE SWING GATE



FENCE / FENCE POST GROUNDING



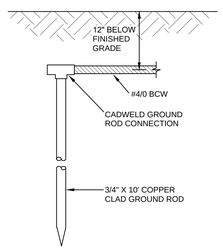
GATE GROUNDING



NOTE:

1. FENCE GROUND CONNECTIONS SHALL BE AT EACH CORNER. GATE JUMPER SHALL BE #4/0 FLEXIBLE COPPER BRAID WITH SLEEVES ON EACH DESIGNED FOR EXOTHERMIC WELDING AND INSTALLED SO THAT JUMPER WILL NOT BE SUBJECTED TO DAMAGING STRAIN WHEN GATE IS FULLY OPENED IN EITHER DIRECTION.

GATE JUMPER



GROUNDING ROD

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY PERIMETER LANDFILL CAP FENCE DETAILS			
LOCATION: SYRACUSE, NEW YORK			
TETRA TECH	CHECKED	MRN	SHEET:
	DRAFTED	HJW	12
	PROJECT	117-2202046	
	DATE	9/27/13	

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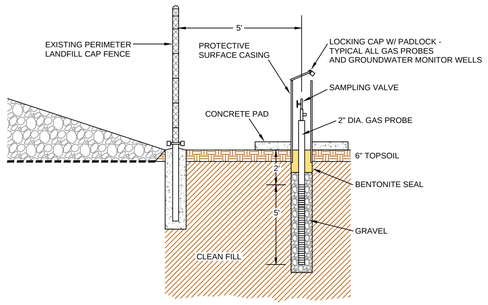
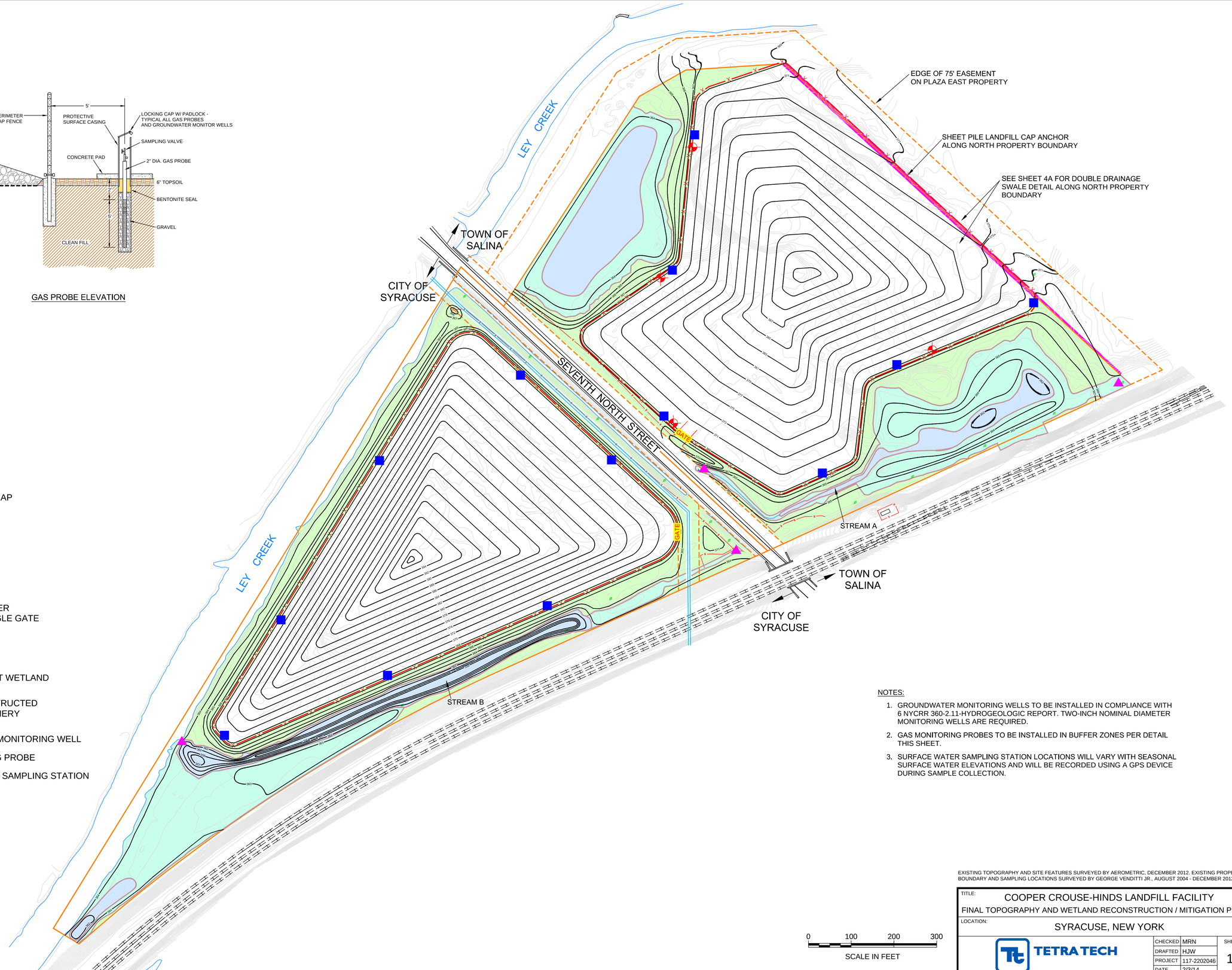


GAS PROBE ELEVATION



EXPLANATION

- PROPOSED FINAL LANDFILL CAP
- PROPERTY BOUNDARY
- EASEMENT
- WATER MAIN
- EXISTING CHAIN LINK FENCE
- ELECTRIC UTILITY POLE
- NEW LANDFILL CAP PERIMETER CHAIN LINK FENCE WITH SINGLE GATE
- BUFFER ZONE
- RECONSTRUCTED EMERGENT WETLAND
- OPEN WATER WITH RECONSTRUCTED EMERGENT WETLAND PERIPHERY
- PROPOSED GROUNDWATER MONITORING WELL
- PROPOSED GAS MONITORING PROBE
- PROPOSED SURFACE WATER SAMPLING STATION

NOTES:

1. GROUNDWATER MONITORING WELLS TO BE INSTALLED IN COMPLIANCE WITH 6 NYCRR 360-2.11-HYDROGEOLOGIC REPORT. TWO-INCH NOMINAL DIAMETER MONITORING WELLS ARE REQUIRED.
2. GAS MONITORING PROBES TO BE INSTALLED IN BUFFER ZONES PER DETAIL THIS SHEET.
3. SURFACE WATER SAMPLING STATION LOCATIONS WILL VARY WITH SEASONAL SURFACE WATER ELEVATIONS AND WILL BE RECORDED USING A GPS DEVICE DURING SAMPLE COLLECTION.

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
FINAL TOPOGRAPHY AND WETLAND RECONSTRUCTION / MITIGATION PLAN

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN	SHEET:
DRAFTED	HJW	13
PROJECT	117-2202046	
DATE	2/3/14	

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APPENDIX F

100% SPECIFICATIONS

BIDDING REQUIREMENTS

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BIDDING REQUIREMENTS

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00301 Unit Price Proposal Form 1-5

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10620 Easements, Permits, and Regulations 1-1
12100 Allowances 1-2
13000 Submittals 1-2
15000 Construction Facilities 1-6
16400 Manufacturers' Services 1-1
17000 Contract Closeout 1-2
18000 Operating and Maintenance Manuals 1-2

DIVISION 2 EXISTING CONDITIONS

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DIVISION 3 EARTHWORK

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31060 Synthetic Geomembrane 1-13
31160 Site Clearing 1-4
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31190 Gas Venting 1-6
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31210 Excavation and Management of PCB Impacted Sediments 1-3
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34000	Sheet Piling	1-3

DRAWINGS (BOUND SEPARATELY)

SECTION 00300
BID FORM

Proposal for:
Remedial Action Implementation, North and South Landfills, Cooper Crouse-Hinds Facility
Syracuse, New York

To:
Mr. Nelson Olavarria
Cooper Industries, LLC
Texas Commerce Tower
600 Travis St., Suite 5600
Houston, TX 77002

We, the undersigned, having familiarized ourselves with the site, local conditions, and the Contract Documents for the above referenced project, propose to furnish labor, material, equipment and other services necessary to complete the Work associated with the above referenced project. All work will be in accordance with the Plans and Specifications as prepared by Tetra Tech, Inc. All work will be carried out by our own forces or under our direct supervision.

THIS WORK WILL BE PERFORMED UNDER A MASTER SERVICES AGREEMENT WITH THE OWNER

BID FORM

Major Bid Items are described below:

BID ITEM 1: ALL WORK AT THE SOUTH LANDFILL

Bid Item 1 Price in numbers: $ _____

Bid Item 1 Price in words: _____dollars.

Bid Item 1 shall include the total of unit prices from pages 00301-1 through 00301-2.

BID ITEM 2: ALL WORK AT THE NORTH LANDFILL

Bid Item 2 Price in numbers: $ _____

Bid Item 2 Price in words: _____dollars.

Bid Item 2 shall include the total of unit prices from pages 00301-3 through 00301-5.

PRICE FOR PERFORMANCE/LABOR AND MATERIAL PAYMENTS BONDS AT 100% OF CONTRACT PRICE

SOUTH LANDFILL $ _____

NORTH LANDFILL $ _____

ADDENDA

The following addenda have been received by the undersigned Bidder; and all costs resulting from these Addenda have been included in the preparation of this Bid Form.

Addendum No._____ Dated_____

Addendum No._____ Dated_____

Addendum No._____ Dated_____

Addendum No._____ Dated_____

COMPLETION TIME

The Contractor can begin work on-site within _____ days of receiving the Notice to Proceed.

All work at the SOUTH LANDFILL will be completed WITHIN_____days of Award of Contract.

All work at the NORTH LANDFILL will be completed WITHIN_____days of Award of Contract.

Firm Name:

By: **Dated:**

Title:

Partner Signatures:

Partner Signatures:

Partner Signatures:

Attest:

(If corporation affix seal)

Official Address:

END OF SECTION

SECTION 00301
UNIT PRICE PROPOSAL FORM
SOUTH LANDFILL

Bid Item Number	Bid Item Description	Quantity	Units	Unit Price	Total
	SITE PREPARATION				
1	Mobilization/Demobilization	1	Lump Sum		
2	Site Supervision/Superintendent		Days		
3	EHS Officer		Days		
4	Environmental and Safety Controls Around Excavations	1	Lump Sum		
5	Community Air Monitoring Program		Days		
6	Traffic Control Flagging/Cones/Signage	1	Lump Sum		
7	On Site Access Road Stabilization With Coarse Stone - ALLOWANCE	1,500	Linear FT		
8	Improve Existing Decon Pad	1	Lump Sum		
9	Remove Vegetation and Grind Stumps	19.4	Acres		
10	Configure Existing North Landfill Planking (Re-use from North Landfill)	1	Lump Sum		
	SEDIMENT REMOVAL TASKS				
11	By Pass Pumping - Water From Pit to Tank	200,000	Gallon		
12	Place, Remove, and Re-Install Check Dams During Constructoin	1	Lump Sum		
13	Silt Fence - ALLOWANCE	2,000	Linear FT		
14	55-Gallon DOT Drums with Lids - ALLOWANCE	10	Each		
15	Hay Bale Dikes - ALLOWANCE	300	Linear FT		
16	Filter Socks - ALLOWANCE (8" diameter Filtrexx)	400	Linear FT		
17	Frac Tanks for Water Holding (2 at 20,000 gallons each for 180 days)	2	Per Tank		
18	Carbon Treatment and 25-Micron Sediment Filtration for Water (100 gpm capacity)	1	Lump Sum		
19	Haul and Discharge Treated Water to Sanitary Manhole Along 7th North Street	200,000	Gallon		
20	Onondaga County Sanitary Sewer System Discharge Fee	200,000	Gallon		
21	Discovered 55-Gallon Drums - Remove, Place In Overpack Containment Drums and Dispose Off-Site Per NYSDEC Regs	40	Each		
22	Discovered Scrap Metal - Large Pieces - Clean and Place Into Owner-Provided Dumpster for Recycling	5	Tons		
23	Discovered Scrap Tires - Clean and Properly Recycle/Dispose Off-Site Per NYSDEC Regulations	200	Each		
24	Portable Scale	1	Lump Sum		
	Subtotal this page				

See SWPPP in Specification Section 31240 for details on Bid Items 13 - 18

SECTION 00301
UNIT PRICE PROPOSAL FORM
SOUTH LANDFILL

Bid Item Number	Bid Item Description	Location	Reference Sheets	Quantity	Units	Unit Price	Total
25	Waste Excavation	North Boundary Water Line ROW	1 and 8	10,982	CUYD		
26	30' Buffer Zone Backfill			5,507	CUYD		
27	Top Soil			433	CUYD		
28	Seed Mix Mulch			2,600	SQYD		
29	Silt Fence Perimeter			2,200	LIN FT		
30	Temporary Cap Area Edge Drainage Swale		1	900	LIN FT		
31	Waste Excavation	Ley Creek 50' Buffer	2 and 8	12,962	CUYD		
32	Abandon Monitor Wells	South Landfill Cap Area	2	6	Each		
33	50' Buffer Zone Backfill	Ley Creek 50' Buffer	2 and 8	7,162	CUYD		
34	Top Soil			1,058	CUYD		
35	Seed Mix Mulch			6,349	SQYD		
36	Silt Fence Perimeter			2,500	LIN FT		
37	Temporary Cap Area Edge Drainage Swale		2	1,200	LIN FT		
38	Waste Excavation	Wetland C 30' Buffer	3A and 8	16,898	CUYD		
39	30' Buffer Zone Backfill			8,994	CUYD		
40	Top Soil			818	CUYD		
41	Seed Mix Mulch			4,908	SQYD		
42	Silt Fence Perimeter			2,700	LIN FT		
43	Temporary Cap Area Edge Drainage Swale		3A	1,250	LIN FT		
44	Sediment Excavation	Wetland C	3B and 8	24,332	CUYD		
45	Amended Soil/Top Soil		3B and 8	12,632	SQYD		
46	Wetland Seed Mix Mulch		3B and 8	12,632	SQYD		
47	Re-Grade Landfill Cap Area	South Landfill Cap	10	10	ACRES		
48	Install Gas Vent Piping & Risers		8, 9, and 10	1	SYSTEM		
49	Install Landfill Cap		8 and 10	10	ACRES		
50	Install Cap Perimeter Fence		10 and 12	2,950	LIN FT		
51	Install Gas Monitoring Probes	South Landfill Cap Perimeter	13	7	EACH		
	Subtotal this page						

Bid Item Number	Bid Item Description	Quantity	Units	Unit Price	Total
	SITE PREPARATION				
52	Mobilization/Demobilization	1	Lump Sum		
53	Site Supervision/Superintendent		Days		
54	EHS Officer		Days		
55	Environmental and Safety Controls Around Excavations	1	Lump Sum		
56	Community Air Monitoring Program		Days		
57	Traffic Control Flagging/Cones/Signage	1	Lump Sum		
58	On Site Access Road Stabilization With Coarse Stone - ALLOWANCE	1,600	Linear FT		
59	Improve Existing Decon Pad	1	Lump Sum		
60	Remove Vegetation and Grind Stumps	21.5	Acres		
61	Configure Existing Planking	1	Lump Sum		
	SEDIMENT REMOVAL TASKS				
62	By Pass Pumping - Water From Pit to Tank	200,000	Gallon		
63	Place, Remove, and Re-Install Check Dams During Construction	1	Lump Sum		
64	Silt Fence -ALLOWANCE	2,000	Linear FT		
65	55-Gallon DOT Drums with Lids - ALLOWANCE	10	Each		
66	Hay Bale Dikes - ALLOWANCE	300	Linear FT		
67	Filter Socks - ALLOWANCE (8" diameter Filtrexx)	400	Linear FT		
68	Frac Tanks for Water Holding (2 at 20,000 gallons each for 180 days)	2	Per Tank		
69	Carbon Treatment and 25-Micron Sediment Filtration for Water (100 gpm capacity)	1	Lump Sum		
70	Haul and Discharge Treated Water to Sanitary Manhole Along 7th North Street	200,000	Gallon		
71	Onondaga County Sanitary Sewer System Discharge Fee	200,000	Gallon		
72	Discovered 55-Gallon Drums - Remove, Place In Overpack Containment Drums and Dispose Off-Site Per NYSDEC Regs	40	Each		
73	Discovered Scrap Metal - Large Pieces - Clean and Place Into Owner-Provided Dumpster for Recycling	5	Tons		
74	Discovered Scrap Tires - Clean and Properly Recycle/Dispose Off-Site Per NYSDEC Regulations	200	Each		
75	Portable Scale	1	Lump Sum		
	Subtotal this page				

See SWPPP in Specification Section 31240 for details on Bid Items 61 - 66

Bid Item Number	Bid Item Description	Location	Reference Sheets	Quantity	Units	Unit Price	Total
76	Grading	North Boundary Double Swale Grading	4A and 4B	9,600	SQYD		
77	Sheet Pile Installation	North Boundary Double Swale	4A and 4B	1,075	LIN FT		
78	Temporary South Edge Drainage Swale		4A	1,075	LIN FT		
79	Silt Fence Perimeter	North Boundary South Half Double Swale	4A	2,230	LIN FT		
80	Silt Fence Perimeter	North Boundary North Half Double Swale	4A	2,300	LIN FT		
81	Clean Fill			3,000	CUYD		
82	Topsoil			1,500	CUYD		
83	Light Stone Fill	North Boundary South Half Double Swale	4A	500	CUYD		
84	Seed Mix Mulch	North Boundary North Half Double Swale	4A	9,000	SQYD		
85	Waste Excavation	North Landfill South Property Boundary	5 and 9	5,948	CUYD		
86	30' Buffer Zone Backfill			5,948	CUYD		
87	Top Soil			273	CUYD		
88	Seed Mix Mulch			1,635	SQYD		
89	Silt Fence Perimeter			1,100	LIN FT		
90	Temporary Cap Area Edge Drainage Swale		5	500	LIN FT		
91	Waste Excavation	Wetland A 30' Buffer	6A and 9	20,155	CUYD		
92	Abandon Monitor Wells	North Landfill Cap Area	6A	17	Each		
93	30' Buffer Zone Backfill	Wetland A 30' Buffer	6A and 9	18,607	CUYD		
94	Top Soil			1,207	CUYD		
95	Seed Mix Mulch			7,241	SQYD		
96	Silt Fence Perimeter			2,800	LIN FT		
97	Temporary Cap Area Edge Drainage Swale			1,050	LIN FT		
98	Sediment Excavation	Wetland A	6B and 9	8,561	CUYD		
99	Amended Soil/Top Soil			10,489	SQYD		
100	Wetland Seed Mix Mulch			10,489	SQYD		
101	Sediment Excavation	Cells SED-98 and SED-99	6C	207	CUYD		
102	Topsoil			45	CUYD		
103	Seed Mix Mulch			269	SQYD		
	Subtotal this page						

Bid Item Number	Bid Item Description	Location	Reference Sheets	Quantity	Units	Unit Price	Total
104	Waste Excavation	Wetland B 30' Buffer	7A and 9	11,234	CUYD		
105	Abandon Monitor Wells	North Landfill Cap Area	7A	2	Each		
106	30' Buffer Zone Backfill	Wetland B 30' Buffer	7A and 9	9,914	CUYD		
107	Top Soil			897	CUYD		
108	Seed Mix Mulch			5,383	SQYD		
109	Silt Fence Perimeter			2,300	LIN FT		
110	Temporary Cap Area			1,060	LIN FT		
111	Sediment Excavation	Wetland B	7B	3,894	CUYD		
112	Amended Soil/Top Soil			10,578	SQYD		
113	Wetland Seed Mix Mulch			10,578	SQYD		
114	Re-Grade Landfill Cap Area	North Landfill Cap	11	12.5	ACRES		
115	Install Gas Vent Piping & Risers		8, 9, and 11	1	SYSTEM		
116	Install Landfill Cap		8 and 11	12.5	ACRES		
117	Install Cap Perimeter Fence		11 and 12	3,050	LIN FT		
118	Install Gas Monitoring Probes	North Landfill Cap Perimeter	13	6	EACH		
119	Install Groundwater Monitoring Well			3	EACH		
	Subtotal this page						

TECHNICAL SPECIFICATIONS

DIVISION 1 – GENERAL REQUIREMENTS

SECTION 10100
SUMMARY OF THE WORK

PART 1 - GENERAL

1.1 SUMMARY

A. The "Project," of which the "Work" of this Contract is a part, is titled Remedial Action Implementation, North and South Landfills, Cooper Crouse-Hinds Facility, Syracuse, New York. These Drawings, Specifications and Addenda are an integral part of the "Agreement" between the Contractor and the Owner.

B. The "Work" of this Contract is defined in the Contract Documents to include, but not necessarily to be limited to:

a. Excavation and relocation of soils, sediments, and municipal waste from existing landfill perimeters to the central portion of the landfills.
b. Backfilling of perimeter buffer zones with clean, imported soil, re-grading, applying topsoil, seeding, and mulching.
c. Amending and/or adding topsoil to wetland areas, applying a wetland seed mix, and mulching
d. Re-grading the central landfill areas, installing a landfill cap system including a passive landfill gas venting system, and installing a landfill cap perimeter security fence.

C. The Contractor's coordination of the project shall include all portions of the Work indicated by the Contract Documents including coordination of the work of subcontractors.

D. The Contractor acknowledges that this work is being carried under a Record of Decision issue by the NYSDEC. The Contractor is responsible to take all necessary care and precautions for the health and safety of workers, Owner's Representatives and the public at large, while carrying out the work. In addition, all handling, transport and removal of hazardous materials shall be in accordance with the Drawings and Specifications, as well as supplemental documents related to health, safety and material handling provided by the Owner.

E. Representatives, Consultants and Contractors to NYSDEC, the State of New York, as well as the Owner and the Owner's Representatives, shall have full rights and authority to access and inspect all areas of the project. In addition, the Contractor shall allow the Owner's Representatives and NYSDEC, and their authorized representatives to enter and freely move about all property at the site and off-site areas, subject to or affected by the work or where documents, required to be prepared or maintained by this project, are located, for the purposes of inspecting conditions, activities, the results of activities, records, operating logs and contracts related to the site, Owner's Representatives or others pursuant to this project. These rights shall include: right to review the progress of the work, conduct tests as deemed necessary by the Owner or the State of New York, use a camera, sound recording device or other documentary equipment and verify all data submitted to the Owner by the Contractor. The Contractor shall allow the State of New York, the Owner, and the Owner's Representatives to enter the site to inspect copies of all records, files, photographs, documents, sampling and monitoring data and other writings related to the work undertaken in carrying out this project.

F. Record Preservation: The Contractor will not mutilate, discard, destroy or otherwise dispose of any records which relate to the execution of this project. The Contractor shall not dispose of any documents without prior approval of the Owner and NYSDEC. Upon request, the Contractor shall make all documents available to the Owner and the State of New York.

a. The Contractor shall provide to the Owner or the State of New York, upon request, copies of all documents and information within their possession or control or that of any of their subcontractors or agents relating to the activities at the site or the implementation of this order, including but not limited to samples, test results, analysis, chain of custody records, manifests, trucking logs, receipts, reports, sample traffic routing, correspondence, record drawings, shop drawings or other documents or information. The Contractor shall also make available to the Owner and the State of New York, for the purposes of investigation, information gathering or testimony, their employees, agents or representatives with knowledge of relevant facts concerning the performance of the work.

b. Until ten (10) years after the Owner receives notice of termination of this order from NYSDEC, the Contractor shall preserve and shall instruct their subcontractors and agents to preserve all documents, records and information of whatever kind, nature and description relating to the performance of the work. Upon the conclusion of this document retention period, respondents shall notify the Owner, at least ninety (90) days prior to the destruction of any such records, documents or information and shall, upon request, deliver all such documents, records and information to the Owner.

c. The Contractor may assert a claim of business confidentiality covering part or all of the information submitted, provided such claim is not inconsistent with Section 104(E)(7) of CERCLA, 42USC 9604(E)(7) or other provisions of law. This claim shall be asserted in the manner described by 40CFR 2.203(B) and substantiated by the Subcontractor at the time the claim is made. Information determined to be confidential by the Owner and EPA will be given the protection specified in 40CFR, Part 2. If no such claim accompanies the information when it is submitted, it may be made available to the public by U.S. EPA, state agencies or other parties. The Contractor shall not assert confidentiality claims with respect to any data or documents related to site conditions, sampling or monitoring.

d. The Contractor shall maintain, for the period during which this project and the associated NYSDEC order is in effect, an index of documents that the Contractor claims contain confidential business information. The index shall contain, for each document, the date, author, addressee and subject of the document. Upon written request from the Owner or NYSDEC, respondents shall submit a copy of the index to NYSDEC.

1.2 DESCRIPTION OF THE PROJECT

A. The work generally includes construction of the following:

a. Excavation and relocation to central landfill cap areas of buffer zone soils located at the landfill cap area perimeters. Placement of imported clean backfill into the buffer zone areas, final grading, topsoil application, seeding, and mulching.

b. Excavation and relocation to central landfill cap areas of wetland sediments located at the landfill cap area perimeters. Amendment and/or addition of wetland topsoil to the wetland areas, wetland seed mix application, and mulching.

c. Re-grading of the central landfill cap areas for drainage and placement of a landfill cap system compliant with NYSDEC regulations including a 60 mil LLDPE membrane. A passive landfill gas venting system, perimeter drainage, and security fencing surrounding the landfill cap areas are included.

1.3 WORK SCHEDULE

A. The Contractor shall be responsible for scheduling work with the Owner, Sub-Contractors and the City of Syracuse and Town of Salina as applicable. All communications with the City of Syracuse and the Town of Salina shall be made through the Owner's representative.

In general, work on site shall be carried out between 7 AM and 5 PM, Monday through Friday. The Contractor may request working outside of these hours, but approval is subject to the acceptance by the state and cities. If the Contractor chooses to conduct work outside of these hours, the Owner shall be notified, to obtain approval, at least 48 hours prior to commencing work at alternative times. Scheduling of alternative times shall take into account disturbing of nearby facilities, disruption of City and Town activities and accessibility to the work area after hours. (Additional approval for alternative work schedules may be required from the City and Town.) Supplemental safety requirements for after hours work shall be coordinated with the Owner/Engineer. The Owner will coordinate these changes with State of New York, the City of Syracuse, and the Town of Salina.

1.4 CONSTRUCTION DOCUMENTS

A. The Drawings and Specifications are intended to provide the general requirement of the project, based on the best information at the time of design. The Contractor shall be responsible to provide all additional layout, dimensions, coordination, survey work, labor and materials necessary to provide a complete and operating system.

1.5 COORDINATION OF THE WORK

A. The Contractor shall coordinate all work, including the work of subcontractors, as necessary. In addition, the Contractor shall be responsible for verifying utility locations with, both, the utility companies and making necessary notifications to utility companies and the City of Syracuse and Town of Salina regarding any disruptions.

B. The Contractor shall be responsible for necessary safety equipment, barricades, on-site traffic control and coordination of traffic disruptions with the City of Syracuse and Town of Salina. The Owner shall also be notified of all such disruptions. Means and schedule of notification will be determined in the Pre-Construction Conference.

END OF SECTION

SECTION 10250
MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.1 PROCEDURES

A. The Contractor will prepare a Payment Application monthly as defined in the Master Services Agreement.

B. The Contractor will meet with the Owner's Representative on the work site with the completed Payment Application to review each payment item for percentage completion.

a. Specification Section 00301, "Unit Price Proposal Form", shall be completed with the unit price items completed during the month entered. This document shall accompany the Payment Application. The unit pricing unit rates of Section 00301 will be used in the case of a change in bid quantities.

b. The Owner's Representative will sign and date the completed Unit Price Proposal Form upon verification of the completed work. Each item completed will be initialed and dated by the Owner's Representative.

c. A copy of the completed Payment Application will be provided to and retained by the Owner's Representative.

END OF SECTION

SECTION 10450
ENVIRONMENTAL MITIGATION

PART 1 - GENERAL

1.1 DESCRIPTION

A. The Contractor shall comply with all State and local regulations for environmental mitigation during construction activities.

B. Environmental mitigation shall include but not be limited to dust control, construction dewatering, surface water control, storm water management, and erosion control. Normal environmental mitigation is incidental to the work and the costs for same shall be included in the unit prices.

C. Site work requiring environmental mitigation includes buffer zone excavation and backfilling, wetland sediment excavation, landfill cap area grading, and landfill cap construction.

D. Site work within any area of the site may discover grossly contaminated soils from prior site uses. The Contractor shall notify the Owner's Representative immediately of any discovery of noticeably contaminated material.

PART 2 – PRODUCTS

(NOT USED)

PART 3 - EXECUTION

3.1 PLANS

A. The Contractor shall prepare and submit a Water Control Plan in compliance with the SWPPP and Sections 31220 and 31240.

B. The Contractor shall prepare and submit a Stormwater Management and Erosion Control (SM/EC) Plan in compliance with A.

C. The Contractor shall not begin site work until Owner approvals of the Water Control Plan, Stormwater Management Plan, and Erosion Control Plan are received.

D. Upon discovery of grossly contaminated soil, drums, tires, or other suspect material at a site work location, the Contractor shall notify the Owner's Representative. The Contractor will proceed to mitigate the environmental contamination under the direction of the Owner's Representative and in compliance with the regulations of the State of New York. The Contractor shall prepare and submit a cost estimate for the additional costs for environmental mitigation outside the Contract and submit it to the Owner for approval within 15 working days of discovery.

END OF SECTION

SECTION 10620
EASEMENTS, PERMITS AND REGULATIONS

PART 1 - GENERAL

1.1 SCOPE

A. The Contractor shall comply with all applicable regulations and shall obtain permits for the work as necessary. Where applicable, the Contractor shall mark all easements for approval before commencing work (i.e., South Landfill 36-inch water line, utility poles).

B. The Contractor shall obtain all building/construction permits necessary for commencement of the work, including building permits, mechanical permits, plumbing permits, electrical permits, etc. Permit costs are incidental to the work and shall be included in the unit costs.

C. The contractor shall supply the Engineer with a copy of all permits within one week of obtaining the permit.

1.2 PROJECT CLOSEOUT

A. At the completion of the project, the Contractor shall provide documentation of all approvals obtained from regulatory agencies prior to final acceptance by the Owner.

END OF SECTION

SECTION 12100
ALLOWANCES

PART 1 - GENERAL

1.1 SUMMARY

A. This Section specifies administrative and procedural requirements for processing Allowances. Selected materials and equipment, and in some cases their installation, are shown and specified in the Contract Documents by Allowances. Allowances have been established in lieu of additional requirements and to defer selection of actual materials and equipment to a later date when additional information is available for evaluation. Additional requirements, if necessary, will be issued by Change Order.

1.2 DEFINITIONS

A. Lump Sum Allowance: A monetary sum that includes, as part of the Contract Price, the associated costs and requirements to complete the specified Allowance.

B. Unit-cost Allowance: A specified quantity of a product or assembly, as part of the Contract Price, that is to be included in the Work even though the location of the product or assembly is not indicated on Drawings or shown in the specifications.

C. Contingency Allowance: A monetary sum that, as part of the Contract Price, is to be utilized as directed by Owner, through a Change Order, to cover minor changes in the Work.

1.3 SUBMITTALS

A. Submit invoices or delivery slips to indicate actual quantities of materials delivered to the Site for use in fulfillment of each Allowance.

1.4 OWNER'S INSTRUCTIONS

A. At the earliest feasible date after Contract Award, advise Engineer of the date when the final selection and purchase of each product or system described by an Allowance must be completed in order to avoid delay in performance of the Work.

B. When requested by Engineer, obtain Bids for each Allowance for use in making final selections; include recommendations that are relevant to performance of the Work.

C. Purchase products and systems as selected by Engineer from the designated supplier.

D. Use Allowances only as directed for Owner's purposes, and only by Change Orders which designate amounts to be charged to the Allowance.

E. Change Orders authorizing use of funds from the Contingency or Provisionary Allowances will include Contractor's related costs and reasonable overhead and profit margins.

F. At Project closeout, any amounts remaining in Allowances will be credited to Owner by Change Order.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

3.1 INSPECTION

A. Inspect products covered by an Allowance promptly upon delivery for damage or defects.

3.2 PREPARATION

A. Coordinate materials and their installation for each Allowance with related materials and installations to ensure that each Allowance item is completely integrated and interfaced with related construction activities.

END OF SECTION

SECTION 13000
SUBMITTALS

PART I - GENERAL

1.1 SCOPE

A. This section outlines requirements for submittals, including initial, as well as periodic submittals required during the course of the project.

B. A Site Health and Safety Plan shall be submitted prior to the start of work.

C. Submittals shall include Schedule of Values, Project Schedule, Shop Drawings, Product Data, Samples, Certification of Qualifications, Applications for Payment, Certificates of Completion, etc. provided throughout the course of the project. The Project Schedule shall be submitted with the initial bid and updated monthly once work has begun.

1.2 RELATED SECTIONS

A. Section 10620, "Easements, Permits and Regulations"
B. Section 17000, "Contract Closeout"
C. Section 18000, "Operating and Maintenance Manuals"
D. Refer to other sections of the Specifications, as applicable, for additional requirements.

1.3 SUBMITTAL PROCEDURES

A. Provide submittals as outlined herein, unless modified elsewhere in the Specifications.

B. Each submittal shall be accompanied by the Contractor's Standard Transmittal Letter.

C. All submittals shall identify the Project, applicable Subcontractors and Suppliers and applicable Specification Sections.

D. The Contractor shall stamp and approve all submittals prior to forwarding to the Engineer/Owner.

E. The Contractor is responsible for coordination and scheduling of all submittals. No allowance will be made for delays caused by the failure to properly schedule and to allow time for review. The Engineer will require approximately 14 days for review, depending on the specific submittal.

F. Identify any deviations from the Contract Documents on the Submittal forms. If submittals are re-submittals, highlight all changes made.

G. The Engineer will be responsible to distribute copies of submittals to all parties necessary for proper coordination.

1.4 CONTRACTOR OBLIGATIONS

A. Review of submittals by the Engineer is provided as a convenience and shall not be considered as an approval of construction methods, performance, changes in scope, construction details, etc.

B. Review/approval of submittals does not constitute a request for a change order or approval of a change order.

C. Contractor shall make submittals in adequate time to assure an orderly progression of the Work. Rejections and requests for revision to submittals shall not be considered as a basis for construction delay.

D. The Contractor shall verify all information contained in submittals for correctness and accuracy, including dimensions, quantities, field measurement data (where appropriate), etc. The Engineer shall stamp, date and approve all submittals prior to forwarding to the Owner.

1.5 SCHEDULE OF VALUES

A. Provide a Schedule of Values in accordance with Section 00301 of these Specifications.

1.6 APPLICATION FOR PAYMENT

A. Applications for payment shall be completed and submitted to the Owner in conformance with the Owner's Standard Conditions and Contract.

B. Application for payment shall be adjusted each month to indicate all approved changes to the total contract amount.

C. Application for payment shall reflect retainages from applicable payment amount to be withheld by the Owner. Retainages are as follows:

1. A 10% retainage will be withheld on payments up to 50% of the total contract amount (50% completion).

2. No additional retainage will be withheld from 50% to 100% completion.

3. For invoices submitted at the end of the project, retainage amounts of 200% of the value of any incomplete work will be withheld until all outstanding work is complete and accepted by the Owner.

1.7 TESTING

A. As specified elsewhere in the specifications for the various system components.

B. Samples and laboratory testing shall be at the Contractor's expense as defined in the specifications.

C. Where applicable, testing procedures shall be in accordance with EPA and State of New York requirements.

D. All testing shall be performed by independent laboratories. Laboratories shall be licensed and/or approved for the testing to be performed and should be recognized by the EPA and/or State of New York, as applicable.

E. Submittals shall be provided at least monthly with the invoice, with a lack of known submittals being a valid basis for holding payment of an invoice.

1.8 CONTRACT CLOSEOUT

A. Submit documentation of final approvals, certificates of completion, final waiver of lien, etc. in accordance with Section 17000, "Contract Closeout".

1.9 OPERATING AND MAINTENANCE MANUALS

A. Submit operating and maintenance manuals in accordance with Section 18000 of the Specifications.

END OF SECTION

SECTION 15000
CONSTRUCTION FACILITIES

PART I - GENERAL

1.1 SUMMARY

A. This Section describes construction facilities and temporary controls required for the Work.

B. Related Work:

1. Except that equipment furnished by the Contractor shall comply with the requirements of pertinent safety regulations, such equipment normally furnished by the individual trades in execution of their own portions or the Work are not part of this Section.

2. Any permanent installation and hookup of the various utility lines are described in other sections.

1.2 REQUIREMENTS

A. Provide or coordinate the use of existing facilities and temporary controls needed for the Work including, but not necessarily limited to:

1. Temporary utilities such as heat, water, electricity and telephone
2. Field office for the Contractor's personnel;
3. Sanitary facilities;
4. Enclosures such as tarpaulins, barricades and canopies;
5. Temporary fencing of the construction site(s);
6. Temporary lighting.

B. Note that facilities for Owner's Representatives will be provided by the Contractor.

1.3 DELIVERY, STORAGE, AND HANDLING

A. Coordinate all routes of delivery, parking arrangements and required permits with the Engineer and the Owner's Representative before starting construction.

1.4 UTILITIES

A. Water:

1. Provide piping and water supply and, upon completion of the Work, remove such temporary facilities. The Contractor is responsible for obtaining and coordinating temporary water supply for each part of the Work.

B. Electricity:

1. Provide necessary temporary wiring and, upon completion of the Work, remove such temporary facility. The Contractor is responsible for obtaining and coordinating temporary electricity for each part of the Work.

2. Provide area distribution boxes so located that the individual trades may furnish and use 100 ft. maximum length extension cords to obtain power and lighting at points where needed for work, inspection and safety.

C. Heating:

1. Maintain heat necessary for proper conduct of operations needed in the Work. The Contractor is responsible for obtaining and coordinating temporary heat for each part of the Work.

D. Telephone:

1. Make necessary arrangements and pay costs for telephone service to the Contractor's office(s) at the site, if necessary.

E. Temporary Lighting

1. The Contractor shall be responsible for providing adequate temporary lighting for all stages and areas of the work.

F. Temporary Toilet Facilities

1. The Contractor shall provide an adequate number of temporary toilet facilities, to be located near the Work. All maintenance, security and operation of these facilities will be the responsibility of the Contractor. Removal of these facilities at the completion of the project will be the responsibility of the Contractor.

1.5 ENCLOSURES

A. Provide and maintain for the duration of construction all scaffolds, tarpaulins, canopies, warning signs, steps, platforms and other temporary construction necessary for proper completion of the Work in compliance with pertinent safety and other regulations.

1.6 TEMPORARY FENCING

A. The Contractor will provide and maintain for the duration of construction a temporary fence of design and type needed to prevent entry onto the Work area by the public.

1.7 CONTRACTOR'S FIELD OFFICE

A. The Contractor shall provide a field office to be located on the site. Coordinate the exact field office location with the Owner’s Representative. The Contractor shall arrange for all necessary utility connections, including electricity, telephone, etc.

1.8 HEALTH AND SAFETY

A. General

1. This section outlines the health and safety requirements to be followed by the Contractor during the performance of the work specified. If a conflict occurs between these requirements and current regulations, the more stringent shall apply.

B. Safety:

1. The Contractor shall comply with (i) all applicable federal, state, and local laws, ordinances, rules and regulations (including the Occupational Safety and Health Act of 1970 and the regulations issued there under), and (ii) the requirements set forth in the project Health and Safety Plan relating to the Work, to the extent applicable.

2. For the purposes of this bid, all site work shall be classified as Hazardous Waste Site Activities and are therefore, subject to regulations contained in 29 CFR 190.120 "Hazardous Waste Operations and Emergency Response".

3. Landfill cap construction shall be classified as "construction activities" and shall be subject to all applicable Health and Safety regulations of 29 CFR Part 1926 "Construction Industry" and of 29 CFR Part 1910 "General Industry".

C. Contractor Responsibilities

1. The Contractor is solely responsible for the health, safety, and protection of its on-site personnel during the performance of the work. The Contractor shall perform the work specified in these contract documents in accordance with the Health and Safety Requirements specified herein. It shall be the responsibility of the Contractor to be familiar with the required health and safety regulations in the performance of this work.

2. The Contractor shall appoint a Health and Safety Officer to assist in implementation, monitoring, and enforcement of the Site Health and Safety Plan. The Health and Safety Officer shall have a working knowledge of federal and state occupational safety and health regulations. The Health and Safety Officer will interact with, and as necessary, take direction from the Owner's Representative Health and Safety Coordinator.

3. The Contractor can assume Level "D" protection is required for all tasks for bidding purposes.

4. Should any unforeseen or site-specific safety related factor, hazard, or condition become evident during the performance of the work, the Contractor shall take immediate action to establish and maintain safe working conditions and to safeguard site personnel, the public, and the environment.

D. Work Areas

1. The Contractor shall clearly lay out and identify work areas or zones and shall limit equipment, operations and personnel access in the areas as necessary to conduct the work safely.

E. Exclusion Zone

1. The exclusion zone is the zone where contamination does or could occur. All people entering the exclusion zone shall wear prescribed levels of protection. It shall be assumed for planning purposes that the exclusion zone shall encompass any excavation plus a 20-foot radius. The zone may be adjusted based upon field conditions.

F. Contamination Reduction Station

1. At the boundary of the exclusion zone, a decontamination station shall be established, one for personnel and small equipment, and one for heavy equipment, if needed. Running water, spraying or washing facilities, decontamination pad and other such facilities shall be provided as required for adequate decontamination of equipment and personnel and to maintain the cleanliness of the contamination reduction zone.

G. Housekeeping

1. All work wash areas shall be maintained in a well-kept and tidy condition. Road and walkways must be kept as clear as possible. Cones or caution tape should be used to demarcate work areas and danger zones.

H. Personnel Protection Training

1. The Contractor shall establish and maintain a complete personnel protection program for its personnel working in the potentially hazardous work areas. Each Contractor employee shall follow the site safety plan that describes the site and potential hazards and prescribed monitoring requirements, personal protection requirements and criteria for their selection, work practices and limitations, and emergency response.

2. The Contractor shall provide all its personnel with appropriate personal safety equipment and protective clothing. The Contractor shall ensure that all safety equipment and protective clothing is kept clean and well maintained. All personal protective equipment shall be decontaminated at the end of the work day.

3. All personnel who, due to the location in which they work, may be required to wear an air-purifying respirator or air-supplied respirator, such as a self-contained breathing apparatus (SCBA), shall be fit-tested and properly trained and experienced in their use. All respiratory protection equipment shall be properly decontaminated and sanitized at the end of each work day.

I. OSHA Training Certification

1. Occupational Safety and Health Administration (OSHA) regulations for employers engaged in work on hazardous sites (29 CFR 1910.120) require each employee to obtain specialized training prior to entry onto a site. The minimum training required is typically 40 hours and must be documented by a certificate of completion. Employees engaged in work on hazardous waste sites as defined in 29 CFR 1910.120 shall have appropriate specialized training. The Contractor is responsible for ensuring that employees have required training and agrees to furnish proof of training for their employees to the Owner upon request.

2. The Contractor shall be required to certify that all subcontractors or service personnel entering the exclusion zone or contaminant reduction station for the purpose of the work; for health, safety, security, or administrative purposes; for maintenances; or for any other site-related function; have received medical examinations and safety training provided by or for the subcontractor.

3. All on-site personnel shall be provided with medical surveillance prior to onset of work, at the conclusion of the project, and at any time there is suspected excessive exposure to toxic chemicals or physical agents.

4. The Contractor shall maintain all medical surveillance records and make these records available to the Owner, U.S. EPA, or regulatory agencies upon request by appropriate officials.

J. Emergency and First-Aid Requirements

1. The Contractor shall arrange for emergency medical care services at a nearby medical facility and be familiar with emergency routes. The Contractor shall have available communications links with health and emergency services to inform them of any emergency situations that may arise. Emergency services include but are not limited to the Fire Department, County Sheriff, Ambulance, Hospital, U.S. EPA, and the State of New York.

2. In the event of any emergency associated with or resulting from work at this site, the Contractor shall without delay, cease work activity on the site, take diligent action to remove or otherwise minimize the cause of the emergency, render full assistance to local authorities to remedy any impact on local residents or property, alert the Owner's Representative, and institute whatever measure might be necessary to prevent any repetition of the conditions of actions leading to or resulting in the emergency.

3. The Contractor shall have at least one employee who is certified in First-Aid on-site at all times. This person may perform other duties, but must be immediately available to render First-Aid when needed. Certification shall consist of successful completion of an American Red Cross course in Multi Media and Cardio-Pulmonary Resuscitation (CPR) or equivalent.

4. The Support Zone shall be provided with specially designated and approved emergency eyewash by the Contractor.

5. At least one "industrial" First-Aid kit shall be provided by the Contractor and maintained fully stocked. The locations of these kits shall be specially marked and provided with adequate water and other supplies necessary to cleanse and decontaminate burns, wounds, or lesions. A kit shall be available to all active work areas.

6. Twenty-pound ABC type dry chemical fire extinguishers shall be provided at any work location where flammable materials present a fire risk by the Contractor.

K. Decontamination

1. The Contractor shall provide:

a. Suitable disposable outerwear, gloves, hardhats, and footwear on a daily basis for use by on-site personnel.
b. Appropriate MSHA/NIOSH certified respirators, if required, in sufficient quantities for on-site personnel.
c. Contained storage and disposal for used disposable outerwear.
d. Hand washing facilities.
e. Sufficient quantities of potable water at the site for on-site personnel.
f. A facility for changing into and out of and storing work clothing, separate from street clothing, including separate facilities for women as necessary.
g. A lunch or break area.

2. Used disposable outerwear shall not be reused, and when removed, shall be placed inside disposal containers provided for the purpose.

3. The Contractor shall provide an equipment decontamination station for removing contaminants from all vehicles and equipment leaving the hazardous work area.

4. No wastewater shall be allowed to run off of the site onto rights-of-way or adjacent property.

5. Personnel engaged in vehicle decontamination shall wear protective equipment including disposable clothing and respiratory protection as conditions require under the site health and safety plan.

6. The decontamination area shall be considered a hazardous work area.

7. Any item taken into the exclusion area must be assumed to be contaminated and must be decontaminated before the item leaves the area. Vehicles, equipment, and materials brought into the exclusion areas will remain until no longer necessary for the project. All contaminated vehicles, equipment, and materials shall be cleared prior to leaving the hazardous area.

1.9 MAINTENANCE AND REMOVAL

A. Maintain temporary facilities and controls as long as needed for safe and proper completion of the Work.

B. Remove such temporary facilities and controls as rapidly as progress of the Work will permit, or as directed by the Owner’s Representative.

C. The Contractor shall adequately protect the work, adjacent property and the public and shall be responsible for any damage or injury due to his act or neglect.

C. The Contractor shall provide for and document proper disposal of any materials and facilities which are disposed during or after the project, including water containers, refuse, equipment, etc. Refer also to Section 13000 Submittals.

END OF SECTION

SECTION 16400
MANUFACTURERS' SERVICES

PART 1 - GENERAL

1.1 DESCRIPTION

A. Where required by other sections of the Specifications, and as determined necessary by the Engineer, the Contractor shall provide for all Manufacturers' Services outlined by the Construction Documents.

B. Manufacturers' Services shall consist of Certificates of Compliance, Certificates of Inspection and Testing, and Certificates of Proper Installation. Manufacturers' Services shall included site visits as necessary by Manufacturers' Representatives to direct, inspect, and test the Work as necessary to provide Certificates as listed above.

C. Tests, required by the Specifications or the Manufacturer to be performed by an independent laboratory, shall be completed and the results submitted to the Owner's Representative prior to approval for payment for the Work.

D. The Owner will be responsible for submitting Certificates to the State of New York. Where required, provide the Owner with additional copies (notarized, if required) for submission to regulatory agencies.

E. All testing of the Work shall be performed in accordance with the requirements of the Health and Safety Plan, as applicable.

PART 2 - PRODUCTS

(NOT USED)

PART 3 - EXECUTION

3.1 INSPECTION, TESTING, AND INSTALLATION

A. The Contractor shall schedule any Manufacturers' Services work at the site with the Owner's Representative at least three (3) days prior to occurrence.

B. The Contractor shall obtain all permits and make all necessary notifications to public entities prior to any Manufacturers' Services work at the site.

C. Facility setup for Manufacturers' Services will be reviewed with the Owner's Representative prior to initiation.

D. Written records of Manufacturers' Services: The Owner's Representative will keep written records of all Manufacturers' Services. The Contractor will provide copies of documents used during implementation of Manufacturer's Services, to the Owner's Representative at the time of occurrence, unless these documents will be included in the Operating and Maintenance Manuals. If the documents will be included in the Operating and Maintenance Manuals, the Owner's Representative will note this in the Daily Report for future reference.

END OF SECTION

SECTION 17000
CONTRACT CLOSEOUT

PART 1 - GENERAL

1.1 SUMMARY

A. This section specifies administrative and procedural requirements for project closeout including, but not limited to, inspection procedures, project record document submittal, operating and maintenance manual submittal, submittal of warranties, final cleaning.

1.2 SUBSTANTIAL COMPLETION

A. Preliminary: Before requesting inspection for certificate of Substantial Completion, complete the following list. In the application for payment that coincides with the date Substantial Completion is claimed, show 100% completion for the portion of the work claimed as substantially complete. Include supporting documents for completion, as indicated in these contract documents and a statement showing an accounting of changes to the contract sum. If 100% completion cannot be shown, include a list of incomplete items, the value of incomplete construction and reasons the work is not complete. Prior to claiming Substantial Completion, all final testing, balancing, start-up and clean-up procedures shall be complete. In addition, the Contractor shall provide the following additional written documentation:

1. Written statement advising the Owner of pending insurance changeover requirements.

2. Provide all final submittals, including warranties, operating and maintenance manuals, workmanship bonds, guarantees, final lien waivers, etc. as called for by other sections of the Specifications.

3. Deliver tools, spare parts, spare materials, etc. to the Owner's designated storage area.

4. Make changeover of locks to Owner's permanent lock system and transmit keys to the Owner.

B. Inspection procedures: After receipt of the request for inspection, the Contractor, along with the Engineer and all parties designated by the Owner, will inspect the project site and the operation of all equipment and systems. The above parties will advise the Owner of any deficiencies and unfulfilled requirements. The Contractor will prepare the Certificate of Substantial Completion following inspection or advise the Owner of construction that must be completed or corrected before the Certificate will be issued.

1.3 FINAL ACCEPTANCE

A. Before requesting final inspection for certification of final acceptance and final payment, the following must be completed;

1. Submit the Final Payment Request with final release and supporting documentation, not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.

2. Submit an updated final statement accounting for final additional changes to the contract sum.

3. Submit a copy of the Engineer's Final Inspection with a Contractor' cover letter stating that each item has been completed or otherwise resolved for acceptance.

4. Lien waivers shall be submitted with the final invoice for all subs and suppliers.

1.4 RECORD DOCUMENTS

A. Provide record documents as required by all Federal, State, and local regulations.

1.5 OPERATING AND MAINTENANCE MANUALS

A. Submit Operating and Maintenance Manuals as defined in Section 18000, Operating and Maintenance Manuals.

PART 2 - EXECUTION

NOT USED

PART 3 - EXECUTION

3.1 FINAL CLEANING

A. General cleaning during construction is required, as defined in the General Conditions and as described elsewhere in the Specifications.

B. Final cleaning shall be as described in the contract and standard terms & conditions

END OF SECTION

SECTION 18000
OPERATING AND MAINTENANCE MANUALS

PART 1 - GENERAL

1.1 SUMMARY

A. The Contractor will provide complete Operating and Maintenance Manuals for all equipment and systems, including landfill cap materials

1.2 DESCRIPTION

A. Operating and Maintenance Manuals for equipment shall include as applicable:

1. Repair trouble shooting lists
2. Schedule of recommended maintenance
3. Recommended materials for preventative maintenance
4. Complete parts lists and locations of suppliers
5. Guarantee and warranty sheets
6. Chemical safety data sheets (as applicable)
7. Copies of any available original installation instructions
8. Maintenance Master Forms: For each maintenance item, provide a blank form that could be copied by the Owner's Maintenance Personnel to be used in recording dates and information for repairs and preventative maintenance

B. The Contractor shall bind all Operating and Maintenance Material into a "D" ring type, 3 ring binder with binder ring locks. Provide tabs between each item and provide an index to all material cuts and other sections of information.

C. Under its own tab, at the front of the Operating and Maintenance Manual, provide additional Contractor information as follows:

1. Copy of Contractor's One Year Warranty covering the entire project, starting from the date of final acceptance by the Owner.

2. Copy of Contractor's Certificate of Completion

3. Copy of Contractor's Final Waiver of Lien

4. Complete list of project subcontractors, including addresses, telephone numbers and fax numbers, as applicable.

D. Refer to various other sections of the specifications for additional information applicable to specific equipment and systems.

1.3 SUBMITTAL PROCEDURES

A. Submit Operating and Maintenance Manuals in accordance with Section 13000.

B. After initial submittal, make any corrections or additions requested by the Engineer to comply with the requirements of the Contract Documents.

C. In addition to the above requirements, the Contractor shall make a preliminary submittal of the Operating and Maintenance Manual immediately after completing Shop Drawing submittals. This initial submittal is intended

to allow adequate time for making major corrections based on Suppliers' and/or Contractors' misunderstandings of these requirements.

D. The Contractor's work will not be considered substantially complete until the complete Operating and Maintenance Manual has been submitted to and approved by the Owner. The final Operating and Maintenance Manual shall be submitted prior to or with the final invoice.

END OF SECTION

DIVISION 2 – EXISTING CONDITIONS

SECTION 24010
MONITORING WELL ABANDONMENT

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes the abandonment of monitoring wells identified for decommissioning on the project drawings.

1.2 QUALITY ASSURANCE

A. Reference Standards:

1. The latest edition of the following standards, as referenced, shall be applicable. New York State Department of Environmental Conservation's (NYSDEC's) Policy "CP-43: Groundwater Monitoring Well Decommissioning Policy."

1.3 WELL LOCATIONS

A. All existing monitoring wells to be abandoned have been identified on the Contract Drawings (Sheet 2, Sheet 6A, and Sheet 7A).

1.4 WELL INFORMATION

A. A table that summarizes the well data for each well to be abandoned can be found at the end of this specification.

1.5 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Delivery and Storage:

1. Store products and materials at locations where unnecessary handling is avoided and where they will not interfere with the Owner's operations, construction operations or public travel.

2. Cover all grouting materials to protect the materials from hydration by precipitation.

1.6 QUALITY ASSURANCE

A. Registration:

1. All work shall be completed by a well drilling contractor registered in the State of New York, who shall comply with all applicable rules, regulations, and guidelines published by the State of New York regarding performance of the work.

B. Utilities for Construction:

1. Unless otherwise provided for, the Contractor shall furnish his own source of electricity, fuel, and potable water required to perform the work, and shall bear the costs of these services.

C. Protection of Property:

1. The Contractor shall properly protect all surface and subsurface structures and surrounding areas from damage which may result from the methods employed in performing the work. The Contractor shall be responsible for any damages to such structures resulting from his operations. Damaged property

shall be repaired or replaced to a condition which is equal to that which existed prior to damage. The Engineer and the Owner shall have the right to approve these restoration measures.

2. The Contractor shall clear all underground utilities within the proposed work areas by calling Dig Safely New York, municipal authorities, and public utilities of record prior to commencing all work.

D. Health and Safety:

1. Prior to mobilization to the site, the drilling contractor will be responsible for providing a copy of a project specific Health and Safety Plan (HASP) to the Engineer. A copy of the the HASP will be kept on file at Engineer's office for reference. The contractor will also be responsible for meeting the minimum requirements put forth by the Contract Documents. All on-site personnel must have completed the necessary 40-hour HAZWOPER training.

2. The Contractor shall comply with all applicable laws and regulations governing the furnishing and use of safeguards, safety devices, and protection of equipment. The Contractor shall take any necessary precautions to protect the life and health of employees and the public in performance of the work.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Bentonite-Cement Grout:

1. Bentonite-cement grout shall consist of Type I Portland cement (refer to ASTM Standard C150), finely ground sodium-bentonite type clay, and potable water. The mixture shall consist of one 94 pound bag of Type 1 Portland cement, 3.9 pounds of bentonite clay powder, and 7.8 gallons of potable water.

B. Bentonite Seal:

1. A one-foot thick bentonite seal consisting of 1/4-inch diameter sodium-bentonite chips hydrated with potable water shall be placed at the top of the bentonite-cement grout column. The seal shall be no less than three (3) inches below the existing site grade.

PART 3 – EXECUTION

3.1 WELL ABANDONEMENT

A. General Requirements:

1. All abandoned wells must be fully sealed in a manner appropriate for site specific geologic conditions to prevent contaminant migration through the borehole.

2 The Contractor shall maintain a complete and accurate record of the well abandonment operation. For each well abandoned, the Contractor shall complete a Well Decommissioning Record (Figure 3 of NYSDEC's Groundwater Monitoring Well Decommissioning Policy) The information to be recorded shall include the well ID, the depth of the well and riser diameter, the name of the driller and drilling company, the date of the decommissioning, type of plugging material used, the volume of materials used, the interval grouted, and the method of placing the plugging material into each well. All records shall be submitted to the Engineer within five (5) business days after the well abandonment is complete.

3. All work shall be completed under the direction of the Engineer's on-site representative.

B. Plugging Procedures:

1. The bentonite-cement grout mixture shall be placed in the well by pumping the mixture down a tremie pipe of a least one-inch inside diameter which has been placed to the bottom of the well to avoid segregation or dilution of the sealing materials. The slurry shall be applied in one continuous operation until the well is filled to within at least three feet of the ground surface elevation. The tremie pipe shall be submerged in the grout during grout placement. Equipment used for pumping the grout shall be of the diaphragm, piston, gear, or helical type. The Contractor shall be responsible for determining the amount of grout required to plug each well.

2. The contractor shall allow the grout mixture to settle a minimum of two hours prior to placing the bentonite seal or backfill soils on the grout. Additional grout, if necessary, should be added to the well borehole to raise the grout level to within at least one foot of the ground surface elevation.

3. A one-foot thick bentonite seal consisting of 1/4-inch diameter sodium-bentonite chips hydrated with potable water shall be placed at the top of the bentonite-cement grout to provide a secondary seal.

C. Removal of Well Materials:

1. The concrete surface seal and protective steel casings around monitoring wells shall be removed only after the initial grouting of the well is completed.

2. The top 5-feet of PVC well riser shall be removed to by unthreading the PVC joints, cutting the riser pipe, or lifting the riser pipe upward using a cable hoist system or similar tool.

3. All PVC well riser, screen, and protective casings shall be placed beneath the capping system.

D. Decontamination:

1. All down-hole equipment will be thoroughly decontaminated on-site prior to abandoning each well with a high-pressure steam cleaner.

E. Site Restoration:

1. The Contractor shall restore the site to a condition that reasonably approaches the original condition of the property prior to the start of work. After all well boreholes are sealed, the work area shall be graded to conform to the existing ground contours.

2. Upon completion of the work, the Contractor shall remove from the premises, all materials, debris, tools, and machinery used to complete the work. Plugging materials, grease, or other materials, which have accumulated on the work site premises shall be removed. The contractor shall dispose of all excess materials, the well protective casings, and PVC well pipe off-site in accordance with all local, State, and Federal regulations.

Well ID	Well Diameter (Inches)	Well Depth (Feet)
South Landfill		
MW-1S	2*	25
MW-1SD	2	50
MW-2S	2*	25
MW-2SD	2	76
MW-3S	2*	24.5
MW-3SD	2	81
North Landfill		
MW-1	2*	20
MW-2	2*	20
MW-3	2	15
MW-4A	2	14
MW-4B	2	38
MW-5	2	53.5
MW-7	2	64
MW-8A	2	15
MW-8B	2	43
MW-9A	2	14
MW-9B	2	68
MW-10	2	14
MW-12A	2	15
MW-12B	2	64
MW-13	2	14
MW-14	2	14
OW-2	2	12
OW-3	2	12
OW-4	2	12
Total Depth All Wells		803

* Assumed 2” diameter based on incomplete log information

END OF SECTION

DIVISION 3 - EARTHWORK

SECTION 31050
GEOTEXTILES

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes the installation of separation/stabilization fabric as shown on the Contract Drawings and as specified herein.

1.2 QUALITY ASSURANCE

A. The latest edition of the following standards, as referenced herein, shall be applicable.

1. American Society for Testing and Materials (ASTM).

1.3 SUBMITTALS

A. Product Data:

1. Submit Manufacturer's material specifications, product literature and installation instructions.

1.4 DELIVERY, STORAGE, AND HANDLING

A. Delivery:

1. Deliver sufficient materials to the site to prevent interruption of the work.

2. All materials shall be inspected by Contractor upon delivery. Contractor shall notify Engineer of any damage. Products received at the site torn, with holes, deteriorated, or otherwise damaged will not be approved and shall be returned and replaced at no expense to the Owner.

B. Storage:

1. All material shall be stored in strict accordance with the manufacturer's recommendations and as approved by the Engineer.

2. Do not store products directly on ground. Ship and store geotextile with suitable wrapping for protection against moisture and ultraviolet exposure. Store geotextile in way that protects it from elements, if stored outdoors, elevate and protect geotextile with waterproof cover.

C. Handling:

1. All material shall be handled in strict accordance with the manufacturer's recommendations and as approved by the Engineer.

PART 2 – PRODUCTS

2.1 WOVEN GEOTEXTILE

A. Stabilization Fabric: To be used beneath roadways and walks.

B. Composed of polymeric yarn interlaced to foam planar structure with uniform weave pattern.

C. Calendared or finished so yarns will retain their relative position with respect to each other.

D. Polymeric Yarn: Long-chain synthetic polymers (polyester or polypropylene) with stabilizer or inhibitors added to make filament resistant to deterioration due to heat and ultraviolet light exposure.

E. Sheet Edges: Selvaged or finished to prevent outer material from separating from sheet.

F. Unseamed Sheet Width: Minimum 12 feet.

G. Physical Properties:

Fabric Weight	ASTM D 5261	Fabric Weight	8
Grab Strength	ASTM D 4632	LBS	225
Grab Elongation	ASTM D 4632	%	50
Tear Strength	ASTM D 4533	LBS	90
Puncture Resistance	ASTM D 4833	LBS	130
CBR Puncture	ASTM D 6241	LBS	650
Water Flow Rate	ASTM D 4491	GPM/SQFT	100
Permittivity	ASTM D 4491	SEC (-1)	1.26
Permeability	ASTM D 4491	CM/SEC	0.3
AOS	ASTM D 4751	US SIEVE	80

PART 3 – EXECUTION

3.1 GENERAL

A. The Contractor shall be responsible for the installation, and seaming of geotextile fabric in accordance with the specifications and the manufacturer's recommendations, as approved by the Engineer.

3.2 SUBGRADE PREPARATION

A. Surfaces to be covered with geotextile fabric shall be smooth and free of rocks, sticks, roots, sharp objects, and all debris that may damage the fabric. The surface to be covered shall be firm and unyielding, with no sudden changes or breaks in grade. There shall be no standing water or excessive moisture on the surface when the fabric is placed.

B. The compacted subgrade shall be maintained in a smooth, uniform and compacted condition during installation of the fabric.

3.3 GEOTEXTILE INSTALLATION

A. The fabric shall be cleaned of all debris or other materials that may negatively affect the fabric's performance.

B. Mechanical equipment shall not be permitted to operate directly on the fabric unless authorized to do so by the manufacturer and approved by the Engineer.

C. Geotextile Placement

1. Fabric shall be placed as recommended by the manufacturer and approved by the Engineer on surfaces which have been prepared to conform with these Specifications and found acceptable for fabric installation.

2. The fabric shall be placed as smooth and wrinkle-free as possible.

3. When installing geotextile in trenches, swales, ditches, etc., overlap geotextile in the direction of flow.

4. All areas of fabric damaged during installation as determined by the Engineer shall be repaired or replaced by the Contractor as specified at no additional cost to the Owner. Should the fabric be damaged during any step of the installation, the damaged section shall be repaired by covering it with a piece of fabric which extends at least 24 inches in all directions beyond the damaged area. The fabric shall be secured by sewing or bonding as approved by the Engineer.

5. At time of installation, fabric will be rejected if it has defects, ribs, holes, flaws, deterioration, or damage incurred during manufacture, transportation, handling, or storage. Damaged materials shall be removed and replaced at no additional cost to the Owner.

6. Fabric shall be placed with long dimension down slope.

7. Fabric shall be protected at all times during construction from contamination by surface runoff and any fabric so contaminated shall be removed and replaced with uncontaminated fabric.

D. Seams and Overlaps of Geotextile:

1. All overlaps shall be a minimum of eighteen (18) inches (450 mm).

3.4 COVER MATERIALS OVER GEOTEXTILES

A. Granular materials shall be placed on geotextiles as shown on the Contract Drawings. During back dumping and spreading, a minimum depth of 6 inches of granular material shall be maintained at all times between the fabric and wheels of trucks or spreading equipment. All equipment used in spreading or traveling on the cover layer for any reason shall exert low ground pressures and shall be

approved by the manufacturer and Engineer. Dozer blades, etc. shall not make direct contact with the fabric; however, if tears occur in the fabric during the spreading operation, the granular material shall be cleared from the fabric and the damaged area repaired as previously described.

B. The granular material shall be spread in the direction of fabric overlap. Large fabric wrinkles which may develop during the spreading operations shall be folded and flattened in the direction of the spreading. Occasionally, large folds may reduce the fabric overlap width. Special care shall be given to maintain proper overlap and fabric continuity.

C. All equipment spreading cover material or traveling on the cover layer shall avoid making sharp turns, quick stops or quick starts.

D. Fabric shall be covered as soon as possible after placement to minimize exposure to sunlight. Fabric shall not be exposed for more than 5 days.

3.5 DISPOSAL OF SCRAP MATERIALS

A. On completion of installation, the Contractor shall legally dispose of all trash and scrap material off site or in a location approved by the Owner and Engineer, remove equipment used in connection with the work herein, and shall leave the premises in a neat acceptable manner.

END OF SECTION

SECTION 31060
SYNTHETIC GEOMEMBRANE

PART 1 – GENERAL

1.1 SUMMARY

A. Section includes textured synthetic geomembrane.

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM)

1. D 1004 Test Method for Initial Tear Resistance of Plastic Film and Sheeting

2. D 1238 Standard Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer

3. D 1505 Test Method for Density of Plastics by the Density-Gradient Technique

4. D 1603 Test Method for Carbon Black in Olefin Plastics

5. D 3895 Standard Test Method for Oxidative-Induction Time of Polyolefins by Differential Scanning Calorimetry

6. D 4218 Standard Test Method for Determination of Carbon Black in Polyethylene Compounds

7. D 4833 Standard Test Method for Index Puncture Resistance of Geotextiles, Geomembranes, and Related Products

8. D 5199 Standard Test Method for Measuring Nominal Thickness of Geotextiles and Geomembranes

9. D 5397 Standard Test Method for Evaluation of Stress Crack Resistance of Polyolefin Geomembranes Using Notched Constant Tensile Load Test

10. D 5596 Standard Test Method for Microscopic Evaluation of the Dispersion of Carbon Black in Polyolefin Geosynthetics

11. D 5994 Standard Test Method for Measuring Core Thickness of Textured Geomembranes

12. D 6392 Standard Test Method for Determining the Integrity of Nonreinforced Geomembrane Seams Produced Using Thermo-Fusion Methods

13. D 6693 Standard Test Method for Determining Tensile Properties of Nonreinforced Polyethylene and Nonreinforced Flexible Polypropylene Geomembranes

14. D 7240 Standard Practice for Leak Location using Geomembranes with an Insulating Layer in Intimate Contact with a Conductive Layer via Electrical Capacitance Technique (Conductive Geomembrane Spark Test)

B. Geosynthetic Research Institute

1. GRI GM 13 Test Properties, Testing Frequency and Recommended Warranty for High Density Polyethylene (HDPE) Smooth and Textured Geomembranes

2. GRI GM 17 Test Properties, Testing Frequency and Recommended Warranty for Linear Low Density Polyethylene (LLDPE) Smooth and Textured Geomembranes

1.3 SUBMITTALS

A. Submit product data, samples, schedules, and shop drawings describing the work to be performed. Work covered by these submittals shall not proceed until they have been approved by the Engineer.

B. Required submittals include:

1. Manufacturer's qualifications.

2. Liner installer's qualifications.

3. Liner installer's crew foreman, welders and quality assurance/quality control personnel qualifications.

4. Manufacturer's product data and specifications for synthetic geomembrane components.

5. Manufacturer's detailed description of recommended seaming equipment and procedures, including testing.

6. Manufacturer's QA/QC procedures, for both manufacturing and installation.

7. Synthetic geomembrane panel layout detailing seams and sequence of installation.

8. Installation schedule.

9. Material samples of all synthetic geomembrane components, including seams.

10. Manufacturer's recommended maintenance and repair procedures.

11. Details of joints, anchoring, penetrations and other construction details.

C. Submit pertinent record documents including:

1. Manufacturer's quality control certification for all material delivered. Submit certification upon delivery.

2. Results of all destructive and non-destructive seam strength tests performed by the contractor or installer including failed trial welds, test results and subsequent repairs, retests and any imperfection repairs, tests and inspections. Documentation shall include but not be limited to date, location, test unit number, name of tester, type of test and results of each individual test.

3. Record drawings showing panel layout, number, installation sequence and date, locations of destructive seam tests, non-destructive tests, all seam test failures and all repairs and patches.

4. Upon completion of the geomembrane installation and prior to payment for completed work, a complete and comprehensive set of records and record drawings shall be submitted for final review and approval.

1.4 QUALITY ASSURANCE

A. Qualifications

1. Manufacturer's Qualifications:

a. The synthetic geomembrane manufacturer shall have manufactured 25 million square feet of synthetic geomembrane and at least 5 million square feet of the type listed in this specification.

b. The manufacturer shall permit the Owner and Engineer to visit the manufacturing plant.

2. Liner Installer's Qualifications:

a. The liner installer shall submit to the Engineer documented evidence of their ability and sufficient capacity to perform the work by having previously successfully installed a minimum of twenty (20) million square feet of similar type synthetic geomembrane.

b. The liner installer's crew foreman must have documented minimum qualifications of successful installation experience of at least five (5) million square feet on five (5) different projects.

c. Each of the liner installer's welders shall have documented minimum qualifications of successful welding experience of 100,000 linear feet of seam.

d. Liner installer shall have quality assurance/quality control personnel on site at all times. These personnel will be dedicated solely to performing quality assurance/quality control functions. The quality assurance/quality control foreman will have documented minimum qualifications of successful quality assurance/quality control experience of at least three (3) million square feet, on five (5) different projects. No substitution for QA/QC personnel will be allowed during the course of the project unless approved by the Engineer.

3. Sheet Manufacturer:

a. Documentation for the resin shall be checked against the material as received.

b. Contractor shall supply data on each roll of material documenting that the thickness, density, percent carbon black, melt index, elongation at break and tensile strength at yield and break comply with the product specification.

B. Resin used in sheet manufacture shall be specified by the manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Deliver, store and handle synthetic geomembrane in accordance with the manufacturer's recommendations. Each roll shall be clearly labeled with the name of the manufacturer, product type, roll number, physical dimensions and date of production.

1.6 WARRANTY

A. Manufacturer shall furnish a material warranty for the synthetic geomembrane material to the Owner. Material warranty shall be for 5 years commencing with the date of final acceptance of the installation.

B. The Contractor shall guarantee the synthetic geomembrane installation against defects in materials, installation and workmanship for 1 year commencing with the date of completion. The guarantee shall include the services of qualified service technicians and all material required for repairs at no expense to the Owner. All welds shall be included in the guarantee. Where the double wedge welding technique is used, both the inner and outer welds along the seam shall be guaranteed.

PART 2 - PRODUCTS

2.1 MATERIAL

A. General:

1. All synthetic geomembrane components shall be new.

2. Synthetic geomembrane material shall be a linear low density polyethylene geomembrane having a nominal thickness of 60 mils and shall be textured on both sides.

3. The synthetic geomembrane material used must have a maximum coefficient of permeability of 1 x 10^{-12} centimeters per second.

4. The synthetic geomembrane material shall be free of holes, blisters, undispersed raw materials, and any sign of contamination by foreign matter. Synthetic geomembrane with holes, blisters, undispersed raw material or signs of contamination by foreign material shall be removed from the site and replaced at no additional cost to the Owner.

5. The synthetic geomembrane lining material shall be a minimum 20.0' seamless width. Labels on the roll shall identify the thickness, length, width, manufacturer's mark number, and the direction to unroll the material.

B. Specific:

1. Textured Geomembrane: Textured synthetic geomembrane shall be manufactured from first quality polyethylene resins and meet or exceed the following specifications:

Low Density Polyethylene (LDPE) Geomembrane
(TEXTURED)

Tested Property	Test Method	Frequency	Minimum Average Values			
			40 mil	60 mil	80 mil	100 mil
Thickness, mil Lowest individual reading	ASTM D 5199	every roll	40 36	60 54	80 72	100 90
Density, g/cm^3 (max.)	ASTM D 1505	200,000 lbs	0.939	0.939	0.939	0.939
Tensile Properties (each direction) Strength at Break, lb/in-width Elongation at Break, %	ASTM D 6693, Type IV Dumbbell, 2 ipm G.L. 2.0 in	20,000 lbs	 60 250	 90 250	 120 250	 150 250
Tear Resistance, lb	ASTM D 1004	45,000 lbs	22	33	44	55
Puncture Resistance, lb	ASTM D 4833	45,000 lbs	44	66	88	110
Carbon Black Content, % (Range)	ASTM D 1603*/4218	20,000 lbs	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0	2.0 - 3.0
Carbon Black Dispersion	ASTM D 5596	45,000 lbs	Note(1)	Note(1)	Note(1)	Note(1)
Asperity Height, mil	ASTM D 7466	second roll	18	18	18	18
Oxidative Induction Time, min	ASTM D 3895, 200°C; O_2, 1 atm	200,000 lbs	>100	>100	>100	>100
Typical Roll Dimensions						
Roll Length(2), ft	Double-Sided Textured Single-Sided Textured		700 650	520 420	400 320	330 250
Roll Width(2), ft			22.5	22.5	22.5	22.5
Roll Area, ft^2	Double-Sided Textured Single-Sided Textured		15,750 14,625	11,700 9,450	9,000 7,200	7,425 5,625

NOTES:
• (1)Dispersion only applies to near spherical agglomerates. 9 of 10 views shall be Category 1 or 2. No more than 1 view from Category 3.
• (2)Roll lengths and widths have a tolerance of ±1%.
• LDPE Textured is available in rolls weighing approximately 4,000 lb.
• LDPE geomembranes have dimensional stability of ±2% when tested according to ASTM D 1204 and LTB of <-77°C when tested according to ASTM D 746.
• *Modified.

PART 3 - EXECUTION

3.1 EXAMINATION

A. The geomembrane installer shall certify daily in writing that the subgrade surface on which the synthetic geomembrane is to be installed is acceptable.

3.2 PREPARATION

A. Surfaces to be lined shall be smooth and free of rocks, sticks, roots, sharp objects, and all debris that may puncture the synthetic geomembrane. The surface to be lined shall be firm and unyielding, with no sudden changes or breaks in grade.

B. Moisture Content:

1. Allow no standing water or excessive moisture within construction area.

2. Maintain moisture content of the surface soils to receive synthetic geomembrane within three percent low of the optimum moisture until covered by the synthetic geomembrane.

3. Cover all surfaces where moisture content is critical promptly after they have been accepted for synthetic geomembrane installation.

3.3 INSTALLATION

A. The synthetic geomembrane material shall be cleaned of all debris or other materials that may negatively affect the membrane system.

B. Sheet Placement:

1. The first ten (10) feet of material of each roll shall be inspected prior to placement by the Engineer. Material deemed unsuitable for placement by Engineer shall be discarded at no additional cost to the Owner.

2. Sheets shall be placed as directed by the manufacturer's representative on surfaces which have been prepared to conform with these specifications and found acceptable for membrane installation. A subgrade acceptance form provided by the Engineer shall be prepared and signed daily by the Installer, Contractor and Engineer. Copies of these documents shall be included in the final record documents submitted by the Contractor.

3. The overlap between adjacent sheets shall be a minimum of four (4) inches.

4. The synthetic geomembrane shall be placed over the prepared surface in such a manner as to assure minimum handling. Anchor trench excavation and any structure seal preparation shall be completed before the synthetic geomembrane installation begins. The sheets shall be of such lengths and widths and shall be placed in such a manner as to minimize field seaming. Horizontal field seams on the

slopes shall be kept to a minimum. Only those sheets of synthetic geomembrane material which can be anchored and sealed together that same day shall be unpackaged and placed in position. Placement methods shall minimize formation of wrinkles. Wrinkles shall be repaired at the direction of the Engineer.

5. In areas where wind is prevalent, synthetic geomembrane installation shall be started at the upwind ide of the project and proceed downwind. The leading edge of the synthetic geomembrane shall be secured at all times with sandbags or other means sufficient to hold it down during high winds.

6. Sandbags or rubber tires may be used as required to hold the synthetic geomembrane in position during installation. Tires shall not have exposed steel cords or other sharp edges which may snag or cut the synthetic geomembrane. Materials, equipment or other items shall not be dragged across the surface of the synthetic geomembrane or be allowed to slide down slopes on the synthetic geomembrane. All parties walking or working upon the synthetic geomembrane material shall wear soft-sole shoes.

7. Synthetic geomembrane sheets shall be closely fit and sealed around protrusions through the synthetic geomembrane. All piping, structures and other protrusions through the synthetic geomembrane shall be sealed with approved sealing methods, or as shown on the Drawings.

8. Smoking shall not be permitted by personnel working on the synthetic geomembrane.

9. All areas of the synthetic geomembrane damaged during installation as determined by the Engineer shall be repaired by the Contractor as specified at no additional expense to the Owner.

10. No vehicles of any sort will be allowed to operate directly on the liner.

C. Field Seams:

1. All seams shall be made using either the extrusion welding technique or the double wedge welding technique. Field seaming is prohibited when either ambient air or sheet temperatures below 32°F, when the ambient air temperature is above 120°F, when the sheet temperature is above 158°F, during periods of precipitation, or when winds are in excess of 20 miles per hour.

2. All field welds shall have a minimum test strength of 90 ppi with 50% elongation minimum when tested in shear, and 75 ppi with 25% maximum separation when tested in peel. A test revealing a non-film tear bond seam failure shall be deemed a failed test regardless of seam strength. Shear and peel testing shall be performed in accordance with ASTM D 4437.

3. Welding equipment which exhibits an excessive number of "burn-outs" or failing tests, as determined by the Engineer, shall be removed from the project until proof of repair is shown. The engineer may require continuous monitoring of the welding machine by the installer.

D. Extrusion Welding:

1. Field joints shall be made by overlapping adjacent sheets a minimum of four (4) inches and extruding a ribbon of extrusion joining resin between overlapped sheets or over the seam between the sheets according to procedures recommended by the manufacturer.

2. Prior to extrusion welding of the seams, all areas which are to become seam interfaces shall be cleaned of dust and dirt as directed by the synthetic geomembrane manufacturer's representative. The slick surfaces of the sheet which are to become seam interfaces shall be roughened with a wire brush, grinding wheel or other acceptable means as directed by the synthetic geomembrane manufacturer's representative before extrudate is placed between the overlapping sheets or over a lapped seam.

3. Self-propelled extrusion welders shall be used for welding the lapped seams between sheets.

4. Hand-held extrusion welders shall be used for making repairs and for welding in areas not accessible to the self-propelled welder as directed by the synthetic geomembrane manufacturer's representative.

E. Double Wedge Welding:

1. Field joints shall be made by overlapping adjacent sheets a minimum of four (4) inches or as recommended by the welding machine manufacturer or synthetic geomembrane manufacturer.

2. Prior to double wedge welding of the seams, all areas which are to become seam interfaces shall be cleaned of dust and dirt as directed by the geomembrane manufacturer.

3. Self-propelled double wedge welders shall be used for welding the lapped seams between sheets.

4. Double wedge welding shall not take place unless the sheet is dry.

5. Hand-held extrusion type welders shall be used for making repairs and for welding in areas not accessible to the self-propelled welders as directed by the synthetic geomembrane manufacturer's representative.

F. Defects and Repairs:

1. All seams and non-seam areas of the geomembrane shall be examined by Installer for identification of defects, holes, blisters, excessive scuffing, wrinkles, distress, undispersed raw materials and any sign of contamination by foreign matter.

a. Defective or damaged materials shall be identified via a deficiency report. Actions taken to resolve or correct the problem will also be recorded on the form.

b. Defects, wrinkles, holes, blisters, undispersed raw materials, signs of contamination by foreign matter, unacceptable welds in geomembranes and other unsatisfactory conditions will be identified on the Daily Report Form. The repair or corrective action to "correct" the problem will also be recorded on a Deficiency Correction Form.

c. Both deficiency and daily reports must be received and approved by the Engineer prior to covering the geomembrane.

2. Each suspect location both in seam and non-seam areas shall be non-destructively tested as specified. Each location which fails the non-destructive testing shall be marked by Installer and repaired. Work shall not proceed with any materials which will cover locations which have been repaired until laboratory test results with passing values are available. Owner or Engineer may require Installer to perform conformance tests in areas which appear inadequate or damaged. Owner shall pay for tests which show suspect areas are adequate. Installer shall pay for tests which prove suspect areas are inadequate or deficient.

G. Geomembrane Repair Procedures:

1. Any portion of the Geomembrane failing a destructive or non-destructive test shall be repaired. Several procedures exist for the repair of these areas. The final decision as to the appropriate repair procedure shall be decided by the Engineer. The procedures available include:

a. Patching - used to repair large holes, tears, wrinkles, and contamination by foreign matter;

b. Buffing and re-welding - used to repair small sections of extruded seams;

c. Spot welding or seaming - used to repair small tears, pinholes, or other minor localized flaws;

d. Capping - used to repair large lengths of failed seams or wrinkles;

e. Topping - used to repair areas of inadequate seams which have an exposed edge;

2. In addition, the following provisions shall be satisfied:

a. Surfaces of the geomembrane which are to be repaired shall be abraded no more than one hour prior to the repair;

b. All surfaces must be clean and dry at the time of the repair;

c. All seaming equipment used in repairing procedures must be approved;

d. The repair procedures, materials, and techniques shall be approved in advance of the specific repair by the Engineer.

e. Patches or caps shall extend at least 6 in. beyond the edge of the defect, and all corners of patches shall be rounded with a radius of at least 3 inches.

H. Geomembrane Verification of Repairs:

1. All repairs shall be identified on the as-built drawing. Each repair shall be nondestructively tested using the methods described in Paragraph 3.4 (C) of this Section as appropriate. The Engineer may also require repaired areas to be destructively tested. Failed tests indicate that the repair shall be redone and retested until a passing test result is obtained.

3.4 FIELD QUALITY CONTROL

A. Installation Contractor shall employ on-site physical inspection of installation procedures.

B. Contractor shall notify Engineer in writing when material is delivered to site. Contractor will perform conformance tests on material within three (3) weeks of receiving materials. At a minimum, parent material conformance testing shall be performed every 50,000 square feet of liner material delivered to the site. A two foot wide sample along the entire roll width shall be cut after the first lap on the roll is removed and submitted by the Contractor for testing. The following tests shall be performed:

1. Textured Synthetic Geomembrane:

PROPERTIES	TEST METHOD	60 MILS	TESTING FREQUENCY (MINIMUM)
Thickness mils (min. ave.) • lowest individual for 8 out of 10 values • lowest individual for any of the 10 values	D 5994	Nom. (-5%) -10% -15%	Per roll
Tensile Properties (3) (min. ave.) • break strength – lb/in. • break elongation - %	D 6693 Type IV	90 250	20,000 lb
Puncture Resistance – lb (min. ave.)	D 4833	66	45,000 lb

C. Installation Contractor shall perform physical nondestructive testing on all welds to document airtight homogeneous seams. Testing shall consist of pressure testing on fused seams and vacuum box testing on extrusion welded seams. Engineer shall observe and document that all non-destructive testing of the geomembrane was performed.

1. Air Pressure Testing (ASTM D5820):

a. Equipment for Air Testing:

1) Air pump capable of generating and sustaining a pressure between 20 to 60 psi.

2) Rubber hose with fittings and connections.

3) Sharp hollow needle, or other approved pressure feed device with a sealed and liquid filled pressure gauge capable of reading and sustaining a pressure between 0 and 60 psi in one pound increments.

b. Procedure for Air Testing:

1) Seal both ends of the seam to be tested.

2) Insert needle or other approved pressure feed device into the sealed channel created by the fusion weld.

3) Inflate the test channel to a pressure of approximately 25 to 30 psi, and allow the pressurized channel to stabilize for two (2) minutes. Re-inflate to a minimum of 25 psi as necessary. The initial pressure reading shall be recorded once stabilization has taken place. Close valve, observe and record the initial pressure.

4) Observe and record the air pressure five (5) minutes after the initial pressure setting is recorded. If loss of pressure exceeds 4 psi or if the pressure does not stabilize, locate the suspect area and repair.

5) At the conclusion of all pressure tests, the end of the air-channel opposite the pressure gauge shall be cut. A decrease in gauge pressure must be observed or the air channel will be considered “blocked” and the tests shall be repeated from the point of blockage. If the point of blockage cannot be found, cut the air channel in the middle of the seam and treat each half as a separate test.

6) Remove the pressure feed needle and seal the resulting hole be extrusion welding.

c. In the event of a Non-Complying Air Pressure Test, the following procedure shall be followed:

1) Check seam and seals and retest seams.

2) If a seam will not maintain the specified pressure, the seam shall be visually inspected to localize the flaw. If this method is unsuccessful, cut one inch (1") samples from each end of the seam.

3) Perform destructive peel tests on the samples using the field tensiometer.

4) If all samples pass destructive testing remove the overlap left by the wedge welder and vacuum test the entire length of seam.

a) If a leak is located by the vacuum test, repair by extrusion fillet welding. Test the repair by vacuum testing.

b) If no leak is discovered by vacuum testing, the seam will be considered to have passed non-destructive testing.

5) If one or more peel specimens are in non-compliance, additional samples shall be taken in accordance with the specifications.

a) When two (2) passing samples are located, the length of seam bounded by the two (2) passing test locations will be considered non-complying. The overlap left by the wedge welder shall be heat tacked in place along the entire length of seam and the noncomplying portion of seam will be extrusion fillet welded.

b) Test the entire length of the repaired seam by vacuum testing.

d. General Air Testing Procedures:

1) The opposite end of the air channel will in all cases be pierced to assure that no blockages of the air channel have occurred.

2) Whenever possible, seams should be air-tested prior to completing butt seams to avoid having to cut into liner. All cuts through the liner as a result of testing will be repaired by extrusion welding.

3) All needle holes in air channels remaining after testing shall be circled by testing crew and will be repaired with an extrusion bead.

e. Air Pressure Testing Documentation:

1) All information regarding air-pressure testing, (date, initial time and pressure, final time and pressure, pass/fail designation, and Technician's initials) shall be written at both ends of the seam, or portion of seam tested. All of this information shall be logged on appropriate forms provided by the Engineer. Test locations and unit numbers shall also be logged by the Installer's QA/QC personnel on appropriate forms provided by the Engineer. These forms will be reviewed daily by the Engineer. The Contractor shall include this information in the record document submittal for the geomembrane.

2) Vacuum Testing (ASTM D5641): This test shall be used on extrusion welds, or when the geometry of a fusion weld makes air pressure testing impossible or impractical, or when attempting to locate the precise location of a defect believed to exist after air pressure testing.

a. Equipment for Vacuum Testing:

1) Vacuum box assembly consisting of a rigid housing with a soft neoprene gasket attached to the bottom, a transparent viewing window, port hole or valve assembly, and a vacuum gauge.

2) Vacuum pump assembly equipped with a pressure controller and pipe connection.

3) A rubber pressure/vacuum hose with fittings and connections.

4) A bucket and means to apply a soapy solution.

5) A soapy solution.

b. Procedure for Vacuum Testing:

1) Trim excess overlap from the seam, if any.

2) Turn on the vacuum pump to reduce the vacuum box to between 3 and 5 psi gauge.

3) Apply a generous amount of a strong solution of liquid detergent and water to the area to be tested.

4) Place the vacuum box over the area to be tested and apply sufficient downward pressure to "seat" the seal strip against the liner.

5) Close the bleed valve and open the vacuum valve.

6) Apply a minimum of 3 psi vacuum to the area as indicated by the gauge on the vacuum box.

7) Ensure that a leak tight seal is created.

8) For a period of approximately 10 to 15 seconds, examine the geomembrane through the viewing window for the presence of soap bubbles.

9) If no bubbles appear after 15 seconds, close the vacuum valve and open the bleed valve, move the box over the next adjoining area with a minimum three inch (3") overlap, and repeat the process.

c. Procedure for Non-Complying Test:

1) Mark all areas where soap bubbles appear and repair the marked areas.

2) Retest repaired areas.

d. General Vacuum Testing Procedures:

1) Vacuum box testing shall be performed by qualified personnel with frequent supervision by the Installers Construction Quality Control Coordinator.

2) Overlap shall be trimmed prior to vacuum boxing all seams.

3) Special attention shall be exercised when vacuum testing "T" seams or patch intersections with seams.

e. Vacuum Testing Documentation:

1) Vacuum testing crew will use permanent markers to write on liner indicating tester's initials, date, and pass/fail designation on all areas tested.

2) All of the above information plus location and test unit number shall be logged by the Installer's QA/QC personnel on appropriate forms provided by the Engineer. The forms will be reviewed daily by the Engineer. The Contractor shall include this information in the record document submittal for the geomembrane.

D. Quality-control technicians, employed by the Installation Contractor, shall inspect each seam. Any area showing a defect shall be marked and repaired by the installation Contractor.

E. Trial Welds: A test weld three feet long from each welding machine and from each operator shall be run twice per day (once in the morning and once in the afternoon) prior to geomembrane welding and under the same conditions as exist for the geomembrane welding. Test welds shall also be run when significant changes in geomembrane sheet temperatures are observed. The test weld shall be marked with date, ambient temperature, and welding machine number. Samples of weld measuring 1 inch x 12 inches shall be cut from the test weld and pulled in peel in the field prior to production welding using a field tensiometer, and recorded as pass or fail regarding the requirements of Section 3.3 - C. If trial test specimens do not pass, then the seaming device and its operator will not perform any seaming operations until the deficiencies are corrected and two successive passing trial seam test specimens are produced. Completed trial seam samples cannot be used as portions of a second sample and must be discarded. Trial weld samples shall be achieved for potential subsequent laboratory strength testing in accordance with applicable ASTM standards (ASTM D 4437). Documentation of all trials welds shall be logged on appropriate forms provided by the Engineer. The data shall be reviewed by the Engineer prior to the commencement of work each day. The Contractor shall include copies of trial weld reports in the record document submittal for the geomembrane.

F. Destructive Testing: Destructive seam tests shall be performed at random locations. Seam strength testing shall be done as the seaming work progresses, not at the completion of all field seaming. The Owner or Engineer shall select locations where seam samples will be cut. Destructive samples shall be pulled at intervals of 1 sample for every 500 linear feet of weld, at a minimum. At least one representative sample shall be taken for each seaming machine being used on any given day. The seaming technician shall not be informed in advance of the locations where the seam samples will be taken. Seam strength and failure mode shall be as specified in Paragraph 3.3-C of this Section.

1. Samples shall be cut by Installer as the seaming progresses.

2. Installer shall assign a number to each sample which is to be based upon seam and sample number and mark it accordingly.

3. Installer shall record sample location and number on "As-Built" record drawing.

4. All holes in the geomembrane resulting from destructive seam sampling shall be repaired in accordance with repair procedures described in Paragraph 3.3-F of this Section at no additional cost to the Owner. The continuity of the new seams in the repaired area shall be tested according to Paragraph 3.4-c of this Section.

G. Samples for Destructive Tests:

1. Installer, under the Engineers direction, shall take two coupon samples. The coupon samples shall be 1 inch x 12 inches, and separated by 36 inches.

2. Installer shall test the two coupon samples in the presence of the Engineer. The installer shall test the coupon samples in peel (inner track weld only) and shear, and the sample shall not fail in the seam (failor shall not be by a non-film tear bond mode). If both coupon samples pass, the Engineer will direct the Installer to collect a sample from between the locations from which the coupon samples were removed. Installer shall cut the sample into three, 12 inch by 12 inch specimens and Engineer will distribute the three specimens as follows:

a. One specimen will be given to the Owner for archive storage;

b. One specimen will be retained by the Engineer should further sampling be required; and,

c. One sample will be shipped by overnight mail to the Contractors/Installers independent geosynthetic laboratory for testing in accordance with ASTM D 4437.

3. Contractor/Installer shall direct the selected geosynthetic laboratory to perform five peel (inner track weld only) and five shear tests. If more than one of the tests fail to meet the strength or failure mode requirements, the seam shall be considered inadequate and the Installer shall repair the seam or retest the seam as required by the specifications.

4. The following procedures shall apply whenever a sample fails a destructive test. Installer has two options:

a. Reconstruct the seam between any two passed test locations;

5. Trace the welding path to an intermediate location [10 feet minimum from the point of the failed test in each direction] and take a small sample for an additional field test at each location. If these additional samples pass the field test, then full laboratory samples shall be taken in accordance with Paragraph 3.4-G of this Section. If these laboratory samples pass the tests, then the seam is reconstructed between these locations. If either sample fails, then the process is repeated (with testing at the Contractor's expense with no additional cost to Owner) to establish the zone in which the seam shall be reconstructed.

1) All acceptable seams must be bounded by two locations from which samples passing laboratory destructive tests have been taken.

2) Installer shall document all actions taken in conjunction with destructive test failures; e.g., capping of failed seam area.

H. Any tensile testing which indicates a defective weld shall result in the contractor repairing the weld by capping the weld between two locations where successful welds have been documented by tests. Repaired seam strength shall be as specified in Paragraph 3.3-C of this Section.

I. Alternative test methods or quality control procedures and specifications shall be reviewed and approved by the Engineer prior to use.

J. Installation Contractor shall submit to the Engineer a written description of procedures, sample types and locations and results of laboratory testing described above.

K. No materials shall be placed over any area of installed geomembrane until the installed geomembrane has been accepted by the Engineer. In order to gain acceptance by the Engineer, Contractor shall submit all as-built documentation and test results required by this specification including, but not necessarily limited to, as-built geomembrane panel lay-out, all field installation logs, destructive and non-destructive test logs and results showing passing and failing tests, and repair reports. This information shall be reviewed and approved by the Engineer prior to acceptance of any areas of installed geomembrane and installation of cover materials above the geomembrane.

L. Upon the Engineer's acceptance of the geomembrane installation or portions thereof, the geomembrane shall be covered with proposed geosynthetic and or soil materials as soon as possible to prevent damage to the geomembrane that could be caused by weather conditions or construction activities. Any completed geomembrane that is left uncovered prior to acceptance by the Engineer shall be protected from potential wind damage through the use of sandbags and/or tires to prevent uplift, and protected from construction activities by preventing construction personnel and equipment from entering these areas. In no case shall a geomembranes that has been accepted by the Engineer remain uncovered for longer than 14 calendar days.

M. The Contractor shall maintain and prepare at the site, record drawings which detail and delineate all geomembrane panels, deficiencies, seams, repairs, destructive sample locations, penetrations, roll numbers, seam numbers, and other required information to fully and comprehensively document the as-built condition.

END OF SECTION

SECTION 31160
SITE CLEARING

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes the following:

1. Protecting existing trees, shrubs, groundcovers, plants, and grass to remain.

2. Removing existing trees, shrubs, groundcovers, plants, and grass.

3. Clearing and grubbing.

4. Stripping and stockpiling topsoil.

5. Removing above- and below-grade site improvements.

6. Disconnecting, capping or sealing, abandoning site utilities in place, and removing site utilities.

1.2 DEFINITION

A. Topsoil: Natural or cultivated surface-soil layer containing organic matter and sand, silt, and clay particles; friable, pervious, and black or a darker shade of brown, gray, or red than underlying subsoil; reasonably free of subsoil, clay lumps, gravel, and other objects more than 2 inches (50 mm) in diameter; and free of subsoil and weeds, roots, toxic materials, or other non-soil materials.

B. Tree Protection Zone: Area surrounding individual trees or groups of trees to be protected during construction, and defined by the drip line of individual trees or the perimeter drip line of groups of trees, unless otherwise indicated.

C. Grubbing: Removal of vegetation and other organic matter including stumps, buried logs, and roots.

1.3 MATERIAL OWNERSHIP

A. Except for excess stripped topsoil or other materials indicated to remain Owner's property, cleared materials shall become Contractor's property and shall be removed from Project site.

1.4 SUBMITTALS

A. Photographs or videotape, sufficiently detailed, of existing conditions of trees and plantings, adjoining construction, and site improvements that might be misconstrued as damage caused by site clearing.

B. Record drawings identifying and accurately locating capped utilities and other subsurface structural, electrical, and mechanical conditions.

C. Certification: Submit written certification by qualified arborist that trees indicated to remain have been protected during the course of construction in accordance with recognized standards and that where damage did occur, trees were promptly and properly treated. Indicate which damaged trees (if any) are incapable of retaining full growth potential and are recommended to be replaced.

1.5 QUALITY ASSURANCE

A. Stake limits of clearing, grubbing, and stripping, prior to commencing of work.

1.6 PROJECT CONDITIONS

A. Traffic: Minimize interference with adjoining roads, streets, walks, and other adjacent occupied or used facilities during site-clearing operations.

1. Do not close or obstruct streets, walks, or other adjacent occupied or used facilities without permission from Owner and authorities having jurisdiction.

2. Provide alternate routes around closed or obstructed traffic ways if required by authorities having jurisdiction. Detour routes shall be identified by adequate signs in accordance with the Manual on Uniform Traffic Control Devices.

B. Protect areas outside limits of disturbance from encroachment by construction personnel or equipment, regardless of property Ownership. Access shall be by specific, written permission or easement only.

C. Improvements on Adjoining Property: Authority for performing site clearing indicated on property adjoining Owner's property will be obtained by Owner before award of Contract.

1. Do not proceed with work on adjoining property until directed by Engineer and Owner’s Representative.

D. Utility Locator Service: Properly notify utility locator service for area where Project is located before site clearing in accordance with local protocol.

E Do not commence site clearing operations until temporary erosion and sedimentation control measures are in place.

F. Contractor shall verify existing grades prior to performing work under this section. If existing grades are at variance with the drawings, notify the Owner and receive instructions prior to proceeding. No additional compensation will be considered resulting from grade variances once site clearing has commenced.

PART 2 - PRODUCTS (Not Used)

PART 3 – EXECUTION

3.1 PREPARATION

A. Protect and maintain benchmarks and survey control points from disturbance during construction.

B. Locate and clearly flag, fence and protect trees and vegetation to remain or to be relocated.

C. Protect existing site improvements to remain from damage during construction.

1. Restore damaged improvements to their original condition, as acceptable to Owner.

3.2 UTILITIES

A. Locate, identify, disconnect, and seal or cap off utilities indicated to be removed.

1. Arrange with utility companies to shut off indicated utilities.

2. Existing Utilities: Do not interrupt utilities serving facilities occupied by Owner or others unless permitted under the following conditions and then only after arranging to provide temporary utility services according to requirements indicated:

3. Notify Engineer and Owner's Representative and owner not less than two days in advance of proposed utility interruptions.

4. Do not proceed with utility interruptions without Engineer and Owner's Representative written permission.

5. Excavate for and remove underground utilities indicated to be removed.

3.3 CLEARING AND GRUBBING

A. Completely remove obstructions, trees, shrubs, stumps, roots, grass, and other vegetation to permit installation of new construction.

1. Do not remove trees, shrubs, and other vegetation indicated to remain or to be relocated.

2. Cut minor roots and branches of trees indicated to remain in a clean and careful manner where such roots and branches obstruct installation of new construction.

3. Use only hand methods for grubbing within tree protection zone.

4. Chip removed tree branches and brush. Re-use as mulch on site.

5. Stumps to be chipped and used as mulch on site.

6. All unused materials to remain on-site under the cap.

3.4 TOPSOIL STRIPPING

A. Remove sod and grass before stripping topsoil.

B. Where trees are designated to remain, stop topsoil stripping and adequate distance from the trees to prevent damage to the main root system.

C. Strip topsoil to whatever depths are encountered in a manner to prevent intermingling with underlying subsoil or other waste materials.

1. Remove subsoil and non-soil materials from topsoil, including trash, debris, weeds, roots, and other waste materials.

D. Stockpile topsoil materials away from edge of excavations without intermixing with subsoil. Grade and shape stockpiles to drain surface water. Cover to prevent windblown dust.

1. Limit height of topsoil stockpiles to 72 inches (1800 mm).

2. Do not stockpile topsoil within tree protection zones.

3. Dispose of excess topsoil on-site under the cap.

3.5 SITE IMPROVEMENTS

A. Remove existing above- and below-grade improvements as indicated and as necessary to facilitate new construction.

B. Remove aggregate base and store for reuse on site.

3.6 DISPOSAL

A. Dispose of all debris and surplus materials on-site under the cap, or as directed by owner. Receive direction from Owner for off-site disposal of tires, drums, scrap metal, and other material classified as recyclable or hazardous.

B. Dispose of all diseased Elm wood within 4 days after cutting by burning or by other methods approved by the Department of Environmental Conservation.

END OF SECTION

SECTION 31180
EARTHWORK

PART 1 – GENERAL

1.1 SUMMARY

A. This section includes the preparation of the site, protection, excavation, embankment, drainage for site grading, as shown on the Drawings, and as herein specified.

B. The Contractor shall accept the site in the condition in which it exists at the time of the award of the Contract.

C. The Engineer shall determine the suitability of materials that are to be used in the work and should any imported materials encountered be unsatisfactory for the purpose intended, they shall be removed from the site at no additional cost to the Owner.

D. Work within or around utility right-of-way shall be performed in accordance with the Right-of-Way Use Restrictions Specification as applicable and under full-time observation of a utility company representative when working within or around utility right-of-way.

E. Dig Safety New York to be notified a minimum of three days prior to start of excavation.

F. Excavation to be performed in accordance with approved excavation work plan and site specific health and safety plan.

1.2 QUALITY ASSURANCE

A. Reference Standards:

1. The latest edition of the following standards, as referenced herein, shall be applicable.

a. "Standard Specifications, Construction and Materials, New York State Department of Transportation, Office of Engineering".

b. "Standard Specifications for Highway Materials and Methods of Sampling and Testing, American Association of State Highway and Transportation Officials (AASHTO)".

c. "Specifications for Proposed Activities Within NM/NG Easements and Rights-of- Ways".

d. "Specification for Work by Others in NG ROW and Easements".

B. The Contractor shall comply with the requirements for soil erosion and sedimentation control, and other requirements of governmental authorities having jurisdiction, including the State of New York.

C. The Contractor shall provide and pay for all costs in connection with an approved independent testing facility to determine conformance of soils and aggregate with the quality requirements of these specifications.

D. All imported fill soils and aggregates (including buffer zone soils) will need to meet the Unrestricted Use Soil Cleanup Objectives set forth in Table 375-6.8(a) of 6NYCRR Part 375 for a minimum of two feet in measured depth measured from the finished surface grade. The remaining (buffer zone) soils will need to meet, at a minimum, the lower of the protection of groundwater or the protection of public health soil cleanup objectives for commercial use as set forth in Table 375-6.8(b) of 6NYCRR Part 375 (see table at end of this section).

1.3 SUBMITTALS

A. Submit reports for prequalification tests listed in Article "Source Quality Control" of this Section directly from independent testing agency to Engineer, with copy to Contractor.

B. Contractor shall submit detailed manufacturer's data for all proposed compaction equipment, including equipment proposed for use in confined areas.

C. Submit plan detailing proposed borrow source and estimated borrow source quantity. Include copy of NYSDEC mining permit.

1.4 PROJECT REQUIREMENTS

A. Notify the Engineer of any unexpected subsurface condition.

B. Protection of Existing Utilities:

1. Locate existing utilities in areas of work. If utilities are to remain in place, provide adequate support and protection during earthwork operations; comply with OSHA requirements.

2. Coordinate interruption or termination of utilities with the utility companies and the Owner.

3. Provide a minimum of forty-eight (48) hour notice to the Owner and receive written notice to proceed before interrupting any utility.

4. Demolish and completely remove from the site any existing underground utilities designated to be removed as shown on the Drawings or as specified in Section "Clearing and Grubbing."

5. Repair any damaged utilities as acceptable to the Engineer, at no additional cost to the Owner.

C. Protection of Persons and Property:

1. Barricade open excavations occurring as part of this work, and post with warning lights as directed by the Engineer.

2. Operate warning lights as recommended by authorities having jurisdiction.

3. Protect structures, utilities, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

4. Perform excavation within drip-line of large trees to remain by hand, and protect the root system from damage or dry out to the greatest extent possible. Maintain moist conditions for root system and cover exposed roots with burlap. Paint root cuts of 1" diameter and larger with emulsified asphalt tree paint.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Daily and Intermediate Cover (If required): Sound, durable sand, gravel, stone or blends of these materials, free from organic, frozen or other deleterious materials.

1. Gradation:

Sieve	Percent Passing
1"	100
No. 200	0-20

2. Material passing No. 40 sieve shall be non-plastic.

B. Coarse Aggregate: Crushed stone or crushed gravel meeting the Material Requirements established in Section 703-02, Coarse Aggregate of the NYSDOT's "Standard Specifications."

1. Gradation: As specified on Drawings or as approved by the Engineer.

2. Physical Requirements: As specified in Table 703-2 and 703-3 of the NYSDOT's "Standard Specifications."

C. Select Structural Fill: Sound, durable, sand, gravel, stone, or blends of these materials, free from organic, frozen or other deleterious materials, conforming to the requirements of NYSDOT Section 203-2.02C and meeting the following gradation requirements:

Sieve	Percent Passing
4"	100
No. 40	0-70
No. 200	1-10

1. Fines passing No. 200 shall be non-plastic.

2. Particle size analysis shall show no gap grading.

D. Selected Fill: Sound, durable, sand, gravel, stone, or blends of these materials, free from organic, frozen or other deleterious materials.

Sieve	Percent Passing
4"	100
No. 40	0-70
No. 200	1-10

1. Fines passing No. 200 shall be non-plastic.

2. Particle size analysis shall show no gap grading.

2.2 SOURCE QUALITY CONTROL

A. Contractor shall employ the services of an independent testing agency in accordance with Section "Quality Requirements" to perform the prequalification tests listed in the Paragraphs of this Article.

B. Notify Engineer when and where sampling will take place. Provide 5 working day notice. The Engineer may elect to witness borrow source sampling.

C. Three (3) representative samples shall be obtained from each potential borrow source. If different material gradations are known to exist in the pit, samples shall be obtained for each material proposed for use in the Work. Each sample shall be collected in accordance with ASTM D 75 - Practice for Sampling, Aggregates, and if necessary, reduced to test specimen size in accordance with ASTM C707 - Standard Practice for Reducing Field Samples of Aggregate to Testing Size. The tests shall be performed in the order shown. Failure to pass any test is grounds for disqualification of the material.

D. Three (3) test reports completed within three (3) months prior to construction may be submitted for suppliers of coarse aggregates in lieu of prequalification tests as approved by Engineer.

E. Daily and Intermediate Cover (If required):

1. Particle Size Analysis:

a. Method: ASTM D 422 - Standard Test Method for Particle-Size Analysis of Soils.

b. Number of Tests: Three (3) per potential source.

2. Plasticity Index:

a. Method: ASTM 4318 - Test Method for Liquid Limit, Plastic Limit and Plasticity Index of Soils.

b. Number of Tests: Three (3) per potential source.

E. Coarse Aggregate:

1. Per Table 703-2 of the NYSDOT's "Standard Specifications."

2. Particle Size Analysis:

a. Method: ASTM D 422 - Standard Test Method for Particle-Size Analysis of Soils.

b. Number of Tests: Three (3) per potential source.

c. Acceptance Criteria: Gradation within specified limits.

F. Select Fill: A 100-pound minimum representative sample shall be obtained from each potential borrow source. If different material gradations are known to exist in the pit, samples shall be obtained for each material. Each sample shall be mixed thoroughly and reduced to test specimen size, in accordance with AASHTO T87. The test shall be performed in the order shown. Failure to pass any test is grounds for disqualification and shall lead to cessation of the test program for that material.

1. Particle Size Analysis:

a. Method: ASTM D422.

b. Number of Tests: One (1) per potential source.

c. Acceptance Criteria: Gradation within specified limits.

2. Maximum Density Determination:

a. Method: ASTM D1557, Modified Proctor.

b. Number of Tests: One (1) per potential source.

3. Re-establish gradation and maximum density of fill material if source is changed during construction.

PART 3 – EXECUTION

3.1 PREPARATION

A. Establish required lines, levels, contours and datum.

B. Maintain benchmarks and other elevation control points. Re-establish, if disturbed or destroyed, at no additional cost to the Owner.

C. Establish location and extent of utilities before commencement of grading operations.

3.2 EXCAVATION

A. Excavation shall consist, in general, of the excavation of whatever material is encountered to the lines, grades and sections shown on the Drawings, including excavation as necessary for grading and installation of the Work.

B. All suitable materials removed in excavation shall be used in the construction of embankments, subgrade, slopes and at such other places as directed. The Engineer shall be the sole judge of what constitutes suitable material.

C. During construction, the grading operations shall be executed in such a manner that the excavation will be well drained at all times. All grading shall be finished on neat, regular lines conforming to the sections and contours shown on the Plans.

D. Removal of materials beyond the indicated subgrade elevations, without authorization by the Engineer, shall be classified as unauthorized excavation and shall be performed at no additional cost to the Owner.

E. Excavation shall be performed in proper sequence with all other associated operations.

F. Maintain the slopes of excavation in a safe condition until completion of the grading operation.

G. All excavation work shall be inspected and approved by the Engineer before proceeding with construction.

H. Any excess excavation shall be corrected on site at the Contractor's expense.

3.3 FILL

A. Conduct filling and backfilling using materials specified on the Contract Drawings and in these specifications.

B. Before depositing fills outside the landfill cap areas, the surface of the ground shall be cleared of all refuse, brush and large stones.

C. Prior to placing fill over undisturbed material, scarify to a minimum depth of six (6) inches as directed by the Engineer.

D. Where fills are made on hillsides or slopes, the slope of the original ground upon which the fill is to be placed shall be plowed or scarified and where the slope ratio of the original ground is steeper than 2 horizontal to 1 vertical, the bank shall be stepped or benched as directed by the Engineer.

E. The original ground shall be proof rolled until the underlying soil is thoroughly compacted to the satisfaction of the Engineer before any filling is begun. A steel-wheel tandem roller weighing 8 to 10 tons or equipment capable of obtaining the same compaction effort shall be used to obtain a thoroughly compacted subgrade. Remove or re-compact any soft or loose soils as determined by the Engineer prior to filling.

F. A thoroughly and satisfactorily compacted subgrade is defined as having a minimum dry density of 90 percent of the maximum dry density of the material. The subgrade material shall be compacted at a moisture content suitable for obtaining the required density.

G. Place backfill and fill materials in layers not more than 12" in loose depth. Lift height shall be governed by the ability of the compaction equipment to obtain the required compaction with 12" as a maximum lift height. An 8 ton vibratory compactor shall make a minimum of four passes over all fill materials. Before compaction, moisten or aerate each layer as necessary to facilitate compaction to the

required density. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost, ice, ponded water or extraneous debris.

H. When work is suspended during periods of freezing weather, measures shall be taken to prevent fill already in place from freezing. Upon resumption of work after any inclement weather, prepare the exposed surface by proof rolling to identify any zones of soft/loose soils. Soft/loose materials or frozen soils shall be removed and replaced by compacted granular fill.

I. Moisture Control:

1. Where fill or backfill must be moisture conditioned before compaction, uniformly apply water to the surface of each layer of fill or backfill. Prevent ponding or other free water on surface subsequent to, or during, compaction operations.

2. Remove and replace, or scarify and air dry, soil that is too wet to permit compaction to the specified density. Soil that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by dicing, harrowing or pulverizing, until moisture content is reduced to a value which will permit compaction to the percentage of maximum dry density specified.

J. All fill shall be thoroughly and satisfactorily compacted to 90 percent of the maximum dry density of the material used.

3.4 GRADING

A. The present and proposed grade lines are shown on the Contract Drawings. Grade over the entire area, as shown on the Drawings, shall be to the proposed grade levels. Upon completion of this work, all debris shall be cleaned out and removed from the premises.

B. All cutting, filling, backfilling and grading necessary shall be done to bring the area to the following grade or subgrade levels:

1. For drainage way surface areas; to the finished subgrade levels specified on the Contract Drawings.

2. For areas to be topsoiled and seeded; to within 6-inches of the finished grade.

3. For other surface treatments; as detailed on the Drawings.

C. Sufficient grading must be done during the progress of the work so that the entire site shall be well drained and free from water pockets.

D. Finish grading, including dressing swales, cleaning up excess footing excavation, dressing terraces, disposing of excess material and all other work necessary to prepare the site for topsoil and seeding shall be done after construction of structures and drainage way surface areas is substantially complete.

3.5 COMPACTION EQUIPMENT

A. Compaction equipment used for the Work is subject to approval by the Engineer. Any equipment not originally manufactured for compaction purposes and equipment which is not in proper working order will not be approved. Furnish manufacturer's specifications covering data not obvious from a visual inspection of the equipment and necessary to determine its classification and performance characteristics.

3.6 DRAINAGE

A. Prevent surface, subsurface or ground water from flowing into excavation and from flooding project area, as well as surrounding areas.

B. Do not allow water to accumulate in excavations. Remove water to prevent softening of subgrades.

C. Provide and maintain temporary drainage ditches and other diversions outside excavation limits to convey rain water and water removed from excavations by dewatering to collection or run-off areas.

3.7 FIELD QUALITY CONTROL

A. Notify the Engineer at least one (1) working day in advance of all phases of filling and backfilling operations.

B. Contractor shall notify Engineer two working days prior to performing in place density testing. Contractor shall perform in place density tests in accordance with ASTM D 2922: Test Methods for Density of Soil and Soil Aggregate in Place by Nuclear Methods (shallow depth) at a minimum frequency of nine (9) tests per lift per acre. Acceptance criteria is a minimum in place dry density of 90% of the standard Proctor maximum dry density with moisture content within three (3) percent of the optimum moisture content unless noted otherwise. If a test fails to qualify, the fill shall be further compacted and retested. Subsequent test failures shall be followed by removal and replacement of the material at no additional cost to the Owner.

C. Contractor shall perform the following tests each time 2,000 cubic yards of soil material is brought on site and placed.

1. ASTM D 422: Method for Particle-Size Analysis of Soil.

a. Frequency: One (1) representative sample per 2,000 cubic yards of material placed.

b. Acceptance Criteria: Within specified gradation.

2. ASTM D 698: Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort.

a. Frequency: One (1) test per 2,000 cubic yards of material placed.

D. Engineer will direct Contractor to perform additional tests to establish gradation, maximum density, and plasticity if the quality of the materials change.

3.8 CLEAN UP

A. Provide and maintain protections of newly filled areas against damage. Upon completion or when directed, correct all damaged and deficient work by building up low spots and remove temporary protections, fencing, shoring and bracing.

B. Leave the premises and work in clean, satisfactory condition, ready to receive subsequent operations.

END OF SECTION

NOTE: APPENDIX 5 – ALLOWABLE CONSTITUENT LEVELS FOR IMPORTED FILL OR SOIL SUBDIVISION 5.4(e) FOLLOWS THIS PAGE

Appendix 5
Allowable Constituent Levels for Imported Fill or Soil
Subdivision 5.4(e)

Source: This table is derived from soil cleanup objective (SCO) tables in 6 NYCRR 375. Table 375-6.8(a) is the source for unrestricted use and Table 375-6.8(b) is the source for restricted use.

Note: For constituents not included in this table, refer to the contaminant for supplemental soil cleanup objectives (SSCOs) in the Commissioner Policy on *Soil Cleanup Guidance*. If an SSCO is not provided for a constituent, contact the DER PM to determine a site-specific level.

Buffer Zone Soils - Top 2 Feet

Buffer Zone Soils - Below 2 Feet

Constituent	Unrestricted Use	Residential Use	Restricted Residential Use	Commercial or Industrial Use	If Ecological Resources are Present
Metals					
Arsenic	13	16	16	16	13
Barium	350	350	400	400	433
Beryllium	7.2	14	47	47	10
Cadmium	2.5	2.5	4.3	7.5	4
Chromium, Hexavalent[1]	1 [3]	19	19	19	1 [3]
Chromium, Trivalent[1]	30	36	180	1500	41
Copper	50	270	270	270	50
Cyanide	27	27	27	27	NS
Lead	63	400	400	450	63
Manganese	1600	2000	2000	2000	1600
Mercury (total)	0.18	0.73	0.73	0.73	0.18
Nickel	30	130	130	130	30
Selenium	3.9	4	4	4	3.9
Silver	2	8.3	8.3	8.3	2
Zinc	109	2200	2480	2480	109
PCBs/Pesticides					
2,4,5-TP Acid (Silvex)	3.8	3.8	3.8	3.8	NS
4,4'-DDE	0.0033 [3]	1.8	8.9	17	0.0033 [3]
4,4'-DDT	0.0033 [3]	1.7	7.9	47	0.0033 [3]
4,4'-DDD	0.0033 [3]	2.6	13	14	0.0033 [3]
Aldrin	0.005	0.019	0.097	0.19	0.14
Alpha-BHC	0.02	0.02	0.02	0.02	0.04 [4]
Beta-BHC	0.036	0.072	0.09	0.09	0.6
Chlordane (alpha)	0.094	0.91	2.9	2.9	1.3
Delta-BHC	0.04	0.25	0.25	0.25	0.04 [4]
Dibenzofuran	7	14	59	210	NS
Dieldrin	0.005	0.039	0.1	0.1	0.006
Endosulfan I	2.4[2]	4.8	24	102	NS
Endosulfan II	2.4[2]	4.8	24	102	NS
Endosulfan sulfate	2.4[2]	4.8	24	200	NS
Endrin	0.014	0.06	0.06	0.06	0.014
Heptachlor	0.042	0.38	0.38	0.38	0.14
Lindane	0.1	0.1	0.1	0.1	6
Polychlorinated biphenyls	0.1	1	1	1	1

Constituent	Unrestricted Use	Residential Use	Restricted Residential Use	Commercial or Industrial Use	If Ecological Resources are Present
Semi-volatile Organic Compounds					
Acenaphthene	20	98	98	98	20
Acenaphthylene	100	100	100	107	NS
Anthracene	100	100	100	500	NS
Benzo(a)anthracene	1	1	1	1	NS
Benzo(a)pyrene	1	1	1	1	2.6
Benzo(b)fluoranthene	1	1	1	1.7	NS
Benzo(g,h,i)perylene	100	100	100	500	NS
Benzo(k)fluoranthene	0.8	1	1.7	1.7	NS
Chrysene	1	1	1	1	NS
Dibenz(a,h)anthracene	0.33 [3]	0.33 [3]	0.33 [3]	0.56	NS
Fluoranthene	100	100	100	500	NS
Fluorene	30	100	100	386	30
Indeno(1,2,3-cd)pyrene	0.5	0.5	0.5	5.6	NS
m-Cresol(s)	0.33 [3]	0.33 [3]	0.33 [3]	0.33 [3]	NS
Naphthalene	12	12	12	12	NS
o-Cresol(s)	0.33 [3]	0.33 [3]	0.33 [3]	0.33 [3]	NS
p-Cresol(s)	0.33	0.33	0.33	0.33	NS
Pentachlorophenol	0.8 [3]	0.8 [3]	0.8 [3]	0.8 [3]	0.8 [3]
Phenanthrene	100	100	100	500	NS
Phenol	0.33 [3]	0.33 [3]	0.33 [3]	0.33 [3]	30
Pyrene	100	100	100	500	NS
Volatile Organic Compounds					
1,1,1-Trichloroethane	0.68	0.68	0.68	0.68	NS
1,1-Dichloroethane	0.27	0.27	0.27	0.27	NS
1,1-Dichloroethene	0.33	0.33	0.33	0.33	NS
1,2-Dichlorobenzene	1.1	1.1	1.1	1.1	NS
1,2-Dichloroethane	0.02	0.02	0.02	0.02	10
1,2-Dichloroethene(cis)	0.25	0.25	0.25	0.25	NS
1,2-Dichloroethene(trans)	0.19	0.19	0.19	0.19	NS
1,3-Dichlorobenzene	2.4	2.4	2.4	2.4	NS
1,4-Dichlorobenzene	1.8	1.8	1.8	1.8	20
1,4-Dioxane	0.1 [3]	0.1 [3]	0.1 [3]	0.1 [3]	0.1
Acetone	0.05	0.05	0.05	0.05	2.2
Benzene	0.06	0.06	0.06	0.06	70
Butylbenzene	12	12	12	12	NS
Carbon tetrachloride	0.76	0.76	0.76	0.76	NS
Chlorobenzene	1.1	1.1	1.1	1.1	40
Chloroform	0.37	0.37	0.37	0.37	12
Ethylbenzene	1	1	1	1	NS
Hexachlorobenzene	0.33 [3]	0.33 [3]	1.2	3.2	NS
Methyl ethyl ketone	0.12	0.12	0.12	0.12	100
Methyl tert-butyl ether	0.93	0.93	0.93	0.93	NS
Methylene chloride	0.05	0.05	0.05	0.05	12

Volatile Organic Compounds (continued)					
Propylbenzene-n	3.9	3.9	3.9	3.9	NS
Sec-Butylbenzene	11	11	11	11	NS
Tert-Butylbenzene	5.9	5.9	5.9	5.9	NS
Tetrachloroethene	1.3	1.3	1.3	1.3	2
Toluene	0.7	0.7	0.7	0.7	36
Trichloroethene	0.47	0.47	0.47	0.47	2
Trimethylbenzene-1,2,4	3.6	3.6	3.6	3.6	NS
Trimethylbenzene-1,3,5	8.4	8.4	8.4	8.4	NS
Vinyl chloride	0.02	0.02	0.02	0.02	NS
Xylene (mixed)	0.26	1.6	1.6	1.6	0.26

All concentrations are in parts per million (ppm)
NS = Not Specified

Footnotes:
[1] The SCO for Hexavalent or Trivalent Chromium is considered to be met if the analysis for the total species of this contaminant is below the specific SCO for Hexavalent Chromium.
[2] The SCO is the sum of endosulfan I, endosulfan II and endosulfan sulfate.
[3] For constituents where the calculated SCO was lower than the contract required quantitation limit (CRQL), the CRQL is used as the Track 1 SCO value.
[4] This SCO is derived from data on mixed isomers of BHC.

SECTION 31190
GAS VENTING LAYER

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes the gas venting layer as shown on the Contract Drawings and as specified herein.

B. The Contractor shall accept the site in the condition in which it exists at the time of the award of the Contract.

C. The Engineer will determine the suitability of materials that are to be used in the work and should any materials encountered be unsatisfactory for the purpose intended, they shall be removed from the site at the Contractor's expense.

1.2 QUALITY ASSURANCE

A. The latest edition of the following standards and regulations, as referenced herein, shall be applicable.

1. American Society for Testing and Materials (ASTM).

2. Standard Specification for Highway Materials and Methods of Sampling and Testing, American Association of State Highway and Transportation Officials (AASHTO).

3. 6 NYCRR Part 360 Solid Waste Management Facilities.

B. The Contractor shall comply with the requirements for soil erosion and sedimentation control, and other requirements of governmental authorities having jurisdiction, including the State of New York.

C. The Contractor shall provide and pay for all costs in connection with an approved independent testing facility to determine conformance of soils with the specifications, in accordance with Section "Quality Requirements."

D. All imported fill soils and aggregates will need to meet the Unrestricted Use Soil Cleanup Objectives set forth in Table 375-6.8(a) of 6NYCRR Part 375 for a minimum of two feet in measured depth measured from the finished surface grade (see table at end of Section 31180).

1.3 SUBMITTALS

A. The Contractor shall furnish representative earth materials to the testing laboratory for analysis and report, as directed by the Engineer or as outlined in the specifications.

B. Descriptive information on compaction equipment to be used for construction of the barrier layer, including equipment proposed for use in confined areas.

C. Plan detailing proposed borrow source, borrow source prequalification testing data, and estimated borrow source quantity. A copy of the NYSDEC mining permit for the borrow source shall be included in the plan.

D. Schedule of placement.

E. Test reports for prequalification and construction quality control/quality assurance testing shall be submitted to both the Contractor and Engineer.

1.4 PRODUCT HANDLING

A. Soil materials shall be excavated from the borrow source, transported, conditioned, placed, and stockpiled in such a manner so as to prevent contamination, segregation, and excessive wetting. Materials that have become contaminated, excessively wet, or segregated shall not be used and shall be removed from the site.

PART 2 – PRODUCTS

2.1 MATERIALS

A. The gas venting layer shall be a geosynthetic drainage layer fabric as shown on the Contract Drawings and specified in Section 31350, unless an alternate is required by the NYSDEC. If an alternate is required, and imported soils are necessary, the soils shall conform to this section.

B. Select Granular Material (for use in gas venting layer): Sound, durable, sand, gravel, stone or blends of these materials, free from organic, frozen, or other deleterious materials, conforming to the following requirements:

Sieve	Percent Passing
1"	100
¼”	30-65
No. 40	5-40
No. 200	0-10

1. Fines passing No. 200 sieve shall be non-plastic.

2. Particle size analysis shall show no gap grading.

3. The permeability of the gas venting layer shall be greater than 1x10-3 centimeters per second when compacted to a minimum of 90 percent of standard Proctor maximum dry density.

4. All soil or stone particles shall be classified as rounded or sub-rounded (ASTM D 2488)

5. Internal angle of soil friction shall be equal to or greater than 29° when compacted to 90% standard proctor maximum density.

6. Interface friction angle between geo-synthetic shall be equal to or greater than 29° when compacted to 90% standard proctor maximum density.

PART 3 – EXECUTION

3.1 BORROW SOIL PRECONSTRUCTION MATERIAL QUALIFICATION TESTING

A. General:

1. Sufficient size samples shall be obtained from the potential borrow source to allow completion of tests listed in paragraph B below. Samples may be obtained from test borings, test pits, or from borrow pit faces provided that surficial dry or wet soil is removed to expose undisturbed earth. Tests listed below shall be performed on each sample obtained. A minimum of three (3) representative samples from each potential borrow source shall be furnished to the testing laboratory for prequalification testing.

Test data shall be provided to the Engineer a minimum of 2 weeks prior to start of gas venting layer construction for approval of borrow source.

B. Material Tests:

1. Particle Size Analysis:

a. Method: ASTM D422

b. Number of Tests: One (1) per sample; three (3) samples per source.

c. Acceptance Criteria: Gradation within specified limits.

2. Atterberg Limits Determinations:

a. Method: ASTM D4318

b. Number of Tests: One (1) per sample; three (3) per potential source.

c. Acceptance Criteria: Plasticity index within specified limits.

3. Moisture Content:

a. Method: ASTM D2216

b. Number of Tests: One (1) per sample, three (3) per potential source. Test shall be performed on sample specimen preserved at natural (undisturbed) moisture condition.

4. Maximum Density Determination:

a. Method: ASTM D698 - Standard Proctor

b. Number of Tests: One (1) per sample, equaling three (3) per potential source.

5. Permeability of Granular Soils:

a. Method: ASTM D2434 - Constant Head Method

b. Number of Tests: One (1) tests per sample performed with sample compacted to a minimum of 90% maximum standard Proctor maximum dry density.

1.) Total number of tests per sample: 1

2.) Total number of samples per source: 3

c. Acceptance Criteria: Coefficient of permeability greater than 1x10-3 centimeters per second.

6. Internal angle of soil friction and cohesion:

a. Method: ASTM 3080 - Direct shear test.

b. Number of Tests: One (1) test series per sample. Test series shall consist of three (3) identical specimens from each sample subjected to direct shear test using normal (vertical) stresses of approximately 1 pound per square inch (psi), 2 psi and 4 psi. Test specimens shall be compacted to 90% of standard Proctor maximum dry density.

1.) Total number of specimens shear tested per sample: 3.

2.) Total number of specimens shear tested per potential borrow source: 9.

7. Interface Friction Angle:

a. Method: ASTM 3080 - Direct shear test with apparatus modified to test a minimum 12" by 12" (plan size) soil specimen and to firmly and uniformly hold geosynthetic material in place. Deformation of geosynthetic material shall not be permitted.

b. Number of Tests: One (1) test series per potential borrow source for each of the synthetic materials listed in paragraph 7-d below. Test series shall consist of three (3) identical specimens from one of the three borrow source samples subjected to shear test using normal (vertical) stresses of approximately 1 psi, 2 psi, and 4 psi. Test specimens shall be compacted to 90% of standard Proctor maximum dry density.

c. Acceptance Criteria: Friction angle greater than or equal to 29°. The purpose of the test is to verify design friction angles.

c. Synthetic to be used for interface shall be same type and manufacturer use and during construction.

1.) Geotextile filter fabric meeting specifications described in Section “Geotextiles”;

2.) Geomembrane materials meeting specifications described in Section “Synthetic Geomembrane.”

3.2 PLACEMENT AND COMPACTION

A. General:

1. Do not place fill material on surfaces that are muddy, frozen, or contain frost, ice, ponded water or extraneous debris.

2. When work is suspended during periods of freezing weather, measures shall be taken to prevent fill already in place from freezing. Upon resumption of work after any inclement weather, prepare the exposed surface by proof rolling to identify any zones of soft/loose soils. Soft/loose materials or frozen soils shall be removed and replaced.

3. The distribution of materials throughout the gas venting layer shall be such that the layer will be free from lenses, pockets, streaks, and layers of materials differing substantially from the surrounding materials.

4. The placing of material shall be done so as to obtain a layer of uniform thickness without spaces between successively deposited loads.

5. Compaction of each layer shall proceed in a systematic, orderly, and continuous manner so as to ensure the specified coverage by the compaction equipment.

6. Materials which cannot be compacted by the approved rolling compaction equipment because of interferences shall be compacted with smaller approved compactors to a density at least equal to the density achieved in adjacent areas by the rolling compaction equipment and methods. Single pad vibratory base plate compactors shall weigh not less than 200 lbs. and have a vibration frequency not less than 1600 cycles per minute.

7. Should the fill surface become rutted or uneven subsequent to compaction, it shall be re-leveled and re-compacted before placing the next layer of material.

8. Fill on landfill side slopes shall be placed in lifts parallel with the sloping surface.

B. Gas Venting Layer Placement and Compaction:

1. Place fill materials in a layer not less than 6" in compacted depth. Lift height shall be governed by the ability of the compaction equipment to obtain the required compaction. The moisture content of the material during compaction shall be between 3 percent wet and 3 percent dry of optimum moisture content as determined by ASTM D698 (standard Proctor)

2. All fill shall be thoroughly and satisfactorily compacted to at least 90 percent of the standard Proctor maximum dry density of the material used (ASTM D-698).

3. Where fill must be moisture conditioned before compaction, uniformly apply water to the surface of each layer of fill. Prevent ponding or other free water on the surface subsequent to or during, compaction operations.

4. Remove and replace, or scarify and air dry, soil that is too wet to permit compaction to the specified density. Soil that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing, until moisture content is reduced to a value which will permit compaction to the percentage of maximum density specified.

5. Rolling compaction equipment shall be heavy smooth drum vibratory equipment capable of achieving the intended result. Compaction equipment used for the Work is subject to approval by the Engineer. Any equipment not originally manufactured for compaction purposes and equipment which is not in proper working order will not be approved. Furnish manufacturer's specifications covering data not obvious from a visual inspection of the equipment and necessary to determine its classification and performance characteristics.

6. Compaction equipment shall make a minimum of 4 complete passes over the entire area of each lift.

7. The Contractor shall grade partially completed fill areas for drainage and thoroughly compact and smooth the surface at the end of each workday.

8. For areas not accessible to heavy rolling compaction equipment, fill materials shall be placed in horizontal layers not to exceed 6 inches in loose thickness and compacted with smaller rolling compaction equipment or hand operated equipment, as approved by the Engineer.

9. The final surface of the layer shall be uniform and suitable for placement of the next subsequent layer.

3.3 FIELD QUALITY CONTROL

A. The Contractor's Testing Laboratory shall perform testing of gas venting layer materials to insure compliance with these specifications.

B. A grain size analysis shall be performed in accordance with ASTM D422 for every 1000 cubic yards of select granular material placed.

C. In-place density and moisture content tests shall be performed on in- place fill material in accordance with ASTM D 1556, D 2167 or D 2922. In-place density shall be determined at a depth of 3 inches below grade. At least 9 tests shall be performed per acre per lift of material placed and at least one test shall be performed each day. Field test locations shall be subject to approval or relocation by the Engineer.

D. Tests for moisture content shall be performed on the in-place fill at a rate of nine tests per acre per lift. If nuclear methods or microwave methods are used to determine field moisture content, one oven-dry

moisture content determination (ASTM D2216) shall be performed per acre per lift for calibration. Sample shall be obtained from a location immediately adjacent to an in-place density location.

E. The Engineer may direct additional tests to establish gradation, Atterberg limits, permeability, maximum density, and in-place density, and water content as required by working conditions, or changes in borrow source material at the Contractor's expense.

F. Acceptance Criteria:

1. Grain size analyses shall show gradation of the soil material placed to be within specified limits.

2. Minimum dry density for all fill shall be 90 percent of the standard Proctor maximum dry density. The in-place moisture content shall be within 3 percent dry or 3 percent wet of optimum as determined by the standard Proctor compaction method (ASTM D-698). If a test fails to qualify, the fill shall be further reworked, compacted and re-tested. Subsequent test failures shall be followed by removal and replacement of the material.

3.4 CLEAN UP

A. Provide and maintain protection of newly filled areas against damage. Upon completion or when directed, correct all damaged and deficient work by building up low spots and remove temporary protections, fencing, shoring and bracing if any.

B. Remove all surplus excavated material not required for filling and backfilling and legally dispose of same away from premises.

C. Leave the premises and work in clean, satisfactory condition, ready to receive subsequent operations.

END OF SECTION

SECTION 31200
WASTE EXCAVATION AND RELOCATION

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes the excavation of waste which includes but is not limited to excavating, hauling, placing, and compacting waste on the existing landfill surface.

B. The contractor shall also provide suitable barricades, warning lights, signs, etc., to protect excavations, and provide health and safety protection and monitoring.

C. Work shall be performed under the full-time supervision of the Contractor's Health and Safety Officer (HSO).

D. Work shall be performed under full-time observation of a utility company representative when working within or around utility right-of-way.

E. Dig Safety New York to be notified a minimum of three days prior to start of excavation.

F. Excavation to be performed in accordance with approved excavation work plan and site specific health and safety plan

1.2 REFERENCES

A. American Society for Testing and Materials (ASTM).

B. Standard Specification for Highway Materials and Methods of Sampling and Testing, American Association of State Highway and Transportation Officials (AASHTO).

C. 6 NYCRR Part 360 Solid Waste Management Facilities, including 360-2.18.

D. Occupational Safety and health Administration (OSHA).

E. 6 NYCRR Part 753.

F. "Specifications for Proposed Activities Within NM/NG Easements and Rights-of-Ways".

G. "Specification for Work by Others in NG ROW and Easements".

1.3 SUBMITTALS

A. Contractor shall submit a detailed excavation work progression and materials staging plan with construction schedule. This plan shall address control of surface water, dewatering methods, protection of exposed, clean natural soils from contamination. Plan shall include equipment and materials to be used, including safety and excavation equipment.

B. Support system drawings.

1.4 QUALITY ASSURANCE

A. Contractor shall not backfill excavated areas without prior approval of Engineer. Engineer will confirm that the target depth or bottom of waste has been reached and all waste and contaminated soil has been removed from area, prior to backfilling.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Intermediate cover soil material as specified in Section "EARTHWORK" or synthetic cover material approved by the Engineer.

B. Waste - Garbage, rubble, construction and demolition debris, white goods, all other wastes regulated under 6 NYCRR Part 360, and existing soil cover material. Waste shall also include contaminated soil and sediment as indicated on the drawings.

C. Clean sand pipe backfill as specified in Section “Trenching and Backfilling”.

PART 3 - EXECUTION

3.1 EXCAVATION

A. Excavate waste and soil material from the landfill as shown on the Contract Drawings to the grades indicated.

B. Divert surface water away from the excavation at all times.

C. Temporary cut slopes shall be in accordance with OSHA requirements.

D. Maintain the smallest open face of waste practical, to minimize emission of gas and odors.

E. Excavated areas shall be re-graded, after excavation is complete, and accepted by the Engineer to create a uniform surface. Positive surface drainage shall be maintained toward designated on-site locations shown on the Contract Drawings.

F Final surface of area shall be suitable for the placement of subsequent materials such as topsoil, intermediate cover, and/or gas venting soil.

G. Any hazardous waste materials excavated shall be handled by the Contractor as specified in the Contractor’s health and safety plan, contract documents, and applicable regulations and specifications. A temporary storage area shall be designated prior to excavation procedures.

H. Measures shall be taken by the Contractor to remove ponded water from the waste mass.

I. Excavation area shall be outlined in white paint prior to excavation.

J. Utilities in and around excavations shall be identified and marked by Utility Representatives prior to excavation.

K. Excavations near utilities shall not start prior to approval by Utility Representatives.

L. No equipment shall work directly over a utility; the utility location to be clearly marked.

M. When working in utility right-of-way, teeth of bucket shall be covered with a welded plate and side cutters removed.

N. No excavation shall be performed to impair, withdraw lateral support from underground utility, accumulate water or cause damage.

O. If required, sand or cement bags will be placed to support the utility. Work will not be permitted until support is installed. Support shall also include hangers, shoring, and bracing. Support system shall be in accordance with utility requirements.

P. No buried utility to be exposed without utility approval.

Q. Engineer to be notified if unusual conditions encountered.

3.2 PROTECTION

A. Protect excavated areas with temporary barricades, warning lights, signs and other protection devices until hazard created by excavation is eliminated by completion of work in such areas.

B. Review the location of utilities shown on the Contract Drawings, and protect any utilities in the vicinity of waste excavation areas. The Contractor shall be responsible for verification of actual locations of utilities shown on the Contract Drawings.

C. The Contractor shall notify the Engineer of unknown utility locations not shown on the Contract Drawings, and shall stop all work in areas of such utilities until notified to resume work by the Engineer.

D. The Contractor shall provide health and safety protection equipment and monitoring in accordance with all federal, state, and local requirements, and the requirements of the General Contract.

3.4 NIAGARA MOHAWK/NATIONAL GRID REQUIREMENTS

A. All work within the NM/NG rights-of-way and easements shall be in accordance with the following conditions (copies attached):

1. National Grid USA Companies "Conditions for Proposed Activities Within Electric Transmission Line Rights-of-Way".

2. "Specifications for Work by Others on NM/NG Easements and Rights-of-Ways containing Gas Facilities".

B. A gas-qualified inspector will be assigned to monitor & protect National Grid’s electric facilities during construction activities in the vicinity of the affected ROW and easements.

1. This inspector will ensure that all Gas Department’s construction requirements are adhered to by the contractor.

2. Corrective action & repairs will be initiated as required to correct damage to National Grid’s gas facilities.

C. All existing test stations and marker posts will remain in their current location. If a test station is broken during construction the Contractor must notify the Owner, who will notify National Grid so the test station can be repaired. The Contractor will be responsible to reimburse the Owner for National Grid costs to replace the marker posts or test stations.

D. Any costs incurred by National Grid to provide Watch Guard services will be reimbursed by the Contractor.

E. Future Needs - National Grid will need unrestricted access to this site to perform routine construction and maintenance activities.

3.5 BUCKEYE REQUIREMENTS

A. In accordance with their "Right-of-Way Use Restrictions Specifications."

3.6 ONONDAGA COUNTY REQUIREMENTS

A. Excavation and earthwork shall be limited to as directed by the Engineer at any easement and shall not extend further than required into the easement.

B. The maximum depth of any cut within the easement shall as directed by the Engineer.

C. The thickness of cover directly over any existing sewer shall not be increased or decreased.

D. All areas disturbed within any easement should be top-soiled and seeded.

END OF SECTION

EXHIBIT B
National Grid USA Companies
Conditions for Proposed Activities
Within Electric Transmission Line Rights-of-Way

1. Compliance/Safety

A. All activities conducted by the Licensee shall comply with all applicable Federal, state, and local laws, statutes, rules, regulations, and codes. In particular, the requirements of the following statutes, regulations, and safety codes and guidelines must be met:

- *National Electrical Safety Code*
- In Massachusetts, 220 CMR 125.00, "Installation and Maintenance of Electric Transmission Lines"
- In New York, Part 57 of the New York State Industrial Codes Rules (also known as the "High-Voltage Proximity Act")
  http://www.labor.state.ny.us/business_ny/employer_responsibilities/safety/s57.htm
- **OSHA regulations governing working clearances from energized lines. OSHA Standard 29 CFR 1926.550 Subpart N is specific to cranes, derricks, hoists, elevators, and conveyors. However, all vehicles, equipment, and loads shall maintain the minimum clearances from energized wires that are specified in this Standard unless a more restrictive standard applies.**
- **Licensee must contact New York State's one-call system, "Dig Safely New York" (aka UFPO) at 800-962-7962 prior to any excavation work on the Easement or Property. In addition, Licensee agrees to comply with Public Service Law Section 119-b and General Business Law Article 36, which implement the Public Service Commission regulation 16 NYCRR Part 753 (formerly Industrial Code Rule 53) regarding protection of underground facilities (including any and all updates thereof), and take any and all reasonable measures to protect and secure worksite from entry by the general public.**

B. The Licensee shall adequately ground vehicles, equipment, fences and gates, at all times and in accordance with applicable Federal, state, and local laws, statutes, rules, regulations, and design codes, including, but not limited to, those listed in paragraph A above and IEEE Standard 80.

C. No men or equipment or combination thereof shall come closer than 15 feet to any energized conductor.

D. UFPO shall be notified prior to any excavation specifically but not limited to the purpose of identifying and locating Niagara Mohawk's facilities. Extreme caution shall be used during excavation to insure that Niagara Mohawk's facilities are not disturbed. The Licensee shall be responsible for all repair costs of damages incurred to Niagara Mohawk facilities which are a result any excavations or other activities conducted by the Licensee.

2. **Protection of Transmission Line Facilities**

The Licensee shall, at all times, protect transmission line facilities from damage. In addition to compliance with safety codes as described in paragraph 1 above, protection of transmission facilities shall, as a minimum, include the following, unless otherwise approved in writing by National Grid:

A. The Licensee shall operate equipment and vehicles at least 50 feet horizontally away from any transmission line pole, tower, guy wire, or guy anchor.

B. When making a rough cut during excavation, the Licensee shall disturb no earth within an area bounded by a line drawn 25 feet plus 2.5 times the depth of the cut from the nearest transmission line pole, tower leg, guy wire, or guy anchor, but not less than 50 feet. Upon completion of the rough cut, the slopes of the bank shall be graded on a slope no steeper than one vertical to five horizontal and stabilized with vegetation or rip-rap. The top of the slope shall be at least 50 feet from the nearest pole, tower leg, guy wire, or guy anchor.

C. The Licensee shall not store or use explosives within the right-of-way.

D. No construction materials or debris, excavated soils, explosives, junk vehicles or other trash of any kind shall be stockpiled or disposed of on the Easement and Property, and no oil or hazardous wastes or substances shall be stored or disposed of on the Easement and Property.

E. The Licensee shall not unload or load vehicles or equipment within the right-of-way.

F. The Licensee shall place no above or below ground structures within the right-of-way, including, but not limited to, streetlights, signs, sheds, fences, septic systems, and swimming pools.

G. The Property shall not be used as a staging or marshalling yard for contractors, employees, equipment or materials.

H. No parking or storage of vehicles of any kind is allowed on the Easement or Property including, but not limited to, automobiles, trucks, all-terrain vehicles (ATV's), four-wheel vehicles and boats.

3. **Access to Right-of-way**

A. The Licensee shall not at any time block or impede access to or along the right-of-way.

B. The Licensee shall not damage roads or trails used to gain access to or along the right-of-way.

4. **Preservation of Rights and Future Use**

A. Licensor reserves the right to determine any area(s) where improvements will not be permitted due to its need for these area(s) for its future facilities. This includes the bisector of angles in the right-of-way and generally includes areas adjacent to existing structures.

5. **Protection of Interests**

A. Mild shocks due to electrostatic currents may be felt when touching conductive structures or objects within the right-of-way. Although these shocks may be annoying, Licensor is unable to eliminate them.

6. **Additional Conditions**

A. Licensee shall install suitable two-inch (2") plastic markers, extending a minimum of three (3') feet above ground, at the point of entrance and exit of any pipelines, cables or other underground facilities installed by Licensee on the Easement.

B. Licensee shall notify Licensor of any survey monument, marker or stake that has become dislodged, lost or misplaced during installation of Licensee's facilities. Licensor will resurvey the Easement and replace any such survey monument. Resurvey expense shall be reimbursed by Licensee to Licensor.

C. In the event Licensor determines that injury or damage to, or interference with, its facilities may occur as a result of loss of metal from Licensor's, Licensee's or a third party's facilities due to corrosion or electrolysis caused or hastened by the installation of Licensee's facilities or by Licensee's activities, Licensor may require the following protective measures to be taken by Licensee. Licensee shall cover said facilities and shall install and maintain cathodic protection devices, all subject to prior approval of Licensor. Licensee shall keep accurate records of each such cathodic protection device, furnish Licensor with a copy of such records, and shall from time to time take such other and further protective measures as Licensor may require.

D. Licensee shall install, maintain and provide adequate drainage facilities so that there will not be a collecting or pooling of surface or run-off waters upon the Easement or Property resulting from the installation, construction, maintenance and operation of Licensee's Easement and facilities.

E. Licensee shall provide not less than thirty (30") inches of cover over any underground facilities installed by Licensee pursuant hereto; such cover shall be compacted so as to be capable of withstanding AASHTO H20 highway load rating.

F. Licensee is hereby notified that other underground physical occupations of the subject Easement may exist that do not appear upon the attached drawing and/or maps and property records maintained by Licensor. Accordingly, Licensee is cautioned to excavate carefully and comply with all applicable state and local laws and regulations with respect thereto.

7. **Insurance Requirements**

A. **Coverage:** From the commencement of the License, through final expiration or longer where specified below, Licensee shall provide and maintain, at its own expense, insurance policies, intended to be primary (with no right of contribution by any other coverage available to National Grid and its subsidiaries (National Grid), covering the Permitted Uses, including, without limitation, all recreational activities, under or in connection with this License, issued by reputable insurance companies with an A.M. Best Rating of at least B+, which meet or exceed the requirements listed herein:

1. **Workers' Compensation and Employers Liability insurance** as required by the State in which the work activities under this License will be performed. If applicable, coverage shall include the U.S. Longshoreman's & Harbor Workers Compensation Act, and the Jones Act. The employer's liability limit shall be at least $500,000 each per accident, per person disease, and disease by policy limit.

2. **Commercial general liability (CGL) Insurance,** covering all the Permitted Uses to be performed by or on behalf of Licensee or its Invitees under or in connection with this License, with **minimum** limits of :

Bodily Injury (BI)	- $1,000,000 per occurrence
Property Damage (PD)	- $1,000,000 per occurrence
OR	
Combined Single Limit	- $1,000,000 per occurrence
OR	
BI & PD per Occurrence	- $1,000,000
General Aggregate & Product Aggregate	- $2,000,000 each

- Coverage shall include: contractual liability (with this License, and any associated verbal agreements, being included under the definition of "insured Contract" there under), products/completed operations, and if applicable, explosion, collapse and underground (XC&U).
- If the products-completed operations coverage is written on a claims-made basis, coverage shall be maintained continuously for the duration of this License and for at least two years thereafter.
- National Grid USA and its subsidiaries, including its officers and employees, shall be included as an additional insured for all CGL coverages.
- Coverage for sudden and accidental pollution liability - limited solely by the Insurance Services Organization Standard pollution exclusion, or its equivalent. A contractor's pollution liability policy can be used to fulfill this requirement.

3. **Automobile Liability,** covering all owned, non-owned and hired vehicles used in connection with the Permitted Uses to be performed by or on behalf of Licensee or its Invitees under or in connection with this License, including, without limitation, recreational vehicles, with **minimum** limits of:

Bodily Injury	- $1,000,000 per occurrence; 1,000,000 aggregate
Property Damage	- $1,000,000 per occurrence
OR	
Combined Single Limit	- $1,000,000 per occurrence

- Coverage for sudden and accidental pollution liability - limited solely by the Insurance Services Organization Standard pollution exclusion, or its equivalent).
- National Grid and its subsidiaries, including its officers and employees, shall be included as an additional insured with respect to liability associated with, or arising out of, all operations, work and services to be performed by or on behalf of Licensee under or in connection with this License.

4. **Umbrella liability or excess liability** coverage, with a **minimum** per occurrence limit of $4,000,000. National Grid and its subsidiaries, including its officers and employees, shall be included as an additional insured for liabilities associated with, or arising out of, all Permitted Uses to be performed by or on behalf of Licensee or its Invitees under this License. This coverage shall run concurrent to the CGL required in section 2 above, and shall apply excess of the required automobile, CGL and employer's liability coverage required herein.

B. **Risk of Loss:** Licensee shall be responsible for all risk of loss to its equipment and materials, and any other equipment and materials owned by its employees if applicable, or by other third parties that may be in their care, custody and control.

C. **Sub-Contractors/subletting**: In the event Licensee uses contractors to perform any work activities on the right-of-way associated with this License, it is expressly agreed that Licensee shall have the sole responsibility to make certain that all contractors are in compliance with these insurance requirements, and remain in compliance throughout the course of this License, and thereafter as required. In the event Licensee sublets all or any portion of the Premises defined in this License, or assigns this License in accordance with its terms and conditions, Licensee shall require all subtenants or assignees provide the same insurance coverage as required in this insurance article.

In the event any sub-contractor is unable to maintain all of the same insurance coverage as required in this insurance article, Licensee agrees to indemnify and hold National Grid harmless against any and all liability resulting from any deficiency in sub-contractor's insurance coverage that may be out of compliance with these insurance requirements.

D. **Insurance Certification:** Prior to starting work, Licensee shall promptly provide National Grid with (a) **Certificate(s) of Insurance** for all coverage's required herein at the following address:

National Grid
Real Estate, DG
300 Erie Boulevard West
Syracuse, NY 13202
Attn: Real Estate Department, DG

Such certificates, and any renewals or extensions thereof, shall outline the amount of deductibles or self-insured retentions which shall be for the account of Licensee. Such deductibles or self-insured retentions shall not exceed $100,000 unless agreed to in writing by the Risk Management Department of National Grid, whose approval shall not be unreasonably withheld, delayed or conditioned.

Licensee shall provide National Grid with at least 30 days prior written notice of any cancellation or diminution of the insurance coverage required in this insurance article.

E. **Insurance Obligation:** If any insurance coverage is not secured, maintained or is cancelled before final termination of this License, or the completion of all obligations provided for under this License, whichever is later, and Licensee fails immediately to procure other insurance as specified, National Grid has the right, but not the obligation, to procure such insurance and to invoice Licensee for said coverage.

F. **Incident Reports:** Licensee shall furnish the Risk Management department of National Grid with copies of any accident or incident report(s) sent to Licensee's insurance carriers covering

accidents, incidents or events occurring on the property as defined within this License. In addition, if requested, Licensee shall promptly provide copies of all insurance policies relevant to this accident or incident.

G. **Other Coverage**: Licensee shall comply with any governmental and/or site specific insurance requirements, even if not stated herein.

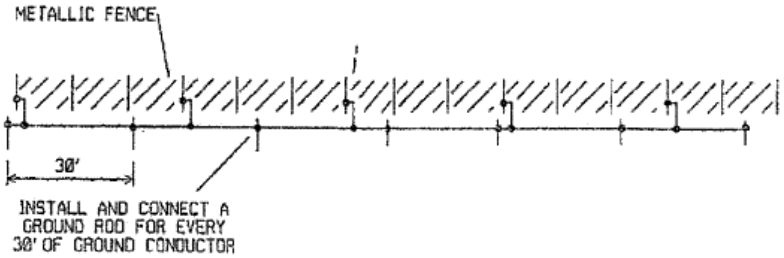
H. **Coverage Representation:** Licensee represents that it has full policy limits available and shall notify provide National Grid's Risk Management Department in writing when the minimum coverage's required in this article herein have been reduced as a result of claims payments, expenses, or both. However, this obligation does not apply to any claims that would be handled solely with in Licensee's deductible or self-insured retention.

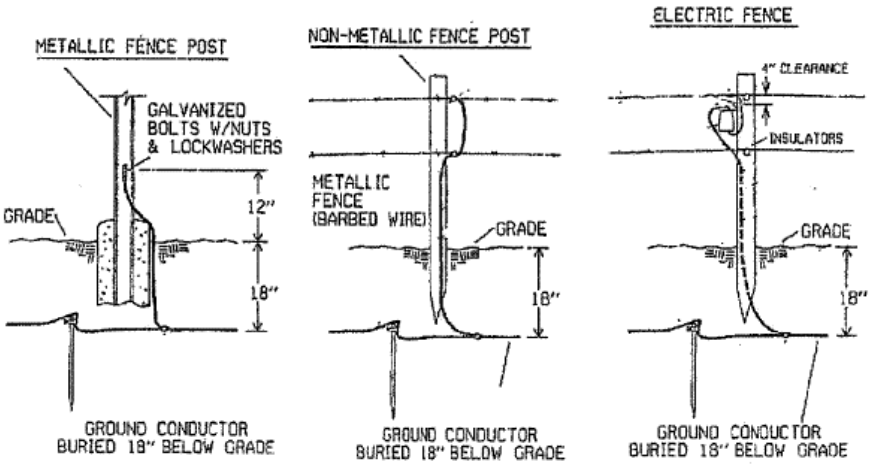
I. **Coverage Limitation**: Nothing contained in this article is to be construed as limiting the extent of the Licensee's responsibility for payment of damages resulting from all operations, work and services to be performed by or on behalf of Licensee under or in connection with this License, or limiting, diminishing, or waiving Licensee's obligation to indemnify, defend, and save harmless National Grid in accordance with this License.

MINIMUM GROUNDING SPECIFICATIONS FOR FENCES

Metallic fences that have the potential to be crossed by electric lines shall be grounded from the location that the supply line could cross the fence to the edge of the right-of-way on both sides. A grounding conductor must be buried below the fence line and bonded to the metallic posts. If the fence posts are nonconducting material, the ground conductor must be bonded to the metallic fence. This includes separate barbed wire strands if used.

Ground rods shall be installed at approximately 30 foot intervals along the buried grounding conductor. The grounding conductor should be bonded to the fence at every third fence post, or at 30 foot intervals, whichever distance is least.





SEP 1994 FENCE GROUNDING DETAILS 10-1067

SECTION 31210
EXCAVATION AND MANAGEMENT OF PCB IMPACTED MATERIALS

PART 1 - GENERAL

1.1 DESCRIPTION

A. The materials covered by this specification are soils and waste materials that contain elevated levels of PCBs (greater than 50 parts per million), and potentially contain elevated levels of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and heavy metals. Soils with this characteristic may be encountered during the project. Upon discovery, the Owner shall be notified and this section shall be followed.

B. The Contractor shall provide all labor, materials, equipment, and services necessary for, and incidental to, the excavation, handling, management, and off-site disposal of impacted materials covered by this section and as herein specified.

1.2 REFERENCES

A. Reference Standards:

1. The latest edition of the following standards, as referenced herein, shall be applicable.

a. Occupational Safety and Health Act Regulations, 29 CFR 1910 and 1926.

b. Toxic Substance Control Act (TSCA) and 40 CFR 761.

c. 6 NYCRR Parts 360 & 364.

1.3 SUBMITTALS

A. Site-Specific Health and Safety Plan: Develop a written site-specific Health and Safety Plan (HASP) prior to commencing any on-site work and continue to implement, maintain, and enforce the plan until final demobilization from the site, in accordance with Section “Health & Safety Program”. The development, implementation and maintenance of the HASP is the Contractor’s responsibility.

B. Analytical Test Results: The testing laboratory shall submit written reports of all tests and analytical results to the Contractor and the Engineer.

C. Disposal Facility: Provide facility name, address, contact person, signed letter of agreement from the facility of intent to accept the waste as specified in the Contract, a listing of all permits, licenses, and letters of approval authorizing the disposal of wastes of this description at the designated facility as they pertain to this Contract. Additionally, the Contractor shall submit all waste profiles to the Engineer for review prior to commencing off-site disposal of the material. The Owner may direct that waste profiles be prepared and obtained by the Engineer.

D. Hauling of Material: For off-site disposal involving movement through an active lane of a public roadway, provide identification of and information of the proposed waste transporter, including the following minimum information: Hauler(s) name, address, contact person, EPA and NYS Transporter Identification Number, and any and all necessary permit authorizations for waste to be transported from the site to treatment/storage/disposal facilities. (Note: Any soil moved off-site or transported through an active lane of a public ready must be in NYSDEC Part 364 permitted vehicles and all loads must be properly covered and secured. Any federally required permits shall also be obtained by the Contractor prior to commencing with hauling activities.)

E. Disposal documentation: Within two (2) weeks of off-site disposal, the Contractor shall submit weight tickets and fully-executed manifests to the Engineer. The waste manifest ID number shall be placed on all weight tickets so that they can be correlated with the waste manifests. All documents shall be submitted in a collated/organized fashion to the Engineer along with a summary sheet documenting the number of loads of material and the overall tonnage of material disposed.

F. Confirmatory Sample Results: Confirmatory soil samples will be collected from removal areas of the project site only as directed by the Engineer. Results shall be submitted to the Engineer upon receipt.

G. Notifications:

1. At least five (5) working days prior to beginning the work, provide the Engineer with the anticipated schedule of dates and work locations for the collection of the characterization samples if not already completed by the Engineer.

2. The Engineer and New York State Department of Environmental Conservation (NYSDEC) shall be provided a minimum of five (5) working days of notification prior to excavating or transporting any materials off-site for disposal.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Furnish all materials required by the Contractor's approved Materials Handling Plan. At a minimum furnish:

1. 10 mil plastic sheeting for covering the face of excavations not complete at the end each work day.

2. Waterproof tarpaulins for covering of trucks/roll-offs, and waterproof liners as required.

3. Barricades and signage for excavation areas and work zones.

2.2 EQUIPMENT

A. Furnish all heavy equipment required by the Contractor to excavate, load, and haul waste materials. Provide dewatering equipment as necessary.

PART 3 - EXECUTION

3.1 PREPARATION

A. All excavations, including those to facilitate the collection of analytical samples, shall be completed in accordance with the requirements of Section "Earthwork" and Section "Waste Excavation and Relocation."

3.2 PRE-EXCAVATION CHARACTERIZATION

A. If completed by contractor personnel, sampling shall be conducted by a person thoroughly trained in sampling protocols using standard accepted sampling practices that are representative of the each area identified on the Drawings.

B. Collect representative composite samples of the soil from each of the potentially contaminated piles or lots, (separate samples for each pile category) from a depth of greater than one foot within each area identified. Include, at a minimum, four sample points for each composite sample and homogenize before placing into laboratory containers. If required by the disposal facility, the contractor shall collect one composite sample for every 500 cubic yards of material disposed. An alternate sampling frequency may be allowed by the disposal facility. Grab samples shall be collected for all samples for VOC analysis.

END OF SECTION

SECTION 31220
DEWATERING

PART 1 - GENERAL

1.1 SUMMARY

A. This section includes furnishing, installing, and maintaining a dewatering system to continuously lower and control groundwater levels and hydrostatic pressures in order to maintain near-dry conditions for construction of the work as shown on the plans and specified herein.

1.2 SUBMITTALS

A. Description: of proposed dewatering system.

B. Layout: of dewatering system, including location of sumps, deep wells, well points, header pipes, pumps, discharge lines and observation wells.

C. Details: of dewatering system, including installation methods for deep wells, well points and observation wells, depths of wells, material descriptions, pipe sizes, intake screen sizes, and pump capacities.

D. Estimate of time required to lower groundwater levels after start of pumping

1.3 JOB CONDITIONS

A. Site soil boring data and samples, soil laboratory testing, and any soil reports shall be made available to prospective bidders for study and review. Bidders must make their own interpretation of subsurface conditions that may affect methods or the cost of construction of the Work.

PART 2 - PRODUCTS

2.1 DEWATERING SYSTEM

A. Provide a dewatering system of adequate size and capacity to lower and maintain the groundwater at the specified level. The system shall include standby pumps and power source for continuous operation.

1. Dewatering system shall consist of well points, deep wells, cut-off walls, riser pipes, swing joints, header lines, valves, pumps, discharge lines, and all other necessary fittings, accessories and equipment for a complete operating system. Provide hole punches, sand backfill and clay plugs as required by soil conditions.

B. Observation well points: Provide groundwater reading wells or piezometers to monitor the groundwater level, as indicated on the approved Shop Drawings or as directed by the Engineer.

C. Sand: Clean concrete sand conforming to ASTM C 33.

PART 3 - EXECUTION

3.1 PREPARATION

A. Install the observation well points at locations indicated on approved Shop Drawings or where directed by the Engineer. Install observation well points in accordance with manufacturer's printed instructions and in accordance with approved Shop Drawings. Provide sand backfill around well point. Test each observation well point to verify that the installation is performing properly.

B. Protect observation well standpipes from damage by construction operations and maintain accessibility to them. Maintain reading wells until groundwater is allowed to return to its normal level.

3.2 INSTALLATION

A. Install the dewatering system in accordance with approved Shop Drawings and as required by site conditions. Locate elements of the system to allow a continuous dewatering operation without interfering with the installation of any permanent project Work.

3.3 OPERATION

A. Keep the system in continuous operation from the time excavation is started in the dewatering area (or before if required by site conditions to lower the groundwater to the elevations specified) until the time backfilling is completed at least 2 feet above the normal groundwater level.

1. Do not discontinue dewatering operations without specific approval from the Engineer.

2. Rates of groundwater withdrawal during dewatering operations, shall at all times be below the rate at which soil particles are removed from the existing soils.

B. In the event excavation proceeds subsequent to dewatering as specified above, and the groundwater level is found to be within two feet of the excavation, the dewatering Contractor shall immediately continue to dewater as specified herein, including, but not limited to, additional dewatering and monitoring facilities, at no additional cost to the Owner.

3.4 FIELD CONTROL

A. Maintain a careful check to detect any settlement in existing adjacent Work. Notify the Engineer of any signs of settlement. Establish settlement point bench marks and take periodic readings as directed. The Contractor shall take all such precautions and do any and all work necessary to protect the stability and integrity of adjacent lands, pavements, buildings and utilities from settlement or other movement that may be caused by his dewatering operations. The Contractor shall be solely responsible for any damage or injury to adjacent lands, pavements, buildings, or utilities caused by his dewatering or other operations or his failure to use corrective or preventive procedures or methods.

B. Take and record measurements of the groundwater in each reading and pumping well periodically and when directed by the Engineer.

3.5 DISCHARGE

A. Dispose of all water removed from the excavation in such a manner as not to endanger public health, property, or any portion of the Work under construction or completed.

B. Dispose of water in such a manner as to cause no inconvenience to others on or adjacent to the site.

C. Convey water from the excavation in a closed conduit. Do not use trench excavations as temporary drainage ditches.

D. Disposal of water shall be approved by the Engineer and shall not cause erosion or sedimentation to occur. All sedimentation or blocking of existing systems shall be thoroughly cleaned and returned to original condition by the Contractor, at his expense.

E. Discharge shall not be conveyed into water courses.

F. Discharge may be recirculated onto other parts of the landfill.

3.6 REMOVAL

A. When system is no longer required, gradually decrease the pumping rate until the water table resumes its natural position so that the velocity of the returning groundwater will be low enough as not to carry fines.

B. When the dewatering system is no longer required and when directed by the Engineer, dismantle and remove the system and all appurtenances from the site.

END OF SECTION

SECTION 31230
TRENCHING AND BACKFILLING

PART 1 - GENERAL

1.1 SUMMARY

A. This Section includes the excavation of trenching, backfilling, compacting, dewatering, excavation support and disposal, as shown on the Contract Drawings, and as herein specified.

B. The Engineer will determine the suitability of materials that are to be used in the work and should any materials encountered be unsatisfactory for the purpose intended, they shall be removed from the site at the Contractor's expense.

1.2 QUALITY ASSURANCE

A. Reference Standards:

1. The latest edition of the following standards, as referenced herein, shall be applicable.

a. "Standard Specifications, Construction and Materials, New York State Department of Transportation, Office of Engineering."

b. "Standard Specifications for Highway Materials and Methods of Sampling and Testing, American Association of State Highway and Transportation Officials (AASHTO)."

c. American Society for Testing and Materials (ASTM).

d. National Electric Code(NEC)

B. The Contractor shall comply with the requirements for soil erosion and sedimentation control and other requirements of governmental authorities having jurisdiction, including the State.

C. The Contractor shall provide and pay for all costs in connection with an approved independent testing facility to determine conformance of soils and aggregate with the specifications, in accordance with Section "Quality Requirements."

D. All imported fill soils and aggregates (including buffer zone soils) will need to meet the Unrestricted Use Soil Cleanup Objectives set forth in Table 375-6.8(a) of 6NYCRR Part 375 for a minimum of two feet in measured depth measured from the finished surface grade. The remaining (buffer zone) soils will need to meet, at a minimum, the lower of the protection of groundwater or the protection of public health soil cleanup objectives for commercial use as set forth in Table 375-6.8(b) of 6NYCRR Part 375 (see table at end of Section 31180).

1.3 SUBMITTALS

A. Samples:

1. The Contractor shall furnish representative earth materials to the testing laboratory for analysis and report, as directed by the Engineer, or as outlined in the specifications.

B. Test Results:

1. The testing laboratory shall submit written reports of all tests, investigations, findings and recommendations to the Contractor and the Engineer.

1.4 PROJECT REQUIREMENTS

A. Notify the Engineer of any unexpected subsurface condition.

B. Protect excavations by shoring, bracing, sheet piling, or by other methods, as required to ensure the stability of the excavation. Comply with OSHA requirements.

C. Underpin or otherwise support structures adjacent to the excavation which may be damaged by the excavation. This includes service lines.

D. Protection of Existing Utilities:

1. Locate existing underground utilities in areas of work. If utilities are to remain in place, provide adequate means of support and protection during earthwork operations. Comply with OSHA requirements.

2. Coordinate interruption and/or termination of utilities with the utility companies and the Owner.

3. Provide a minimum of forty-eight (48) hours notice to the Owner and receive written notice to proceed before interrupting any utility.

E. Demolish and completely remove from the site any existing underground utilities designated to be removed, as shown on the Drawings or as specified.

F. Repair any damaged utilities as acceptable to the Owner, Engineer, and utility company at no additional cost to the Owner.

G. Contractor shall comply with maintenance and protection requirements as approved by the authority having jurisdiction.

H. Protection of Persons and Property:

1. Barricade open excavations occurring as part of this work and post with warning lights, if required.

2. Operate warning lights as recommended by authorities having jurisdiction.

3. Protect structures, utilities, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout and other hazards created by earthwork operations.

4. Perform excavation within drip-line of trees to remain by hand, and protect the root system from damage or dry out to the greatest extent possible. Maintain moist conditions for root system and cover exposed roots with burlap. Paint cut roots of 1" diameter and larger with emulsified asphalt tree paint.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Pipe Zone Bedding and Backfill: Sound, durable sand, gravel, stone or blends of these materials, free from organic, frozen or other deleterious materials, conforming to the requirements of NYSDOT Section 304 and meeting the following gradation requirements (NYSDOT Subbase Type 4):

Sieve	Percent Passing
2"	100
¼”	30-65
No. 40	5-40
No. 200	0-10

B. Suitable Material: Sound, durable sand, gravel, stone or blends of these materials, free from organic, frozen or other deleterious materials, conforming to the requirements of NYSDOT 203-2.02C and meeting the following gradation requirements:

Sieve	Percent Passing
4"	100
No. 40	0-70
No. 200	0-15

Run-of-trench material, meeting the above criteria, shall be considered suitable material and shall be used for trench backfill only after tested in accordance with Section "Quality Requirements" and approved by the Engineer. The Contractor shall pay for all additional testing required to determine the conformance of run-of-trench material, if at any time during the Work this material appears to be in non-conformance in the opinion of the Engineer.

PART 3 - EXECUTION

3.1 PRECONSTRUCTION MATERIAL QUALIFICATION TESTING

A. General:

1. Sufficient size samples shall be obtained from the potential borrow source to allow completion of tests listed in paragraph B below. Samples may be obtained from test borings, test pits, or from borrow pit faces provided that surficial dry or wet soil is removed to expose undisturbed earth. Tests listed below shall be performed on each sample obtained. A minimum of three (3) representative samples from each potential borrow source shall be furnished to the testing laboratory for prequalification testing. Test data shall be provided to the Engineer a minimum of 2 weeks prior to construction for approval of borrow source. Three test reports completed within three months prior to construction may be submitted for commercial earth borrow sources or suppliers of stone products (crushed stone or graded stone products) in lieu of prequalification tests as approved by the Engineer.

B. Material Tests:

1. Particle Size Analysis:

a. Method: ASTM D422

b. Number of Tests: One (1) per sample; three (3) per potential source.

c. Acceptance Criteria: Gradation within specified limits.

2. Maximum Density Determination:

a. Method: ASTM D1557 - Modified Proctor

b. Number of Tests: One (1) per sample; three (3) per potential source.

3. Re-establish gradation and maximum density of fill material if source is changed during construction.

3.2 PREPARATION

A. Establish required lines, levels, contours and datum.

B. Maintain benchmarks and other elevation control points; re-establish if disturbed or destroyed, at no additional cost to the Owner.

C. Establish location and extent of existing utilities prior to commencement of excavation.

3.3 EXCAVATION

A. Excavation within National Grid/Niagara Mohawk easements shall comply with "Specifications for Proposed Activities Within NM/NG Easements and Rights-of-Ways included in Section "Waste Excavation".

B. All excavation shall be made to such depth as required and of the width shown on the Contract Drawings. Hand trench excavation may be required to protect existing utilities and structures.

C. Stockpile excavated subsoil for reuse where directed or approved.

D. Stability of Excavation: Slope sides of excavations shall comply with local codes and ordinances having jurisdiction. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated. Maintain sides and slopes of excavation in safe condition until completion of backfilling.

H. Removal of materials beyond the indicated subgrade elevations, without authorization by the Engineer, shall be classified as unauthorized excavation and shall be performed at no additional cost to the Owner.

3.4 DEWATERING

A The Contractor shall remove all water from the excavation promptly and continuously throughout the progress of the work and shall keep the excavation dry at all times until the work is completed and excavation is backfilled or have sufficient weight to resist uplift pressures. Groundwater levels shall be depressed to a minimum of 2 feet below excavation subgrade.

B. Provide a suitable point of discharge from dewatering operations. Water shall be conveyed in a non-erosive manner satisfactory to the Engineer.

C. Precautions shall be taken to protect uncompleted work from flooding during storms or from other causes. All pipe lines or structures not stable against uplift during construction or prior to completion shall be thoroughly braced or otherwise protected.

3.5 BEDDING AND BACKFILLING

A. All backfill shall be compacted by tamping or rolling to achieve a minimum dry density of 90 percent of the modified Proctor maximum dry density of the material used (ASTM D1557). Backfill materials shall be placed with water content within plus or minus 4 percent of optimum moisture content per the standard Proctor method (ASTM D1557). Any water used for compaction shall be provided by the Contractor at his own expense. The Contractor is responsible for the repair of any trench settlement at no expense to the owner.

3.6 BACKFILLING AROUND STRUCTURES

A. The Contractor shall not place backfill against any structure without obtaining the approval of the Engineer. No dumping shall be allowed where materials would flow against or around such structures. Backfill material shall be deposited in horizontal layers not exceeding 6 inches in loose thickness or as shown on the Contract Drawings and thoroughly compacted by hand or by mechanical means to the satisfaction of the Engineer.

3.7 SUSPENSION OF WORK

A. Whenever the work is suspended, excavations shall be protected and the roadways, if any, left unobstructed. Within or adjacent to private property, material shall be stored at such locations as will not unduly interfere with traffic of any nature and in no case shall materials be stored in locations which will cause damage to existing improvements.

3.8 DISPOSAL OF MATERIAL

A. Excess and unsuitable materials shall be disposed of by the Contractor on the site in an area approved by the Engineer or legally disposed of off- site at the Contractors expense.

3.9 FIELD QUALITY CONTROL

A. Notify the Engineer at least three (3) working days in advance of all phases of filling and backfilling operations.

B. In-place density testing shall be performed to ascertain the compacted density of the fill and backfill materials in accordance with the following methods:

1. In-place relative density:

a. Method: AASHTO T238, Nuclear Method

B. Perform initial density testing to verify that contractors proposed compaction effort will obtain the minimum required densities.

D. In-place density tests on trench backfills shall be provided for every 500 cubic yards of fill and in vertical lifts not exceeding two (2) feet, and at least once daily.

D. One particle size analysis (ASTM D422) and one standard Proctor compaction test (ASTM D698) shall be competed for every 5,000 cubic yards of material placed.

F. The Engineer may direct additional tests to establish gradation, maximum density, and in-place density as required by working conditions, at the Contractor's expense.

G. Acceptance Criteria: The criteria for acceptability of in-place fill shall be in-situ dry density and moisture content. If a test fails to qualify, the fill shall be further compacted and re-tested. Subsequent test failures shall be followed by removal and replacement of the material.

END OF SECTION

SECTION 31240
EROSION AND SEDIMENT CONTROL

PART 1 – GENERAL

1.1 SUMMARY

A This Section covers work necessary for stabilization of soil to prevent erosion and sedimentation during and after construction and land disturbing activities. The work shall include the furnishing of all labor, materials, tools, and equipment to perform the work and services necessary as herein specified and as indicated on the Drawings. This shall include installation, maintenance, and final removal of all temporary soil erosion and sediment control measures. All erosion and sediment control methods and devices used shall conform to the latest requirements imposed by federal, state and local authorities.

B. Comply with SPDES General Permit GP-0-10-001 for stormwater discharges from construction activities and the Stormwater Pollution Prevention Plan prepared for the project. (Attached at the end of this Section.)

C. The minimum areas requiring soil erosion and sediment control measures are indicated on the Drawings. The right is reserved to modify the use, location, and quantities of soil erosion and sediment control measures based on activities of the Contractor and as the Engineer considers to be the best interest of the Owner.

D. The Contractor shall be responsible for repair of any damage caused and shall be financially responsible for any penalties imposed.

1.2 QUALITY ASSURANCE

A. Soil erosion and sediment control measures shall be implemented in accordance with the requirements and procedures outlined in this specification, contract Drawings and documents, state standards or guidelines for soil erosion and sediment control, and all regulatory authorities having jurisdiction. Where conflicts between requirements exist, the more restrictive rules shall govern.

B. The Contractor shall provide all temporary control measures shown on the Drawings, or as directed by the Owner, Owner's representative, or soil conservation district for the duration of the contract. Erosion and sediment control Drawings are intended to be a guide to address the stages of work shown. Additional measures not specified on the Drawings may be necessary and shall be implemented to address intermediary stages of work and any conditions that may develop during construction at no cost to the Owner.

C. Temporary control provisions shall be coordinated with permanent erosion control features to the extent practical to assure economical, effective and continuous erosion and sediment control throughout the construction and post-construction period.

D. Soil erosion and sediment control measures shall at all times be satisfactory to the Owner's Representative. Owner’s Representative will inform the Contractor of unsatisfactory construction procedures and operations if observed. If the unsatisfactory construction procedures and operations are not responded to and corrected within 48 hours, the Owner's Representative may suspend the performance of any or all other construction until the unsatisfactory condition has been corrected. Such suspension shall not be the basis of any claim by the Contractor for additional compensation nor for an extension of time to complete the work. Any complaints, fines, etc. relating to ineffective erosion control, shall be the sole responsibility of the Contractor.

E. The Contractor shall inspect all soil erosion and sediment control measures at least at the beginning and end of each day to ascertain that all devices are functioning properly during construction. Maintenance of all soil erosion and sediment control measures on the project site shall be the responsibility of the

Contractor until final stabilization is complete, and until the permanent soil erosion controls are established and in proper working condition.

F. The Contractor shall protect adjacent properties and watercourses from soil erosion and sediment damage throughout construction.

1.3 GENERAL

A. Soil erosion stabilization and sediment control measures consist of the following elements:

1. Maintenance of existing permanent or temporary storm drainage piping and channel systems, as necessary.

2. Installation and maintenance of stabilized construction entrance(s)

3. Construction of new permanent and temporary storm drainage piping and channel systems, as necessary.

4. Construction of temporary erosion control facilities such as silt fences, check dams, etc.

5. Topsoil and Seeding: Placement and maintenance of Temporary Seeding on all areas disturbed by construction. Placement of permanent topsoil, fertilizer, and seed, etc., in all areas not occupied by structures or pavement, unless shown otherwise.

6. Soil Stabilization Seeding: Placement of fertilizer and seed, etc., in areas as specified hereinafter.

B. The Contractor shall he responsible for phasing Work in areas allocated for his exclusive use during this Project, including any proposed stockpile areas, to restrict sediment transport. This will include installation of any temporary erosion control devices, ditches, or other facilities.

C. The areas set aside for the Contractor's use during the Project may be temporarily developed to provide satisfactory working, staging, and administrative areas for his exclusive use. Preparation of these areas shall be in accordance with other requirements contained within these Specifications and shall he done in a manner to both control all sediment transport away from the area.

D. Stockpiles remaining in place longer than 14 calendar days shall be considered permanent stockpiles for purposes of erosion and sediment control.

E. All permanent stockpiles shall be seeded with soil stabilization seed and protected by construction of silt fences completely surrounding stockpiles and located within 10 feet of' the toes of the stockpile slopes.

F. Sediment transport and erosion from working stockpiles shall be controlled and restricted from moving beyond the immediate stockpile area by construction of temporary toe-of-slope ditches and accompanying silt fences as necessary. The Contractor shall keep these temporary facilities in operational condition by regular cleaning, re-grading, and maintenance.

G. The Contractor shall maintain all elements of the Soil Erosion Stabilization and Sedimentation Control systems and facilities to be constructed during this Project for the duration of his activities on this Project.

H. Formal inspections made jointly by the Contractor and the Engineer shall be conducted every 2 weeks to evaluate the Contractor's conformance to the requirements of these Specifications.

I. Replacement or repair of failed or overloaded silt fences, check dams, or other temporary erosion control devices shall be accomplished by the Contractor within 24 hours after receiving written notice from the Engineer.

J. If the Contractor has not complied with any of the above maintenance efforts to the satisfaction of the Engineer within two working days after receiving written notification from the Engineer, the Owner shall have the prerogative of engaging others to perform any needed maintenance or cleanup, including removal of accumulated sediment at constructed erosion control facilities, and deduct from the Contractor's monthly partial payment the costs for such efforts in accordance with the General Condition of the Contract.

1.4 SUBMITTALS

A. Submittals shall he made in accordance with Section "Submittal Procedures"

B. Material Certificates signed by material producer and Contractor, certifying that each material item complies with or exceeds specified requirements.

C. Results of all tests and investigations, including recommendations.

D. Submit product data, samples, specifications and manufacturer's installation procedures for approval as directed by Engineer prior to use.

PART 2 – PRODUCTS

2.1 GENERAL

A. Contractor shall provide all materials necessary to perform the work in accordance with the SWPPP or as shown on the Drawings or specified herein.

2.2 PERMANENT SEED

A. Refer to Section "Landfill Seeding".

2.3 SOIL STABILIZATION AND TEMPORARY SEED

A. Temporary Seed: Rye grass, cereal grasses or other quick growing species suitable to the area as a temporary cover, which will not compete with the grasses specified for permanent cover, or as specified in the SWPPP or on the Drawings.

2.4 TOPSOIL

A. Topsoil shall be as specified under Section "Landfill Topsoil".

2.5 FERTILIZER

A. Refer to Section "Landfill Seeding".

2.6 LIME

A. Ground dolomite limestone not less than 85 percent total carbonates and magnesium, ground so that 50 percent passes through a No.100 mesh sieve and 90 percent passes a No.20-mesh sieve. Coarser material will be acceptable provided the specified rates of application are increased proportionately on the basis of quantities passing the No.100-mesh sieve.

2.7 STRAW MULCH

A. Threshed straw of oats, wheat, barley, or rye, free from seed of noxious weeds or clean salt hay.

2.8 EROSION CONTROL BLANKET

A. Erosion Control Blanket (ECB) installed in the buffer zones shall be constructed of 100% biodegradable material with no use of polypropylene top net or polypropylene bottom net. Any thread used to attach blanket segments shall be biodegradable. No synthetic netting or blanket content is allowed. Acceptable products shall be protective of animals and include Curlex NetFree as manufactured by American Excelsior Company or an approved equal.

2.9 TURF REINFORCEMENT MATS

A. Permanent Synthetic Turf Reinforcement Mat (TRM) shall be constructed of UV stabilized polypropylene fiber (0.70 lbs/yd2) stitched with permanent polypropylene thread between heavyweight UV stabilized polypropylene top net (5.0 lbs/1000 ft2 approx. weight) and bottom net (3.0 lbs/1000 ft2 approx. weight). Both the netting and fiber material shall be green in color. Acceptable products shall include P300 Permanent Turf Reinforcement Mat as manufactured by North American Green; Recyclex TRM by American Excelsior Company or an approved equal.

2.10 STRAW BALE

A. Bales shall be tightly bound, staked with 1 inch by 1 inch hardwood stakes. Straw shall be from mowings of acceptable herbaceous growth free from noxious weeds.

2.11TONE CHECK DAM

A. The gradation of stone check dam material shall meet the following requirements:

NCSA Rock Size*	Percent Passing by Weight
12”	100
6”	15-50
3”	0-15

*National Crushed Stone Association

B. Geotextile fabric for stone check dam shall meet the requirements non-woven fabric found in Section “Geotextiles.”

2.12 SILT FENCE

A. Silt Fence (SF) shall consist of woven geotextile fabric, posts, wire mesh backing, and fasteners meeting the requirements shown on the plan detail.

PART 3 – EXECUTION

3.1 GENERAL

A. The Contractor shall comply with and implement the Stormwater Pollution Prevention Plan provided in this section.

B. Review the soil erosion and sediment control Drawings as they apply to current conditions. Any deviation from the Drawings must be submitted for approval to the site Engineer in writing at least 72 hours prior to commencing that work.

C. Initial soil sediment and erosion control devices shall be in place prior to any land disturbing activity, in their proper sequence, and maintained until permanent protection is established.

D. The limit of the area of any earthwork operations in progress shall be commensurate with the Contractor's capability and progress in keeping the finished grading, mulching, seeding, and other such permanent control measures current and in accordance with the accepted schedule for construction phasing. Should seasonal limitations make such coordination unrealistic, as determined by the Owner's Representative, temporary erosion control measures shall be provided immediately by the Contractor at no expense of the Owner.

E. Temporary erosion control measures shall be used to correct conditions which develop during construction that are needed prior to installation of permanent control features, or that are temporarily needed to control erosion that develops during normal construction practices, but are not associated with permanent control features on the project.

F. The Contractor shall incorporate all permanent erosion control features (stabilization) into the project at the earliest practical time to minimize the need for temporary controls.

G. A stabilized construction entrance (SCE) shall be installed and maintained at any point where construction vehicles enter a public right-to-way, street or parking area. The SCE shall be used to eliminate mud from the construction area onto public right-of-way. The SCE shall be constructed as shown on the Drawings. Any mud or debris tracked on streets shall be cleaned up immediately.

H. Dust Control: The Contractor shall provide a commercial grade; enclosed broom mechanical street sweeper to control sediment and/or dust that is tracked on to the adjacent streets. The street sweeper shall be equipped with a water storage tank to wet the area prior to sweeping. Where on site controls do not prevent material from being tracked on to adjacent streets, the street sweeper shall be used to clean the adjacent streets immediately. In addition, at a minimum, the adjacent streets shall be swept at the end of each day or as directed by the Engineer.

I. Any disturbed or stockpiled areas that will be left exposed more than 14 days or less according to State NPDES General Stormwater Permits shall immediately receive temporary or permanent seeding. Mulch/straw shall be used if the season prevents the establishment of a temporary cover. Disturbed areas shall be limed and fertilized prior to temporary seeding.

J. Permanent vegetation shall be established as specified on all exposed areas within 7 days or less according to State NPDES General Stormwater Permits after final grading. Mulch as necessary for seed protection and establishment. Lime and fertilize seedbed prior to permanent seeding.

K. Slopes shall be permanently seeded and mulched. Any slopes that erode easily shall be temporarily seeded and mulched. Any slopes deeper than 3:1 or steeper or as indicated on Drawings shall be protected with Erosion Control Blanket per specifications.

L. All storm drainage outlets must be stabilized, as specified, before the discharge points become operational. Equip all inlets with inlet protection immediately upon construction.

M. Discharge from dewatering operations for the excavated areas shall not be directed to surface waters without first properly removing the suspended sediment through filtration and/or settlement. The Contractor shall obtain any required permits or confirm a permit is in place for dewatering activities.

N. Silt fence shall be installed at locations on the Drawings and any additional locations necessary for proper sediment control. The Contractor shall maintain the silt fence until the project is stabilized and shall remove and dispose of the silt fence as directed by the Engineer. Field conditions may require silt fence to remain in place after project completion for later removal by the Owner.

O. Soil erosion and sediment control shall include but not be limited to the approved measures. The Contractor shall be responsible for providing all additional measures that may be necessary to accomplish the intent of the Drawings.

P. Comply with all other requirements of authorities having jurisdiction.

Q. Soil Stabilization and Temporary Seeding:

1. Soil stabilization seeding shall consist of the application of the following materials in quantities as further described herein for stockpiles and disturbed areas left inactive for more than 14 days.

   a. Lime.
   b. Fertilizer.
   c. Seed.
   d. Mulch.
   e. Maintenance.

2. Hydroseeding will be permitted as an alternative method of applying seed and associated soil conditioning agents described above. Should the Contractor elect to apply soil stabilization seeding by hydroseeding methods, he shall submit his operational plan and methods to the Engineer.

3. Temporary Seeding may be placed and maintained over all disturbed areas prior to Permanent Seeding. Maintain Temporary Seeding until such time as areas are approved for Permanent Seeding. As a minimum, maintenance shall include the following:

a. Fix-up and reseeding of bare areas or re-disturbed areas.

b. Mowing for stands of grass or weeds exceeding 6 inches in height, at the direction of the Engineer.

R. Topsoil and Permanent Seeding: conform to the requirements of Section “Landfill Topsoil” and “Landfill Seeding”.

END OF SECTION

STORMWATER POLLUTION PREVENTION PLAN
REMEDIAL ACTION IMPLEMENTATION

NORTH AND SOUTH LANDFILLS
COOPER CROUSE-HINDS FACILITY
SYRACUSE, NEW YORK

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February 3, 2014

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1.0 INTRODUCTION

Prior to excavation and relocation of soils, sediments, and landfill solid waste at part of the selected remedy for the North and South Landfills at the Cooper Crouse-Hinds Facility, submission of a Notice of Intent is being completed to comply with New York State Department of Environmental Conservation (NYSDEC) requirements.

Excavation of soils, sediments, and landfill waste with relocation and capping involving soil disturbances of one (1) or more acres require coverage under SPDES General Permit GP-0-10-001 with an effective date of January 29, 2010 issued by the New York State Department of Environmental Conservation (NYSDEC – Appendix A). The listed activities at the North (21.48 acres) and South (19.4 acres) Landfills thus requires this coverage.

To gain coverage under General Permit GP-0-10-001, a Notice of Intent (NOI – Appendix B) must be filed with the NYSDEC. A Storm Water Pollution Prevention Plan (SWPPP) must be included with the NOI submittal. Coverage under General Permit GP-0-01-001 may not be required as this project is a NYSDEC-approved remediation, however a SWPPP will detail the best practices for project completion.

2.0 PROJECT BACKGROUND INFORMATION

The Cooper Crouse-Hinds, LLC (CC-H) Site consists of two inactive landfills, referred to as the North and South landfills, which are located immediately west of the CSX railroad tracks and the adjacent operating CC-H manufacturing facility. The Site is located in the Town of Salina (North landfill) and City of Syracuse (South landfill), Onondaga County, New York (Latitude 043º 05' 7" N, Longitude 076º 09' 40" W). The North landfill consists of three contiguous parcels (Tax ID Nos. 073.-01-08.1, 073.-01-08.3, and 073.-01-08.4) totaling 21.48 acres in size. The South landfill consists of one parcel (Tax ID No. 01.01-03) totaling 19.4 acres in size. The Site is located in an area of mixed usage including light industrial/manufacturing, commercial, retail and residential usage. Seventh North Street is oriented southeast-northwest and separates the two landfills that comprise the Site. A Site Location Map is presented as Figure 1 and a Site Plan is presented as Figure 2.

2.1 Landfills

The North landfill is bordered along its northern border by vacant land (approximately 37 acres) owned by Plaza East, LLC (Plaza), which consists of areas of fill (municipal waste and miscellaneous debris) with woodland cover and wetlands. The North landfill is bordered to the east and southeast by CSX railroad tracks followed by the CC-H facility, mixed commercial and retail development, Wolf Street and residential development. Seventh North Street followed by the South landfill border the North landfill to the south to southwest. West of the North landfill are wetlands (Plaza property) followed by Ley Creek, mixed commercial and retail development, the Ley Creek waste transfer station, the Onondaga County sewage treatment plant, and Interstate Highway 81.

The South landfill is bordered to the north by Seventh North Street followed by the North landfill. To the east and southeast the South landfill is bordered by CSX railroad tracks followed by mixed commercial and retail development and Hiawatha Boulevard. Further east to southeast is residential development. Undeveloped woods, wetlands and mixed commercial and retail development border the South landfill further to the south. Ley Creek abuts the entire west and northwest boundary of the South landfill. Further west and northwest is a mixture of commercial and retail development.

Review of available historical documentation indicate that prior to the mid-to-late 1950's the North and South landfills had been occupied by low lying fields, salt marshes and woodlands. From the mid-1950's to 1989 fill material had been placed across various areas of the North and South landfills. Current topographic conditions are shown on the topographic survey map included in Figure 2.

2.2 Topography

Topography of the North landfill is generally flat across the southern half of the landfill with an average elevation range of approximately 370 feet to 372 feet above mean sea level (AMSL). However, moving to the north from the central area of the site, the

elevation rises moderately and increases to near an average of 381 feet AMSL across a notably mounded area of the landfill. Topography slopes moderately to steeply downward from the fill mound along the northern, eastern and western areas of the north landfill. Drainage across the North landfill is generally radially outward from the fill mound area in all directions. Drainage to the north-northeast is to lower lying adjacent property owned by Plaza East. Drainage to the east-southeast is towards the east wetland (Wetland A) and the eastern stream segment (Stream A). Drainage to the south tends to go southeast or southwest towards wetland (Wetland A and B) and stream areas (Stream A). Drainage to the west is toward the west wetland (Wetland B) and lower lying areas.

Topography of the South landfill is generally flat across the landfill area with an average elevation range of 373 feet to 377 feet AMSL. Topography along the edges of the fill mound slopes moderately to steeply away from the fill mound to the north, east, south and west. Drainage across the south landfill is generally radially outward from the fill mound in all directions. Drainage to the north-northeast is to the drainage ditch that parallels Seventh North Street and drains into Ley Creek. Drainage to the east-southeast is to the stream (Stream B) and wetland areas (Wetland C) located on the east-southeast side of the landfill. Drainage to the south is to the wetland area (Wetland C) located to the south of the fill mound. Drainage to the west is to Ley Creek, which is located along the landfill's western border.

2.3 Surface Water Features

Ley Creek is located between 80 feet and 120 feet west of the western property boundary of the North landfill and adjacent to the western boundary of the South landfill (Figure 2). Ley Creek is part of the Onondaga Lake drainage basin and flows to the southwest towards Onondaga Lake. Between the mouth of Ley Creek and the Onondaga County Ley Creek Transfer Station and former sewage treatment plant POTW outfall, Ley Creek is classified as a Class C water body. From the POTW outfall to a point located 3.1 miles north of the creek mouth, Ley Creek is classified as a Class B water body. The section of Ley Creek adjacent to the CC-H Site is classified as a Class C water body. Flood insurance maps indicate that the CC-H Site is located within the 100 year flood plain of Ley Creek as defined by the Federal Emergency Management Agency (FEMA). The base flood water surface elevation for the site is 374 AMSL at the southern half of the South Landfill and is 375 AMSL at the northwest corner of the South Landfill and mid-way through the North Landfill.

Bear Trap Creek drains into Ley Creek at its terminus that is located approximately 260 feet west of the southwest corner of the North landfill, which is to the immediate north of the Seventh North Street Bridge that crosses Ley Creek (Figure 2). Bear Trap Creek extends northward from its terminus and receives drainage from areas that range from undeveloped usage to commercial usage and potentially light industrial usage.

Two stream segments and one drainage ditch are located on the CC-H site and are described in the next section.

2.4 Wetlands

In November 2005, wetland delineation was conducted across the Site to define the extent of wetlands onsite. All work was conducted according to the criteria set forth in the *1987 United States Army Corps of Engineers Wetlands Delineation Manual*, *Classification of Wetlands and Deepwater Habitats of the United States*, and the *1995 NYSDEC Freshwater Wetlands Delineation Manual*. Wetland areas identified onsite are described further below.

Two wetland areas and one stream section were identified on the North landfill (Figure 2). The first wetland, Wetland A (a.k.a. the "east wetland") extends from the east corner of the North landfill and along the majority of the eastern side of the landfill and is approximately 2.63 acres in size. The east wetland receives flow from an offsite drainage ditch/stream that enters the wetland at the east corner of the landfill. Surface water in this ditch/stream appears to originate as surface water runoff and drainage from and across the adjacent properties owned by Plaza and the CSX Railroad. Surface water discharge from the east wetland is to a stream (Stream A) that is 675 feet in length and flows south out of the southern portion of the east wetland and parallel to the eastern property boundary of the North landfill to the southeast corner of the North landfill where it then turns to the northwest and parallels Seventh North Street. At its terminus, the stream discharges into two twenty-four-inch diameter culverts, which carry flow beneath Seventh North Street and into a drainage ditch that is located along the north boundary of the South landfill. Drainage in the ditch flows west and ultimately discharges to Ley Creek. The second wetland, Wetland B (a.k.a. the "west wetland") is located along the western side of the North landfill; the onsite portion of this wetland feature is approximately 2.61 acres in size. The west wetland occurs adjacent to and within the flood plain of Ley Creek and extends off-site from the western property boundary, and across the adjacent property owned by Plaza, to Ley Creek. The west wetland is identified on National Wetland Inventory (NWI) maps (ID No. PFO1/SS1E).

One wetland area, stream section, and drainage ditch were identified on the South landfill (Figure 2). The wetland, Wetland C (a.k.a. the "south wetland") is located in the southern area of the South landfill and is approximately 1.29 acres in size. The stream section (Stream B) is approximately 1,825 feet in length and extends along the eastern side of the South landfill from the eastern corner to the southeastern corner. The stream channel begins near the east corner of the landfill and runs parallel with the CSX railroad and eastern-southeastern edge of the landfill until it enters the south wetland. Upon entering the south wetland, the stream flows west and follows the northern edge of the south wetland area to its terminus point near Ley Creek.

Prior to 2009, surface water from the stream and south wetland discharged into Ley Creek at the terminus of the stream via a 36-inch diameter culvert pipe. On January 6, 2009, the culvert pipe was removed and the area backfilled with imported gravel material and fill (Figure 2) to prevent the flow of surface water and entrained sediments from Ley Creek to the South landfill and to Ley Creek from the South landfill; therefore, there is no longer a discharge point to Ley Creek. Surface water can still flow along Stream B and

into Wetland C. If the water level in Ley Creek is lower than the water level in Wetland C, water from Wetland C will seep and/or discharge into Ley Creek.

Surface water flow in the stream appears to be primarily from surface water runoff from the South landfill and the adjacent CSX railroad property. Observations indicate that flow in the stream is generally limited to times of heavy runoff due to either rainfall events or snow melt. Generally, the upper one third of the stream area is dry for the majority of the year. Prior to the removal of the culvert pipe, observations indicated that surface water from Ley Creek flowed into the stream and south wetland during high water events in Ley Creek.

The drainage ditch is located along the northern boundary of the South landfill and Seventh North Street. The ditch is 1,075 feet in length and begins at the east corner of the South landfill. Flow in the ditch is to the west to its terminus where it discharges into Ley Creek. The ditch accepts discharge from a culvert pipe located at the head of the ditch and from the two 24-inch culvert pipes leading beneath the roadway from the North landfill area. The source of flow from the culvert pipe at the head of the ditch is unknown. The head of the ditch is located at an elevation of approximately two feet below the head of the South landfill stream reach (Stream B) and does not provide flow to the stream reach.

Based on the NYSDEC wetlands maps, the wetlands located on the North and South landfills are not under the jurisdiction of New York State; however, they may fall under United States Army Corps of Engineers (USACOE) jurisdiction.

3.0 ENFORCEMENT STATUS

In 1984, the CC-H Site was listed as a "Class 3" New York State Inactive Hazardous Waste Disposal Site (IHWDS) (Site No. 7-34-004) pursuant to Environmental Conservation Law 27-1301(2).

In May 2004, Cooper Industries, Inc. (Respondent) entered into a Consent Order (Index No.D-7-0002-01-07) for the CC-H Site, which became effective on May 14, 2004. Under the terms of the Consent Order the Respondent agreed to: 1) develop and implement a Preliminary Site Assessment (PSA) to characterize that nature and extent of impacts at the Site (completed on May 25, 2006); 2) depending on the findings of the PSA and the corresponding determination made by NYSDEC, to develop and implement an RI/FS for the Site (RI/FS Work Plan approved by NYSDEC on March 26, 2008; RI Report approved by NYSDEC on October 6, 2009); and 3) to perform any mutually agreed upon Interim Remedial Measures (IRMs).

Declaration of Covenants and Restrictions (DCR) were filed with the Onondaga County Clerk on September 15, 2004, in Book 4850 of Deeds at page 833 (Attachment 1). The DCR stipulates that the property (North and South Landfills) is subject to an Order on Consent between the NYSDEC and Cooper Industries, Inc. and that the restrictive covenant shall run with the land and be binding upon Cooper Industries, Inc., its successors and assigns.

In March of 2007, CC-H indicated that the NYSDEC had verbally indicated to CC-H that USEPA will not make the Site part of the Onondaga Lake Superfund site, and that NYSDEC would retain authority for the Site.

4.0 PROJECT DESCRIPTION

4.1 2012 Clearing and Hot Spot Removal Operations

Under the NYSDEC approved remedy for the site, removal of contaminated soils and transportation to an off-site licensed disposal facility was completed at three selected area within the North Landfill during October through November 2012 (Figure 3). At the same time, to allow an aerial photographic survey to be flown over both the North and South Landfills, all trees were cut to leave six-inch stumps, brush was cleared, and grass was mowed to a six-inch height.

Upon examination at the site by the NYSDEC, mowing up to the water's edge along Ley Creek and along all wetlands was completed to allow increased accuracy for the aerial survey.

4.2 Project Disturbance Area

Total Disturbed Area:	+/- 41 acres
Existing Total Impervious Area:	0 acres
Proposed Total Impervious Area:	0 acres

The landfills will be reconstructed in consecutive years. The South Landfill is scheduled for reconstruction in 2013. The North Landfill is scheduled for reconstruction in 2014. Waste relocation to the landfill centers from buffer zones, contaminated wetland sediment relocation to the landfill centers, wetland reconstruction/mitigation, and landfill capping are the project elements.

4.3 Description and Limitations of On-Site Soils

The soil disturbance for the proposed work is approximately 41 acres for all excavation and grading operations.

A summary of the soil composition in the project area is shown in Table 1. Descriptions of each soil type, according to the USDA Soil Survey of Onondaga, New York, are located in Appendix C.

Table 1 – Soil Analyses Summary

Soil Name	Hydrologic Soil Group
Ce – Carlisle muck	A/D
ChB – Collamer silt loam	C
ML – Made Land	No Classified Group (Assumed D)
Ub – Urban Land	No Classified Group (Assumed D)

The Natural Resource Conservation Service (NRCS, formerly known as the SCS), as part of their soil classification system, assigns each soil series to a Hydrologic Soil Group (HSG). The HSG is a four-letter index intended to indicate the minimum rate of infiltration obtained after prolonged wetting, and to indicate the relative potential for a soil type to generate runoff. The infiltration rate is the rate at which water enters the soil at the soil surface. The HSG also indicates the transmission rate – the rate at which water moves within the soil. Soil scientists define the four groups as follows:

- HSG 'A' (sand, loamy sand, or sandy loam): Soils have low runoff potential and high infiltration rates even when thoroughly wetted. They consist chiefly of deep, well to excessively drained sands or gravels and have a high rate of water transmission (> than 0.30 inches/hour).
- HSG 'B' (silt loam or loam): Soils have moderate infiltration rates when thoroughly wetted, and consist chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to fine texture. These soils have a moderate rate of water transmission (0.15 to 0.30 inches/hour).
- HSG 'C' (sandy clay loam): Soils have low infiltration rates when thoroughly wetted and consist chiefly of soils with a layer that impedes downward movement of water, and soils with moderately fine to fine texture. These soils have a low rate of water transmission (0.05 to 0.15 inches/hour).
- HSG 'D' (clay loam, silty clay loam, sandy clay, silty clay, or clay): Soils have high runoff potential. They have very low infiltration rates when thoroughly wetted, and consist chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a clay pan or clay layer at or near the surface, and shallow soils over nearly impervious material. These soils have a very low rate of water transmission (< 0.05 inches/hour).

4.4 Historic Places

The proposed project is not shown on the National Register of Historic Places. A Phase IA Cultural Resources Report is included as Appendix D.

4.5 Sequence of Major Activities

This SWPPP presents temporary erosion and sediment controls to assist the operator in compliance with the project's SPDES General Permit for construction activity. To the degree practicable, all temporary erosion and sediment control mitigation measures shall be installed immediately before associated project areas are disturbed in anticipation of all soil disturbing activities to follow. Based upon NYS DEC regulations, the owner or operator of a construction activity shall not disturb greater than five (5) acres of soil at any one time without prior written authorization from the Department or, in areas under the jurisdiction of a regulated, traditional land use control MS4, the MS4 (provided the MS4 is not the owner or operator of the construction activity). At a minimum, the owner or operator must comply with the following requirements in order to be authorized to disturb greater than five (5) acres of soil at any one time:

1. The owner or operator shall have a qualified inspector conduct at least two (2) site inspections in accordance with Part IV.C.2 every seven (7) calendar days, for as long as greater than five (5) acres of soil remain disturbed. When performing just two (2) inspections every seven (7) calendar days, the inspections shall be separated by a minimum of two (2) full calendar days.

2. In areas where soil disturbance activity has been temporarily or permanently ceased, temporary and/or permanent soil stabilization measures shall be installed and/or implemented within seven (7) days from the date the soil disturbance activity ceased. The soil stabilization measures selected shall be in conformance with the most current version of the technical standard, New York Standards and Specifications for Erosion and Sediment Control.

3. The owner or operator shall prepare a phasing plan that defines maximum disturbed area per phase and shows required cuts and fills.

4. The owner or operator shall install any additional site specific practices needed to protect water quality.

5. The owner or operator shall include the requirements above in their SWPPP.

Due to the nature of this project, it is intended to disturb more than 5 acres of land at one time. A waiver will be requested before grading operations commence.

It is the responsibility of the Contractor to ensure that all soils removed from the project site are spoiled in a manner consistent with all local, state, and federal regulations (particularly those governing hazardous waste sites). Appropriate erosion and sediment controls shall be installed at all spoil sites. Additionally, the Contractor is responsible for coordinating the application for a GP-0-10-001 permit (and development of an associated SWPPP) if disturbance associated with any soil spoils area is greater than 1 acre. GP-0-10-001 applications must be signed by the owner of the lands on which soils are spoiled.

This project will be carried out in multiple phases. See approved construction documents for actual construction sequencing. The South Landfill work will be conducted in the first calendar year (2013) and the North Landfill work will be conducted in the second calendar year (2014).

4.6 Name of Receiving Waters

Stormwater runoff moving off-site will eventually drain into Ley Creek (Class B), which is a 303(d) listed water body.

5.0 EROSION AND SEDIMENT CONTROL PRACTICES

This section presents erosion and control practices that will be used at the North and South Landfills.

5.1 Construction Road Stabilization

One gated access road into each (North and South) landfill currently exists. Extending from Seventh North Street inwards, the initial 50 feet of driveway access has been improved by adding six inches of gravel road base and being sloped away from Seventh North Street. This improvement has stabilized the driveways for heavy equipment use, provides a tracking road and clean-off station for vehicles leaving the site, and directs any water from vehicles away from the street.

Existing access roads on the landfill property are visible on historical landfill air photographs and will be used for access during operations to the extent possible. These access roads will be inspected and wood chips or imported gravel placed as needed to stabilize road surfaces to minimize rutting and reduce soil tracking off-site by clearing and grubbing vehicles.

Dump trucks hauling materials to and from the project site shall be covered with a tarpaulin to reduce dust. An existing decon pad is present at the entrance of each landfill with a rinse off station and an attendant or the driver will inspect any vehicle leaving the site. Any sediment and debris tracked from work area along project adjacent roadways shall be immediately removed with a street sweeper or equivalent sweeping method. Further, sweeping of streets adjacent to disturbed areas shall be performed prior to the end of each work day (at a minimum) when tracking of sediment is occurring.

5.2 Dust Control

Should dust control become an issue, a portable or truck mounted water pump will be used to draw water from an on-site wetland or stream for use in wetting down access roads. If construction operations cause excessive dust, work areas will be wetted down as necessary using on-site water.

5.3 Timing of Controls/Measures

The erosion and sediment control measures shall be constructed prior to clearing or grading of any portion of the project. Where land disturbance is necessary, temporary seeding or mulching must be used on areas which will be exposed for more than 7 days. Permanent stabilization should be performed as soon as possible after completion of grading. After the entire project area is stabilized, the accumulated sediment shall be removed from the project area. Erosion control devices shall remain in place until disturbed areas are permanently stabilized. For projects where soil disturbance is greater than five (5) acres, and construction activity has temporarily or permanently ceased, temporary and/or permanent soil stabilization measures shall be installed and/or implemented within seven (7) days from the date the soil disturbance activity ceased. The

soil stabilization measures selected shall be in conformance with the most current version of the technical standard, New York Standards and Specifications for Erosion and Sediment Control.

Excavations will occur in the order shown on each design drawing sheet to move from areas of higher elevation to areas of lower elevation. This will allow drainage from each higher elevation area sampled as "clean" to be collected at any temporary swale without re-contaminating the contacted soils.

Excavated soils will be transported to the landfill interior to a pre-determined area as indicated on the contractor's written work plan. The only exception to this will be PCB sediment cells in the North Landfill that will be transported off-site to a TSCA landfill. The contractor's written work plan will be updated on a weekly basis, approved by the on-site engineer, and available on-site for review by any interested party.

Each pre-determined area will have a silt fence perimeter and an interior temporary swale (Figure 6) sized to contain the water quality volume as defined in Section 4.2 of the New York State Stormwater Management Design Manual. The objective is for all interior water to either seep into the ground or evaporate and not leave the pre-determined area silt fence perimeter. Localized areas within the landfill interior may allow excavated soil piling within a pre-determined are without perimeter silt fence if sufficient WQ_v capacity makes a silt fence perimeter unnecessary. This will occur if the swale can be shown to contain 300% of the calculated water quality volume. A silt fence perimeter will always be present on the landfill cap area perimeter (Figure 3).

5.4 Erosion and Sediment Controls / Stabilization Practice

5.4.1 Temporary Stabilization

Topsoil stockpiles, staging areas and disturbed pervious portions of the project area where construction activity temporarily ceases for at least 7 days shall be stabilized with temporary seed and mulch no later than 7 days from the last construction activity in that area.

Temporary seed shall be ryegrass applied at the rates specified below:

- If seeding in spring, summer or early fall then seed with annual or perennial rye at a rate of 30 lbs per acre. If area is to remain stabilized over the winter into the following spring use perennial rye only.
- If seeding in late fall or early winter, use certified Aroostook winter rye (cereal rye) at a rate of 90 lbs per acre.

Any seeding method may be used that will provide uniform application of seed to the area and result in relatively good soil to seed contact. The area must be free of large rocks and debris and seeded within 24 hours of disturbance or scarification of the soil surface will be necessary prior to seeding. Fertilizer or lime is not typically used for temporary plantings.

Mulch shall be applied in conjunction with seeding and applied at the rate of 90 lbs per 1000 square feet. Mulch shall be reapplied as necessary.

Proposed grades which will have slopes steeper than 3:1 shall be stabilized with erosion control fabric. (These specific areas have been highlighted on the Grading Sheets.)

Temporary diversion swales shall be installed on site where necessary. A diversion swale is designed to divert runoff around active construction areas to a point of discharge.

Rip-rap outlet protection shall be installed at all stormwater end sections, including that from the temporary sediment basin(s). Rip-rap material shall be hard, durable field or quarry stone which is angular and resists breaking down when exposed to water or weathering.

Sediment control fencing shall be installed around the site where depicted on the attached plan (Figures 3 and 4). Prior to commencing any earthwork, the existing stabilized construction entrances shall be inspected and improved to comply with the attached plans. These entrances shall be utilized as the exclusive construction entrances and exits to the construction areas. Construction traffic shall be limited to the construction entrances.

5.4.2 Permanent Stabilization

Disturbed portions of the project area where construction activities permanently cease shall be stabilized with permanent seed no later than 7 days after the last construction activity. The permanent seed mix shall be in accordance with the project specifications and plans. Construction and maintenance of erosion and siltation control measures are in accordance with the New York Standards and Specifications for Erosion and Sediment Control.

Where construction activity is complete over areas to be permanently vegetated, stabilize with permanent seeding. Verify seeding dates with engineer. If engineer determines that seed cannot be applied due to climate, topsoil shall not be spread and mulching shall be applied to the exposed surface to stabilize soils until the next recommended seeding period.

5.4.3 Winter Operation

If construction activities proceed through the winter season, access points should be enlarged and stabilized to provide for snow stockpiling. Drainage structures should be kept open and free of potential snow and ice dams. Inspection and maintenance are necessary to ensure the function of these practices during runoff events. For sites where construction activities temporarily cease, temporary and/or permanent soil stabilization measures shall be installed within seven (7) days from the date the soil disturbing activity

ceased. Disturbed areas should be stabilized with seed and mulch, or other approved methods, even if the ground is covered by significant amounts of snow.

5.4.4 Winter Shutdown

Site inspections (by the qualified inspector) may be decreased to a minimum of one (1) time every thirty (30) days for sites where soil disturbing activities have ceased and at least 80% of the site has been stabilized with an approved method. Inlet protection should be installed and/or repaired before shutdown of the site. The owner or operator shall provide written notification to the respective DEC regional office prior to reducing the frequency of any site inspections.

5.4.5 Waste Disposal

Waste materials and foreign waste materials shall be collected and stored in a secured area until removal and disposal by a licensed solid waste management company. All trash and construction debris from the project area shall be disposed of in a portable container unit. No foreign waste materials shall be buried within the project area. All personnel shall be instructed regarding the correct procedure for waste disposal. Notices stating these practices shall be posted in the project trailer and the individual who manages day-to-day project operations will be responsible for seeing that these procedures are followed.

Petroleum-Impacted/Hazardous Waste – During the excavation activities, there is the potential that petroleum impacted soils and/or hazardous waste may be encountered. Except for the defined TSCA sediment areas in the North Landfill, all excavated wastes will be relocated to the area to be capped. Drums and tires discovered during project activities will be segregated and disposed of off-site per current NYSDEC regulations.

Sanitary Waste - Any sanitary waste from portable units shall be collected from the portable units by a licensed sanitary waste management contractor, as required by NYS DEC regulations.

5.4.6 Non-Stormwater Discharges

Non-stormwater discharges are not expected to exit the project sites during construction.

5.4.7 Certification of Compliance with Federal, State, & Local Regulations

The stormwater pollution prevention plan reflects the New York State requirements for stormwater management and erosion and sediment control. To ensure compliance, this plan was prepared in accordance with New York State Standards. There are no other applicable State or Federal requirements for sediment and erosion plans (or permits), or stormwater management plans (or permits).

6.0 POST-CONSTRUCTION STORMWATER MANAGEMENT

6.1 Methodology

In order to evaluate the potential impacts associated with the proposed project, existing and proposed conditions were examined. At each landfill, only land grading activities which do not change overall drainage patterns will take place. No impervious surfaces are proposed throughout either site. Any slight increase in peak flows after construction will be mitigated by detention swales surrounding the landfill cap areas.

Local drainage patterns within the landfill areas will be altered with the sediment and waste consolidation activities locating mounds at the center of each landfill. Construction of the landfill caps in compliance with 6 NYCRR Part 360 and re-vegetation of the buffer zone areas will ensure that the proposed conditions will similarly cause no increase in peak flow leaving the site after construction.

The Enhanced Phosphorus Removal Standards are required in on-site stormwater management practices due to the project location within the Onondaga Lake Watershed. All on-site flow is directed to on-site streams and wetlands where extended retention takes place. The drains to the ditch along 7th North Street that empties into Ley Creek are located at the ends of Streams A and B so that any stormwater entering the ditch has traveled the maximum distance from the center of the site over vegetated cover.

6.2 Existing Conditions

South Landfill – 19.4 acres in size covered with tree stumps, brush, and grasses. Essentially flat across the area, with radial drainage to a stream, wetlands, Ley Creek, and a ditch along 7th North Street.

North Landfill – 21.48 acres in size covered with tree stumps, brush, and grasses. Slightly higher elevations along the north edge draining to the south, east, and west, into a stream, wetlands, and to a ditch along 7th North Street.

6.3 Proposed Conditions

South Landfill – 19.4 acres in size, with a mounded landfill cap in the center bordered by a vegetated buffer zone to the east, south and west. Drainage will occur through the buffer zones to a stream, wetlands, Ley Creek, and a ditch along 7th North Street.

North Landfill – 21.48 acres in size, with a mounded landfill cap in the center bordered by a vegetated buffer zone to the east and west. Drainage will occur through the buffer zones to a stream, wetlands, and a ditch along 7th North Street.

Proposed conditions are indicated on Figure 5.

6.4 Floodplains

Flood insurance maps indicate that the CC-H Site is located within the 100 year flood plain of Ley Creek as defined by the Federal Emergency Management Agency (FEMA). The base flood water surface elevation for the site is 374-375 AMSL. No negative impact will be present due this location.

In November of 2013, upon receipt of comments from the City of Syracuse, calculations were performed to verify that the construction of the North and South Landfill caps, adjacent buffer zones, and wetland sediment relocations would result in no net loss of flood storage at either landfill for the 100-year flood at elevation 374 feet. Appendix E contains the calculations and modifications to the 95% design. The modifications to the design are included in the Final Design documents.

7.0 MAINTENANCE / INSPECTION PROCEDURES

7.1 Erosion and Sediment Control Inspection and Maintenance Practices

These are the minimum required inspection and maintenance practices that shall be used to maintain erosion and sediment controls:

Owner/Operator Inspection Requirements

- Prior to construction activity the owner/operator shall have contractors and sub-contractors identify a trained individual responsible for the implementation of the SWPPP. The trained individual must be on-site on a daily basis when soil disturbing activities are occurring.
- The owner/operator shall inspect the erosion and sediment control measures as identified in the SWPPP to ensure that they are being maintained in effective operating conditions at all times. Where soil disturbing activities temporarily cease and temporary stabilization measures have been applied to all disturbed areas, the owner/operator can stop conducting inspections. The owner/operator shall resume inspections when soil disturbing activities begin again.
- Where soil disturbing activities have ceased with partial project completion, the owner/operator can stop conducting inspections when disturbed areas have reached final stabilization. All post construction stormwater management practices required for the completed areas shall have been constructed in conformance with the SWPPP and be fully operational. Final stabilization means that all soil disturbance activities have ceased and a uniform, perennial vegetative cover with a density of eighty (80) percent over the entire pervious surface has been established; or other equivalent stabilization measures, such as permanent landscape mulches, rock rip-rap or washed/crushed stone have been applied on all disturbed areas that are not covered by permanent structures, concrete or pavement.
- The owner/operator shall notify the DEC Regional Office's stormwater contact person or, in areas under the jurisdiction of a regulated, traditional land use MS4, the MS4 prior to any reduction in the frequency of site inspections.
- The owner/operator shall retain copies of the NOI, SWPPP, MS4 SWPPP acceptance form and any inspection reports submitted in conjunction with this permit and records or all data used to complete the NOI to be covered by this permit for a period of at least five (5) years from the date that the site is finally stabilized.

Qualified Inspector Inspection Requirements

- The qualified inspector is defined as a person that is knowledgeable in the principles and practices of erosion and sediment control, such as a licensed Professional Engineer, Certified Professional in Erosion and Sediment Control (CPESC), licensed Landscape Architect, or other Department endorsed individual(s). It may also mean someone working under the direct supervision of the licensed Professional Engineer or licensed Landscape Architect, provided that

person has training in the principles and practices of erosion and sediment control. Training in the principles and practices of erosion and sediment control means the person has received four (4) hours of training endorsed by the Department and shall receive four (4) hours of training every three (3) years after the initial training.

- A site inspection in accordance with Part IV.C shall be conducted at least once every seven (7) days by the qualified inspector when soil disturbing activities are occurring. Inspections must be conducted at least twice every seven (7) calendar days when soil disturbance is 5 acres or more with no less than 2 calendar days between inspections. A copy of the "Construction Duration Inspection Form" is included in the "inspection forms" section of this plan.
- All measures shall be maintained in good working order; if any repairs or corrective actions are necessary, it is the responsibility of the qualified inspector to notify the owner/operator and appropriate contractor within one business day. The contactor shall begin implementing the corrective action within one business day of being notified.
- All inspection forms must be signed by a qualified inspector.
- For construction sites where soil disturbing activities are temporarily suspended, temporary stabilization measures shall be applied and the qualified inspector shall conduct a site inspection at least once every thirty (30) calendar days.
- Where soil disturbing activities have ceased with partial project completion the qualified inspector can stop conducting inspections when disturbed areas have reached final stabilization and all post construction stormwater management practices required for the completed areas have been constructed in conformance with the SWPPP and are fully operational.
- Where soil disturbing activities are not resumed within two (2) years, from the date of shut down of partial project completion, the qualified inspector shall perform a final inspection and certify that all disturbed areas have achieved final stabilization, all temporary and permanent erosion control measures have been removed, and post-construction stormwater management practices have been constructed in conformance with the SWPPP. Qualified inspector shall sign the "Final Stabilization" and "Post-Construction Stormwater Management Practice" certification statements on the Notice of Termination (NOT).

General Requirements

- A copy of the SPDES General Permit (GP-0-10-001), SWPPP and inspection reports shall be maintained onsite until the site has achieved final stabilization.
- Built up sediment shall be removed from any silt fence when it has reached one-third the height of the fence / dike.
- Sediment fencing shall be inspected for depth of sediment, and tears, to see if fabric is securely attached to the fence posts, and to see that the fence posts are firmly in the ground.
- The construction entrance shall be cleaned of sediment and redressed when voids in the crushed stone become filled and vehicular tracking of sediment is occurring.

- Dust shall be controlled on access points and other disturbed areas subject to surface dust movement and blowing.
- Stabilization fabric and check dams shall be inspected to ensure that slopes and swales are not being eroded. Fabric shall be replaced / reinstalled and rock dams added as necessary to prevent any such erosion.
- Inspection of swales shall be conducted to check condition of swale.
- Inspection must verify that all practices are adequately operational, maintained properly and that sediment is removed from all control structures.
- Inspection must look for evidence of soil erosion on the site, potential of pollutants entering drainage systems, problems at the discharge points, and signs of soil and mud transport from the site to the public road.

7.2 Post-Construction Stormwater Inspection and Maintenance Practices

CCH will maintain ownership of the site and will be responsible for maintaining the drainage system. Long-term inspection forms for the stormwater management practices (included in Appendix F of this plan) are referenced from Appendix G of the New York State Stormwater Management Design Manual.

8.0 INVENTORY FOR POLLUTION PREVENTION PLAN

The materials or substances listed below are expected to be within the project area during construction:

- Fertilizers / seeding materials
- Stone
- Petroleum based products
- Straw bales (Hay will not be used per City of Syracuse requirement)
- Silt fence fabric
- Lumber
- Pavement marking paint
- Iron pipe and corrugated metal pipe (CMP)
- Bonded fiber matrix material
- HDPE Geomembrane material

9.0 SPILL PREVENTION

The following are the material management practices that shall be used to reduce the risk of spills or other accidental exposure of materials and substances to stormwater runoff.

9.1 Good Housekeeping

The following good housekeeping practices shall be followed within project areas during construction:

- An effort shall be made to store only enough products required to do the job.
- All materials stored within project areas shall be stored in a neat, orderly manner in their appropriate containers and, if possible, under a roof or other enclosure.
- Products shall be kept in their original containers with the original manufacturer's label.
- Substances shall not be mixed with one another unless recommended by the manufacturer.
- Whenever possible, all of a product shall be used up before disposing of the container.
- Manufacturers' recommendations for proper use and disposal shall be followed.
- The project superintendent shall inspect daily to ensure proper use and disposal of materials.

9.2 Hazardous Products

These practices are used to reduce the risks associated with hazardous materials:

- Products shall be kept in original containers unless they are not resealable.
- Original labels and material safety data shall be retained.
- If surplus product must be disposed of, manufacturers' or local and state recommended methods of proper disposal shall be followed.
- Material Safety Data Sheets for all hazardous products shall be within the project area for the duration of construction.

9.3 Product Specific Practices

The following product-specific practices shall be followed within the project areas:

9.3.1 Petroleum Products

All project related vehicles shall be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage. Petroleum products shall be stored in tightly sealed containers which are clearly labeled.

Any asphalt substances used during construction shall be applied according to the manufacturer's recommendations**.**

9.3.2 Fertilizers

Fertilizers used shall be applied only in the minimum amounts recommended by the manufacturer. Once applied, fertilizer shall be worked into the soil to limit exposure to stormwater. Fertilizers shall be stored in a covered or other contained area.

9.3.3 Paints

All containers shall be tightly sealed and stored when not required for use. Excess paint shall not be discharged to the storm sewer system but shall be properly disposed of according to manufacturer's instructions or State regulations.

9.3.4 Watercourse Protection

Construction operations shall be conducted in such a manner as to prevent damage to watercourses from pollution of debris, sediment, or other foreign material, or from manipulation, from equipment and/or materials in or near the watercourse. The contractor shall not return directly to the watercourse any water used for wash purposes or other similar operations which may cause the water to become polluted with sand, silt, cement, oil or other impurities. If the contractor uses water from the water course, the contractor shall construct an intake or temporary dam to protect and maintain watercourse water quality.

9.3.5 Spill Control Practices

The contractor will be responsible for preparing a project area specific spill control plan in accordance with local and NYS DEC regulations. At a minimum this plan should:

- Reduce stormwater contact if there is a spill.
- Contain the spill.
- Stop the source of the spill.
- Dispose of contaminated material in accordance with manufactures procedures, and NYSDEC regulations.
- Identify responsible and trained personnel.
- Ensure spill area is well ventilated.

10.0 UPDATING THE SWPPP

The SWPPP shall be updated/revised as conditions merit or as directed by the regulating authority. The attached inspection forms included with this document allows for the certification of any updates/revisions.

11.0 SWPPP CERTIFICATION

Contracting Firm Information:

_____

Contracting Firm

_____

Address

_____

City/Town **State** **Zip**

Site Location:

CCH Landfills
Wolf and 7th North Streets
City of Syracuse (South Landfill) and Town of Salina (North Landfill)
Onondaga County, NY

Contractor's Certification

I hereby certify that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the qualified inspector during a site inspection. I also understand that the owner or operator must comply with the terms and conditions of the New York State Pollutant Discharge Elimination System (SPDES) general permit for stormwater discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

_____

Signature (Contractor/Subcontractor) **Date**

_____

For

_____

Responsible For

_____

Signature (Trained Individual) **Date**

_____

For

_____

Responsible For

_____

Signature (Contractor/Subcontractor) **Date**

For

_____

Responsible For

_____

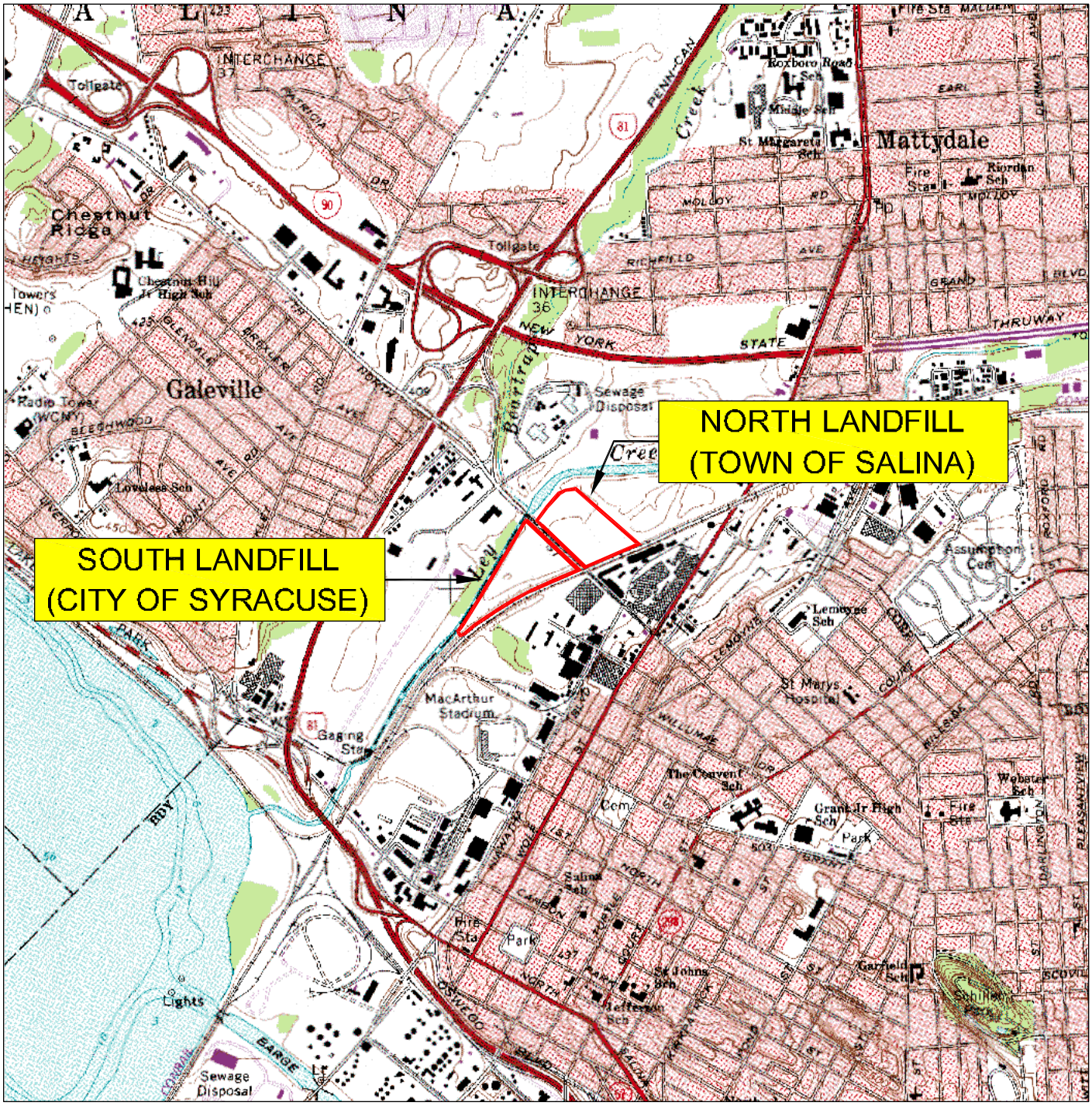
Signature (Trained Individual) **Date**

_____

For

_____

Responsible For



National Geodetic Vertical Datum of 1929
Contour Interval 10 Feet

SCALE
0 5000
FEET

QUADRANGLE LOCATION

N

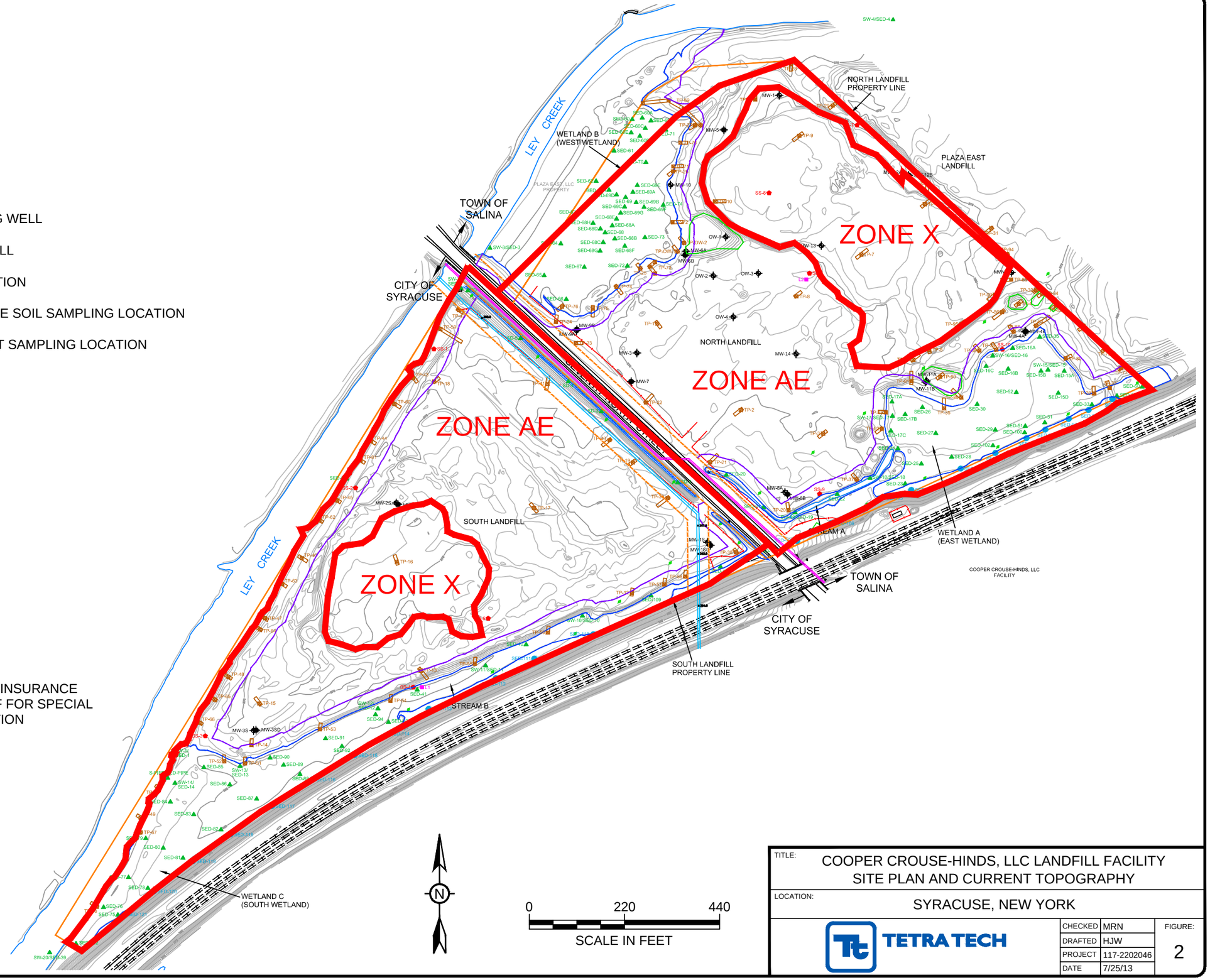
Base map from U.S.G.S. 7.5' SYRACUSE WEST, NEW YORK topographic quadrangle map.

COOPER CROUSE-HINDS, LLC LANDFILL FACILITY SYRACUSE, NEW YORK	DATE: 8/1/12
	DESIGNED: HJW
SITE LOCATION MAP	CHECKED: MRN
	APPROVED: MRN
	DRAWN: HJW
	PROJ.: 117-2202046
TETRA TECH	Figure 1

S:\CAD\COOPER\SYRACUSE\12-11-09\2202036FIG1.DWG

EXPLANATION

- MW-3S — SHALLOW AQUIFER MONITORING WELL
- MW-3SD — DEEP AQUIFER MONITORING WELL
- SS-1 — SURFACE SOIL SAMPLING LOCATION
- SED-95 — SURFACE SOIL AND SUBSURFACE SOIL SAMPLING LOCATION
- SW-1/SED-1 — SURFACE WATER AND SEDIMENT SAMPLING LOCATION
- SED-27 — SEDIMENT SAMPLING LOCATION
- TP-48 — TEST PIT LOCATION
- L1 — LEACHATE SAMPLING LOCATION
- WETLAND BOUNDARY
- LEY CREEK / WETLAND BUFFER
- PROPERTY BOUNDARY
- EASEMENT
- WATER MAIN
- GAS MAIN
- EXISTING CHAIN LINK FENCE
- ELECTRIC UTILITY POLE
- ZONE X AND ZONE AE: SEE FIRE INSURANCE RATE MAP NUMBER 36067C0208F FOR SPECIAL FLOOD HAZARD AREA DESIGNATION



TITLE:	COOPER CROUSE-HINDS, LLC LANDFILL FACILITY SITE PLAN AND CURRENT TOPOGRAPHY
LOCATION:	SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN	FIGURE:
DRAFTED	HJW	2
PROJECT	117-2202046	
DATE	7/25/13	

S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\SITE PLAN.DWG

EXPLANATION

MW-3S — EXISTING SHALLOW AQUIFER MONITORING WELL. INSTALL STRAW BALES TO SURROUND WELL WITH ORANGE TRAFFIC CONES ON TOP - 2 CONES PER WELL. ABANDON / RECONSTRUCT AS DIRECTED BY ENGINEER

MW-3SD — EXISTING DEEP AQUIFER MONITORING WELL. INSTALL STRAW BALES TO SURROUND WELL WITH ORANGE TRAFFIC CONES ON TOP - 2 CONES PER WELL. ABANDON / RECONSTRUCT AS DIRECTED BY ENGINEER

SOIL REMOVAL AREA ADJACENT TO WETLAND

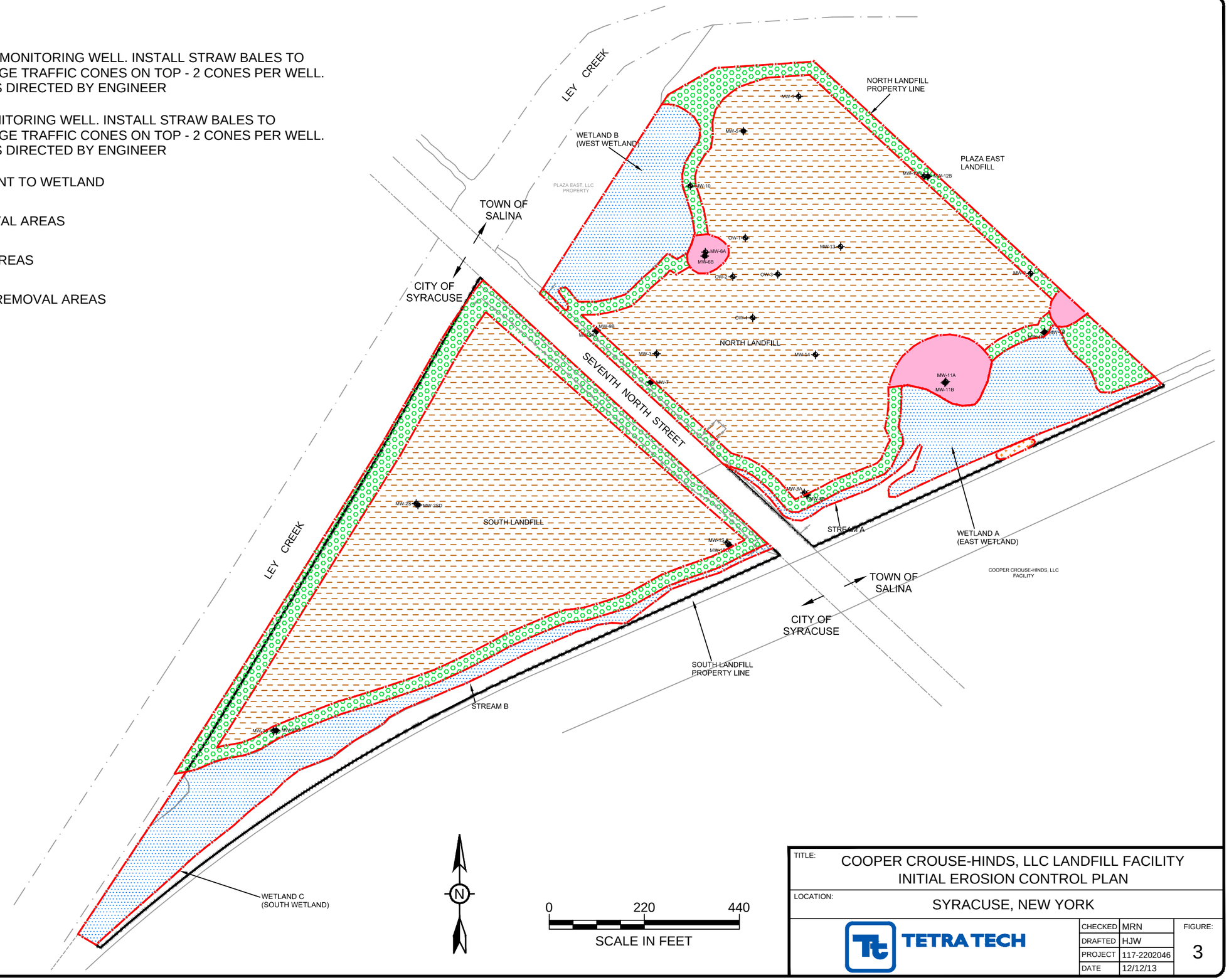
WETLANDS SEDIMENT REMOVAL AREAS

BUFFER ZONE EXCAVATION AREAS

2012 COMPLETED HOT SPOT REMOVAL AREAS

LANDFILL CAP AREA

SILT FENCE PERIMETER



TITLE:	COOPER CROUSE-HINDS, LLC LANDFILL FACILITY INITIAL EROSION CONTROL PLAN
LOCATION:	SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN	FIGURE:
DRAFTED	HJW	3
PROJECT	117-2202046	
DATE	12/12/13	

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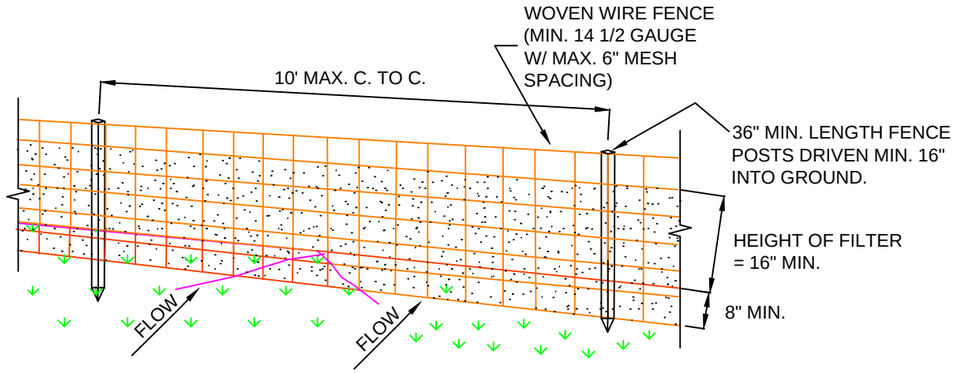
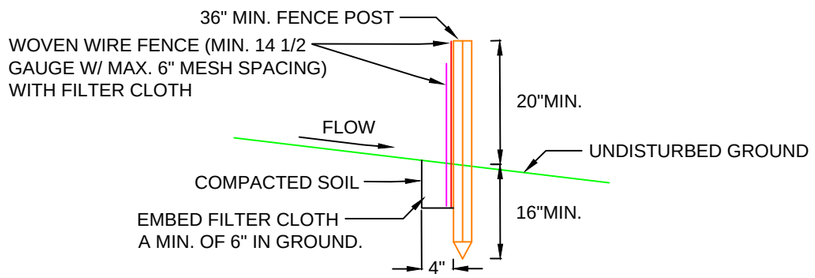


PERSPECTIVE VIEW

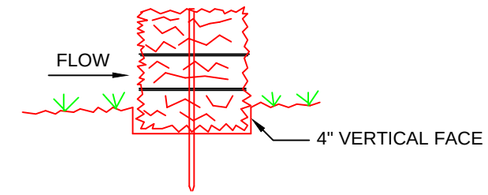


SECTION VIEW

CONSTRUCTION SPECIFICATIONS

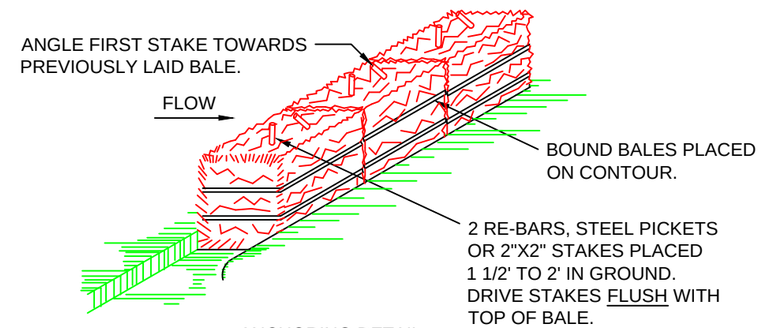
1. WOVEN WIRE FENCE TO BE FASTENED SECURELY TO FENCE POSTS WITH WIRE TIES OR STAPLES. POSTS SHALL BE STEEL EITHER "T" OR "U" TYPE OR HARDWOOD.
2. FILTER CLOTH TO BE TO BE FASTENED SECURELY TO WOVEN WIRE FENCE WITH TIES SPACED EVERY 24" AT TOP AND MID SECTION. FENCE SHALL BE WOVEN WIRE, 12 1/2 GAUGE, 6" MAXIMUM MESH OPENING.
3. WHEN TWO SECTIONS OF FILTER CLOTH ADJOIN EACH OTHER THEY SHALL BE OVER-LAPPED BY SIX INCHES AND FOLDED. FILTER CLOTH SHALL BE EITHER FILTER X, MIRAFI 100X, STABILINKA T140N, OR APPROVED EQUIVALENT.
4. PREFABRICATED UNITS SHALL BE GEOFAB, ENVIROFENCE, OR APPROVED EQUIVALENT.
5. MAINTENANCE SHALL BE PERFORMED AS NEEDED AND MATERIAL REMOVED WHEN "BULGES" DEVELOP IN THE SILT FENCE.

SILT FENCE DETAIL



BEDDING DETAIL
NOT TO SCALE

DRAINAGE AREA NO MORE THAN 1/4 ACRE PER 100 FEET OF STRAW BALE DIKE FOR SLOPES LESS THAN 25%.



ANCHORING DETAIL
NOT TO SCALE

CONSTRUCTION SPECIFICATIONS

1. BALES SHALL BE PLACED AT THE TOE OF A SLOPE OR ON THE CONTOUR AND IN A ROW WITH ENDS TIGHTLY ABUTTING THE ADJACENT BALES.
2. EACH BALE SHALL BE EMBEDDED IN THE SOIL A MINIMUM OF (4) INCHES, AND PLACED SO THE BINDINGS ARE HORIZONTAL.
3. BALES SHALL BE SECURELY ANCHORED IN PLACE BY EITHER TWO STAKES OR RE-BARS DRIVEN THROUGH THE BALE. THE FIRST STAKE IN EACH BALE SHALL BE DRIVEN TOWARD THE PREVIOUSLY LAID BALE AT AN ANGLE TO FORCE THE BALES TOGETHER. STAKES SHALL BE DRIVEN FLUSH WITH THE BALE.
4. INSPECTION SHALL BE FREQUENT AND REPAIR REPLACEMENT SHALL BE MADE PROMTLY AS NEEDED.
5. BALES SHALL BE REMOVED WHEN THEY HAVE SERVED THEIR USEFULLNESS SO AS NOT TO BLOCK OR IMPEDE STORM FLOW OR DRAINAGE.

STRAW BALE DIKE DETAIL

TITLE:	COOPER CROUSE-HINDS, LLC LANDFILL FACILITY SILT FENCE AND STRAW BALE DIKE DETAILS		
LOCATION:	SYRACUSE, NEW YORK		
TETRA TECH	CHECKED	MRN	FIGURE:
	DRAFTED	HJW	4
	PROJECT	117-2202046	
	DATE	2/25/13	

S:\CAD\COOPER\SYRACUSE\8-5-10\2202036FIG5.DWG

EXPLANATION

- PROPOSED FINAL TOPOGRAPHY
- EXCAVATION LIMITS
- PROPERTY BOUNDARY
- EASEMENT
- WATER MAIN
- EXISTING CHAIN LINK FENCE
- BUFFER ZONE
- RECONSTRUCTED EMERGENT WETLAND
- OPEN WATER WITH RECONSTRUCTED EMERGENT WETLAND PERIPHERY
- ZONE X AND ZONE AE: SEE FIRE INSURANCE RATE MAP NUMBER 36067C0208F FOR SPECIAL FLOOD HAZARD AREA DESIGNATION

TITLE: COOPER CROUSE-HINDS, LLC LANDFILL FACILITY

FINAL TOPOGRAPHY AND WETLAND RECONSTRUCTION / MITIGATION PLAN

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN	FIGURE:
DRAFTED	HJW	5
PROJECT	117-2202046	
DATE	12/12/13	

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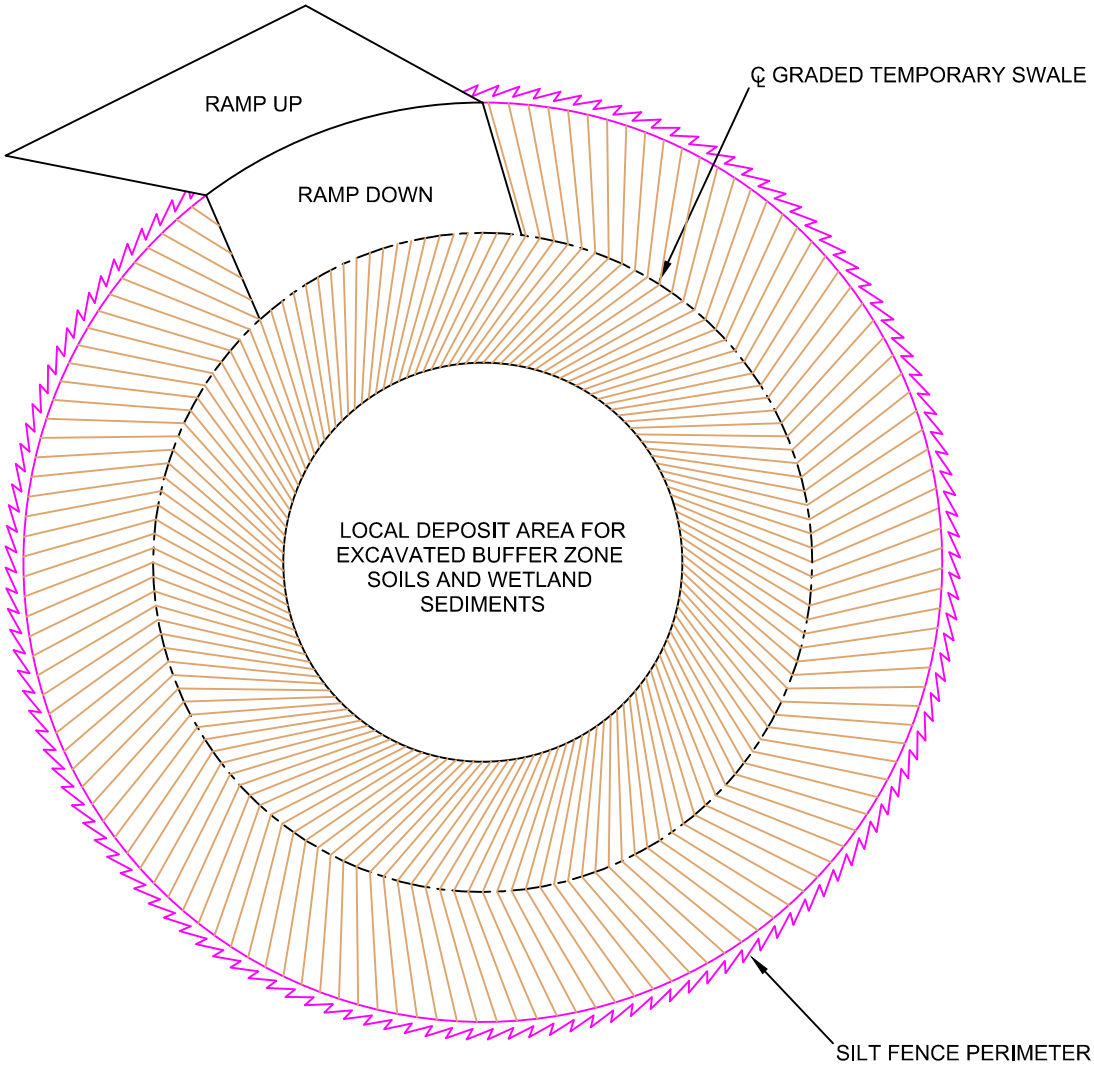

NOTES:

1. DETERMINE TARGET AREA WITHIN LANDFILL CAP AREA TO DEPOSIT EXCAVATED SOILS / SEDIMENTS.
2. GRADE TEMPORARY SWALE SURROUNDING TARGET AREA TO CONTAIN WATER QUALITY VOLUME PER SECTION 4.2 OF NEW YORK STATE STORMWATER DESIGN MANUAL (WQV).
3. PLACE SILT FENCE AT SWALE PERIMETER UNLESS TEMPORARY SWALE VOLUME ≥3WQV.
4. SWALE SHAPE MAY VARY.
5. EXISTING TOPOGRAPHY MAY BE USED FOR SWALE.

LANDFILL CAP SEGMENT AREA PLAN

COOPER CROUSE-HINDS, LLC LANDFILL FACILITY SYRACUSE, NEW YORK	DATE: 8/28/13	
	DESIGNED:	HJW
LANDFILL CAP SEGMENT AREA TEMPORARY STORMWATER SWALE	CHECKED:	MRN
	APPROVED:	MRN
	DRAWN:	HJW
	PROJ.: 117-2202046	
TETRA TECH	Figure 6	

S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\8-22-13\FIG 6 SEGMENT AREA.DWG

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures.** Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 18. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum.** For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov/ or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC- 3, #9202
1315 East- West Highway
Silver Spring, MD 20910- 3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713- 3242,** or visit its website at http://www.ngs.noaa.gov/.

Base map information shown on this FIRM was derived from digital othophotography provided by the New York Office of Cyber Security & Critical Infrastructure from photography dated April 2006.

This map reflects more detailed and up- to- date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in *the Flood Insurance Study report (which contains authoritative hydraulic data* may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de- annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1- 800- 358- 9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a *Flood Insurance Study report*, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1- 800- 358- 9620 and its website at http://www.msc.fema.gov/.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1- 877- FEMA MAP** (1- 877- 336- 2627) or visit the FEMA website at http://www.fema.gov/.

This digital FIRM was produced through a unique cooperative partnership between the New York State Department of Environmental Conservation (NYSDEC) and FEMA. As part of the effort, NYSDEC has joined in a Cooperative Technical Partnership agreement to produce and maintain FEMA's digital FIRM.

LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

A — A	Cross section line
23 - - - - - 23	Transect line
97°07'30", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)
4275 000m N	1000-meter Universal Transverse Mercator grid values, zone 18
6000000 FT	5000-foot grid ticks: New York State Plane coordinate system, central zone (FIPSZONE 3102), Transverse Mercator
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
• M1.5	River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1- 800- 638- 6620.

MAP SCALE 1" = 500'

250 0 500 1000 FEET

150 0 150 300 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0208F

FIRM
FLOOD INSURANCE RATE MAP
ONONDAGA COUNTY, NEW YORK
(ALL JURISDICTIONS)

PANEL 208 OF 520

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
GEDDES, TOWN OF	360579	0208	F
SALINA, TOWN OF	360591	0208	F
SYRACUSE, CITY OF	360595	0208	F

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
36067C0208F

EFFECTIVE DATE

Federal Emergency Management Agency

APPENDIX A

SPDES GENERAL PERMIT # GP-0-10-001

NEW YORK STATE
DEPARTMENT OF ENVIRONMENTAL CONSERVATION

SPDES GENERAL PERMIT
FOR STORMWATER DISCHARGES

from

CONSTRUCTION ACTIVITY

Permit No. GP-0-10-001

Issued Pursuant to Article 17, Titles 7, 8 and Article 70
of the Environmental Conservation Law

Effective Date: January 29, 2010 Expiration Date: January 28, 2015

William R. Adriance
Chief Permit Administrator

William R. Adriance January 28, 2010
Authorized Signature Date

Address: NYS DEC
Div. Environmental Permits
625 Broadway, 4th Floor
Albany, N.Y. 12233-1750

PREFACE

Pursuant to Section 402 of the Clean Water Act ("CWA"), stormwater *discharges* from certain *construction activities* are unlawful unless they are authorized by a *National Pollutant Discharge Elimination System ("NPDES")* permit or by a state permit program. New York's *State Pollutant Discharge Elimination System ("SPDES")* is a NPDES-approved program with permits issued in accordance with the *Environmental Conservation Law ("ECL").*

This general permit ("permit") is issued pursuant to Article 17, Titles 7, 8 and Article 70 of the ECL. An *owner or operator* may obtain coverage under this permit by submitting a Notice of Intent ("NOI") to the Department. Copies of this permit and the NOI for New York are available by calling (518) 402-8109 or at any New York State Department of Environmental Conservation ("the Department") regional office (see Appendix G).They are also available on the Department's website at:

http://www.dec.ny.gov/

An *owner or operator* of a *construction activity* that is eligible for coverage under this permit must obtain coverage prior to the *commencement of construction activity*. Activities that fit the definition of "*construction activity*", as defined under 40 CFR 122.26(b)(14)(x), (15)(i), and (15)(ii), constitute construction of a point source and therefore, pursuant to Article 17-0505 of the ECL, the *owner or operator* must have coverage under a SPDES permit prior to *commencing construction activity*. They cannot wait until there is an actual *discharge* from the construction site to obtain permit coverage.

***Note: The italicized words/phrases within this permit are defined in Appendix A.**

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
SPDES GENERAL PERMIT FOR STORMWATER DISCHARGES

FROM CONSTRUCTION ACTIVITIES

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Part I. PERMIT COVERAGE AND LIMITATIONS

A. Permit Application - This permit authorizes stormwater *discharges* to *surface waters of the State* from the following *construction activities* identified within 40 CFR Parts 122.26(b)(14)(x), 122.26(b)(15)(i) and 122.26(b)(15)(ii), provided all of the eligibility provisions of this permit are met:

1. *Construction activities* involving soil disturbances of one (1) or more acres; including disturbances of less than one acre that are part of a *larger common plan of development or sale* that will ultimately disturb one or more acres of land; excluding *routine maintenance activity* that is performed to maintain the original line and grade, hydraulic capacity or original purpose of a facility;

2. *Construction activities* involving soil disturbances of less than one (1) acre where the Department has determined that a *SPDES* permit is required for stormwater *discharges* based on the potential for contribution to a violation of a *water quality standard* or for significant contribution of *pollutants* to *surface waters of the State.*

3. *Construction activities* located in the watershed(s) identified in Appendix D that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land.

B. Maintaining Water Quality - It shall be a violation of this permit and the *ECL* for any *discharge* to either cause or contribute to a violation of *water quality standards* as contained in Parts 700 through 705 of Title 6 of the Official Compilation of Codes, Rules and Regulations of the State of New York, such as:

1. There shall be no increase in turbidity that will cause a substantial visible contrast to natural conditions;

2. There shall be no increase in suspended, colloidal or settleable solids that will cause deposition or impair the waters for their best usages; and

3. There shall be no residue from oil and floating substances, nor visible oil film, nor globules of grease.

C. Eligibility Under This General Permit

1. This permit may authorize all *discharges* of stormwater from *construction activity* to *surface waters of the State* and *groundwaters* except for ineligible *discharges* identified under subparagraph D. of this Part.

2. Except for non-stormwater *discharges* explicitly listed in the next paragraph, this permit only authorizes stormwater discharges from *construction activities*.

(Part I. C)

3. Notwithstanding paragraphs C.1 and C.2 above, the following non-stormwater *discharges* may be authorized by this permit: discharges from fire fighting activities; fire hydrant flushings; waters to which cleansers or other components have not been added that are used to wash vehicles or control dust in accordance with the SWPPP, routine external building washdown which does not use detergents; pavement washwaters where spills or leaks of toxic or hazardous materials have not occurred (unless all spilled material has been removed) and where detergents are not used; air conditioning condensate; uncontaminated groundwater or spring water; uncontaminated discharges from construction site de-watering operations; and foundation or footing drains where flows are not contaminated with process materials such as solvents. For those entities required to obtain coverage under this permit, and who discharge as noted in this paragraph, and with the exception of flows from fire fighting activities, these discharges must be identified in the SWPPP. Under all circumstances, the *owner or operator* must still comply with water quality standards in Part I.B.

D. <u>Activities Which Are Ineligible for Coverage Under This General Permit</u> - All of the following are **<u>not</u>** authorized by this permit:

1. *Discharges* after *construction activities* have been completed and the site has undergone *final stabilization*;

2. *Discharges* that are mixed with sources of non-stormwater other than those expressly authorized under subsection C.3. of this Part and identified in the SWPPP required by this permit;

3. *Discharges* that are required to obtain an individual SPDES permit or another SPDES general permit pursuant to Part VII, subparagraph K of this permit;

4. *Discharges* from *construction activities* that adversely affect a listed, or proposed to be listed, endangered or threatened species, or its critical habitat;

5. *Discharges* which either cause or contribute to a violation of *water quality standards* adopted pursuant to the *ECL* and its accompanying regulations;

6. *Construction activities* for residential, commercial and institutional projects that:

    a. are tributary to waters of the state classified as AA or AA-s; and

(Part I. D. 6)

b. disturb one or more acres of land with no existing impervious cover and where the Soil Slope Phase is identified as an E or F on the USDA Soil Survey for the County in which the disturbance will occur.

7. *Construction activities* for linear transportation projects and linear utility projects that:
   a. are tributary to waters of the state classified as AA or AA-s; and

   b. disturb two or more acres of land with no existing impervious cover and where the Soil Slope Phase is identified as an E or F on the USDA Soil Survey for the County in which the disturbance will occur.

8. *Construction activities* that adversely affect a property that is listed or is eligible for listing on the State or National Register of Historic Places (Note: includes Archeological sites), unless there are written agreements in place with the NYS Office of Parks, Recreation and Historic Preservation (OPRHP) or other governmental agencies to mitigate the effects, or there are local land use approvals evidencing the same.

Part II. <u>OBTAINING PERMIT COVERAGE</u>

A. <u>Notice of Intent (NOI) Submittal</u>

1. An *owner or operator* of a *construction activity* that is <u>not</u> subject to the requirements of a *regulated, traditional land use control MS4* must first develop a SWPPP in accordance with all applicable requirements of this permit and then submit a completed NOI form to the address below in order to be authorized to *discharge* under this permit. The NOI form shall be one which is associated with this permit, signed in accordance with Part VII.H. of this permit.

   NOTICE OF INTENT
   NYS DEC, Bureau of Water Permits
   625 Broadway, 4th Floor
   Albany, New York 12233-3505

2. An *owner or operator* of a *construction activity* that is subject to the requirements of a *regulated, traditional land use control MS4* must first develop a SWPPP in accordance with all applicable requirements of this permit and then have its SWPPP reviewed and accepted by the *MS4* prior to submitting the NOI to the Department. The *owner or operator* shall have the "MS4 SWPPP Acceptance" form signed by the principal executive officer or ranking elected official from the *regulated, traditional land use control MS4*, or by a duly authorized representative of that person, and then submit that form along with the NOI to the address referenced under "Notice of Intent (NOI) Submittal".

(Part II. A.2)

This requirement does not apply to an *owner or operator* that is obtaining permit coverage in accordance with the requirements in Part II.E. (Change of Owner or Operator).

3. The *owner or operator* shall have the SWPPP preparer sign the "SWPPP Preparer Certification" statement on the NOI prior to submitting the form to the Department.

4. As of the date the NOI is submitted to the Department, the *owner or operator* shall make the NOI and SWPPP available for review and copying in accordance with the requirements in Part VII.F. of this permit.

B. <u>Permit Authorization</u>

1. An *owner or operator* shall not *commence construction activity* until their authorization to *discharge* under this permit goes into effect.

2. Authorization to *discharge* under this permit will be effective when the *owner or operator* has satisfied <u>all</u> of the following criteria:

    a. project review pursuant to the State Environmental Quality Review Act (SEQRA) have been satisfied, when SEQRA is applicable,

    b. where required, all necessary Department permits subject to the *Uniform Procedures Act (UPA)* (see 6 NYCRR Part 621) have been obtained, unless otherwise notified by the Department pursuant to 6 NYCRR 621.3(a)(4). *Owners or operators* of *construction activities* that are required to obtain *UPA* permits must submit a preliminary SWPPP to the appropriate DEC Regional Office in Appendix F at the time all other necessary *UPA* permit applications are submitted. The preliminary SWPPP must include sufficient information to demonstrate that the *construction activity* qualifies for authorization under this permit,

    c. the final SWPPP has been prepared, and

    d. an NOI has been submitted to the Department in accordance with the requirements of this permit.

3. An *owner or operator* that has satisfied the requirements of Part II.B.2 above will be authorized to *discharge* stormwater from their *construction activity* in accordance with the following schedule:

(Part II. B. 3)

a. For *construction activities* that are not subject to the requirements of a *regulated, traditional land use control MS4*:

i. Five (5) business days from the date the Department receives a complete NOI for *construction activities* with a SWPPP that has been prepared in conformance with the technical standards referenced in Parts III.B.1, 2 and/or 3, or

ii. Sixty (60) business days from the date the Department receives a complete NOI for *construction activities* with a SWPPP that has not been prepared in conformance with the technical standards referenced in Parts III.B.1, 2 or 3.

b. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4*:

i. Five (5) business days from the date the Department receives a complete NOI and signed "MS4 SWPPP Acceptance" form,

4. The Department may suspend or deny an *owner's or operator's* coverage under this permit if the Department determines that the SWPPP does not meet the permit requirements.

5. Coverage under this permit authorizes stormwater *discharges* from only those areas of disturbance that are identified in the NOI. If an *owner or operator* wishes to have stormwater *discharges* from future or additional areas of disturbance authorized, they must submit a new NOI that addresses that phase of the development, unless otherwise notified by the Department.

C. General Requirements For Owners or Operators With Permit Coverage

1. The *owner or operator* shall ensure that the provisions of the SWPPP are implemented from the *commencement of construction activity* until all areas of disturbance have achieved *final stabilization* and the Notice of Termination (NOT) has been submitted to the Department in accordance with Part V. of this permit. This includes any changes made to the SWPPP pursuant to Part III.A.4.

2. The *owner or operator* shall maintain a copy of the General Permit (GP-0-10-001), NOI, *NOI Acknowledgment Letter*, SWPPP, MS4 SWPPP Acceptance form and inspection reports at the construction site until all disturbed areas have achieved *final stabilization* and the NOT has been submitted to the Department.

(Part II. C. 2)

The documents must be maintained in a secure location, such as a job trailer, on-site construction office, or mailbox with lock. The secure location must be accessible during normal business hours to an individual performing a compliance inspection.

3. The *owner or operator* of a *construction activity* shall not disturb greater than five (5) acres of soil at any one time without prior written authorization from the Department or, in areas under the jurisdiction of a *regulated, traditional land use control MS4,* the MS4 (provided the MS4 is not the *owner or operator* of the construction activity). At a minimum, the *owner or operator* must comply with the following requirements in order to be authorized to disturb greater than five (5) acres of soil at any one time:

    a. The *owner or operator* shall have a *qualified inspector* conduct **at least** two (2) site inspections in accordance with Part IV.C. every seven (7) calendar days, for as long as greater than five (5) acres of soil remain disturbed. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

    b. In areas where soil disturbance activity has been temporarily or permanently ceased, temporary and/or permanent soil stabilization measures shall be installed and/or implemented within seven (7) days from the date the soil disturbance activity ceased. The soil stabilization measures selected shall be in conformance with the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control.

    c. The *owner or operator* shall prepare a phasing plan that defines maximum disturbed area per phase and shows required cuts and fills.

    d. The *owner or operator* shall install any additional site specific practices needed to protect water quality.

    e. The *owner or operator* shall include the requirements above in their SWPPP.

4. The Department may suspend or revoke an *owner's or operator's* coverage under this permit at any time if the Department determines that the SWPPP does not meet the permit requirements.

(Part II. C)

5. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4,* the *owner or operator* shall notify the *MS4* in writing of any planned amendments or modifications to the post-construction stormwater management practice component of the SWPPP required by Part III.A. 4. and 5. of this permit. Unless otherwise notified by the *MS4*, the *owner or operator* shall have the SWPPP amendments or modifications reviewed and accepted by the *MS4* prior to commencing construction of the post-construction stormwater management practice.

D. <u>Permit Coverage for Discharges Authorized Under GP-0-08-001</u>

1. Upon renewal of SPDES General Permit for Stormwater Discharges from Construction Activity (Permit No. GP-0-08-001), a*n owner or operator* of *construction activity* with coverage under GP-0-08-001, as of the effective date of GP-0-10-001, shall be authorized to *discharge* in accordance with GP-0-10-001 unless otherwise notified by the Department.

E. <u>Change of Owner or Operator</u>

1. When property ownership changes or when there is a change in operational control over the construction plans and specifications, the original *owner or operator* must notify the new *owner or operator*, <u>in writing,</u> of the requirement to obtain permit coverage by submitting a NOI with the Department. Once the new *owner or operator* obtains permit coverage, the original *owner or operator* shall then submit a completed NOT with the name and permit identification number of the new *owner or operator* to the Department at the address in Part II.A.1.. If the original *owner or operator* maintains ownership of a portion of the *construction activity* and will disturb soil, they must maintain their coverage under the permit.

   Permit coverage for the new *owner or operator* will be effective as of the date the Department receives a complete NOI, provided the original *owner or operator* was not subject to a sixty (60) business day authorization period that has not expired as of the date the Department receives the NOI from the new *owner or operator*.

Part III. <u>STORMWATER POLLUTION PREVENTION PLAN (SWPPP</u>)

A. <u>General SWPPP Requirements</u>

1. The SWPPP shall be prepared prior to the submittal of the NOI. The NOI shall be submitted to the Department prior to the *commencement of construction activity*.

(Part III. A)

2. The SWPPP shall describe the erosion and sediment control practices and where required, post-construction stormwater management practices that will be used and/or constructed to reduce the pollutants in stormwater discharges and to assure compliance with the terms and conditions of this permit. In addition, the SWPPP shall identify potential sources of pollution which may reasonably be expected to affect the quality of stormwater *discharges*.

3. All SWPPPs that require the post-construction stormwater management practice component shall be prepared by a *qualified professional* that is knowledgeable in the principles and practices of stormwater management and treatment.

4. The *owner or operator* must keep the SWPPP current so that it at all times accurately documents the erosion and sediment controls practices that are being used or will be used during construction, and all post-construction stormwater management practices that will be constructed on the site. At a minimum, the *owner or operator* shall amend the SWPPP:

    a. whenever the current provisions prove to be ineffective in minimizing pollutants in stormwater *discharges* from the site;

    b. whenever there is a change in design, construction, or operation at the construction site that has or could have an effect on the discharge of pollutants; and

    c. to address issues or deficiencies identified during an inspection by the *qualified inspector*, the Department or other regulatory authority.

5. The Department may notify the *owner or operator* at any time that the SWPPP does not meet one or more of the minimum requirements of this permit. The notification shall be in writing and identify the provisions of the SWPPP that require modification. Within fourteen (14) calendar days of such notification, or as otherwise indicated by the Department, the *owner or operator* shall make the required changes to the SWPPP and submit written notification to the Department that the changes have been made. If the *owner or operator* does not respond to the Department's comments in the specified time frame, the Department may suspend the *owner's or operator's* coverage under this permit.

6. Prior to the *commencement of construction activity*, the *owner or operator* must identify the contractor(s) and subcontractor(s) that will be responsible for installing, constructing, repairing, replacing, inspecting and maintaining the erosion and sediment control practices included in the SWPPP; and the contractor(s) and subcontractor(s) that will be responsible for constructing the post-construction stormwater management practices included in the SWPPP.

(Part III. A. 6)

The *owner or operator* shall have each of the contractors and subcontractors identify at least one person from their company that will be responsible for implementation of the SWPPP. This person shall be known as the *trained contractor*. The *owner or operator* shall ensure that at least one *trained contractor* is on site on a daily basis when soil disturbance activities are being performed.

The *owner or operator* shall have each of the contractors and subcontractors identified above sign a copy of the following certification statement below before they commence any *construction activity*:

> "I hereby certify that I understand and agree to comply with the terms and conditions of the SWPPP and agree to implement any corrective actions identified by the *qualified inspector* during a site inspection. I also understand that the *owner or operator* must comply with the terms and conditions of the most current version of the New York State Pollutant Discharge Elimination System ("SPDES") general permit for stormwater discharges from construction activities and that it is unlawful for any person to cause or contribute to a violation of water quality standards. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of the referenced permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings. "

In addition to providing the certification statement above, the certification page must also identify the specific elements of the SWPPP that each contractor and subcontractor will be responsible for and include the name and title of the person providing the signature; the name and title of the *trained contractor* responsible for SWPPP implementation; the name, address and telephone number of the contracting firm; the address (or other identifying description) of the site; and the date the certification statement is signed. The *owner or operator* shall attach the certification statement(s) to the copy of the SWPPP that is maintained at the construction site. If new or additional contractors are hired to implement measures identified in the SWPPP after construction has commenced, they must also sign the certification statement and provide the information listed above.

7. For projects where the Department requests a copy of the SWPPP or inspection reports, the *owner or operator* shall submit the documents in both electronic (PDF only) and paper format within five (5) business days, unless otherwise notified by the Department.

8. The SWPPP must include documentation supporting the determination of permit eligibility with regard to Part I.D.8. (Historic Places or Archeological Resource). At a minimum, the supporting documentation shall include the following:

(Part III. A. 8)

a. Information on whether the stormwater discharge or *construction activities* would have an effect on a property (historic or archeological resource) that is listed or eligible for listing on the State or National Register of Historic Places;

b. Results of historic resources screening determinations conducted. Information regarding the location of historic places listed, or eligible for listing, on the State or National Registers of Historic Places and areas of archeological sensitivity that may indicate the need for a survey can be obtained online by viewing the New York State Office of Parks, Recreation and Historic Places (OPRHP) online resources located on their web site at: http://nysparks.state.ny.us/shpo/online-tools/ (using The Geographic Information System for Archeology and National Register). OPRHP can also be contacted at: NYS OPRHP, State Historic Preservation Office, Peebles Island Resources Center, P.O. Box 189, Waterford, NY 12188-0189, phone: 518-237-8643;

c. A description of measures necessary to avoid or minimize adverse impacts on places listed, or eligible for listing, on the State or National Register of Historic Places. If the *owner or operator* fails to describe and implement such measures, the stormwater *discharge* is ineligible for coverage under this permit; and

d. Where adverse effects may occur, any written agreements in place with OPRHP or other governmental agency to mitigate those effects, or local land use approvals evidencing the same.

B. Required SWPPP Contents

1. Erosion and sediment control component - All SWPPPs prepared pursuant to this permit shall include erosion and sediment control practices designed in conformance with the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control. Where erosion and sediment control practices are not designed in conformance with this technical standard, the *owner or operator* must demonstrate equivalence to the technical standard. At a minimum, the erosion and sediment control component of the SWPPP shall include the following:

    a. Background information about the scope of the project, including the location, type and size of project;

(Part III. B. 1)

b. A site map/construction drawing(s) for the project, including a general location map. At a minimum, the site map shall show the total site area; all improvements; areas of disturbance; areas that will not be disturbed; existing vegetation; on-site and adjacent off-site surface water(s), wetlands and drainage patterns that could be affected by the construction activity; existing and final slopes; locations of different soil types with boundaries; material, waste, borrow or equipment storage areas located on adjacent properties; and location(s) of the stormwater discharge(s);

c. A description of the soil(s) present at the site, including an identification of the Hydrologic Soil Group (HSG);

d. A construction phasing plan and sequence of operations describing the intended order of construction activities, including clearing and grubbing, excavation and grading, utility and infrastructure installation and any other activity at the site that results in soil disturbance;

e. A description of the minimum erosion and sediment control practices to be installed or implemented for each construction activity that will result in soil disturbance. Include a schedule that identifies the timing of initial placement or implementation of each erosion and sediment control practice and the minimum time frames that each practice should remain in place or be implemented;

f. A temporary and permanent soil stabilization plan that meets the requirements of the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, for each stage of the project, including initial land clearing and grubbing to project completion and achievement of final stabilization;

g. A site map/construction drawing(s) showing the specific location(s), size(s), and length(s) of each erosion and sediment control practice;

h. The dimensions, material specifications, installation details, and operation and maintenance requirements for all erosion and sediment control practices. Include the location and sizing of any temporary sediment basins and structural practices that will be used to divert flows from exposed soils;

(Part III. B. 1)

i. A maintenance inspection schedule for the contractor(s) identified in Part III.A.6., to ensure continuous and effective operation of the erosion and sediment control practices. The maintenance inspection schedule shall be in accordance with the requirements in the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control;

j. A description of the pollution prevention measures that will be used to control litter, construction chemicals and construction debris from becoming a pollutant source in the stormwater *discharges*;

k. A description and location of any stormwater *discharges* associated with industrial activity other than construction at the site, including, but not limited to, stormwater *discharges* from asphalt plants and concrete plants located on the construction site; and

l. Identification of any elements of the design that are not in conformance with the requirements in the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control. Include the reason for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is equivalent to the technical standards.

2. Post-construction stormwater management practice component - All construction projects identified in Table 2 of Appendix B as needing post-construction stormwater management practices shall prepare a SWPPP that includes practices designed in conformance with the most current version of the technical standard, New York State Stormwater Management Design Manual ("Design Manual"). If the Design Manual is revised during the term of this permit, an *owner or operator* must begin using the revised version of the Design Manual to prepare their SWPPP six (6) months from the final revision date of the Design Manual.

   Where post-construction stormwater management practices are not designed in conformance with this technical standard, the *owner or operator* must demonstrate equivalence to the technical standard.

   At a minimum, the post-construction stormwater management practice component of the SWPPP shall include the following:

   a. Identification of all post-construction stormwater management practices to be constructed as part of the project;

(Part III. B. 2)

b. A site map/construction drawing(s) showing the specific location and size of each post-construction stormwater management practice;

c. The dimensions, material specifications and installation details for each post-construction stormwater management practice;

d. Identification of any elements of the design that are not in conformance with the Design Manual. Include the reason for the deviation or alternative design and provide information which demonstrates that the deviation or alternative design is equivalent to the technical standards;

e. A hydrologic and hydraulic analysis for all structural components of the stormwater management control system;

f. A detailed summary (including calculations) of the sizing criteria that was used to design all post-construction stormwater management practices. At a minimum, the summary shall address the required design criteria from the applicable chapter of the Design Manual; including the identification of and justification for any deviations from the Design Manual, and identification of any design criteria that are not required based on the design criteria or waiver criteria included in the Design Manual; and

g. An operations and maintenance plan that includes inspection and maintenance schedules and actions to ensure continuous and effective operation of each post-construction stormwater management practice. The plan shall identify the entity that will be responsible for the long term operation and maintenance of each practice.

3. Enhanced Phosphorus Removal Standards - All construction projects identified in Table 2 of Appendix B that are located in the watersheds identified in Appendix C shall prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the Enhanced Phosphorus Removal Standards included in the Design Manual. At a minimum, the post-construction stormwater management practice component of the SWPPP shall include items 2.a - 2.g. above.

(Part III. C)

C. <u>Required SWPPP Components by Project Type</u> - Unless otherwise notified by the Department, *owners or operators* of *construction activities* identified in Table 1 of Appendix B are required to prepare a SWPPP that only includes erosion and sediment control practices designed in conformance with Part III.B.1. *Owners or operators* of the *construction activities* identified in Table 2 of Appendix B shall prepare a SWPPP that also includes post-construction stormwater management practices designed in conformance with Part III.B.2 or 3.

Part IV. <u>INSPECTION AND MAINTENANCE REQUIREMENTS</u>

A. <u>General Construction Site Inspection and Maintenance Requirements</u>

1. The *owner or operator* must ensure that all erosion and sediment control practices and all post-construction stormwater management practices identified in the SWPPP are maintained in effective operating condition at all times.

2. The terms of this permit shall not be construed to prohibit the State of New York from exercising any authority pursuant to the ECL, common law or federal law, or prohibit New York State from taking any measures, whether civil or criminal, to prevent violations of the laws of the State of New York, or protect the public health and safety and/or the environment.

B. <u>Owner or Operator Maintenance Inspection Requirements</u>

1. The *owner or operator* shall inspect, in accordance with the requirements in the most current version of the technical standard, New York State Standards and Specifications for Erosion and Sediment Control, the erosion and sediment controls identified in the SWPPP to ensure that they are being maintained in effective operating condition at all times.

2. For construction sites where soil disturbance activities have been temporarily suspended (e.g. winter shutdown) and temporary stabilization measures have been applied to all disturbed areas, the *owner or operator* can stop conducting the maintenance inspections. The *owner or operator* shall begin conducting the maintenance inspections in accordance with Part IV.B.1. as soon as soil disturbance activities resume.

3. For construction sites where soil disturbance activities have been shut down with partial project completion, the *owner or operator* can stop conducting the maintenance inspections if all areas disturbed as of the project shutdown date have achieved *final stabilization* <u>and</u> all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational.

(Part IV. C)

C. <u>Qualified Inspector Inspection Requirements</u> - The *owner or operator* shall have a *qualified inspector* conduct site inspections in conformance with the following requirements:

[Note: The *trained contractor* identified in Part III.A.6. **cannot** conduct the *qualified inspector* site inspections unless they meet the *qualified inspector* qualifications included in Appendix A. In order to perform these inspections, the *trained contractor* would have to be a:

- Licensed Professional Engineer,
- Certified Professional in Erosion and Sediment Control (CPESC),
- Registered Landscape Architect, or
- Someone working under the direct supervision of, and at the same company as, the licensed Professional Engineer or Registered Landscape Architect, provided they have received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity].

1. A *qualified inspector* shall conduct site inspections for all *construction activities* identified in Tables 1 and 2 of Appendix B, <u>with the exception of</u>:

    a. the construction of a single family residential subdivision with 25% or less impervious cover at total site build-out that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres and is <u>not</u> located in one of the watersheds listed in Appendix C and <u>not</u> directly discharging to one of the 303(d) segments listed in Appendix E;

    b. the construction of a single family home that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres and is <u>not</u> located in one of the watersheds listed in Appendix C and <u>not</u> directly discharging to one of the 303(d) segments listed in Appendix E;

    c. construction on agricultural property that involves a soil disturbance of one (1) or more acres of land but less than five (5) acres; and

    d. construction activities located in the watersheds identified in Appendix D that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land.

2. Unless otherwise notified by the Department, the *qualified inspector* shall conduct site inspections in accordance with the following timetable:

    a. For construction sites where soil disturbance activities are on-going, the *qualified inspector* shall conduct a site inspection at least once every seven (7) calendar days.

(Part IV. C. 2)

b. For construction sites where soil disturbance activities are on-going and the *owner or operator* has received authorization in accordance with Part II.C.3 to disturb greater than five (5) acres of soil at any one time, the *qualified inspector* shall conduct at least two (2) site inspections every seven (7) calendar days. The two (2) inspections shall be separated by a minimum of two (2) full calendar days.

c. For construction sites where soil disturbance activities have been temporarily suspended (e.g. winter shutdown) and temporary stabilization measures have been applied to all disturbed areas, the *qualified inspector* shall conduct a site inspection at least once every thirty (30) calendar days. The *owner or operator* shall notify the Regional Office stormwater contact person (see contact information in Appendix F) or, in areas under the jurisdiction of a *regulated, traditional land use control MS4,* the MS4 (provided the MS4 is not the *owner or operator* of the construction activity) in writing prior to reducing the frequency of inspections.

d. For construction sites where soil disturbance activities have been shut down with partial project completion, the *qualified inspector* can stop conducting inspections if all areas disturbed as of the project shutdown date have achieved *final stabilization* <u>and</u> all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational. The *owner or operator* shall notify the Regional Office stormwater contact person (see contact information in Appendix F) or, in areas under the jurisdiction of a *regulated, traditional land use control MS4,* the MS4 (provided the MS4 is not the *owner or operator* of the construction activity). in writing prior to the shutdown. If soil disturbance activities are not resumed within 2 years from the date of shutdown, the *owner or operator* shall have the *qualified inspector* perform a final inspection and certify that all disturbed areas have achieved *final stabilization*, <u>and</u> all temporary, structural erosion and sediment control measures have been removed*;* and that all post-construction stormwater management practices have been constructed in conformance with the SWPPP by signing the "Final Stabilization" and "Post-Construction Stormwater Management Practice" certification statements on the NOT. The *owner or operator* shall then submit the completed NOT form to the address in Part II.A.1..

(Part IV. C. 3)

3. At a minimum, the *qualified inspector* shall inspect all erosion and sediment control practices to ensure integrity and effectiveness, all post-construction stormwater management practices under construction to ensure that they are constructed in conformance with the SWPPP, all areas of disturbance that have not achieved *final stabilization*, all points of discharge to natural surface waterbodies located within, or immediately adjacent to, the property boundaries of the construction site, and all points of discharge from the construction site.

4. The *qualified inspector* shall prepare an inspection report subsequent to each and every inspection. At a minimum, the inspection report shall include and/or address the following:

    a. Date and time of inspection;

    b. Name and title of person(s) performing inspection;

    c. A description of the weather and soil conditions (e.g. dry, wet, saturated) at the time of the inspection;

    d. A description of the condition of the runoff at all points of discharge from the construction site. This shall include identification of any *discharges* of sediment from the construction site. Include *discharges* from conveyance systems (i.e. pipes, culverts, ditches, etc.) and overland flow;

    e. A description of the condition of all natural surface waterbodies located within, or immediately adjacent to, the property boundaries of the construction site which receive runoff from disturbed areas. This shall include identification of any *discharges* of sediment to the surface waterbody;

    f. Identification of all erosion and sediment control practices that need repair or maintenance;

    g. Identification of all erosion and sediment control practices that were not installed properly or are not functioning as designed and need to be reinstalled or replaced;

    h. Description and sketch of areas that are disturbed at the time of the inspection and areas that have been stabilized (temporary and/or final) since the last inspection;

(Part IV. C 4)

i. Current phase of construction of all post-construction stormwater management practices and identification of all construction that is not in conformance with the SWPPP and technical standards;

j. Corrective action(s) that must be taken to install, repair, replace or maintain erosion and sediment control practices; and to correct deficiencies identified with the construction of the post-construction stormwater management practice(s); and

k. Digital photographs, with date stamp, that clearly show the condition of all practices that have been identified as needing corrective actions. The *qualified inspector* shall attach paper color copies of the digital photographs to the inspection report being maintained onsite within seven (7) calendar days of the date of the inspection. The *qualified inspector* shall also take digital photographs, with date stamp, that clearly show the condition of the practice(s) after the corrective action has been completed. The *qualified inspector* shall attach paper color copies of the digital photographs to the inspection report that documents the completion of the corrective action work within seven (7) calendar days of that inspection.

5. Within one business day of the completion of an inspection, the *qualified inspector* shall notify the *owner or operator* and appropriate contractor or subcontractor identified in Part III.A.6. of any corrective actions that need to be taken. The contractor or subcontractor shall begin implementing the corrective actions within one business day of this notification and shall complete the corrective actions in a reasonable time frame.

6. All inspection reports shall be signed by the *qualified inspector*. Pursuant to Part II.C.2., the inspection reports shall be maintained on site with the SWPPP.

Part V. <u>TERMINATION OF PERMIT COVERAGE</u>

A. <u>Termination of Permit Coverage</u>

1. An *owner or operator* that is eligible to terminate coverage under this permit must submit a completed NOT form to the address in Part II.A.1. The NOT form shall be one which is associated with this general permit, signed in accordance with Part VII.H.

2. An *owner or operator* may terminate coverage when one or more the following conditions have been met:

(Part V. A. 2)

a. Total project completion - All construction activity identified in the SWPPP has been completed; and all areas of disturbance have achieved *final stabilization*; and all temporary, structural erosion and sediment control measures have been removed; and all post-construction stormwater management practices have been constructed in conformance with the SWPPP and are operational;

b. Planned shutdown with partial project completion - All soil disturbance activities have ceased; and all areas disturbed as of the project shutdown date have achieved *final stabilization*; and all temporary, structural erosion and sediment control measures have been removed; and all post-construction stormwater management practices required for the completed portion of the project have been constructed in conformance with the SWPPP and are operational;

c. A new *owner or operator* has obtained coverage under this permit in accordance with Part II.E.

3. For *construction activities* meeting subdivision 2a. or 2b. of this Part, the *owner or operator* shall have the *qualified inspector* perform a final site inspection prior to submitting the NOT. The *qualified inspector* shall, by signing the "Final Stabilization" and "Post-Construction Stormwater Management Practice" certification statements on the NOT, certify that all disturbed areas have achieved *final stabilization;* and all temporary, structural erosion and sediment control measures have been removed; and that all post-construction stormwater management practices have been constructed in conformance with the SWPPP.

4. For *construction activities* that are subject to the requirements of a *regulated, traditional land use control MS4* and meet subdivision 2a. or 2b. of this Part, the *owner or operator* shall also have the MS4 sign the "MS4 Acceptance" statement on the NOT. The *owner or operator* shall have the principal executive officer, ranking elected official, or duly authorized representative from the *regulated, traditional land use control MS4*, sign the "MS4 Acceptance" statement. The MS4 official, by signing this statement, has determined that it is acceptable for the *owner or operator* to submit the NOT in accordance with the requirements of this Part. The MS4 can make this determination by performing a final site inspection themselves or by accepting the *qualified inspector's* final site inspection certification(s) required in Part V.3.

5. For *construction activities* that require post-construction stormwater management practices and meet subdivision 2a. of this Part, the *owner or operator* must, prior to submitting the NOT, ensure one of the following:

(Part V. A. 5)

a. the post-construction stormwater management practice(s) and any right-of-way(s) needed to maintain such practice(s) have been deeded to the municipality in which the practice(s) is located,

b. an executed maintenance agreement is in place with the municipality that will maintain the post-construction stormwater management practice(s),

c. for post-construction stormwater management practices that are privately owned, the *owner or operator* has modified their deed of record to include a deed covenant that requires operation and maintenance of the practice(s) in accordance with the operation and maintenance plan,

d. for post-construction stormwater management practices that are owned by a public or private institution (e.g. school, college, university), or government agency or authority, the *owner or operator* has policy and procedures in place that ensures operation and maintenance of the practices in accordance with the operation and maintenance plan.

Part VI. REPORTING AND RETENTION OF RECORDS

A. Record Retention - The *owner or operator* shall retain a copy of the NOI, NOI Acknowledgment Letter, SWPPP, MS4 SWPPP Acceptance form and any inspection reports that were prepared in conjunction with this permit for a period of at least five (5) years from the date that the site achieves *final stabilization*. This period may be extended by the Department, in its sole discretion, at any time upon written notification.

B. Addresses - With the exception of the NOI, NOT, and MS4 SWPPP Acceptance form (which must be submitted to the address referenced in Part II.A.1), all written correspondence requested by the Department, including individual permit applications, shall be sent to the address of the appropriate Department Regional Office listed in Appendix F.

Part VII. STANDARD PERMIT CONDITIONS

A. Duty to Comply - The *owner or operator* must comply with all conditions of this permit. All contractors and subcontractors associated with the project must comply with the terms of the SWPPP. Any non-compliance with this permit constitutes a violation of the Clean Water Act (CWA) and the ECL and is grounds for an enforcement action against the *owner or operator* and/or the contractor/subcontractor; permit revocation, suspension or modification; or denial of a permit renewal application. Upon a finding of significant non-compliance with this permit or the applicable SWPPP, the Department may order an immediate stop to all *construction activity* at the site until the non-compliance is remedied.

(Part VII. A)

The stop work order shall be in writing, shall describe the non-compliance in detail, and shall be sent to the *owner or operator*.

B. <u>Continuation of the Expired General Permit</u> - This permit expires five (5) years from the effective date. However, coverage may be obtained under the expired general permit, which will continue in force and effect, until a new general permit is issued. Unless otherwise notified by the Department in writing, an *owner or operator* seeking authorization under the new general permit must submit a new NOI in accordance with the terms of such new general permit.

C. <u>Enforcement</u> - Failure of the *owner or operator*, its contractors, subcontractors, agents and/or assigns to strictly adhere to any of the permit requirements contained herein shall constitute a violation of this permit. There are substantial criminal, civil, and administrative penalties associated with violating the provisions of this permit. Fines of up to $37,500 per day for each violation and imprisonment for up to fifteen (15) years may be assessed depending upon the nature and degree of the offense.

D. <u>Need to Halt or Reduce Activity Not a Defense</u> - It shall not be a defense for an *owner or operator* in an enforcement action that it would have been necessary to halt or reduce the *construction activity* in order to maintain compliance with the conditions of this permit.

E. <u>Duty to Mitigate</u> - The *owner or operator* and its contractors and subcontractors shall take all reasonable steps to minimize or prevent any *discharge* in violation of this permit which has a reasonable likelihood of adversely affecting human health or the environment.

F. <u>Duty to Provide Information</u> - The *owner or operator* shall make available to the Department for review and copying or furnish to the Department within five (5) business days of receipt of a Department request for such information, any information requested for the purpose of determining compliance with this permit. This can include, but is not limited to, the NOI, NOI Acknowledgment Letter, SWPPP, MS4 SWPPP Acceptance form, executed maintenance agreement, and inspection reports. Failure to provide information requested by the Department within the request timeframe shall be a violation of this permit.

The NOI, SWPPP and inspection reports required by this permit are public documents that the *owner or operator* must make available for review and copying by any person within five (5) business days of the *owner or operator* receiving a written request by any such person to review the NOI, SWPPP or inspection reports. Copying of documents will be done at the requester's expense.

G. <u>Other Information</u> - When the *owner or operator* becomes aware that they failed to submit any relevant facts, or submitted incorrect information in the NOI or in any other report, or have made substantive revisions to the SWPPP (e.g. the scope of the project changes significantly, the type of post-construction stormwater management practice(s)

changes, there is a reduction in the sizing of the post-construction stormwater management practice, or there is an increase in the disturbance area or impervious area), which were not reflected in the original NOI submitted to the Department, they shall promptly submit such facts or information to the Department. Failure of the *owner or operator* to correct or supplement any relevant facts within five (5) business days of becoming aware of the deficiency shall constitute a violation of this permit.

H. <u>Signatory Requirements</u>

1. All NOIs and NOTs shall be signed as follows:

    a. For a corporation these forms shall be signed by a responsible corporate officer. For the purpose of this section, a responsible corporate officer means:

        i. a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or

        ii. the manager of one or more manufacturing, production or operating facilities, provided the manager is authorized to make management decisions which govern the operation of the regulated facility including having the explicit or implicit duty of making major capital investment recommendations, and initiating and directing other comprehensive measures to assure long term environmental compliance with environmental laws and regulations; the manager can ensure that the necessary systems are established or actions taken to gather complete and accurate information for permit application requirements; and where authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

    b. For a partnership or sole proprietorship these forms shall be signed by a general partner or the proprietor, respectively; or

    c. For a municipality, State, Federal, or other public agency these forms shall be signed by either a principal executive officer or ranking elected official. For purposes of this section, a principal executive officer of a Federal agency includes:

        i. the chief executive officer of the agency, or

(Part VII. H. 1. c)

ii. a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., Regional Administrators of EPA).

2. The SWPPP and other information requested by the Department shall be signed by a person described in Part VII.H.1. or by a duly authorized representative of that person. A person is a duly authorized representative only if:

   a. The authorization is made in writing by a person described in Part VII.H.1.;

   b. The authorization specifies either an individual or a position having responsibility for the overall operation of the regulated facility or activity, such as the position of plant manager, operator of a well or a well field, superintendent, position of equivalent responsibility, or an individual or position having overall responsibility for environmental matters for the company. (A duly authorized representative may thus be either a named individual or any individual occupying a named position) and,

   c. The written authorization shall include the name, title and signature of the authorized representative and be attached to the SWPPP.

3. All inspection reports shall be signed by the *qualified inspector* that performs the inspection.

4. The MS4 SWPPP Acceptance form shall be signed by the principal executive officer or ranking elected official from the *regulated, traditional land use control MS4,* or by a duly authorized representative of that person.

   It shall constitute a permit violation if an incorrect and/or improper signatory authorizes any required forms, SWPPP and/or inspection reports.

I. <u>Property Rights</u> - The issuance of this permit does not convey any property rights of any sort, nor any exclusive privileges, nor does it authorize any injury to private property nor any invasion of personal rights, nor any infringement of Federal, State or local laws or regulations. *Owners or operators* must obtain any applicable conveyances, easements, licenses and/or access to real property prior to *commencing construction activity*.

J. <u>Severability</u> - The provisions of this permit are severable, and if any provision of this permit, or the application of any provision of this permit to any circumstance, is held invalid, the application of such provision to other circumstances, and the remainder of this permit shall not be affected thereby.

(Part VII. K)
K. <u>Denial of Coverage Under This Permit</u>

1. At its sole discretion, the Department may require any *owner or operator* authorized by this permit to apply for and/or obtain either an individual SPDES permit or another SPDES general permit. When the Department requires any discharger authorized by a general permit to apply for an individual SPDES permit, it shall notify the discharger in writing that a permit application is required. This notice shall include a brief statement of the reasons for this decision, an application form, a statement setting a time frame for the *owner or operator* to file the application for an individual SPDES permit, and a deadline, not sooner than 180 days from *owner or operator* receipt of the notification letter, whereby the authorization to discharge under this general permit shall be terminated. Applications must be submitted to the appropriate Regional Office. The Department may grant additional time upon demonstration, to the satisfaction of the Regional Water Engineer, that additional time to apply for an alternative authorization is necessary or where the Department has not provided a permit determination in accordance with Part 621 of this Title.

2. Any *owner or operator* authorized by this permit may request to be excluded from the coverage under this permit by applying for an individual permit or another general permit. In such cases, the *owner or operator* shall submit an individual application or an alternative general permit application in accordance with the requirements of this general permit, 40 CFR 122.26(c)(1)(ii) and 6 NYCRR Part 621, with reasons supporting the request, to the Department at the address for the appropriate Department Office (see addresses in Appendix F).The request may be granted by issuance of an individual permit or another general permit at the discretion of the Department.

3. When an individual SPDES permit is issued to a discharger authorized to discharge under a general SPDES permit for the same discharge(s), the general permit authorization for outfalls authorized under the individual SPDES permit is automatically terminated on the effective date of the individual permit unless termination is earlier in accordance with 6 NYCRR Part 750.

L. <u>Proper Operation and Maintenance</u> - The *owner or operator* shall at all times properly operate and maintain all facilities and systems of treatment and control (and related appurtenances) which are installed or used by the *owner or operator* to achieve compliance with the conditions of this permit and with the requirements of the SWPPP.

M. <u>Inspection and Entry</u> - The *owner or operator* shall allow the Department or an authorized representative of EPA, the State, or, in the case of a construction site which discharges through an *MS4*, an authorized representative of the *MS4* receiving the discharge, upon the presentation of credentials and other documents as may be required by law, to:

(Part VII. M)

1. Enter upon the *owner's or operator's* premises where a regulated facility or activity is located or conducted or where records must be kept under the conditions of this permit;

2. Have access to and copy at reasonable times, any records that must be kept under the conditions of this permit; and

3. Inspect at reasonable times any facilities or equipment (including monitoring and control equipment).

N. <u>Permit Actions</u> - At the Department's sole discretion, this permit may, at any time, be modified, suspended, revoked, or renewed. The filing of a request by the *owner or operator* for a permit modification, revocation and reissuance, termination, a notification of planned changes or anticipated noncompliance does not limit, diminish and/or stay compliance with any terms of this permit.

O. <u>Definitions</u> - Definitions of key terms are included in Appendix A of this permit.

P. <u>Re-Opener Clause</u>

1. If there is evidence indicating potential or realized impacts on water quality due to any stormwater discharge associated with *construction activity* covered by this permit, the *owner or operator* of such discharge may be required to obtain an individual permit or alternative general permit in accordance with Part VII.K. of this permit or the permit may be modified to include different limitations and/or requirements.

2. Permit modification, suspension or revocation will be conducted in accordance with 6 NYCRR Part 621, 6 NYCRR 750-1.18, and 6 NYCRR 750-1.20.

Q. <u>Penalties for Falsification of Forms and Reports</u> – Article 17 of the ECL provides for a civil penalty of $37,500 per day per violation of this permit. Articles 175 and 210 of the New York State Penal Law provide for a criminal penalty of a fine and/or imprisonment for falsifying forms and reports required by this permit.

R. <u>Other Permits</u> – Nothing in this permit relieves the *owner or operator* from a requirement to obtain any other permits required by law.

APPENDIX A

Definitions

Alter Hydrology from Pre to Post-Development Conditions - means the post-development peak flow rate(s) has increased by more than 5% of the pre-developed condition for the design storm of interest (e.g. 10 yr and 100 yr).

Combined Sewer - means a sewer that is designed to collect and convey both "sewage" and "stormwater".

Commence (Commencement of) Construction Activities - means the initial disturbance of soils associated with clearing, grading or excavation activities; or other construction related activities that disturb or expose soils such as demolition, stockpiling of fill material, and the initial installation of erosion and sediment control practices required in the SWPPP. See definition for "Construction Activity(ies)" also.

Construction Activity(ies) - means any clearing, grading, excavation, filling, demolition or stockpiling activities that result in soil disturbance. Clearing activities can include, but are not limited to, logging equipment operation, the cutting and skidding of trees, stump removal and/or brush root removal. Construction activity does not include routine maintenance that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of a facility.

Direct Discharge (to a specific surface waterbody) - means that runoff flows from a construction site by overland flow and the first point of discharge is the specific surface waterbody, or runoff flows from a construction site to a separate storm sewer system and the first point of discharge from the separate storm sewer system is the specific surface waterbody.

Discharge(s) - means any addition of any pollutant to waters of the State through an outlet or point source.

Environmental Conservation Law (ECL) - means chapter 43-B of the Consolidated Laws of the State of New York, entitled the Environmental Conservation Law.

Final Stabilization - means that all soil disturbance activities have ceased and a uniform, perennial vegetative cover with a density of eighty (80) percent over the entire pervious surface has been established; or other equivalent stabilization measures, such as permanent landscape mulches, rock rip-rap or washed/crushed stone have been applied on all disturbed areas that are not covered by permanent structures, concrete or pavement.

General SPDES permit - means a SPDES permit issued pursuant to 6 NYCRR Part 750-1.21 authorizing a category of discharges.

Groundwater - means waters in the saturated zone. The saturated zone is a subsurface zone in

which all the interstices are filled with water under pressure greater than that of the atmosphere. Although the zone may contain gas-filled interstices or interstices filled with fluids other than water, it is still considered saturated.

Impervious Area (Cover) - means all impermeable surfaces that cannot effectively infiltrate rainfall. This includes paved, concrete and gravel surfaces (i.e. parking lots, driveways, roads, runways and sidewalks); building rooftops and miscellaneous impermeable structures such as patios, pools, and sheds.

Larger Common Plan of Development or Sale - means a contiguous area where multiple separate and distinct construction activities are occurring, or will occur, under one plan. The term "plan" in "larger common plan of development or sale" is broadly defined as any announcement or piece of documentation (including a sign, public notice or hearing, marketing plan, advertisement, drawing, permit application, State Environmental Quality Review Act (SEQRA) application, zoning request, computer design, etc.) or physical demarcation (including boundary signs, lot stakes, surveyor markings, etc.) indicating that construction activities may occur on a specific plot.

For discrete construction projects that are located within a larger common plan of development or sale that are at least 1/4 mile apart, each project can be treated as a separate plan of development or sale provided any interconnecting road, pipeline or utility project that is part of the same "common plan" is not concurrently being disturbed.

Municipal Separate Storm Sewer (MS4) - a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains):

i. Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, stormwater, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or a designated and approved management agency under section 208 of the CWA that discharges to surface waters of the State*;*
ii. Designed or used for collecting or conveying stormwater;
iii. Which is not a *combined sewer*; and
iv. Which is not part of a Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.2.

National Pollutant Discharge Elimination System (NPDES) - means the national system for the issuance of wastewater and stormwater permits under the Federal Water Pollution Control Act (Clean Water Act).

NOI Acknowledgment Letter - means the letter that the Department sends to an owner or operator to acknowledge the Department's receipt and acceptance of a complete Notice of Intent. This letter documents the owner's or operator's authorization to discharge in accordance with the general permit for stormwater discharges from construction activity.

Owner or Operator - means the person, persons or legal entity which owns or leases the property on which the construction activity is occurring; and/or an entity that has operational control over the construction plans and specifications, including the ability to make modifications to the plans and specifications.

Pollutant - means dredged spoil, filter backwash, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand and industrial, municipal, agricultural waste and ballast discharged into water; which may cause or might reasonably be expected to cause pollution of the waters of the state in contravention of the standards or guidance values adopted as provided in Parts 700 et seq of this Title.

Qualified Inspector - means a person that is knowledgeable in the principles and practices of erosion and sediment control, such as a licensed Professional Engineer, Certified Professional in Erosion and Sediment Control (CPESC), Registered Landscape Architect, or other Department endorsed individual(s).

It can also mean someone working under the direct supervision of, and at the same company as, the licensed Professional Engineer or Registered Landscape Architect, provided that person has training in the principles and practices of erosion and sediment control. Training in the principles and practices of erosion and sediment control means that the individual working under the direct supervision of the licensed Professional Engineer or Registered Landscape Architect has received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity. After receiving the initial training, the individual working under the direct supervision of the licensed Professional Engineer or Registered Landscape Architect shall receive four (4) hours of training every three (3) years.

It can also mean a person that meets the *Qualified Professional* qualifications in addition to the *Qualified Inspector* qualifications.

Note: Inspections of any post-construction stormwater management practices that include structural components, such as a dam for an impoundment, shall be performed by a licensed Professional Engineer.

Qualified Professional - means a person that is knowledgeable in the principles and practices of stormwater management and treatment, such as a licensed Professional Engineer, Registered Landscape Architect or other Department endorsed individual(s). Individuals preparing SWPPPs that require the post-construction stormwater management practice component must have an understanding of the principles of hydrology, water quality management practice design, water quantity control design, and, in many cases, the principles of hydraulics in order to prepare a SWPPP that conforms to the Department's technical standard. All components of the SWPPP that involve the practice of engineering, as defined by the NYS Education Law (see Article 145), shall be prepared by, or under the direct supervision of, a professional engineer licensed to practice in the State of New York.

Regulated, Traditional Land Use Control MS4 - means a city, town or village with land use control authority that is required to gain coverage under New York State DEC's SPDES General Permit For Stormwater Discharges from Municipal Separate Stormwater Sewer Systems (MS4s).

Routine Maintenance Activity - means construction activity that is performed to maintain the original line and grade, hydraulic capacity, or original purpose of a facility, including, but not limited to:

- Re-grading of gravel roads or parking lots,
- Stream bank restoration projects (does not include the placement of spoil material),
- Cleaning and shaping of existing roadside ditches and culverts that maintains the approximate original line and grade, and hydraulic capacity of the ditch,
- Cleaning and shaping of existing roadside ditches that does not maintain the approximate original grade, hydraulic capacity and purpose of the ditch if the changes to the line and grade, hydraulic capacity or purpose of the ditch are installed to improve water quality and quantity controls (e.g. installing grass lined ditch),
- Placement of aggregate shoulder backing that makes the transition between the road shoulder and the ditch or embankment,
- Full depth milling and filling of existing asphalt pavements, replacement of concrete pavement slabs, and similar work that does not expose soil or disturb the bottom six (6) inches of subbase material,
- Long-term use of equipment storage areas at or near highway maintenance facilities,
- Removal of sediment from the edge of the highway to restore a previously existing sheet-flow drainage connection from the highway surface to the highway ditch or embankment,
- Existing use of Canal Corp owned upland disposal sites for the canal, and
- Replacement of curbs, gutters, sidewalks and guide rail posts.

State Pollutant Discharge Elimination System (SPDES) - means the system established pursuant to Article 17 of the ECL and 6 NYCRR Part 750 for issuance of permits authorizing discharges to the waters of the state.

Surface Waters of the State - shall be construed to include lakes, bays, sounds, ponds, impounding reservoirs, springs, rivers, streams, creeks, estuaries, marshes, inlets, canals, the Atlantic ocean within the territorial seas of the state of New York and all other bodies of surface water, natural or artificial, inland or coastal, fresh or salt, public or private (except those private waters that do not combine or effect a junction with natural surface or underground waters), which are wholly or partially within or bordering the state or within its jurisdiction. Waters of the state are further defined in 6 NYCRR Parts 800 to 941.

Temporary Stabilization - means that exposed soil has been covered with material(s) as set forth in the technical standard, New York Standards and Specifications for Erosion and Sediment Control, to prevent the exposed soil from eroding. The materials can include, but are not limited to, mulch, seed and mulch, and erosion control mats (e.g. jute twisted yarn, excelsior wood fiber mats).

Total Maximum Daily Loads (TMDLs) - A TMDL is the sum of the allowable loads of a single pollutant from all contributing point and nonpoint sources. It is a calculation of the maximum amount of a pollutant that a waterbody can receive on a daily basis and still meet water quality standards, and an allocation of that amount to the pollutant's sources. A TMDL stipulates wasteload allocations (WLAs) for point source discharges, load allocations (LAs) for nonpoint sources, and a margin of safety (MOS).

Trained Contractor - means an employee from the contracting (construction) company, identified in Part III.A.6., that has received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity. After receiving the initial training, the *trained contractor* shall receive four (4) hours of training every three (3) years.

It can also mean an employee from the contracting (construction) company, identified in Part III.A.6., that meets the *qualified inspector* qualifications (e.g. licensed Professional Engineer, Certified Professional in Erosion and Sediment Control (CPESC), Registered Landscape Architect, or someone working under the direct supervision of, and at the same company as, the licensed Professional Engineer or Registered Landscape Architect, provided they have received four (4) hours of Department endorsed training in proper erosion and sediment control principles from a Soil and Water Conservation District, or other Department endorsed entity).

The *trained contractor* will be responsible for the day to day implementation of the SWPPP.

Uniform Procedures Act (UPA) Permit - means a permit required under 6 NYCRR Part 621 of the Environmental Conservation Law (ECL), Article 70.

Water Quality Standard - means such measures of purity or quality for any waters in relation to their reasonable and necessary use as promulgated in 6 NYCRR Part 700 et seq.

APPENDIX B

Required SWPPP Components by Project Type

Table 1
CONSTRUCTION ACTIVITIES THAT REQUIRE THE PREPARATION OF A SWPPP THAT ONLY INCLUDES EROSION AND SEDIMENT CONTROLS

The following construction activities that involve soil disturbances of one (1) or more acres of land, but less than five (5) acres: • Single family home not located in one of the watersheds listed in Appendix C and not *directly discharging* to one of the 303(d) segments listed in Appendix E • Single family residential subdivisions with 25% or less impervious cover at total site build-out and not located in one of the watersheds listed in Appendix C and not directly discharging to one of the 303(d) segments listed in Appendix E • Construction of a barn or other agricultural building, silo, stock yard or pen.
The following construction activities that involve soil disturbances of one (1) or more acres of land: • Installation of underground, linear utilities; such as gas lines, fiber-optic cable, cable TV, electric, telephone, sewer mains, and water mains • Environmental enhancement projects, such as wetland mitigation projects, stormwater retrofits and stream restoration projects • Bike paths and trails • Sidewalk construction projects that are not part of a road/ highway construction or reconstruction project • Slope stabilization projects • Slope flattening that changes the grade of the site, but does not significantly change the runoff characteristics • Spoil areas that will be covered with vegetation • Land clearing and grading for the purposes of creating vegetated open space (i.e. recreational parks, lawns, meadows, fields), excluding projects that *alter hydrology from pre to post development* conditions • Athletic fields (natural grass) that do not include the construction or reconstruction of *impervious area* and do not *alter hydrology from pre to post development* conditions • Demolition project where vegetation will be established and no redevelopment is planned • Overhead electric transmission line project that does not include the construction of permanent access roads or parking areas surfaced with *impervious cover* • Structural practices as identified in Table II in the "Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State", excluding projects that involve soil disturbances of less than five acres and construction activities that include the construction or reconstruction of impervious area
The following construction activities that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land: • All construction activities located in the watersheds identified in Appendix D that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land.

Table 2
CONSTRUCTION ACTIVITIES THAT REQUIRE THE PREPARATION OF A SWPPP THAT INCLUDES POST-CONSTRUCTION STORMWATER MANAGEMENT PRACTICES

The following construction activities that involve soil disturbances of one (1) or more acres of land:

- Single family home located in one of the watersheds listed in Appendix C or *directly discharging* to one of the 303(d) segments listed in Appendix E
- Single family residential subdivisions located in one of the watersheds listed in Appendix C or *directly discharging* to one of the 303(d) segments listed in Appendix E
- Single family residential subdivisions that involve soil disturbances of between one (1) and five (5) acres of land with greater than 25% impervious cover at total site build-out
- Single family residential subdivisions that involve soil disturbances of five (5) or more acres of land, and single family residential subdivisions that involve soil disturbances of less than five (5) acres that are part of a larger common plan of development or sale that will ultimately disturb five or more acres of land
- Multi-family residential developments; includes townhomes, condominiums, senior housing complexes, apartment complexes, and mobile home parks
- Airports
- Amusement parks
- Campgrounds
- Cemeteries that include the construction or reconstruction of impervious area (>5% of disturbed area) or *alter the hydrology from pre to post development* conditions
- Commercial developments
- Churches and other places of worship
- Construction of a barn or other agricultural building(e.g. silo) and structural practices as identified in Table II in the "Agricultural Management Practices Catalog for Nonpoint Source Pollution in New York State" that include the construction or reconstruction of *impervious area*, excluding projects that involve soil disturbances of less than five acres.
- Golf courses
- Institutional, includes hospitals, prisons, schools and colleges
- Industrial facilities, includes industrial parks
- Landfills
- Municipal facilities; includes highway garages, transfer stations, office buildings, POTW's and water treatment plants
- Office complexes
- Sports complexes
- Racetracks, includes racetracks with earthen (dirt) surface
- Road construction or reconstruction
- Parking lot construction or reconstruction
- Athletic fields (natural grass) that include the construction or reconstruction of impervious area (>5% of disturbed area) or *alter the hydrology from pre to post development* conditions
- Athletic fields with artificial turf
- Permanent access roads, parking areas, substations, compressor stations and well drilling pads, surfaced with *impervious cover*, and constructed as part of an over-head electric transmission line project , wind-power project, cell tower project, oil or gas well drilling project or other linear utility project
- All other construction activities that include the construction or reconstruction of *impervious area* <u>and</u> *alter the hydrology from pre to post development* conditions, <u>and</u> are not listed in Table 1

APPENDIX C

Watersheds Where Enhanced Phosphorus Removal Standards Are Required

Watersheds where *owners or operators* of construction activities identified in Table 2 of Appendix B must prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the Enhanced Phosphorus Removal Standards included in the technical standard, New York State Stormwater Management Design Manual ("Design Manual").

- Entire New York City Watershed located east of the Hudson River - Figure 1
- Onondaga Lake Watershed - Figure 2
- Greenwood Lake Watershed -Figure 3
- Oscawana Lake Watershed – Figure 4

Figure 1 - New York City Watershed East of the Hudson

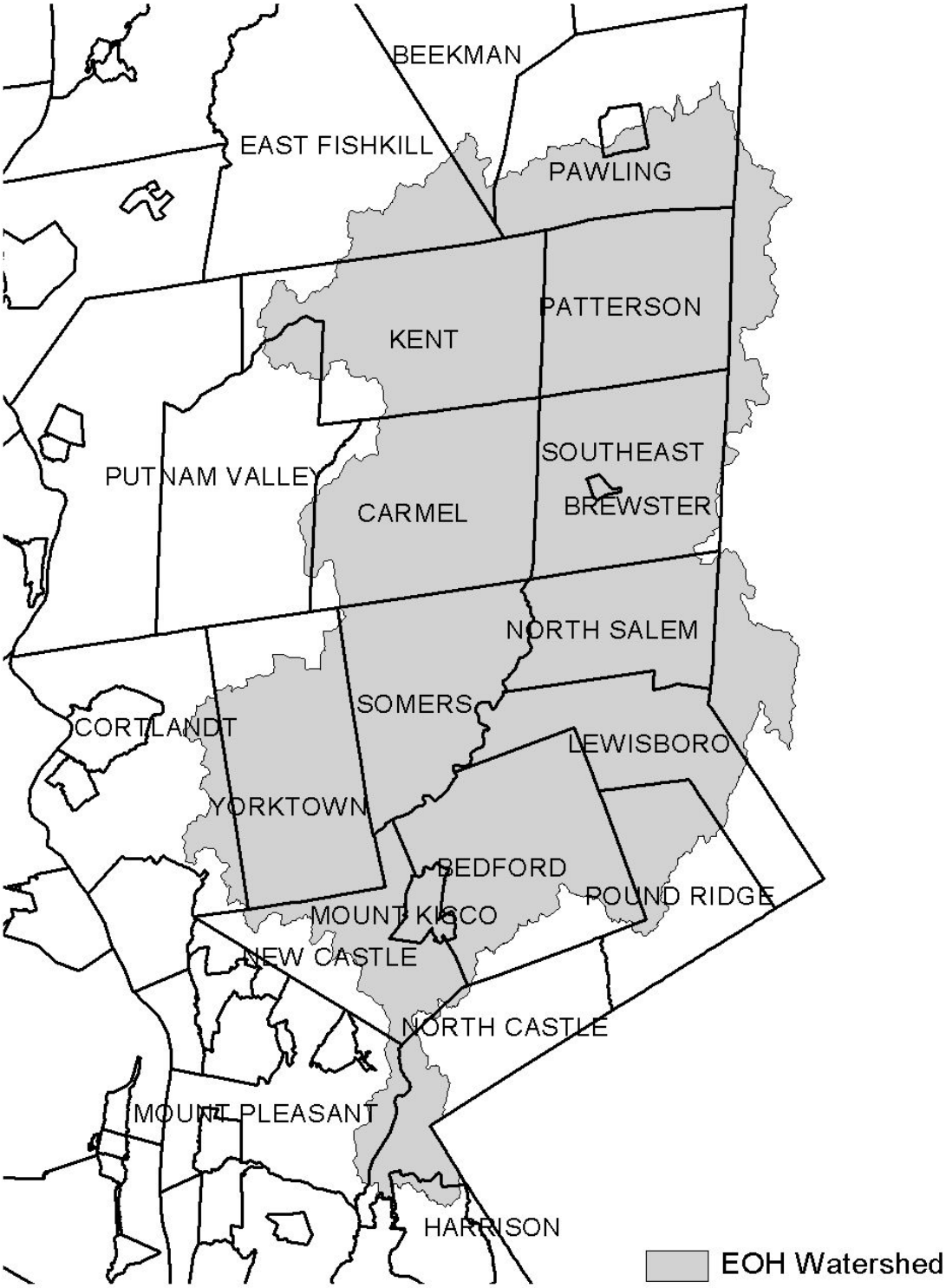
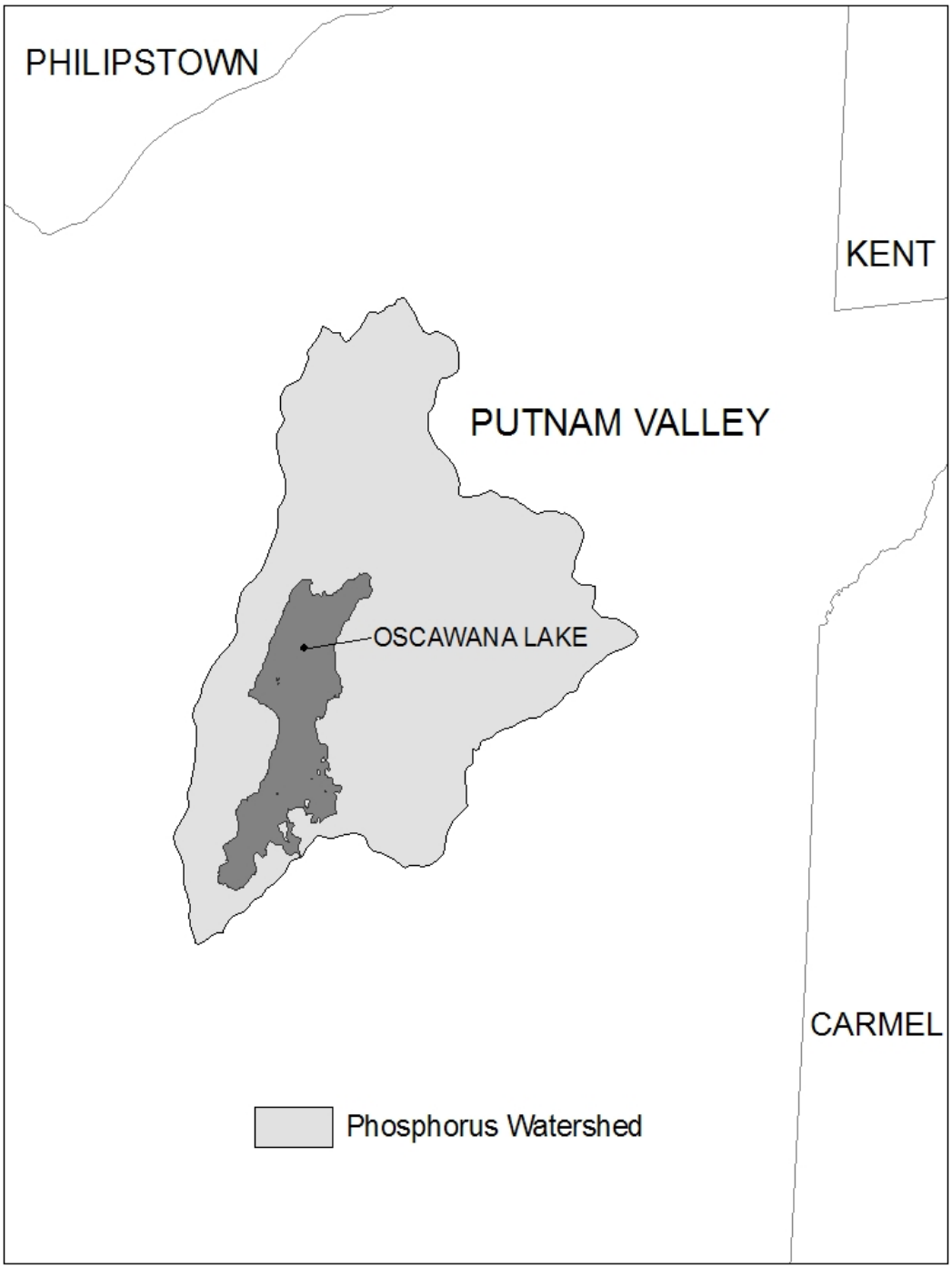


Figure 2 - Onondaga Lake Watershed

Figure 3 - Greenwood Lake Watershed

Figure 4 - Oscawana Lake Watershed



APPENDIX D

Watersheds where *owners or operators* of construction activities that involve soil disturbances between five thousand (5000) square feet and one (1) acre of land must obtain coverage under this permit.

Entire New York City Watershed that is located east of the Hudson River - See Figure 1 in Appendix C

APPENDIX E

List of 303(d) segments impaired by pollutants related to construction activity (e.g. silt, sediment or nutrients). *Owners or operators* of single family home and single family residential subdivision construction activities that involve soil disturbances of one or more acres of land, but less than 5 acres, and *directly discharge* to one of the listed segments below shall prepare a SWPPP that includes post-construction stormwater management practices designed in conformance with the most current version of the technical standard, New York State Stormwater Management Design Manual ("Design Manual").

COUNTY	WATERBODY
Albany	Ann Lee (Shakers) Pond, Stump Pond
Albany	Basic Creek Reservoir
Bronx	Van Cortlandt Lake
Broome	Whitney Point Lake/Reservoir
Broome	Beaver Lake
Broome	White Birch Lake
Chautauqua	Chautauqua Lake, North
Chautauqua	Chautauqua Lake, South
Chautauqua	Bear Lake
Chautauqua	Chadakoin River and tribs
Chautauqua	Lower Cassadaga Lake
Chautauqua	Middle Cassadaga Lake
Chautauqua	Findley Lake
Clinton	Great Chazy River, Lower, Main Stem
Columbia	Kinderhook Lake
Columbia	Robinson Pond
Dutchess	Hillside Lake
Dutchess	Wappinger Lakes
Dutchess	Fall Kill and tribs
Dutchess	Rudd Pond
Erie	Rush Creek and tribs
Erie	Ellicott Creek, Lower, and tribs
Erie	Beeman Creek and tribs
Erie	Murder Creek, Lower, and tribs
Erie	South Branch Smoke Cr, Lower, and tribs
Erie	Little Sister Creek, Lower, and tribs
Essex	Lake George (primary county listed as Warren)
Genesee	Black Creek, Upper, and minor tribs
Genesee	Tonawanda Creek, Middle, Main Stem
Genesee	Tonawanda Creek, Upper, and minor tribs
Genesee	Little Tonawanda Creek, Lower, and tribs
Genesee	Oak Orchard Creek, Upper, and tribs
Genesee	Bowen Brook and tribs
Genesee	Bigelow Creek and tribs
Greene	Schoharie Reservoir
Greene	Sleepy Hollow Lake
Herkimer	Steele Creek tribs
Kings	Hendrix Creek
Lewis	Mill Creek/South Branch and tribs
Livingston	Conesus Lake
Livingston	Jaycox Creek and tribs
Livingston	Mill Creek and minor tribs
Monroe	Genesee River, Lower, Main Stem
Monroe	Genesee River, Middle, Main Stem
Monroe	Black Creek, Lower, and minor tribs
Monroe	Buck Pond
Monroe	Long Pond
Monroe	Cranberry Pond
Monroe	Mill Creek and tribs
Monroe	Shipbuilders Creek and tribs
Monroe	Minor tribs to Irondequoit Bay
Monroe	Thomas Creek/White Brook and tribs
Nassau	Glen Cove Creek, Lower, and tribs
Nassau	LI Tribs (fresh) to East Bay
Nassau	East Meadow Brook, Upper, and tribs
Nassau	Hempstead Bay
Nassau	Hempstead Lake
Nassau	Grant Park Pond
Niagara	Bergholtz Creek and tribs
Oneida	Ballou, Nail Creeks
Onondaga	Ley Creek and tribs
Onondaga	Onondaga Creek, Lower and tribs
Onondaga	Onondaga creek, Middle and tribs
Onondaga	Onondaga Creek, Upper, and minor tribs
Onondaga	Harbor Brook, Lower, and tribs
Onondaga	Ninemile Creek, Lower, and tribs
Onondaga	Minor tribs to Onondaga Lake
Ontario	Honeoye Lake
Ontario	Hemlock Lake Outlet and minor tribs
Ontario	Great Brook and minor tribs
Oswego	Lake Neatahwanta
Putnam	Oscawana Lake
Putnam	Lake Carmel
Queens	Jamaica Bay, Eastern, and tribs (Queens)
Queens	Bergen Basin
Queens	Shellbank Basin
Rensselaer	Snyders Lake
Richmond	Grasmere, Arbutus and Wolfes Lakes
Saratoga	Dwaas Kill and tribs
Saratoga	Tribs to Lake Lonely
Saratoga	Lake Lonely
Saratoga	Schuyler Creek and tribs
Schenectady	Collins Lake

APPENDIX E

List of 303(d) segments impaired by pollutants related to construction activity, cont'd.

COUNTY	WATERBODY	COUNTY	WATERBODY
Schoharie	Engleville Pond		
Schoharie	Summit Lake		
St. Lawrence	Black Lake Outlet/Black Lake		
Steuben	Lake Salubria		
Steuben	Smith Pond		
Suffolk	Millers Pond		
Suffolk	Mattituck (Marratooka) Pond		
Suffolk	Tidal tribs to West Moriches Bay		
Suffolk	Canaan Lake		
Suffolk	Lake Ronkonkoma		
Tompkins	Cayuga Lake, Southern End		
Tompkins	Owasco Inlet, Upper, and tribs		
Ulster	Ashokan Reservoir		
Ulster	Esopus Creek, Upper, and minor tribs		
Warren	Lake George		
Warren	Tribs to L.George, Village of L George		
Warren	Huddle/Finkle Brooks and tribs		
Warren	Indian Brook and tribs		
Warren	Hague Brook and tribs		
Washington	Tribs to L.George, East Shore of Lake George		
Washington	Cossayuna Lake		
Wayne	Port Bay		
Wayne	Marbletown Creek and tribs		
Westchester	Peach Lake		
Westchester	Mamaroneck River, Lower		
Westchester	Mamaroneck River, Upper, and minor tribs		
Westchester	Sheldrake River and tribs		
Westchester	Blind Brook, Lower		
Westchester	Blind Brook, Upper, and tribs		
Westchester	Lake Lincolndale		
Westchester	Lake Meahaugh		
Wyoming	Java Lake		
Wyoming	Silver Lake		

Note: The list above identifies those waters from the final New York State "2008 Section 303(d) List of Impaired Waters Requiring a TMDL/Other Strategy", dated May 26, 2008, that are impaired by silt, sediment or nutrients.

APPENDIX F

LIST OF NYS DEC REGIONAL OFFICES

Region	COVERING THE FOLLOWING COUNTIES:	DIVISION OF ENVIRONMENTAL PERMITS (DEP) PERMIT ADMINISTRATORS	DIVISION OF WATER (DOW) WATER (SPDES) PROGRAM
1	NASSAU AND SUFFOLK	50 CIRCLE ROAD STONY BROOK, NY 11790 TEL. (631) 444-0365	50 CIRCLE ROAD STONY BROOK, NY 11790-3409 TEL. (631) 444-0405
2	BRONX, KINGS, NEW YORK, QUEENS AND RICHMOND	1 HUNTERS POINT PLAZA, 47-40 21ST ST. LONG ISLAND CITY, NY 11101-5407 TEL. (718) 482-4997	1 HUNTERS POINT PLAZA, 47-40 21ST ST. LONG ISLAND CITY, NY 11101-5407 TEL. (718) 482-4933
3	DUTCHESS, ORANGE, PUTNAM, ROCKLAND, SULLIVAN, ULSTER AND WESTCHESTER	21 SOUTH PUTT CORNERS ROAD NEW PALTZ, NY 12561-1696 TEL. (845) 256-3059	100 HILLSIDE AVENUE, SUITE 1W WHITE PLAINS, NY 10603 TEL. (914) 428 - 2505
4	ALBANY, COLUMBIA, DELAWARE, GREENE, MONTGOMERY, OTSEGO, RENSSELAER, SCHENECTADY AND SCHOHARIE	1150 NORTH WESTCOTT ROAD SCHENECTADY, NY 12306-2014 TEL. (518) 357-2069	1130 NORTH WESTCOTT ROAD SCHENECTADY, NY 12306-2014 TEL. (518) 357-2045
5	CLINTON, ESSEX, FRANKLIN, FULTON, HAMILTON, SARATOGA, WARREN AND WASHINGTON	1115 STATE ROUTE 86, PO BOX 296 RAY BROOK, NY 12977-0296 TEL. (518) 897-1234	232 GOLF COURSE ROAD, PO BOX 220 WARRENSBURG, NY 12885-0220 TEL. (518) 623-1200
6	HERKIMER, JEFFERSON, LEWIS, ONEIDA AND ST. LAWRENCE	STATE OFFICE BUILDING 317 WASHINGTON STREET WATERTOWN, NY 13601-3787 TEL. (315) 785-2245	STATE OFFICE BUILDING 207 GENESEE STREET UTICA, NY 13501-2885 TEL. (315) 793-2554
7	BROOME, CAYUGA, CHENANGO, CORTLAND, MADISON, ONONDAGA, OSWEGO, TIOGA AND TOMPKINS	615 ERIE BLVD. WEST SYRACUSE, NY 13204-2400 TEL. (315) 426-7438	615 ERIE BLVD. WEST SYRACUSE, NY 13204-2400 TEL. (315) 426-7500
8	CHEMUNG, GENESEE, LIVINGSTON, MONROE, ONTARIO, ORLEANS, SCHUYLER, SENECA, STEUBEN, WAYNE AND YATES	6274 EAST AVON-LIMA ROAD AVON, NY 14414-9519 TEL. (585) 226-2466	6274 EAST AVON-LIMA RD. AVON, NY 14414-9519 TEL. (585) 226-2466
9	ALLEGANY, CATTARAUGUS, CHAUTAUQUA, ERIE, NIAGARA AND WYOMING	270 MICHIGAN AVENUE BUFFALO, NY 14203-2999 TEL. (716) 851-7165	270 MICHIGAN AVE. BUFFALO, NY 14203-2999 TEL. (716) 851-7070

APPENDIX B

NYSDEC NOTICE OF INTENT AND MS4s

NOTICE OF INTENT

New York State Department of Environmental Conservation
Division of Water
625 Broadway, 4th Floor
Albany, New York 12233-3505

NYR _____
(for DEC use only)

Stormwater Discharges Associated with Construction Activity Under State Pollutant Discharge Elimination System (SPDES) General Permit # GP-0-10-001

All sections must be completed unless otherwise noted. Failure to complete all items may result in this form being returned to you, thereby delaying your coverage under this General Permit. Applicants must read and understand the conditions of the permit and prepare a Stormwater Pollution Prevention Plan prior to submitting this NOI. Applicants are responsible for identifying and obtaining other DEC permits that may be required.

-IMPORTANT-
RETURN THIS FORM TO THE ADDRESS ABOVE
OWNER/OPERATOR MUST SIGN FORM

Owner/Operator Information

Owner/Operator (Company Name/Private Owner Name/Municipality Name)
Cooper Crouse-Hinds

Owner/Operator Contact Person Last Name (NOT CONSULTANT)
Olavarria

Owner/Operator Contact Person First Name
Nelson

Owner/Operator Mailing Address
600 Travis, PO Box 4446

City
Houston

State
TX

Zip
77210 -

Phone (Owner/Operator)
713 - 209 - 8850

Fax (Owner/Operator)
713 - 209 - 8990

Email (Owner/Operator)
Nelson.Olavarria@CooperIndustries.com

FED TAX ID
20 - 1288146 (not required for individuals)

Project Site Information

Project/Site Name
Cooper Crouse-Hinds Landfills

Street Address (NOT P.O. BOX)
Wolf and 7th North Streets

Side of Street
● North ● South ○ East ○ West

City/Town/Village (THAT ISSUES BUILDING PERMIT)
City of Syracuse and Town of Salina

State: NY
Zip: 13221 -
County: Onondaga
DEC Region: 7

Name of Nearest Cross Street
Wolf Street

Distance to Nearest Cross Street (Feet)
2000

Project In Relation to Cross Street
○ North ○ South ○ East ● West

Tax Map Numbers
Section-Block-Parcel
073.-01-08.1-34

Tax Map Numbers
01.01-03

1. Provide the Geographic Coordinates for the project site in NYTM Units. To do this you **must** go to the NYSDEC Stormwater Interactive Map on the DEC website at:

www.dec.ny.gov/imsmaps/stormwater/viewer.htm

Zoom into your Project Location such that you can accurately click on the centroid of your site. Once you have located your project site, go to the tool boxes on the top and choose "i"(identify). Then click on the center of your site and a new window containing the X, Y coordinates in UTM will pop up. Transcribe these coordinates into the boxes below. For problems with the interactive map use the help function.

X Coordinates (Easting): 405513

Y Coordinates (Northing): 4770894

2. What is the nature of this construction project?

○ **New Construction**

○ **Redevelopment with increase in imperviousness**

● **Redevelopment with no increase in imperviousness**

3. Select the predominant land use for both pre and post development conditions.
SELECT ONLY ONE CHOICE FOR EACH

Pre-Development Existing Land Use

- ○ FOREST
- ○ PASTURE/OPEN LAND
- ○ CULTIVATED LAND
- ○ SINGLE FAMILY HOME
- ○ SINGLE FAMILY SUBDIVISION
- ○ TOWN HOME RESIDENTIAL
- ○ MULTIFAMILY RESIDENTIAL
- ○ INSTITUTIONAL/SCHOOL
- ○ INDUSTRIAL
- ○ COMMERCIAL
- ○ ROAD/HIGHWAY
- ○ RECREATIONAL/SPORTS FIELD
- ○ BIKE PATH/TRAIL
- ○ LINEAR UTILITY
- ○ PARKING LOT
- ● OTHER

Landfill

Post-Development Future Land Use

- ○ SINGLE FAMILY HOME
- ○ SINGLE FAMILY SUBDIVISION — Number of Lots
- ○ TOWN HOME RESIDENTIAL
- ○ MULTIFAMILY RESIDENTIAL
- ○ INSTITUTIONAL/SCHOOL
- ○ INDUSTRIAL
- ○ COMMERCIAL
- ○ MUNICIPAL
- ○ ROAD/HIGHWAY
- ○ RECREATIONAL/SPORTS FIELD
- ○ BIKE PATH/TRAIL
- ○ LINEAR UTILITY (water, sewer, gas, etc.)
- ○ PARKING LOT
- ○ CLEARING/GRADING ONLY
- ○ DEMOLITION, NO REDEVELOPMENT
- ○ WELL DRILLING ACTIVITY *(Oil, Gas, etc.)
- ● OTHER

Landfill

*note: for gas well drilling, non-high volume hydraulic fractured wells only

4. Will future use of this site be an agricultural property as defined by the NYS Agriculture and Markets Law ? ○ **Yes** ● **No**

5. Is this a project which does not require coverage under the General Permit (e.g. Project done under an Individual SPDES Permit, or department approved remediation)? ● **Yes** ○ **No**

6. Is this property owned by a state authority, state agency, federal government or local government? ○ **Yes** ● **No**

7. In accordance with the larger common plan of development or sale, enter the total project site acreage, the acreage to be disturbed and the future impervious area (acreage)within the disturbed area. Round to the nearest tenth of an acre.

Total Site Acreage	Acreage To Be Disturbed	Existing Impervious Area Within Disturbed	Future Impervious Area Within Disturbed
40.490.9	40.9	0.0	0.00.0

8. Do you plan to disturb more than 5 acres of soil at any one time? ● **Yes** ○ **No**

9. Indicate the percentage of each Hydrologic Soil Group(HSG) at the site.

A	B	C	D
%	%	%	100 %

10. Is this a phased project? ● Yes ○ No

11. Enter the planned start and end dates of the disturbance activities

Start Date		End Date
08/01/2013	-	12/31/2014

12. Identify the nearest, natural, surface waterbody(ies) to which construction site runoff will discharge.

Name

Ley Creek

12a. Type of waterbody identified in Question 12?

- ○ Wetland / State Jurisdiction On Site (Answer 12b)
- ○ Wetland / State Jurisdiction Off Site
- ○ Wetland / Federal Jurisdiction On Site (Answer 12b)
- ○ Wetland / Federal Jurisdiction Off Site
- ○ Stream / Creek On Site
- ● Stream / Creek Off Site
- ○ River On Site
- ○ River Off Site
- ○ Lake On Site
- ○ Lake Off Site
- ○ Other Type On Site
- ○ Other Type Off Site

12b. How was the wetland identified?

- ○ Regulatory Map
- ○ Delineated by Consultant
- ○ Delineated by Army Corps of Engineers
- ○ Other (identify)

13. Has the surface waterbody(ies) in question 12 been identified as a 303(d) segment in Appendix E of GP-0-10-001? ● Yes ○ No

14. Is this project located in one of the Watersheds identified in Appendix C of GP-0-10-001? ● Yes ○ No

15. Is the project located in one of the watershed areas associated with AA and AA-S classified waters? **If no, skip question 16.** ○ Yes ● No

16. Does this construction activity disturb land with no existing impervious cover and where the Soil Slope Phase is identified as an E or F on the USDA Soil Survey? **If Yes, what is the acreage to be disturbed?** ○ **Yes** ○ **No**

[ ][ ][ ][ ].[ ]

17. Will the project disturb soils within a State regulated wetland or the protected 100 foot adjacent area? ○ **Yes** ○ **No**

18. Does the site runoff enter a separate storm sewer system (including roadside drains, swales, ditches, culverts, etc)? ○ **Yes** ○ **No** ○ **Unknown**

19. What is the name of the municipality/entity that owns the separate storm sewer system?

20. Does any runoff from the site enter a sewer classified as a Combined Sewer? ○ **Yes** ○ **No** ○ **Unknown**

21. Has the required Erosion and Sediment Control component of the SWPPP been developed in conformance with the current NYS Standards and Specifications for Erosion and Sediment Control (aka Blue Book) ? ○ **Yes** ○ **No**

22. Does this construction activity require the development of a SWPPP that includes Water Quality and Quantity Control components (Post-Construction Stormwater Management Practices) **(If No, skip questions 23 and 27-35)** ○ **Yes** ○ **No**

23. Have the Water Quality and Quantity Control components of the SWPPP been developed in comformance with the current NYS Stormwater Management Design Manual ? ○ **Yes** ○ **No**

24. The Stormwater Pollution Prevention Plan (SWPPP) was prepared by:

- ● **Professional Engineer (P.E.)**
- ○ **Soil and Water Conservation District (SWCD)**
- ○ **Registered Landscape Architect (R.L.A)**
- ○ **Certified Professional in Erosion and Sediment Control (CPESC)**
- ○ **Owner/Operator**
- ○ **Other**

SWPPP Preparer
Tetra Tech, Inc.

Contact Name (Last, Space, First)
Morgan, Daniel

Mailing Address
175 N Corporate Drive Suite 100

City
Brookfield

State
WI

Zip
53045-

Phone
262-792-1282

Fax
262-792-1310

Email
dan.morgan@tetratech.com

SWPPP Preparer Certification

I hereby certify that the Stormwater Pollution Prevention Plan (SWPPP) for this project has been prepared in accordance with the terms and conditions of the GP-0-10-001. Furthermore, I understand that certifying false, incorrect or inaccurate information is a violation of this permit and the laws of the State of New York and could subject me to criminal, civil and/or administrative proceedings.

First Name
Daniel

MI
L

Last Name
Morgan

Signature
Daniel L. Morgan

Date
05/03/2013

25. Has a construction sequence schedule for the planned management practices been prepared? ● Yes ○ No

26. Select **all** of the erosion and sediment control practices that will be employed on the project site:

Temporary Structural

- ○ Check Dams
- ● Construction Road Stabilization
- ● Dust Control
- ○ Earth Dike
- ○ Level Spreader
- ○ Perimeter Dike/Swale
- ○ Pipe Slope Drain
- ○ Portable Sediment Tank
- ○ Rock Dam
- ○ Sediment Basin
- ○ Sediment Traps
- ● Silt Fence
- ○ Stabilized Construction Entrance
- ○ Storm Drain Inlet Protection
- ● Straw/~~Hay~~ Bale Dike
- ○ Temporary Access Waterway Crossing
- ○ Temporary Stormdrain Diversion
- ○ Temporary Swale
- ○ Turbidity Curtain
- ○ Water bars

Biotechnical

- ○ Brush Matting
- ○ Wattling

Vegetative Measures

- ○ Brush Matting
- ○ Dune Stabilization
- ○ Grassed Waterway
- ● Mulching
- ○ Protecting Vegetation
- ○ Recreation Area Improvement
- ● Seeding
- ○ Sodding
- ● Straw/~~Hay~~ Bale Dike
- ● Streambank Protection
- ○ Temporary Swale
- ● Topsoiling
- ● Vegetating Waterways

Permanent Structural

- ○ Debris Basin
- ● Diversion
- ○ Grade Stabilization Structure
- ● Land Grading
- ○ Lined Waterway (Rock)
- ○ Paved Channel (Concrete)
- ○ Paved Flume
- ○ Retaining Wall
- ● Riprap Slope Protection
- ● Rock Outlet Protection
- ○ Streambank Protection

Other

Water Quality and Quantity Control

Important: **Completion of Questions 27-35 is not required if response to Question 22 is No.**

Post-Construction Stormwater Management Practices

27. Indicate **all** Stormwater Management Practice(s) that will be installed/constructed on this site:

Ponds

- ○ **Micropool Extended Detention (P-1)**
- ○ **Wet Pond (P-2)**
- ○ **Wet Extended Detention (P-3)**
- ○ **Multiple Pond System (P-4)**
- ○ **Pocket Pond (P-5)**

Filtering

- ○ **Surface Sand Filter (F-1)**
- ○ **Underground Sand Filter (F-2)**
- ○ **Perimeter Sand Filter (F-3)**
- ○ **Organic Filter (F-4)**
- ○ **Bioretention (F-5)**
- ○ **Other** _____

Alternative Practice

- ○ **Rain Garden**
- ○ **Cistern**
- ○ **Green Roof**
- ○ **Stormwater Planters**
- ○ **Permeable Paving (Modular Block)**

Wetlands

- ○ **Shallow Wetland (W-1)**
- ○ **Extended Detention Wetland (W-2)**
- ○ **Pond/Wetland System (W-3)**
- ○ **Pocket Wetland (W-4)**

Infiltration

- ○ **Infiltration Trench (I-1)**
- ○ **Infiltration Basin (I-2)**
- ○ **Dry Well (I-3)**
- ○ **Underground Infiltration System**

Open Channels

- ○ **Dry Swale (O-1)**
- ○ **Wet Swale (O-2)**

Verified Proprietary Practice

- ○ **Hydrodynamic**
- ○ **Wet Vault**
- ○ **Media Filter**

28. Describe other stormwater management practices not listed above or explain any deviations from the technical standards.

29. Has a long term Operation and Maintenance Plan for the post-construction stormwater management practice(s) been developed? ○ **Yes** ○ **No**

If Yes, Identify the entity responsible for the long term Operation and Maintenance

30. Provide the total water quality volume required and the total provided for the site.

WQv Required ___.___ **acre-feet**

WQv Provided ___.___ **acre-feet**

31. Provide the following Unified Stormwater Sizing Criteria for the site.

Total Channel Protection Storage Volume (CPv) - Extended detention of post-developed 1 year, 24 hour storm event

CPv Required ___.___ **acre-feet**

CPv Provided ___.___ **acre-feet**

31a. The need to provide for channel protection has been waived because:

○ **Site discharges directly to fourth order stream or larger**

Total Overbank Flood Control Criteria (Qp) - Peak discharge rate for the 10 year storm

Pre-Development ___.___ **CFS**

Post-development ___.___ **CFS**

Total Extreme Flood Control Criteria (Qf) - Peak discharge rate for the 100 year storm

Pre-Development ___.___ **CFS**

Post-development ___.___ **CFS**

31b. The need to provide for flood control has been waived because:

○ **Site discharges directly to fourth order stream or larger**

○ **Downstream analysis reveals that flood control is not required**

IMPORTANT: For questions 31 and 32, impervious area should be calculated considering the project site and all offsite areas that drain to the post-construction stormwater management practice(s). (Total Drainage Area = Project Site + Offsite areas)

32. Pre-Construction Impervious Area - As a percent of the Total Drainage Area enter the percentage of the existing impervious areas before construction begins. ___ %

33. Post-Construction Impervious Area - As a percent of the Total Drainage Area, enter the percentage of the future impervious areas that will be created/remain on the site after completion of construction. ___ %

34. Indicate the total number of post-construction stormwater management practices to be installed/constructed. ___

35. Provide the total number of stormwater discharge points from the site. (include discharges to either surface waters or to separate storm sewer systems) ___

36. Identify other DEC permits that are required for this project.

DEC Permits

- ○ Air Pollution Control
- ○ Coastal Erosion
- ○ Hazardous Waste
- ○ Long Island Wells
- ○ Mined Land Reclamation
- ○ Other SPDES
- ○ Solid Waste
- ● None
- ○ Other
- ○ Navigable Waters Protection / Article 15
- ○ Water Quality Certificate
- ○ Dam Safety
- ○ Water Supply
- ○ Freshwater Wetlands/Article 24
- ○ Tidal Wetlands
- ○ Wild, Scenic and Recreational Rivers
- ○ Stream Bed or Bank Protection / Article 15

37. Does this project require a US Army Corps of Engineers Wetland Permit? ○ Yes ● No
If Yes, Indicate Size of Impact. _____.

38. Is this project subject to the requirements of a regulated, traditional land use control MS4? ● Yes ○ No
(If No, skip question 39)

39. Has the "MS4 SWPPP Acceptance" form been signed by the principal executive officer or ranking elected official and submitted along with this NOI? ● Yes ○ No

40. If this NOI is being submitted for the purpose of continuing coverage under a general permit for stormwater runoff from construction activities, please indicate the former SPDES number assigned. NYR

Owner/Operator Certification

I have read or been advised of the permit conditions and believe that I understand them. I also understand that, under the terms of the permit, there may be reporting requirements. I hereby certify that this document and the corresponding documents were prepared under my direction or supervision. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations. I further understand that coverage under the general permit will be identified in the acknowledgment that I will receive as a result of submitting this NOI and can be as long as sixty (60) business days as provided for in the general permit. I also understand that, by submitting this NOI, I am acknowledging that the SWPPP has been developed and will be implemented as the first element of construction, and agreeing to comply with all the terms and conditions of the general permit for which this NOI is being submitted.

Print First Name Jesse **MI**

Print Last Name Conklin

Owner/Operator Signature Jesse A Ch

Date 05/08/2013

New York State Department of Environmental Conservation
Division of Water
625 Broadway, 4th Floor
Albany, New York 12233-3505

MS4 Stormwater Pollution Prevention Plan (SWPPP) Acceptance Form

for

Construction Activities Seeking Authorization Under SPDES General Permit

*(NOTE: Attach Completed Form to Notice Of Intent and Submit to Address Above)

I. Project Owner/Operator Information	
1. Owner/Operator Name:	Cooper Industries, LLC
2. Contact Person:	Nelson Olavarria
3. Street Address:	PO Box 4446, 600 Travis, Suite 5600
4. City/State/Zip:	Houston, TX 77210
II. Project Site Information	
5. Project/Site Name:	Cooper Crouse-Hinds South Landfill
6. Street Address:	Wolf and 7th North Streets
7. City/State/Zip:	Syracuse, NY 13208
III. Stormwater Pollution Prevention Plan (SWPPP) Review and Acceptance Information	
8. SWPPP Reviewed by:	RUSSELL HOUCK, PE
9. Title/Position:	FACILITIES ENGINEER
10. Date Final SWPPP Reviewed and Accepted:	1/15/14
IV. Regulated MS4 Information	
11. Name of MS4:	City of Syracuse
12. MS4 SPDES Permit Identification Number: NYR20A	186
13. Contact Person:	RUSSELL HOUCK
14. Street Address:	233 E. WASHINGTON ST
15. City/State/Zip:	SYRACUSE, NY, 13202
16. Telephone Number:	315-448-8059

(NYS DEC - MS4 SWPPP Acceptance Form - January 2010)

MS4 SWPPP Acceptance Form - continued

V. Certification Statement - MS4 Official (principal executive officer or ranking elected official) or Duly Authorized Representative

I hereby certify that the final Stormwater Pollution Prevention Plan (SWPPP) for the construction project identified in question 5 has been reviewed and meets the substantive requirements in the SPDES General Permit For Stormwater Discharges from Municipal Separate Storm Sewer Systems (MS4s).
Note: The MS4, through the acceptance of the SWPPP, assumes no responsibility for the accuracy and adequacy of the design included in the SWPPP. In addition, review and acceptance of the SWPPP by the MS4 does not relieve the owner/operator or their SWPPP preparer of responsibility or liability for errors or omissions in the plan.

Printed Name: MARY ROBISON, P.E.

Title/Position: CITY ENGINEER

Signature: Mary E Robison

Date: 1/31/14

VI. Additional Information

Approval is based on the following conditions:
1. City of Syracuse Site Preparation Permit needs to be obtained prior to any site disturbance within the City of Syracuse.
2. Stormwater Maintenance and Easement Access agreements need to be executed and filed in the County Clerk's Office prior to the City of Syracuse issuing a Site Preparation Permit.
3. This SWPPP acceptance does NOT include authorization to disturb greater than 5 acres at any time. A justification for disturbance, additional erosion and sediment control measures to mitigate disturbance, phasing plan, cuts and fill plan, and total acreage to be disturbed in each phase must be submitted for review and approval by the City of Syracuse and NYSDEC.

New York State Department of Environmental Conservation
Division of Water
625 Broadway, 4th Floor
Albany, New York 12233-3505

MS4 Stormwater Pollution Prevention Plan (SWPPP) Acceptance Form

for

Construction Activities Seeking Authorization Under SPDES General Permit

*(NOTE: Attach Completed Form to Notice Of Intent and Submit to Address Above)

I. Project Owner/Operator Information	
1. Owner/Operator Name:	Cooper Industries, LLC
2. Contact Person:	Nelson Olavarria
3. Street Address:	PO Box 4446, 600 Travis, Suite 5600
4. City/State/Zip:	Houston, TX 77210
II. Project Site Information	
5. Project/Site Name:	Cooper Crouse-Hinds North Landfill
6. Street Address:	Wolf and 7th North Streets
7. City/State/Zip:	Syracuse, NY 13208
III. Stormwater Pollution Prevention Plan (SWPPP) Review and Acceptance Information	
8. SWPPP Reviewed by:	Kristy Harris, CPESC, CPSWQ (CHA)
9. Title/Position:	Asst. Project Engineer
10. Date Final SWPPP Reviewed and Accepted:	10/11/13
IV. Regulated MS4 Information	
11. Name of MS4:	Town of Salina
12. MS4 SPDES Permit Identification Number: NYR20A	374
13. Contact Person:	Jason Perkins
14. Street Address:	201 School Rd.
15. City/State/Zip:	Liverpool, NY 13088
16. Telephone Number:	(315) 451-0492

(NYS DEC - MS4 SWPPP Acceptance Form - January 2010)

MS4 SWPPP Acceptance Form - continued

V. Certification Statement - MS4 Official (principal executive officer or ranking elected official) or Duly Authorized Representative

I hereby certify that the final Stormwater Pollution Prevention Plan (SWPPP) for the construction project identified in question 5 has been reviewed and meets the substantive requirements in the SPDES General Permit For Stormwater Discharges from Municipal Separate Storm Sewer Systems (MS4s).
Note: The MS4, through the acceptance of the SWPPP, assumes no responsibility for the accuracy and adequacy of the design included in the SWPPP. In addition, review and acceptance of the SWPPP by the MS4 does not relieve the owner/operator or their SWPPP preparer of responsibility or liability for errors or omissions in the plan.

Printed Name: Mark Nicotra

Title/Position: Supervisor

Signature: Mark T. Nicotra

Date: 10/15/13

VI. Additional Information

APPENDIX C

SOIL DESCRIPTIONS

Map Unit Description (Brief, Generated)

Onondaga County, New York

[Minor map unit components are excluded from this report]

Map unit: Ce - Carlisle muck

Component: Carlisle (75%)

The Carlisle component makes up 75 percent of the map unit. Slopes are 0 to 2 percent. This component is on swamps, marshes. The parent material consists of deep organic material. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is very poorly drained. Water movement in the most restrictive layer is moderately high. Available water to a depth of 60 inches is very high. Shrink-swell potential is low. This soil is not flooded. It is frequently ponded. A seasonal zone of water saturation is at 0 inches during January, February, March, April, May, June, September, October, November, December. Organic matter content in the surface horizon is about 84 percent. Nonirrigated land capability classification is 5w. This soil meets hydric criteria.

Map unit: ChB - Collamer silt loam, 2 to 6 percent slopes

Component: Collamer (85%)

The Collamer component makes up 85 percent of the map unit. Slopes are 2 to 6 percent. This component is on lake plains. The parent material consists of silty and clayey glaciolacustrine deposits. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is moderately well drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is high. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 21 inches during March, April, May. Organic matter content in the surface horizon is about 4 percent. Nonirrigated land capability classification is 2e. This soil does not meet hydric criteria.

Map unit: ML - Made land

Component: Udorthents (70%)

The Udorthents component makes up 70 percent of the map unit. Slopes are 0 to 5 percent. Depth to a root restrictive layer is greater than 60 inches. The natural drainage class is somewhat excessively drained. Water movement in the most restrictive layer is moderately low. Available water to a depth of 60 inches is low. Shrink-swell potential is low. This soil is not flooded. It is not ponded. A seasonal zone of water saturation is at 54 inches during January, February, March, April, May, June, November, December. Organic matter content in the surface horizon is about 2 percent. Nonirrigated land capability classification is 6s. This soil does not meet hydric criteria.

Map unit: Ub - Urban land

Component: Urban land (70%)

Generated brief soil descriptions are created for major soil components. The Urban land is a miscellaneous area.

APPENDIX D

2013 PHASE 1A CULTURAL RESOURCES REPORT

PHASE IA CULTURAL RESOURCES REPORT

Cooper Crouse-Hinds, LLC.
North Landfill and South Landfill Remedial Action
Town of Salina and City of Syracuse
Onondaga County, New York

Prepared for:

Cooper Crouse-Hinds, LLC
600 Travis, Suite 5600
Houston, Texas 77002

Prepared by:
Tetra-Tech, Inc.
Cultural Resources Services Group
285 Ellicott St
Buffalo, New York 14203
716-849-9419

Report Author:

David Ingleman

Bonnie L. Locking, M.A.
Principal Investigator

February 2013

TETRA TECH

MANAGEMENT SUMMARY

SHPO Project Review Number:

Involved State and Federal Agencies (DEC, CORPS, FHWA, etc.): DEC

Phase of Survey: 1A

Location Information
- Location: Town of Salina and City of Syracuse
- Minor Civil Division: 64815 (Salina) and 73000 (Syracuse)
- County: Onondaga

Survey Area (Metric and English)
- Length: Not applicable
- Depth: Not applicable
- Number of Acres Surveyed: 16.54 hectares (40.88 acres)
- Number of Square Meters and Feet Excavated (Phase II, Phase III only): Not applicable
- Percentage of the Site Excavated (Phase II, Phase III only): Not applicable

USGS 7.5-Minute Quadrangle Map: Syracuse West (1973)

Archaeological Survey Overview
- Number and Interval of Shovel Tests: Not applicable
- Number and Size of Units: Not applicable
- Width of Plowed Strips: Not applicable
- Surface Survey Transect Interval: Not applicable

Results of Archaeological Survey
- Number and name of prehistoric sites identified: Not applicable
- Number and name of historic sites identified: Not applicable
- Number and name of sites recommended for Phase II/Avoidance: Not applicable

Results of Architectural Survey
- Number of buildings/structures/cemeteries within project area: 0
- Number of buildings/structures/cemeteries adjacent to project area: 0
- Number of previously determined NR listed or eligible building/structures/cemeteries/districts: 0
- Number of identified eligible buildings/structures/cemeteries/districts: 0

Report Author(s): David A. Ingleman

Date of Report: February 2013

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LIST OF ATTACHMENTS

ATTACHMENT	DESCRIPTION
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Attachment B	Historic Photographs

1.0 INTRODUCTION

Tetra Tech, Inc. (Tetra Tech) Cultural Resources Services Group performed a Phase IA cultural resources investigation for the proposed Cooper Crouse-Hinds, LLC, North Landfill and South Landfill Remedial Action (hereafter referred to as the Project), located in the Town of Salina and City of Syracuse, Onondaga County, New York in December 2012, on behalf of Cooper Crouse-Hinds, LLC (C-CH). This study was conducted in accordance with cultural resource management practices as required on the Federal and State level. Specifically, the Phase IA cultural resources investigation was conducted in accordance with the National Historic Preservation Act of 1966, as amended, Executive Order 11593, the regulations of the Advisory Council on Historic Preservation (36 Code of Federal Regulations [CFR] 800), Section 14.09 of the New York State Parks, Recreation and Historic Preservation Law of 1980, the New York Archaeological Council's (NYAC) *Standards for Cultural Resource Investigations and Curation of Collections* (1994), and the New York State Historic Preservation Office (SHPO) *Phase I Archaeological Report Format Requirements* (2005).

The Phase IA cultural resources investigation of the Project included a reconnaissance survey (visual assessment, site walkover, and photographic documentation), and background research of the approximately 16.54 hectare (ha) (40.88 acre [ac]) Project area. The purpose of the Phase IA cultural resources investigation is to provide a sensitivity assessment and recommendations regarding Phase IB investigations.

The Phase IA cultural resources investigation was completed under the direction of Bonnie L. Locking. Ms. Locking meets 36 CFR 61 qualifications for conducting archaeological review and compliance projects in New York. David Ingleman served as project archaeologist. Jennifer Laslovich prepared the figures and conducted Geographic Information Systems (GIS) analysis. This report summarizes the background research, describes the environment of the Project Area, describes the results of the field reconnaissance survey, and provides recommendations for further investigations.

1.1 PROJECT DESCRIPTION

The Project area comprises two adjacent, former landfills situated in the Town of Salina and the City of Syracuse, Onondaga County, New York. The two former landfills, referred to as the North Landfill and the South Landfill, are located immediately west of CSX railroad tracks and the adjacent CC-H manufacturing facility, and are separated by Seventh North Street, which also forms the boundary between the Town of Salina (North Landfill) and the City of Syracuse (South Landfill). The Project area is located in an area of mixed usage including light industrial/manufacturing, commercial, and retail usage (Figure 1: Project Location Map).

The North Landfill occupies an irregular polygon shape totaling 8.69 ha (21.48 ac) in size. It is bordered to the north by a former municipal landfill owned by Plaza East, LLC (Plaza), to the east and southeast by CSX railroad tracks and the CC-H facility, to the south and southwest by Seventh North Street and the South Landfill, and to the west by wetlands and Ley Creek. Between the mid-1950s and 1989 CC-H reportedly used the North Landfill for disposal of wastes generated at their adjacent manufacturing facility (Tetra Tech 2012).

The South Landfill occupies a roughly triangular shape totaling 7.85 ha (19.4 ac) in size. The South Landfill is bordered to the north by Seventh North Street and the North Landfill, to the east and southeast by CSX railroad tracks, mixed commercial and retail development, and Hiawatha Boulevard, and to the west and northwest by Ley Creek. Undeveloped woods, wetlands, and mixed commercial and retail development are located further south of the South Landfill. Beginning in 1960, CC-H reportedly began using the South Landfill for disposal of wastes generated at their adjacent manufacturing facility. Between 1960 and early-1965 the South Landfill also accepted approximately 1,529 cubic meters (m^3) (2,000 cubic yards [yd^3]) of municipal solid waste per week from the City of Syracuse. By 1969 all landfilling at the South Landfill had stopped (Tetra Tech 2012).

Both landfills have been designated a Class 3 Inactive Hazardous Waste Disposal Site (Site No. 7-34-004) by the New York State Department of Environmental Conservation (NYSDEC). A Remedial Investigation (RI) completed in August 2009 included the excavation of test pits, boreholes and monitoring wells, as well as the collection of about 200 samples of groundwater, soil, sediments and surface water. On August 29, 2011 CC-H entered into a Consent Order (R7-0666-05-11) with NYSDEC to remediate the Project area. The minimum goals for the remedial program are to eliminate or mitigate all significant threats to public health and the environment presented by the

contamination identified within the Project area. Elements of the proposed remedial action include the following activities:

- Characterization, excavation, and off-site disposal of approximately 5,160 m^3 (6,750 yd^3) of fill material and sediments from three discrete "hot spots" within the North Landfill known to contain elevated contaminant levels.

- Consolidation of the North Landfill and South Landfill to reduce their current areas. The consolidated areas will be fenced and will have engineered cap systems designed and constructed. The areas to be consolidated will be determined during the design; however, areas to be excavated will include a 15-meter (m) (50-foot [ft]) buffer zone area between the South Landfill and Ley Creek and 9-m (30-ft) buffer zone areas between the landfills and on-site wetlands. If required for cap installation, buffer zones will be established between the landfills and Seventh North Street. This excavated material will be consolidated in the landfills above the water table.

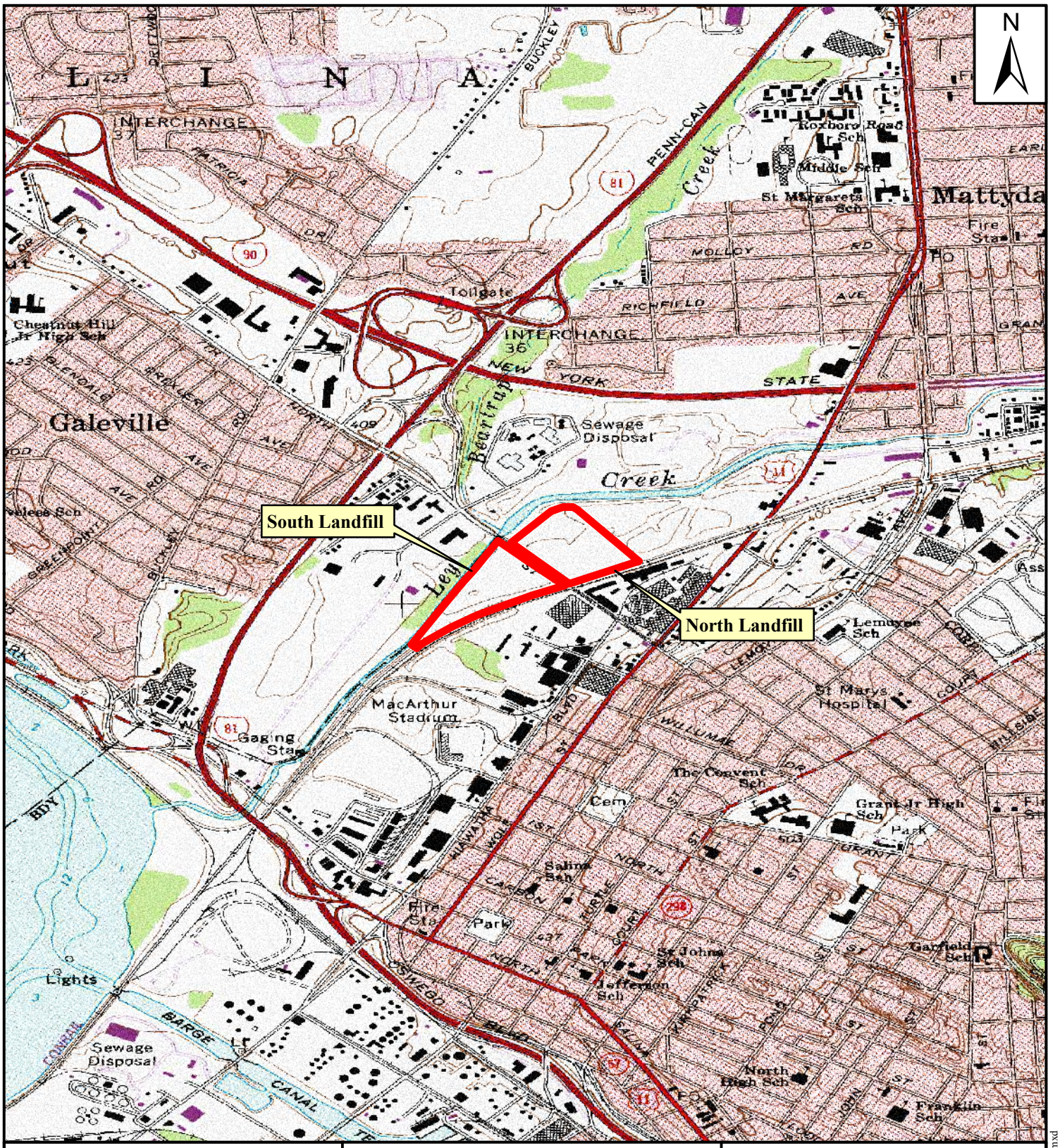
- Excavation of wetland sediment with PCB concentrations greater than 1 part per million (ppm) and less than 50 ppm for consolidation and on-site capping with the material discussed above.

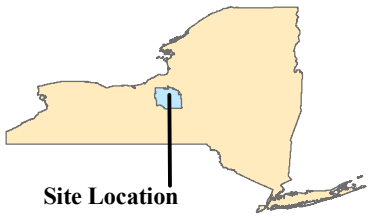
- Excavation of wetland sediment with PCB concentrations of 50 ppm or greater for off-site disposal.

- Restoration and maintenance of excavated wetlands and buffer zones per an approved restoration plan developed during the remedial design phase. Buffer zone soils will be a minimum of 0.6 m (2 ft) in deep, measured from the finished surface grade.

- Possible relocation of several existing utilities that traverse the Project area including overhead power lines (National Grid) and underground water and sanitary sewer pipelines (City of Syracuse).

The Area of Potential Effect (APE) for this cultural resources investigation consists of the entire Project Area. Also included in the APE is any area adjacent to the Project area that may indirectly be impacted through the proposed development.





Source: USDA/NRCS - National Cartography & Geospatial Center; USDA-NRCS-NCGC Digital Raster Graphic MrSID Mosaic for Onondaga County, NY. Project Area on Syracuse West Quad.

Legend

Project Boundary

0 1,000 2,000 Feet

0 240 480 Meters

Figure 1. Project Location Map for the Cooper Crouse-Hinds North Landfill and South Landfill Project, Town of Salina, Onondaga County New York.

Prepared For: Cooper Crouse-Hinds, LLC

Prepared By: TETRA TECH

Date: 2/2013

P:GIS/Projects/112IC04844-Cooper/MXD/Figure1.mxd

1.2 BACKGROUND RESEARCH

1.2.1 Environmental Setting

The Project area is located within the northern portion of the Allegheny Plateau Physiographic Province (Hutton and Rice 1977). The glaciated topography found within a 1.6 kilometers (km) (1 mile [mi]) of the Project area gently slopes up from about 121.9 m (400 ft) above mean sea level (AMSL) north of the Project area to about 131.1 m (430 ft) AMSL south of the Project area (Hutton and Rice 1977; United States Geological Survey [USGS) 1973).

Naturally occurring salt was abundant in the vicinity of the Project area (Thompson 1977:471). The Ley Creek floodplain, which includes the entire Project area, was historically a salt marsh. The confluence of Ley Creek and Bear Trap Creek is about 79 m (260 ft) west of the southwest corner of the North Landfill. From this confluence Ley Creek follows an artificially channelized course generally southwest before emptying into Onondaga Lake. The National Wetland Inventory (NWI) map identified the location of one wetland (ID No. PFO1/SS1E), including Ley Creek, within or adjacent to the Project area. Two additional wetlands, two stream segments and a drainage ditch were also delineated during the RI (Tetra Tech 2012).

Elevations in the North Landfill generally range between 112.8 – 113.4 m (370 – 372 ft) AMSL except for a large fill-mound situated in the northern half of the North Landfill, where the elevation rises to about 116.1 m (381 ft) AMSL. The topography slopes moderately to steeply downward from the fill-mound towards the North Landfill's northern boundary. Drainage across the North Landfill generally follows topography and radiates outward from the fill-mound. Drainage to the north and west is to a wetland, referred to as Wetland B, and then to the adjacent wetland property. Drainage to the south and east is towards the east wetland, referred to as Wetland A and the eastern stream segment, referred to as Stream A (Tetra Tech 2012).

Topography of the South Landfill is generally flat with an average elevation range of 113.7 – 114.9 m (373 – 377 ft) AMSL. Topographic relief is due largely to mounded fill. The topography slopes moderately to steeply away from the fill-mound in all directions. Drainage across the South Landfill generally follows topography and radiates outward from the fill-mound. Drainage to the south and east-southeast is to a small stream, referred to as Stream B, and a wetland, referred to as Wetland C. Drainage to the west is into Wetland C and eventually to Ley Creek.

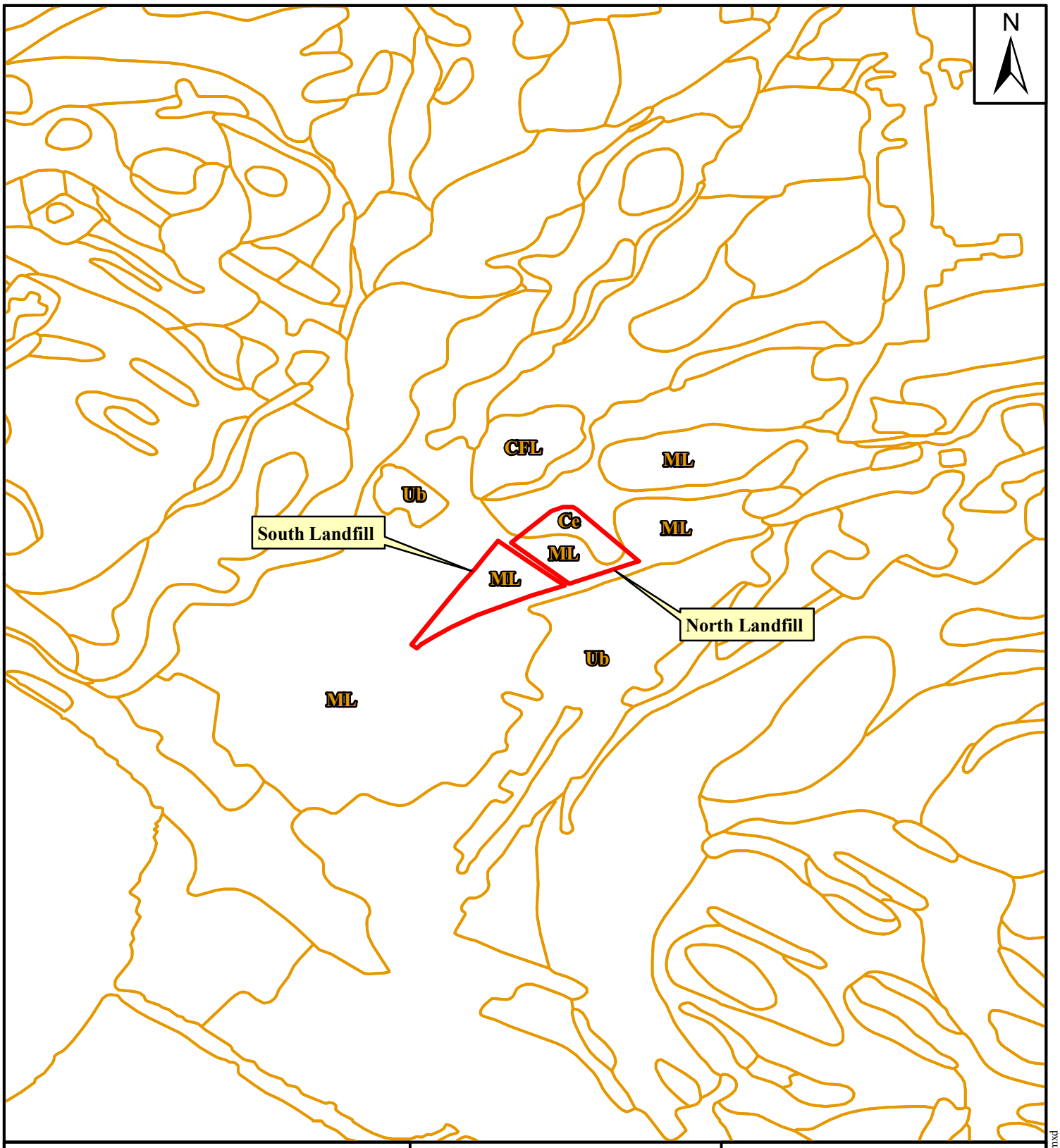
At the time of field investigation the Project area was devoid of vegetation except isolated patches of wetland flora such as cattails (*Typha* sp.) and reeds (*Phragmites* sp.). However, prior to recent vegetative clearing the Project area flora also included several species of deciduous softwoods (Drew Lent, personal communication, December 2012).

The Project area lies mostly within the Urban land soil association, however the northwestern quadrant of the North Landfill lies within the Carlisle-Palms soil association. Generally, Carlisle-Palms soils are deep, very poorly drained, and occur in waterlogged bogs, outwash plains, and flood plains. Urban land soils have been so altered by development that natural soil identification is not feasible. Two Soil Mapping Units — Made Land (Ma) and Carlisle muck (Ce) — are recorded for the Project area and generally correspond to the two soil associations mentioned above (Hutton and Rice 1977). Project area soils are summarized in Table 1 and depicted in Figure 2.

Table 1. Soil Descriptions for the Cooper Crouse-Hinds North Landfill and South Landfill Remedial Action Project, City of Syracuse and Town of Salina, Onondaga County, New York

Name	Soil Horizon Depth cm (in)			Color	Texture, Inclusions	Slope %	Drainage	Landform
Carlisle muck (Ce)	Oa1-3	0 – 165	(0 – 65)	Blk	Muck	0-2	Very poor	Swamps, Marshes
	Oa4	165 – 274	(65 – 108)	VDkBr	Muck			
	Oa5	274 – 282	(108 – 111)	VDkBr	Muck			
	IIC2	282 – 295	(111 – 116)	G	ClLo			
Made land, chemical waste	N/A			N/A	N/A	N/A	N/A	N/A

Source: Hutton and Rice (1977)
Key: Color: Blk – Black, G – Gray, Br – Brown, V – Very, Dk – Dark; Texture: Cl – Clay, Lo – Loam, Sa – Sand, Si – Silt, Muck – Muck



Description of Soil Units Within Project Boundary
Ce - Carlisle muck
ML - Made land

Legend

Project Boundary

USDA Soil Boundary

Source: U.S. Department of Agriculture, Natural Resources Conservation Service; Soil Survey Geographic (SSURGO) database for Onondaga County, New York 2010.

0 1,000 2,000 Feet

0 240 480 Meters

Figure 2. USDA Soils Map for the Cooper Crouse-Hinds North Landfill and South Landfill Project, Town of Salina, Onondaga County New York.

Prepared For: Cooper Crouse-Hinds, LLC

Prepared By: TETRA TECH

Date: 2/2013

P:GIS/Projects/112IC04844-Cooper/MXD/Figure1.mxd

1.2.2 Past and Present Land Uses and Current Conditions

Evidence of prehistoric and historic land use practices in and around the Project area was derived from a review of site files at the New York State Office of Parks, Recreation and Historic Preservation (NYSOPRHP's) Field Service Bureau, the New York State Museum, published and unpublished archaeological studies (Bradley 1979, 1987; Ritchie 1980; Ritchie and Funk; Parker 1920), local histories (Beauchamp 1908; Clark 1840; Clayton 1878), and historic maps (see Section 1.2.4 below). These sources record six prehistoric archaeological sites recorded within 1.6 km (1 mi) of the Project area (Table 2).

Generally the aboriginal inhabitants of the region showed a preference for lake, stream, river and marsh associations, knolls, and small bluffs. The Project area is situated in a swampy salt marsh just below the confluence of two perennial streams, referred to as Bear Trap Creek and Ley Creek. These waters drain into Onondaga Lake about 1.6 km (1 mi) downstream of the Project area. Although poor drainage make it unlikely that the Project area was utilized prehistorically for a settlement of any size, other specialized prehistoric activity areas may have existed at one time. In this setting only special purpose sites, such as extractive or ritual sites, are expected.

Specifically near the Project area, early to mid-eighteenth century Euro-American settlers and aboriginals of the Onondaga Nation were commercially producing salt from the springs at Onondaga Lake through a boiling process. The economic potential of the Onondaga salt springs motivated New York state to negotiate the 1788 Treaty of Fort Stanwix, which featured the transfer of Onondaga land around Onondaga Lake to the state on the condition that the land would be used for the production of salt for the common benefit of the people of New York and the Onondaga Nation. In 1797 New York State created the Onondaga Salt Spring Reservation – a 1.6 km (1 mi) wide strip of land around the southern shore of Onondaga Lake where salt production, storage, and sale were regulated and taxed. Salt exploitation was further stimulated in the early-nineteenth century by the advent of the solar drying method of salt production. Using this process salt production boomed, which in turn led to the rebranding of the City of Syracuse as the "Salt City" (Kappel 2000). By the mid-nineteenth century Lewis Henry Morgan recorded the Onondaga word for the modern Town of Salina as "*Te-ga-jik-ha-do*" signifying "Place of salt" (Morgan 1922). Salt production remained an important industry locally into the early-twentieth century when salt deposits were depleted and the Onondaga Salt Spring Reservation was closed (Kappel 2000).

As the salt industry waned in the late-nineteenth century manufacturing sprang up as the major local industry (Kappel 2000). One prominent manufacturer was the Crouse-Hinds company, whose factory was constructed adjacent to the Project area in 1911. Between the mid-1950s and 1989 Crouse-Hinds reportedly used the North Landfill for disposal of wastes generated at their adjacent manufacturing facility (i.e. foundry sand). Crouse-Hinds also used the South Landfill for disposal of manufacturing wastes beginning in 1960. Between 1960 and early-1965 the South Landfill also accepted approximately 1,529 m^3 (2,000 yd^3) of municipal solid waste per week from the City of Syracuse. All landfilling at the South Landfill ceased by 1969 (Tetra Tech 2012).

1.2.3 Previous Cultural Resource Investigations

A review of archaeological site files at the NYSOPRHP indicates that the Project area has not been previously surveyed for cultural resources. No historic structures or properties listed in or eligible for listing in the State or National Register of Historic Places (S/NRHP) were recorded in the vicinity of the Project area. A total of eight previously recorded archaeological sites were recorded within 1.6 km (1 mi) of the Project area, one of which is immediately adjacent to the Project area (Table 2). Two of the eight sites (NYSOPRHP sites) reference each other therefore the actual number of sites in the vicinity is six.

Table 2. Previously Identified Cultural Resources within 1.6 km (1 mi) of the Cooper-Crouse Hinds North and South Landfills Project, City of Syracuse and Town of Salina, Onondaga County, New York.

NYSOPRHP Site #	Site Name	Distance to APE m(ft)	Time Period	Site Type
06740.000416	Parker #87	974 (3196)	No info	No info
06740.000415	Parker #86	1439 (4721)	No info	No info
	NYSM 4235, Kaneenda, ACP Onda 83A	1416 (4646	Historic Native (1700)	Village
	NYSM 4239, ACP Onda 86A	764 (2507)	Unidentified precontact	Traces of occupation
	NYSM 4240, ACP Onda 87	0	Historic Native(?)	Camp or hamlet
	NYSM 4281	102 (335)	Unidentified precontact	Traces of occupation
	NYSM 6641, ACP Onda 86B	1142 (3747)	No info	Cemetery
	NYSM 6642	1027 (3369)	Unidentified precontact	Camp

The closest known aboriginal site was recorded by Parker (1920) as a "Camp or hamlet," adjacent to the south of the Project area. Elsewhere in the Town of Salina the presence of a few prehistoric campsites and "traces of occupation," as well as historic period sites including Jesuit missions from the seventeenth and eighteenth centuries and a French fort from the early-eighteenth century were also noted by Parker (1920). Little information is provided for these Parker sites and geographical confirmation has not occurred. There appears to be confusion surrounding the actual location of Parker 83 and 86 based on NYSM records.

1.2.4 Historic Maps and Photographs

Project area land use history is well documented in a series of historic maps and aerial photographs. Table 3 summarizes the historic map and photographic research conducted for this study and describes where select maps and aerial photographs can be found in this report. Unfortunately, many of these historic documents were not able to be reproduced here.

Table 3. Summary of Historic Maps and Photographs Depicting the of the Cooper-Crouse Hinds North and South Landfills Project area, City of Syracuse and Town of Salina, Onondaga County, New York.

Title	Author	Date	Report Reference
A Map of Part of Onondaga Lake, and its vicinity, in the State of New York. From Actual Survey	Anonymous	Ca. 1800	--
Map of the Village of Salina	Geddes	1807	--
Map of Part of the Onondaga Salt Springs Reservation	Kellogg	1827	--
Atlas of Onondaga County	Dawson	1860	--
Atlas of Onondaga County	Sweet	1874	--
Sanborn Fire Insurance Map of Syracuse	Sanborn	1892	Figure 3
Atlas of the State of New York	Bien	1895	--
Syracuse, New York 15 Minute Series Quadrangle	USGS	1898	Figure 4
Atlas of the City of Syracuse N.Y. and Suburbs	Hopkins	1924	--
Airmap of City of Syracuse	AirMap Corp.	1926	Attachment B
Aerial Photograph	Crouse-Hinds	1927	Attachment B
Sanborn Fire Insurance Map of Syracuse	Sanborn	1928	Figure 5
Onondaga Aerial Photograph	Cornell University	1938	--
Aerial Photograph	Crouse-Hinds	1948	Attachment B

Title	Author	Date	Report Reference
Syracuse West, New York 7.5 Minute Series Quadrangle	USGS	1947	Figure 6
Onondaga Aerial Photograph	Cornell University	1951	--
Aerial Photograph	Crouse-Hinds	1952	Attachment B
Aerial Photograph	Crouse-Hinds	1954	Attachment B
Map of Syracuse	Polk	1954	--
Onondaga Aerial Photograph	Cornell University	1966	--
Syracuse West, New York 7.5 Minute Series Quadrangle	USGS	1973	Figure 1
Aerial Photograph	Crouse-Hinds	1995	Attachment B

Figure 3. Cooper Crouse-Hinds North Landfill and South Landfill Remedial Action Project location on the 1892 (Vol.2) Sanborn Fire Insurance Map.

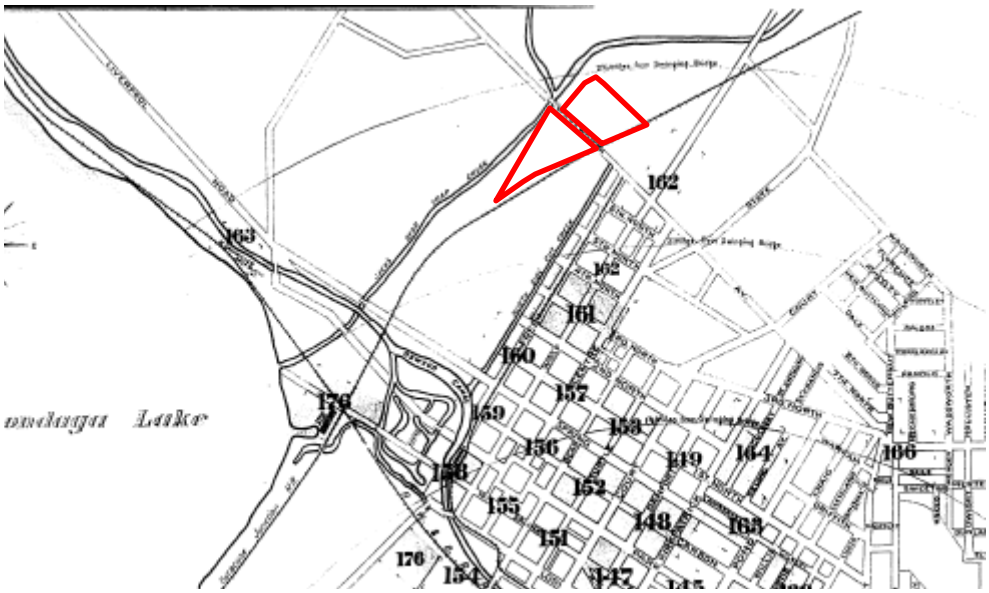


Figure 4. Cooper Crouse-Hinds North Landfill and South Landfill Remedial Action Project location on the 1898 USGS Syracuse, New York 15 Minute Series Quadrangle.

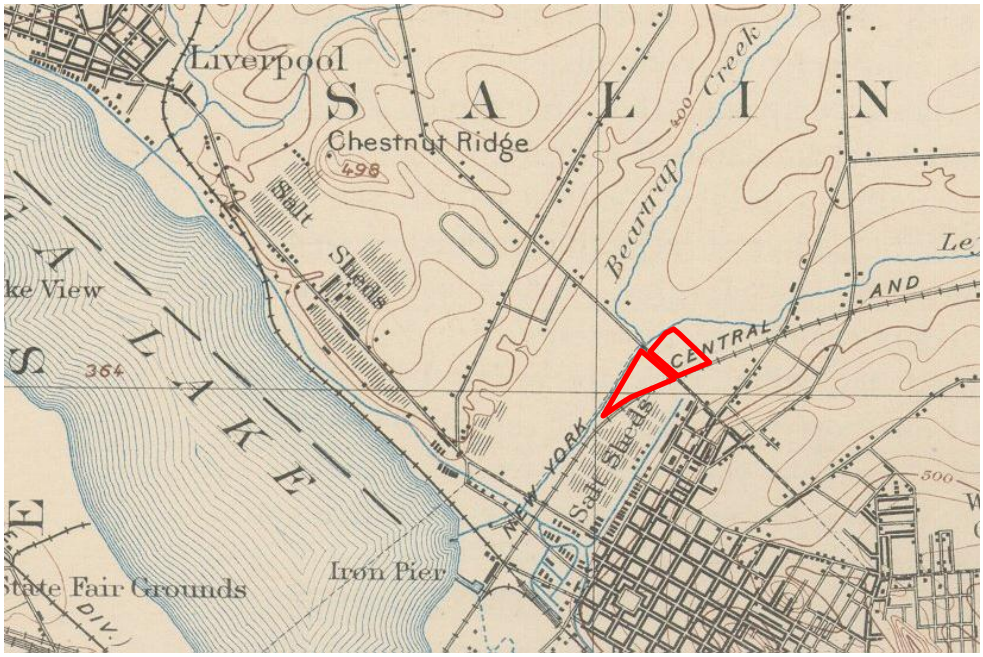


Figure 5. Cooper Crouse-Hinds North Landfill and South Landfill Remedial Action Project location on the 1928 (Vol 4) Sanborn Fire Insurance Co. Map of Syracuse.

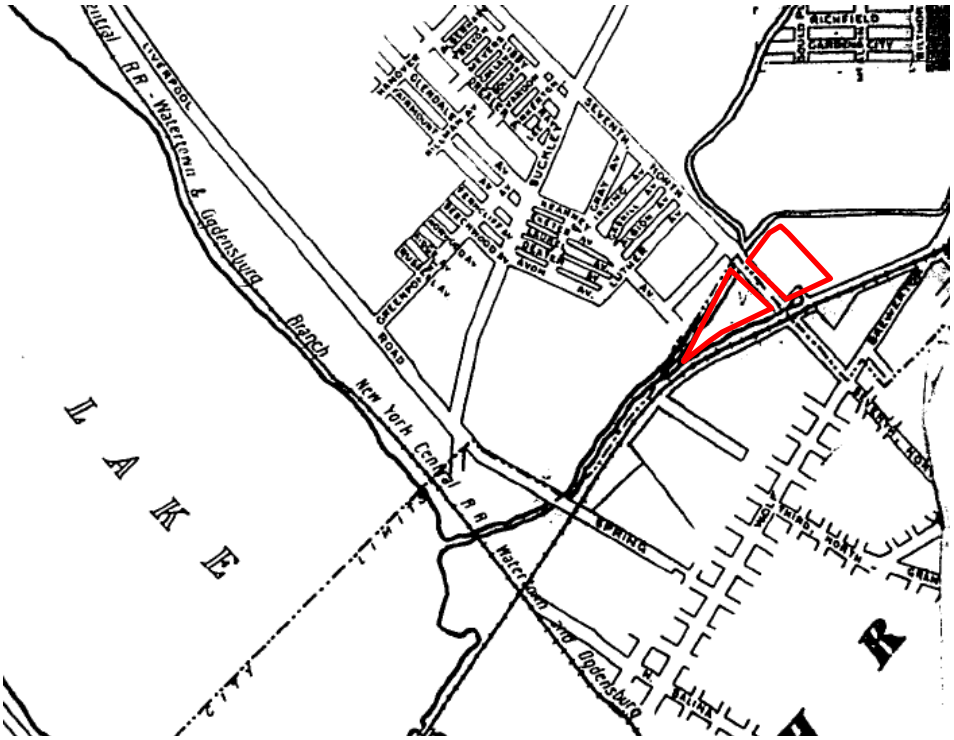
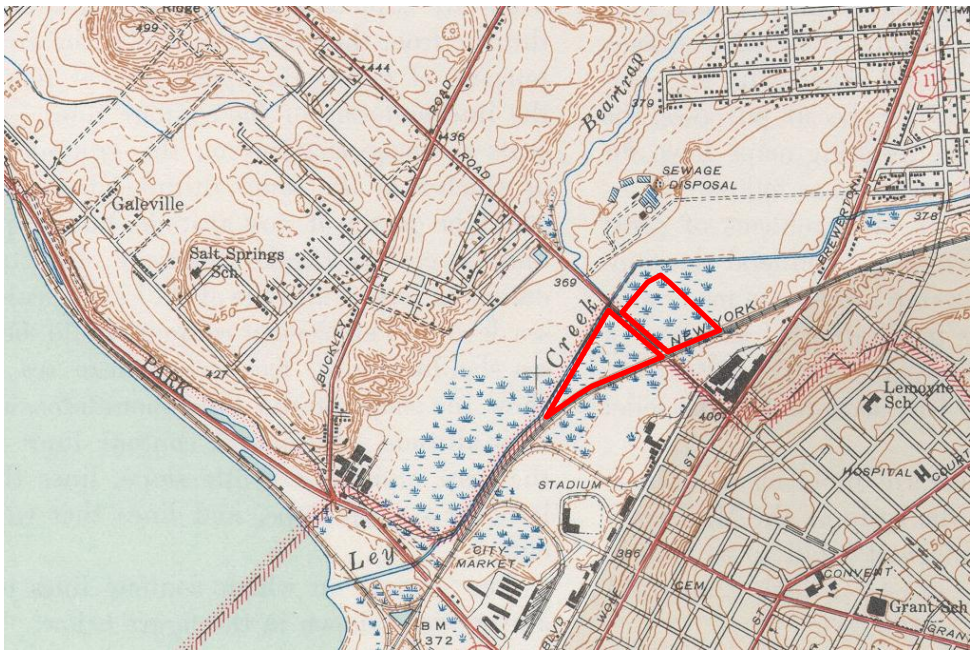


Figure 6. Cooper Crouse-Hinds North Landfill and South Landfill Remedial Action Project on the 1947 USGS Syracuse West, New York 7.5 Minute Series Quadrangle.



Generally, these sources indicate that from the late-nineteenth to early-twentieth century significant transportation and industrial related developments occurred adjacent to the Project area including the construction of Seventh Street along its present alignment, the channelization of Ley (aka Mud) Creek, the construction of the Syracuse Junction (now CSX) Railroad grade, the construction and operation of numerous salt sheds, and the construction of the Crouse-Hinds factory. Despite being surrounded by development, the Project area remained apparently unaltered until the mid-twentieth century when aerial photographs confirm use of the Project area as a landfill.

1.3 PREVIOUS DISTURBANCE

The entire Project Area was previously disturbed in the late-twentieth century by landfill grading and dumping activities. In 2010, as part of a remediation feasibility study, a series of 39 boreholes was excavated throughout the Project Area. This testing revealed widespread disturbances and thick surficial fill layers. Typically, fine brown to black foundry sand, often mixed with metal filings or slag, was found layered with mixed municipal waste (e.g. plastic, fiberglass, beer cans, shoes) to a depth of 1.2 – 3.7 m (4 – 12 ft) below ground surface (BGS). Below the fill peat or silt with shell inclusions was encountered to a maximum depth of 3.0 – 4.3 m (10-14 ft) BGS (Tetra Tech 2012).

1.4 FIELD RECONNAISSANCE

The entire Project area was pedestrian surveyed in December 2012 by Tetra Tech project archaeologist David Ingleman. The survey included visual assessment, site walkover, and photographic documentation. Results of the field reconnaissance are discussed below in Section 2: Archaeological Sensitivity Assessment and Recommendations.

2.0 ARCHAEOLOGICAL SENSITIVITY ASSESSMENT AND RECOMMENDATIONS

2.1 ARCHAEOLOGICAL SENSITIVITY ASSESSMENT

The sensitivity assessment for the Phase IA archaeological reconnaissance survey included a visual assessment, site walkover and photodocumentation of the Project area, and background research including archaeological site file searches at the NYSOPRHP, published and unpublished archaeological studies, and historic research. The assessment for archaeological sensitivity of the Project area was based on site characteristics (*e.g.* landform/terrain, soil characteristics, and proximity to water). Also taken into consideration was the nature and level of observed and documented disturbance and modification to the landscape in the Project area due to historic and recent human development.

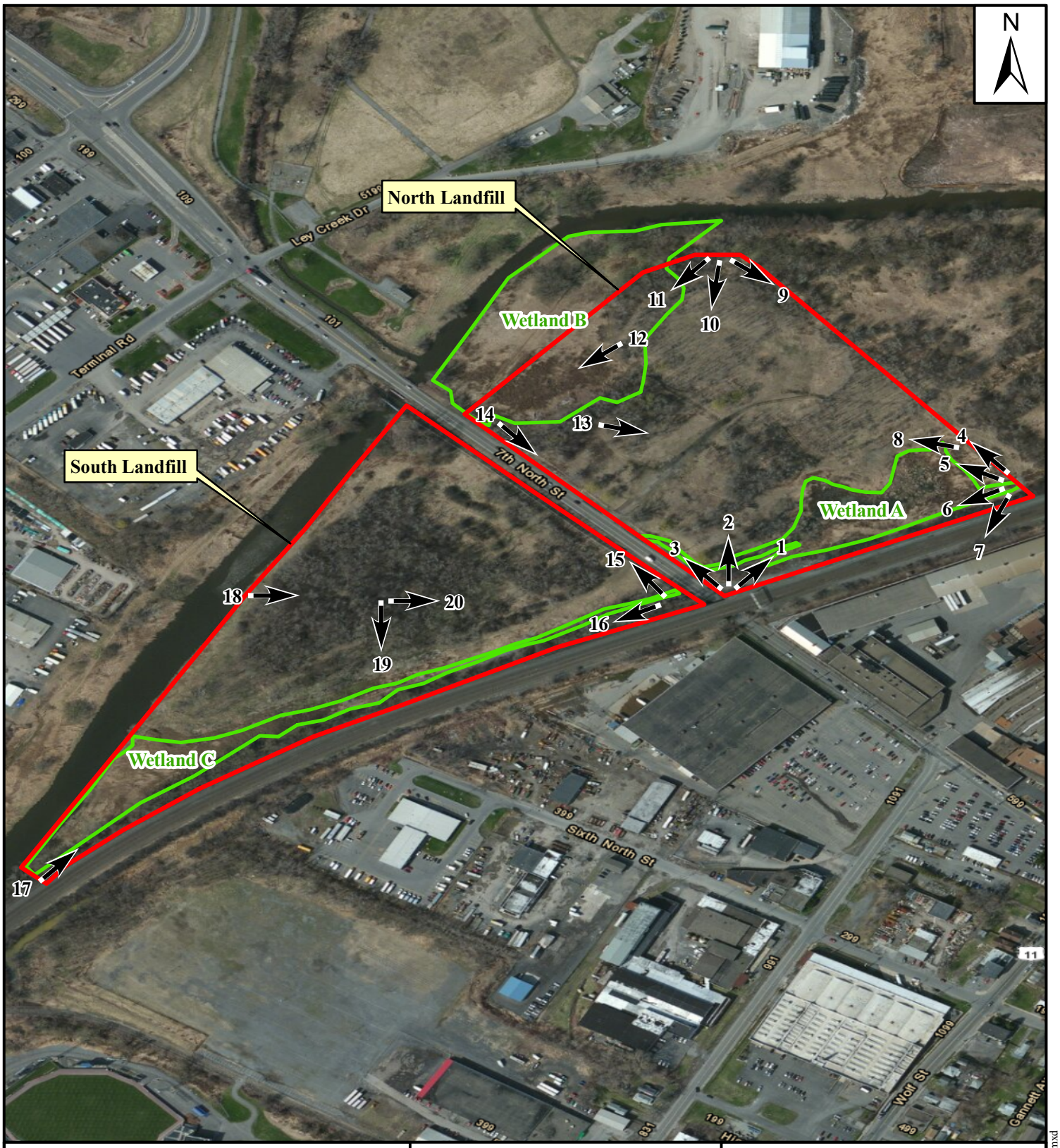
The site walkover indicated that the Project area is situated in a swampy, low lying area with poor drainage. Furthermore, intensive disturbances were observed throughout the Project area. Sundry late-twentieth century artifacts (e.g. rubber soled shoes, assorted plastics, unidentified ferrous metal objects, varicolored glass bottles, shag carpet, Styrofoam, white ware, etc.) were observed scattered throughout the surface of the South Landfill and in the northeast corner of the North Landfill. However, all these artifacts appear to be less than 50 years old and therefore do not meet the minimum age threshold to be considered historic for the purposes of S/NRHP evaluation. Instead, they document the disturbance of the Project area by landfilling activities. Project area conditions are depicted in Attachment A: Photographic Record.

The greatest factors limiting the archaeological potential of the Project area are the environmental setting followed by the nature and extent of modern disturbances. Poor drainage and swampy conditions make the presence of prehistoric and/or historic habitation sites unlikely. In this setting only special purpose sites, such as extractive or ritual sites, are expected. However, the potential of discovering such sites is further limited by the intensive and extensive disturbances associated with late-twentieth century landfilling activities in the Project area. Therefore there is virtually no chance that significant undisturbed prehistoric or historic archaeological deposits could be adversely affected by Project activities.

2.2 TESTING RECOMMENDATIONS

The Phase IA reconnaissance survey of the Project area indicated that there are no historic structures within the Project area. The CSX railroad grade (formerly Syracuse Junction Railroad) located adjacent to the Project area is greater than 50 years old; however design plans indicate no impacts to this resource.

Evidence of prehistoric wetland resource extraction and processing within the Project area is expected to manifest in the archaeological record as small, ephemeral surface or near surface expressions. Unfortunately, if these types of sites formerly existed within the Project area they were likely destroyed by late-twentieth century landfill activities. There is also no evidence of any kind of substantial historic use of the Project area. Therefore, any physical evidence of historic use of the Project area is expected to have manifested in the archaeological record as small ephemeral artifact deposits located at or near the surface. Unfortunately these deposits would also have become mixed and disturbed with late-twentieth century rubbish when landfilling significantly altered the natural landscape. In summary, if prehistoric or historic archaeological resources were ever present within the Project area it is not probable that any intact deposits remain. Given this situation no further archaeological investigations are recommended.



Legend

- Project Boundary
- Wetlands
- Photograph Location/Number

Source: ESRI World Imagery, US-NY-Syracuse 2011.

0 225 450 Feet

0 50 100 Meters

Figure 7. Phase IA Cultural Resources Investigation Map for the Cooper Crouse-Hinds North Landfill and South Landfill Project, Town of Salina, Onondaga County New York.

Prepared For: Cooper Crouse-Hinds, LLC

Prepared By: TETRA TECH

Date: 2/2013

P:GIS/Projects/112IC04844-Cooper/MXD/Figure5.mxd

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Crouse-Hinds

1927 *Aerial Photograph*. Crouse-Hinds. On file with the Cooper Crouse-Hinds Company.

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2013 Personal communication between Mr. Drew Lent and Mr. David Ingleman on December 13, 2013.

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ATTACHMENT A

PHOTOGRAPHIC RECORD

ATTACHMENT A

PHOTOGRAPHIC RECORD

Company: Tetra Tech Inc.
Project: Cooper Crouse-Hinds North and South Landfills
Onondaga County, New York

Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 1
Direction: NE
Comments: Overview of North Landfill, photographed from southern corner. Note disturbed stream segment, referred to as Stream A. Note also elevated CSX railroad grade to right adjacent to Project area and overhead National Grid power lines. Yellow poles mark southern Project area and property boundary.

Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 2
Direction: N
Comments: Overview of North Landfill, photographed from southern corner. Note disturbed stream segment, referred to as Stream A. Note also overhead National Grid power lines at center.

ATTACHMENT A

PHOTOGRAPHIC RECORD

Company: Tetra Tech Inc.
Project: Cooper Crouse-Hinds North and South Landfills
Onondaga County, New York

Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 3
Direction: NE
Comments: Overview of North Landfill photographed from southern corner. Note disturbed stream segment, referred to as Stream A. Note also overhead National Grid power lines to center left. Note also Seventh North Street to left.

Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 4
Direction: NE
Comments: Overview of North Landfill photographed from eastern corner. Note also riprap in foreground. Yellow poles mark northern Project area and property boundary.

ATTACHMENT A

PHOTOGRAPHIC RECORD

Company: Tetra Tech Inc.
Project: Cooper Crouse-Hinds North and South Landfills
Onondaga County, New York

Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 5
Direction: WNW
Comments: Overview of North Landfill photographed from eastern corner. Note reeds in Wetland A and riprap in foreground.

Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 6
Direction: W
Comments: Overview of North Landfill from eastern corner. Note elevated CSX Railroad grade to left and overhead utility lines.

ATTACHMENT A

PHOTOGRAPHIC RECORD

Company: Tetra Tech Inc.
Project: Cooper Crouse-Hinds North and South Landfills
Onondaga County, New York

Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 7
Direction: SW
Comments: Overview of North Landfill from eastern corner. Note elevated CSX Railroad grade to left and rip-rap in foreground.

Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 8
Direction: N
Comments: View of disturbed ground surface in North Landfill photographed from about 50 m (164 ft) northwest of eastern corner. Note mixed late-20th century debris on surface is municipal waste encroached from the adjacent Plaza East Landfill (to right).

ATTACHMENT A

PHOTOGRAPHIC RECORD

Company: Tetra Tech Inc.
Project: Cooper Crouse-Hinds North and South Landfills
Onondaga County, New York

Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 9
Direction: SE
Comments: Overview of North Landfill from the northern corner. Note mounded foundry sand. Note also Cooper Crouse-Hinds plant in background. Yellow poles mark northern Project area and property boundary.

Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 10
Direction: S
Comments: Overview of North Landfill from the northern corner. Note snow fencing around monitoring well in foreground and mounded foundry sand**.**

ATTACHMENT A

PHOTOGRAPHIC RECORD

Company: Tetra Tech Inc.
Project: Cooper Crouse-Hinds North and South Landfills
Onondaga County, New York

Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 11
Direction: SW
Comments: Overview of North Landfill from the northern corner. Note Ley Creek to right (in tree line) and mounded foundry sand.

Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 12
Direction: SW
Comments: View of ground disturbance along the west side of the north landfill. Note prevalent ground disturbance and mixed late-20th debris. Note also Ley Creek in background in tree line).

ATTACHMENT A

PHOTOGRAPHIC RECORD

Company: Tetra Tech Inc.
Project: Cooper Crouse-Hinds North and South Landfills
Onondaga County, New York

Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 13
Direction: SE
Comments: View of deep foundry sand deposit in "Area 3", near center of North Landfill. Note standing water in bottom of excavation. Note also CSX Railroad grade and Cooper Crouse-Hinds plant in background.

Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 14
Direction: SE
Comments: Overview of the North Landfill photographed from the western corner. Note Seventh North Street to right (past fence line). Note also Cooper Crouse-Hinds plant in background.

ATTACHMENT A

PHOTOGRAPHIC RECORD

Company: Tetra Tech Inc.
Project: Cooper Crouse-Hinds North and South Landfills
Onondaga County, New York

Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 15
Direction: NW
Comments: Overview of South Landfill photographed from eastern corner. Note Seventh North Street to right.

Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 16
Direction: SW
Comments: Overview of South Landfill photographed from eastern corner. Note CSX railroad grade to left.

ATTACHMENT A

PHOTOGRAPHIC RECORD

Company: Tetra Tech Inc.
Project: Cooper Crouse-Hinds North and South Landfills
Onondaga County, New York

Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 17
Direction: NE
Comments: Overview of South Landfill, photographed from southern corner. Note Ley Creek to left, Wetland C in center, and CSX railroad grade to right.

Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 18
Direction: SE
Comments: Overview of South Landfill photographed from western side. Note prevalent ground disturbances and mounded foundry sand. Note also Cooper Crouse-Hinds plant in background.

ATTACHMENT A

PHOTOGRAPHIC RECORD

Company: Tetra Tech Inc.
Project: Cooper Crouse-Hinds North and South Landfills
Onondaga County, New York

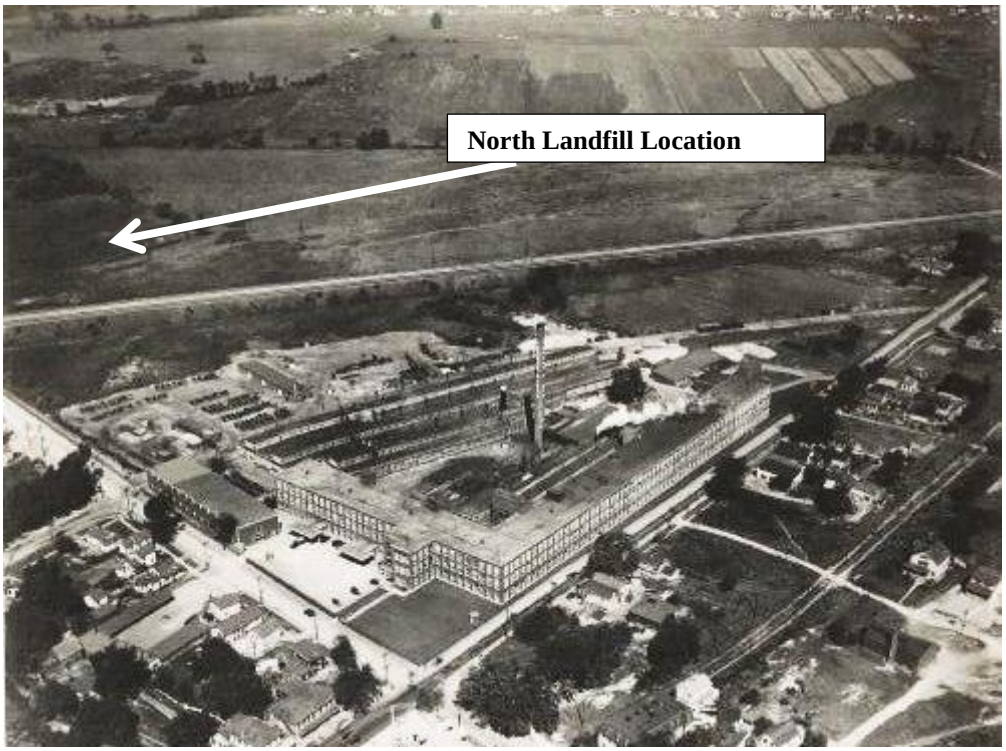
Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 19
Direction: WSW
Comments: Overview of South Landfill photographed from center of landfill. Note mounded foundry sand and Wetland C in background.

Photographer: D. Ingleman
Date: 12/13/12
Photo No.: 20
Direction: E
Comments: Overview of South Landfill photographed from center of landfill. Note Wetland C in middle ground, CSX railroad grade in background, and Cooper Crouse-Hinds plant in distant background.

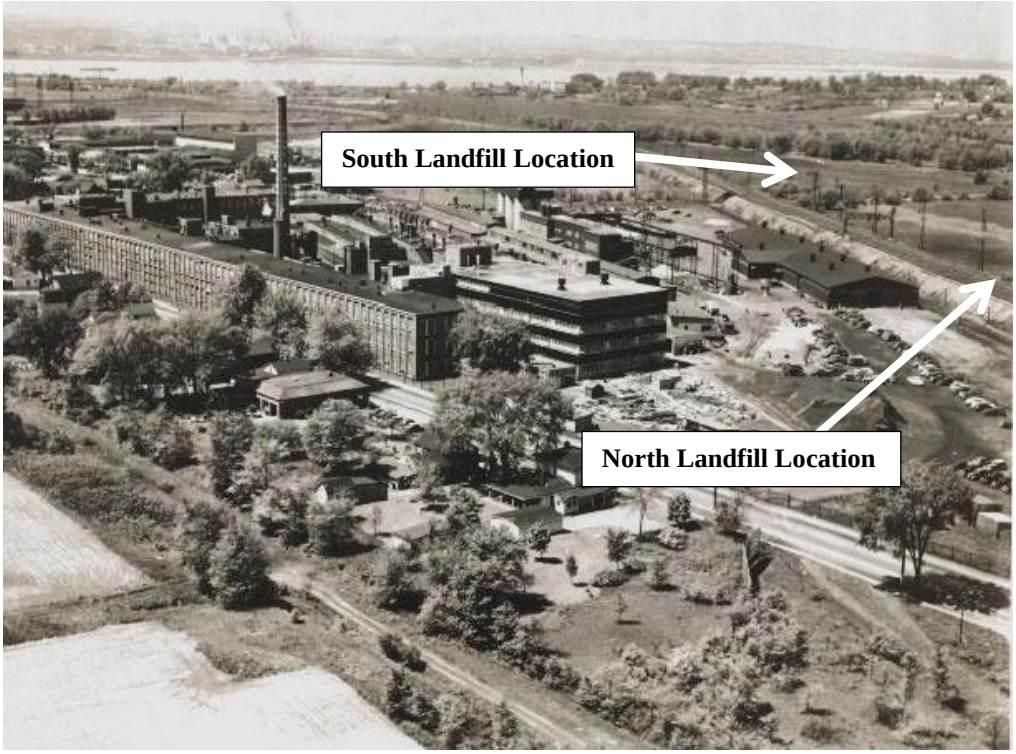
ATTACHMENT B

HISTORIC PHOTOGRAPHS

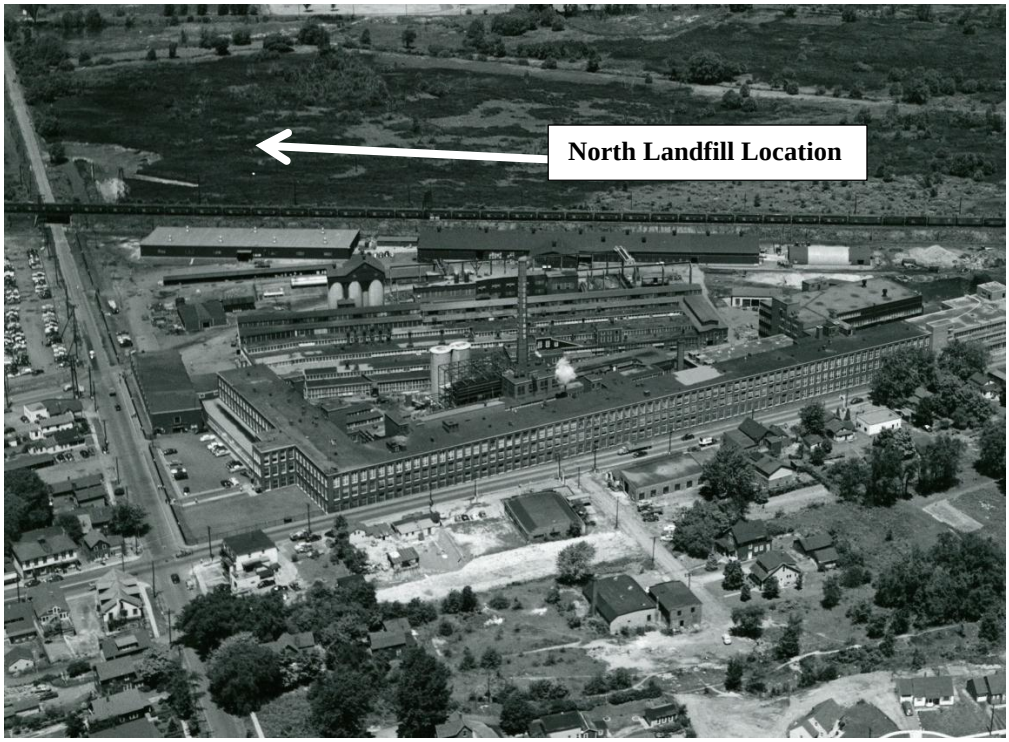
Portion of the 1926 *Airmap of City of Syracuse*, by the Airmap Corporation of America.



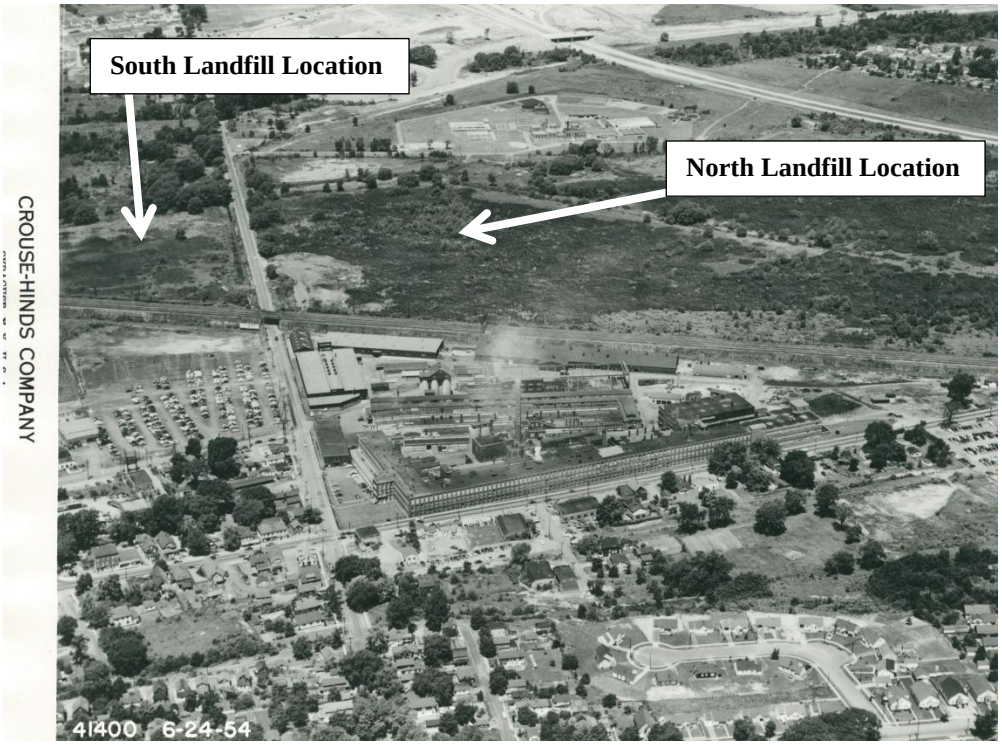
Aerial photograph of the Crouse-Hinds facility in 1927, showing part of the North Landfill location.
Source: Cooper Crouse-Hinds



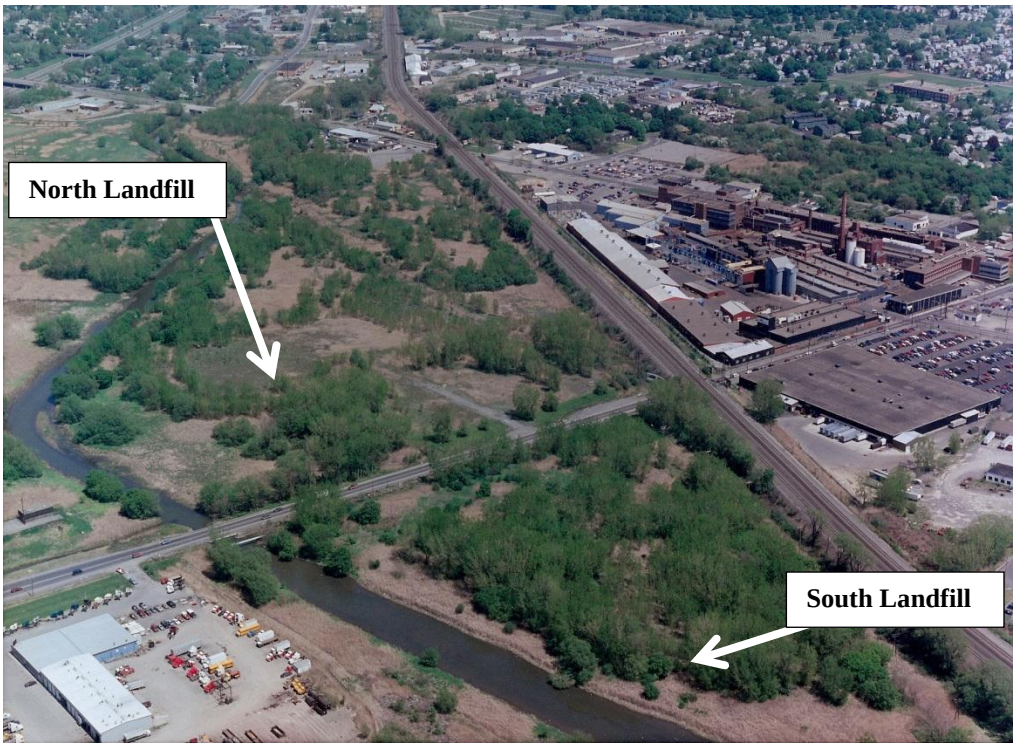
Aerial photograph of the Crouse-Hinds facility in 1948, showing the South Landfill and part of the North Landfill.
Source: Cooper Crouse-Hinds



Aerial photograph of the Crouse-Hinds facility in 1952, showing the North Landfill location.
Source: Cooper Crouse-Hinds



Aerial photograph of the Crouse-Hinds facility in 1954, showing the North Landfill location and part of the South Landfill location.
Source: Cooper Crouse-Hinds



Aerial photograph of the Crouse-Hinds facility in 1995, showing the North Landfill and the South Landfill.
Source: Cooper Crouse-Hinds

APPENDIX E

CALCULATIONS

FOR

NO LOSS OF FLOOD STORAGE

January 3, 2014
117-2202046.19

Mr. Russell Houck, P.E.
Department of Engineering
City of Syracuse
233 E. Washington Street, Room 401
Syracuse, NY 13202

RE: SWPPP for CCH Landfills - Calculations for No Loss of Flood Storage at North and South CCH Landfills

Dear Mr. Houck:

The relocation of contaminated soils and wetland sediments to the center of each landfill property (the South Landfill in the City of Syracuse and the North Landfill in the Town of Salina) and the construction of a landfill cap at each landfill are required by the NYSDEC as a final remedy. At the request of the City of Syracuse, each landfill design was examined and modified as necessary so that the final cap design and resulting topography will result in no loss of flood storage in the event of a 100-year flood (flood elevation of 374') at each landfill, and that the landfill caps will not encroach on the Flood Insurance Rate Map (FIRM) floodway.

Attachment A includes the email chain between Tetra Tech and the City of Syracuse, with other interested parties copied, that lists the concerns to be addressed. The City summary email of November 7, 2013 provides six issues listed below in bold with responses in italics.

1. Please provide the proposed analysis of excavation/fill within the floodplain for the North and South Landfills. Note that the 1% annual chance flood elevation that was provided to Tetra Tech of 374.0 feet is in NAVD88 vertical datum. I don't believe this can be considered the same datum as AMSL and elevation adjustments may need to be made.

We have verified with Aerometrics that the survey topographic contours used in the landfill cap design are in NAVD88 vertical datum. Aerometrics confirmed by email (Attachment A) that the reference to "NGS Mean Sea Level" on the Aerometric survey (Attachment B) is equivalent to NAVD88. NAVD88 is also referenced on Fire Insurance Rate Map Panel 208 of 520 included after Figure 6 in the SWPPP. NAVD88 is the vertical reference datum used for both the landfill design and 100-year flood elevation.

Each landfill property (North and South) was input into AutoCAD using the Aerometric survey data. A cut and fill calculation was then performed for each landfill using elevation 374 as the planar tin. The four calculations are shown on Figures 1 through 4 in Attachment C.

TETRA TECH
175 North Corporate Drive, Suite 100, Brookfield, WI 53045
Tel 262.792.1282 Fax 262.792.1310 www.tetratech.com

<u>South Landfill Analyses of Excavation/Fill Within the Floodplain</u>:

- *Attachment C Figure 1 – South Landfill Existing – The South Landfill as it exists today, with a flood storage volume of 2,900,127 cubic feet below elevation 374. This would be the water volume that the South Landfill Property would hold in the event of the 100-year flood. The calculated number to the left of the "Volume at or below 374" is the volume of earth on the property above elevation 374. The calculated number to the right is the sum.*
- *Attachment C Figure 2 – South Landfill Proposed – The South Landfill as it would exist if the wetland sediment relocation, buffer zone construction, and landfill cap construction as shown in the 95% Design Documents were completed. The new flood storage volume would be 3,273,300 cubic feet below elevation 374. The difference of "Existing" versus "Proposed" is a surplus (gain in flood storage) of 373,173 cubic feet.*

<u>North Landfill Analyses of Excavation/Fill Within the Floodplain</u>:

- *Attachment C Figure 3 -North Landfill Existing – The North Landfill as it exists today, with a flood storage volume of 3,195,702 cubic feet below elevation 374. This would be the water volume that the North Landfill Property would hold in the event of the 100-year flood. The calculated number to the left of the "Volume at or below 374" is the volume of earth on the property above elevation 374. The calculated number to the right is the sum.*
- *Attachment C Figure 4 - North Landfill Proposed – The North Landfill as it would exist if the wetland sediment relocation, buffer zone construction, and landfill cap construction as shown in the 95% Design Documents were completed. The new flood storage volume would be 3,277,690 cubic feet below elevation 374. The difference of "Existing" versus "Proposed" is a surplus (gain in flood storage) of 81,988 cubic feet.*

2. We agree with the revisions to the North landfill cap to eliminate the floodway encroachment.

At the northwest corner of the North Landfill, the edge of the cap has been moved to the southeast and buffer zone cell TP-69 on Sheet 7A has been enlarged so that no portion of the landfill cap is within the floodway. This change is also shown on revised sheets 11 and 13 included in Attachment D and on revised Figures 3 and 5 in the SWPPP. The required changes to other sheets to modify the North Landfill cap area will be included in the 100% (Final) Design Documents.

3. Please provide the revised SWPPP when ready.

The revised SWPPP is attached.

4. With the acceptable SWPPP, the City will provide the SWPPP acceptance form.

Please return the signed MS4 form at your earliest convenience.

5. As noted in the SWPPP, greater than 5 acres will be disturbed at one time as part of the project, and a request will be sent to the City. After receipt of this request, we will provide an authorization letter to the owner. NYSDEC will also need to provide authorization for the greater than 5 acre disturbance.

Prior to the start of work, a request to disturb more than 5 acres at one time will be sent to the City. NYSDEC will also be notified so that the authorization from NYSDEC for the greater than 5 acre disturbance can be granted.

6. The City also requires that the owner provide a Stormwater Maintenance Agreement to maintain any site storm water management facilities, and an Access Agreement allowing the City access to the site for storm water management inspections. Models of these agreements are provided on the City Storm Water Management webpage:

http://www.syracuse.ny.us/Stormwater_Management.aspx .

These agreements can take a little time for the City to review and approve, but there should be more than sufficient time to have these agreements finalized and filed before work commences. The agreements should not be altered from the model form.

Once the City MS4 is signed and returned, the Notice of Intent (NOI) will be submitted to the NYSDEC to obtain coverage under SPDES General Permit GP-0-10-001. Upon receipt of NYSDEC coverage under this general permit, and incorporation of any additional comments to the 95% Design Documents, the Final Design will be submitted to NYSDEC for approval. Once the NYSDEC Design Approval is obtained, the above-mentioned Stormwater Maintenance Agreement and Access Agreement will be completed for City review and approval. The City model forms will be used.

Attachments to this Calculation

A. Email Chain Between Tetra Tech and the City of Syracuse plus the Aerometric email
B. Aerometric Survey
C. Figures 1-4 referenced above
D. Revised 95% Design Sheets 7A, 11, and 13

I trust this information meets your needs. If you have any questions please do not hesitate to call.

Sincerely,
Tetra Tech Inc.

Daniel L. Morgan

Daniel L. Morgan, P.E.
Senior Engineer
encl.

ATTACHMENT A

EMAIL CHAIN

Morgan, Dan

From: Houck, Russell <RHouck@syrgov.net>
Sent: Thursday, November 07, 2013 8:54 AM
To: Morgan, Dan; Richard Mustico
Cc: Robison, Mary; Noel, Mike; William Nechamen; Kevin Delaney; Kelli Higgins-Roche
Subject: RE: Crouse Cooper Hinds Landfill, Syracuse - Floodplain Issues/ SWPPP

Dan and Richard:
Thank you for addressing the City's concerns regarding potential floodplain impacts with the Crouse Copper Hinds Landfill project. The City, along with NYSDEC floodplain management personnel in Syracuse and Albany, reviewed the proposed analyses and revisions to the project to address these concerns. The City believes the proposed work satisfies our concerns and will help reduce potential adverse impacts from flooding in the project area. The NYSDEC also indicated that the proposal was adequate to address these concerns. I have summarized more specifically the proposal items and process for completing the stormwater management requirements:

1. Please provide the proposed analysis of excavation/fill within the floodplain for the North and South Landfills. Note that the 1% annual chance flood elevation that was provided to Tetra Tech of 374.0 feet is in NAVD88 vertical datum. I don't believe this can be considered the same datum as AMSL and elevation adjustments may need to be made.

2. We agree with the revisions to the North landfill cap to eliminate the floodway encroachment.

3. Please provide the revised SWPPP when ready.

4. With the acceptable SWPPP, the City will provide the SWPPP acceptance form .

5. As noted in the SWPPP, greater than 5 Acres will be disturbed at one time as part of the project, and a request will be sent to the City. After receipt of this request, we will provide an authorization letter to the owner. NYSDEC will also need to provide authorization for the greater than 5 acre disturbance.

6. The City also requires that the owner provide a Stormwater Maintenance Agreement to maintain any site stormwater management facilities, and an Access Agreement allowing the City access to the site for stormwater management inspections. Models of these agreements are provided on the City Stormwater Management webpage http://www.syracuse.ny.us/Stormwater_Management.aspx . These agreements can take a little time for the City to review and approve, but there should be more than sufficient time to have these agreements finalized and filed before work commences. The agreements should not be altered from the model form.

Thank you again for your attention to the City's concerns and please don't hesitate to contact me with any questions of if additional information is needed.

- Russell

Russell Houck, P.E., Cert. Floodplain Mgr.
Facilities Engineer
Department of Engineering
City of Syracuse
233 E. Washington Street, Room 401
Syracuse, NY 13202
315-448-8059 (Office)
315-530-0249 (Cell)
rhouck@syrgov.net

From: Morgan, Dan [mailto:Dan.Morgan@tetratech.com]
Sent: Thursday, October 31, 2013 3:45 PM
To: William Nechamen; Kelli Higgins-Roche; Kevin Delaney; Richard Mustico; Houck, Russell
Cc: Robison, Mary; Morgan, Dan; Noel, Mike
Subject: RE: Crouse Cooper Hinds Landfill, Syracuse - Floodplain Issues/ SWPPP

Hello Kevin Delaney and Russell Houck,

I have reviewed the email below and further reviewed the 95% Landfill Cap Design with regards to the floodway encroachment and floodplain excavation and fill concerns. I believe that the concerns expressed can be addressed with changes to the North Landfill (Town of Salina) landfill cap area and buffer zone finished grades at both landfills.

In order to address the concerns, we need to agree on the 1% annual flood elevation at each landfill so that the modifications to the buffer zone finished grades (lowering the central floor of each buffer zone to increase the flood storage and decrease the imported backfill) produce the desired result.

Please confirm that a flood water elevation of 374' is the target for the South Landfill in the City of Syracuse. We will then produce an analyses that shows that the volume of flood water capacity of the existing topography will be equaled or exceeded by the finished topography with the landfill cap installed for the South Landfill site area.

Please confirm that a flood water elevation of 374' is the target for the North Landfill in the Town of Salina. We will then produce an analyses that shows that the volume of flood water capacity of the existing topography will be equaled or exceeded by the finished topography with the landfill cap installed for the North Landfill site area.

With regards to floodway (dashed blue line on map number 36067C0208F) encroachment:

For the South Landfill, the floodway boundary is along the western edge of the property boundary. The edge of the landfill buffer zone may be within the floodway, but when finished will be at a lower elevation than currently exists. We do not see any need to modify the current design along Ley Creek (except as described above for flood water capacity, which will result in a lower amount of imported fill).

For the North Landfill, a review indicates that the northwest corner of the landfill cap may lie within the floodway. This corner of the cap will be converted into buffer zone and the landfill cap terminated at the floodway edge. The remaining floodway area within the North Landfill is buffer zone or wetland, both of which will be finished at a lower elevation than currently exists.

Once the target flood water elevation is determined, we will produce the analyses and include this analyses in the SWPPP.

If I have not correctly interpreted the concerns, please let me know.

Thank you.

Daniel L. Morgan, P.E. | Associate Engineer
Office: 262.792.1282 ext. 269 | FAX: 262.792.1310 | Mobile: 262.408.9399
dan.morgan@tetratech.com

Tetra Tech Inc.
175 N Corporate Drive | Suite 100 | Brookfield WI 53045 |www.tetratech.com

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Morgan, Dan

From: Morgan, Dan
Sent: Thursday, October 31, 2013 2:45 PM
To: William Nechamen; Kelli Higgins-Roche; Kevin Delaney; Richard Mustico; RHouck@syrgov.net
Cc: MRobison@syrgov.net; Morgan, Dan; Noel, Mike
Subject: RE: Crouse Cooper Hinds Landfill, Syracuse - Floodplain Issues/ SWPPP

Hello Kevin Delaney and Russell Houck,

I have reviewed the email below and further reviewed the 95% Landfill Cap Design with regards to the floodway encroachment and floodplain excavation and fill concerns. I believe that the concerns expressed can be addressed with changes to the North Landfill (Town of Salina) landfill cap area and buffer zone finished grades at both landfills.

In order to address the concerns, we need to agree on the 1% annual flood elevation at each landfill so that the modifications to the buffer zone finished grades (lowering the central floor of each buffer zone to increase the flood storage and decrease the imported backfill) produce the desired result.

Please confirm that a flood water elevation of 374' is the target for the South Landfill in the City of Syracuse. We will then produce an analyses that shows that the volume of flood water capacity of the existing topography will be equaled or exceeded by the finished topography with the landfill cap installed for the South Landfill site area.

Please confirm that a flood water elevation of 374' is the target for the North Landfill in the Town of Salina. We will then produce an analyses that shows that the volume of flood water capacity of the existing topography will be equaled or exceeded by the finished topography with the landfill cap installed for the North Landfill site area.

With regards to floodway (dashed blue line on map number 36067C0208F) encroachment:

For the South Landfill, the floodway boundary is along the western edge of the property boundary. The edge of the landfill buffer zone may be within the floodway, but when finished will be at a lower elevation than currently exists. We do not see any need to modify the current design along Ley Creek (except as described above for flood water capacity, which will result in a lower amount of imported fill).

For the North Landfill, a review indicates that the northwest corner of the landfill cap may lie within the floodway. This corner of the cap will be converted into buffer zone and the landfill cap terminated at the floodway edge. The remaining floodway area within the North Landfill is buffer zone or wetland, both of which will be finished at a lower elevation than currently exists.

Once the target flood water elevation is determined, we will produce the analyses and include this analyses in the SWPPP.

If I have not correctly interpreted the concerns, please let me know.

Thank you.

Daniel L. Morgan, P.E. | Associate Engineer
Office: 262.792.1282 ext. 269 | FAX: 262.792.1310 | Mobile: 262.408.9399
dan.morgan@tetratech.com

Tetra Tech Inc.
175 N Corporate Drive | Suite 100 | Brookfield WI 53045 |www.tetratech.com

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From: William Nechamen [mailto:wsnecham@gw.dec.state.ny.us]
Sent: Wednesday, October 23, 2013 12:15 PM
To: Kelli Higgins-Roche; Kevin Delaney; Richard Mustico; RHouck@syrgov.net
Cc: MRobison@syrgov.net; Morgan, Dan
Subject: Re: Crouse Cooper Hinds Landfill, Syracuse - Floodplain Issues/ SWPPP

Kevin: can you take the lead within the region? Kelli: I'll need you to take a look and include Jennifer. I agree with Russ's concerns and possible approaches.
William Nechamen
Chief, Floodplain Management Section
New York State Department of Environmental Conservation
518-402-8146

Sent via Blackberry

>>> "Houck, Russell" <RHouck@syrgov.net> 10/23/2013 12:45:38 PM >>>
Mr. Mustico, Mr. Nechamen and Mr. Delaney,
The City of Syracuse Engineering Department is reviewing the draft SWPPP for the proposed Cooper Crouse-Hinds North and South Landfill project which is planned to be located adjacent to Ley Creek, and within the Ley Creek delineated floodplain. The South Landfill is planned to be located within the City of Syracuse, and the North Landfill located across Seventh North Street in the Town of Salina. The two landfills are planned to consolidate and cap PCB-containing soils and sediments. Both Syracuse and the Town of Salina have effective Flood Insurance Studies for Ley Creek, with a floodway delineated. FEMA is also has draft preliminary FIS and mapping for Ley Creek (dated June 2012 for Syracuse), and planned to be made effective in 2014. The floodways for these two studies are similar in extent in this area.

As planned, both the North and South Landfills will have significant excavation and fill within the 1% annual chance food hazard zone. In addition, the project as proposed will have significant excavation within the floodway in both Syracuse and Salina. Fill is also proposed, to a lesser extent, within the floodway within Salina.

The City of Syracuse has provided comments on the SWPPP to Tetra Tech. We have been in contact with Dan Morgan from TetraTech and appreciate his patience on our review. TetraTech quickly and satisfactorily addressed the majority of these comments. However, we still have concerns with how floodplain management is being addressed. TetraTech's responses indicate no negative impacts to flooding, but there is not an analysis to support this. Excavation is noted as increasing flood storage, which it will; however the fill from the two landfills has not been considered as potentially affecting flood elevations. It appears from the design that fill will exceed excavation within the floodplain.

We recognize that this is a NYSDEC-lead project, and we have reached out to the Region 7 NYSDEC Floodplain Coordinator (Kevin Delaney), who contacted the Dam Safety, Coastal and Flood Protection Bureau (Bill Nechamen) for input. We ask that the NYSDEC floodplain coordinators in Albany and Syracuse review the project and weigh in on potential impacts to the floodplain. The NYSDEC's review and recommendations on the floodplain issues would be welcomed and most likely satisfy the City's concerns.

We believe that, at a minimum, an analysis should be conducted comparing the excavation and fill within the 1% annual chance flood hazard zone, with the results of this analysis included in the SWPPP (goal of excavation exceeding fill). Although the floodway encroachment is not within our municipal jurisdiction (though immediately upstream of Syracuse), typically a floodway encroachment hydraulic analysis is required for this situation, and a No-Rise Certification

provided by the Engineer. To simplify matters, a possible option would be to avoid any fill within the floodway, or at least having none of the proposed landfill within the floodway. Within Syracuse, per City codes, the floodway hydraulic analysis would need to show no increase at all in flood elevations. The analysis should meet the Town of Salina requirements.

Outside of the floodway, but within the floodplain, the City may require a technical analysis to determine a project's impact on flood elevations. By FEMA definition, fill outside of the floodway should not result in an increase to flood elevations greater than 1 foot. However, raising flood elevations by up to one foot in this location would increase the 1% annual flood hazard extents, and impact a greater number of businesses than it currently does (primarily a commercial district). An increase in flood elevations would negatively impact the local area.

Based on these concerns, we ask that the NYSDEC look closely at the proposed project and potential floodplain impacts, and we welcome comments and recommendations. We are available for any discussion on the project.

Thanks,
Russell

Russell Houck, P.E., Cert. Floodplain Mgr.
Facilities Engineer
Department of Engineering
City of Syracuse
233 E. Washington Street, Room 401
Syracuse, NY 13202
315-448-8059 (Office)
315-530-0249 (Cell)
rhouck@syrgov.net

Morgan, Dan

From: Noel, Mike
Sent: Friday, November 08, 2013 11:55 AM
To: Morgan, Dan
Subject: FW: vertical datums

-----Original Message-----
From: Ward, Heath
Sent: Friday, November 08, 2013 11:49 AM
To: Noel, Mike
Subject: FW: vertical datums

Mike, below is exactly what we needed from Ed.
He verified that the topography is based on the North American Vertical Datum of 1988.

From: Edward Crossan [ecrossan@aerometric.com]
Sent: Friday, November 08, 2013 9:45 AM
To: Ward, Heath
Subject: Re: vertical datums

Heath,

As per your recent request with regard to the data on Cooper Crouse-Hinds Landfill, the original mapping submitted by Aerometcic on December 2012 was based on horizontal datum NAD83(Central), vertical datum was NAVD 88(Geoid 09). All units are in feet,call me if you have any questions.

Thanks Ed.

[Quantum Geospatial Logo]
Edward Crossan<mailto:ecrossan@quantumspatial.com> CP, SP VP., Account Manager
45180 Business Court, Suite 800,Dulles, VA 20166
P: (703) 471-4510 M: (703) 887-3116

AeroMetric is now Quantum Spatial. Read all about it here.<http://quantumspatial.com/news/article/Quantum-Spatial-Formed>

On Thu, Nov 7, 2013 at 3:43 PM, Ward, Heath <Heath.Ward@tetratech.com<mailto:Heath.Ward@tetratech.com>> wrote:
Hi Ed, would you mind just sending me an email with any information you have?
I will need to have an explanation in writing, regardless, so that I can present it to Syracuse city officials.
thanks again.

p.s. if you really would rather talk, let me know and I can give you a buzz.

Heath Ward | CAD Designer / IT Coordinator
Direct: 414.550.7911<tel:414.550.7911> | Main: 262.792.1282<tel:262.792.1282> | Fax: 262.792.1310<tel:262.792.1310> Heath.Ward@tetratech.com<mailto:Belinda.Talkington@tetratech.com>

Tetra Tech | Complex World, Clear Solutions™
175 N Corporate Dr | Suite 100 | Brookfield WI 53045 | (Google Map)<http://www.google.com/maps?q=175+North+Corporate+Drive,+Brookfield,+WI+53045&hl=en&sll=34.150543,-118.07833&sspn=0.0255,0.038409&vpsrc=0&t=m&z=16>
www.tetratech.com<http://www.tetratech.com/>

[cid:image001.png@01CE2FB0.22DAD780]<http://www.facebook.com/tetratech>
[cid:image002.png@01CE2FB0.22DAD780] <http://www.twitter.com/tetratech>
[cid:image003.png@01CE2FB0.22DAD780] <http://www.linkedin.com/company/tetra-tech>

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From: Ward, Heath
Sent: Thursday, November 07, 2013 11:43 AM
To: ecrossan@aerometric.com<mailto:ecrossan@aerometric.com>
Subject: vertical datums

Good morning Ed,
I am working with Mike Noel on the Cooper Crouse – Hinds Landfill in Syracuse, NY. The attached topo map was generated by Aero-Metric.
The map gives reference to the vertical datum as NGS MEAN SEA LEVEL.
We have since been inquired by the local municipalities to establish a relationship between your vertical data mentioned above and NAVD88.
The reason is that there are some flood plain issues, and the City of Syracuse suspects that the datums are not the same. Although based on what I found, I believe them to be identical.
So basically, are they the same? If so, please provide a brief explanation. If they are not the same...can you offer a conversion factor?
The City of Syracuse is concerned about the 374' elevation, which has 100-year flood significance...and they (and we) want to be sure that 374' on your map is 374' NAVD88.
Thank you in advance for your assistance in this matter.

Heath Ward | CAD Designer / IT Coordinator
Direct: 414.550.7911<tel:414.550.7911> | Main: 262.792.1282<tel:262.792.1282> | Fax: 262.792.1310<tel:262.792.1310> Heath.Ward@tetratech.com<mailto:Belinda.Talkington@tetratech.com>

Tetra Tech | Complex World, Clear Solutions™

175 N Corporate Dr | Suite 100 | Brookfield WI 53045 | (Google Map)<http://www.google.com/maps?q=175+North+Corporate+Drive,+Brookfield,+WI+53045&hl=en&sll=34.150543,-118.07833&sspn=0.0255,0.038409&vpsrc=0&t=m&z=16>
www.tetratech.com<http://www.tetratech.com/>

[cid:image001.png@01CE2FB0.22DAD780]<http://www.facebook.com/tetratech>[cid:image002.png@01CE2FB0.22DAD780]<http://www.twitter.com/tetratech> [cid:image003.png@01CE2FB0.22DAD780]
<http://www.linkedin.com/company/tetra-tech>

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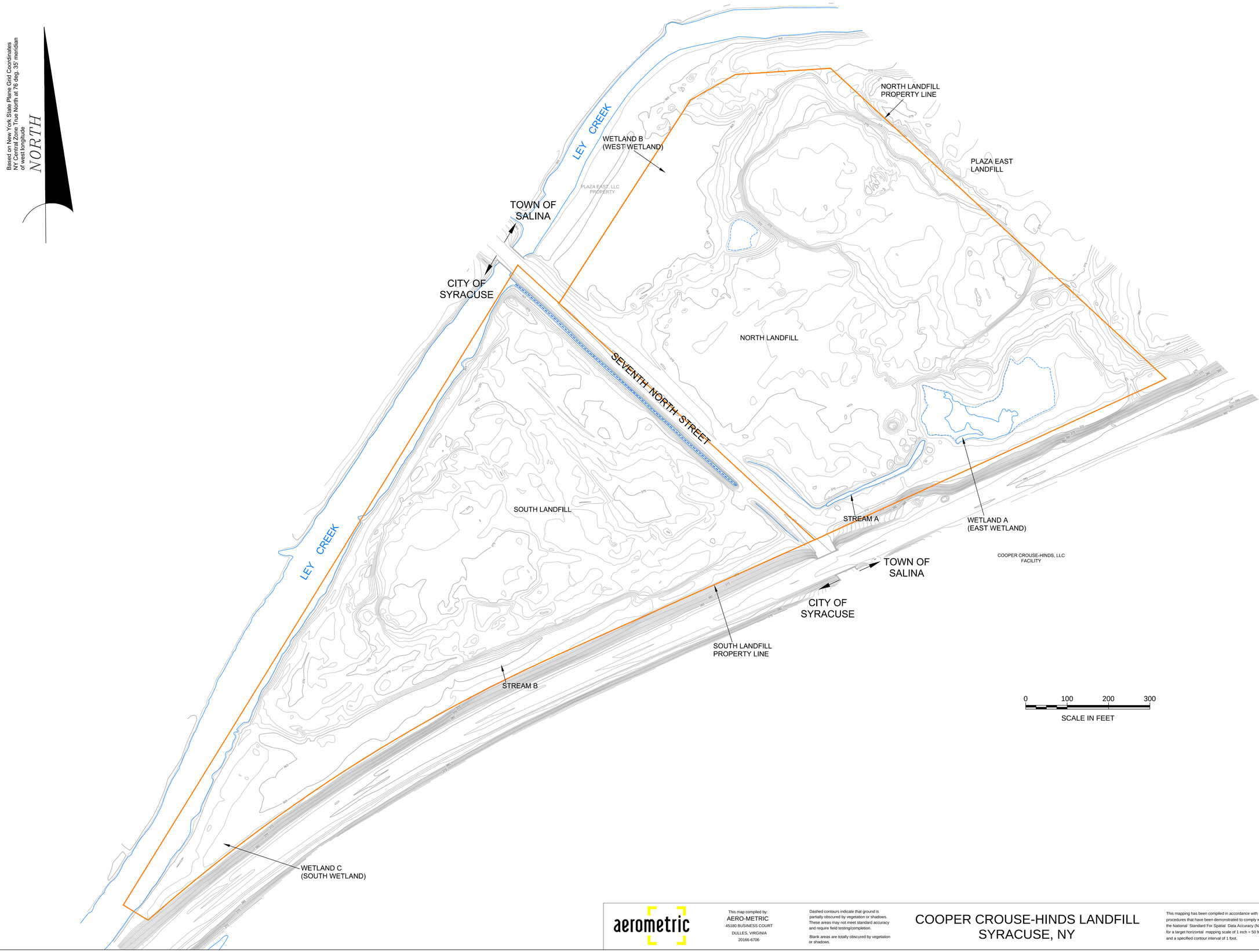
ATTACHMENT B

AEROMETRIC SURVEY



aerometric

This map compiled by:
AERO-METRIC
45180 BUSINESS COURT
DULLES, VIRGINIA
20166-6706

Dashed contours indicate that ground is partially obscured by vegetation or shadows. These areas may not meet standard accuracy and require field testing/completion.

Blank areas are totally obscured by vegetation or shadows.

COOPER CROUSE-HINDS LANDFILL
SYRACUSE, NY

This mapping has been compiled in accordance with procedures that have been demonstrated to comply with the National Standard For Spatial Data Accuracy (NSSDA), for a target horizontal mapping scale of 1 inch = 50 feet and a specified contour interval of 1 foot.

This map compiled by photogrammetric methods from aerial photography dated 11-15-2012
Grid based on New York State Plane
Coordinate System NAD 1983
Vertical datum based on NGS Mean Sea Level

S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\AEROMETRIC\OFFICIAL SURVEY MAP.DWG

ATTACHMENT C

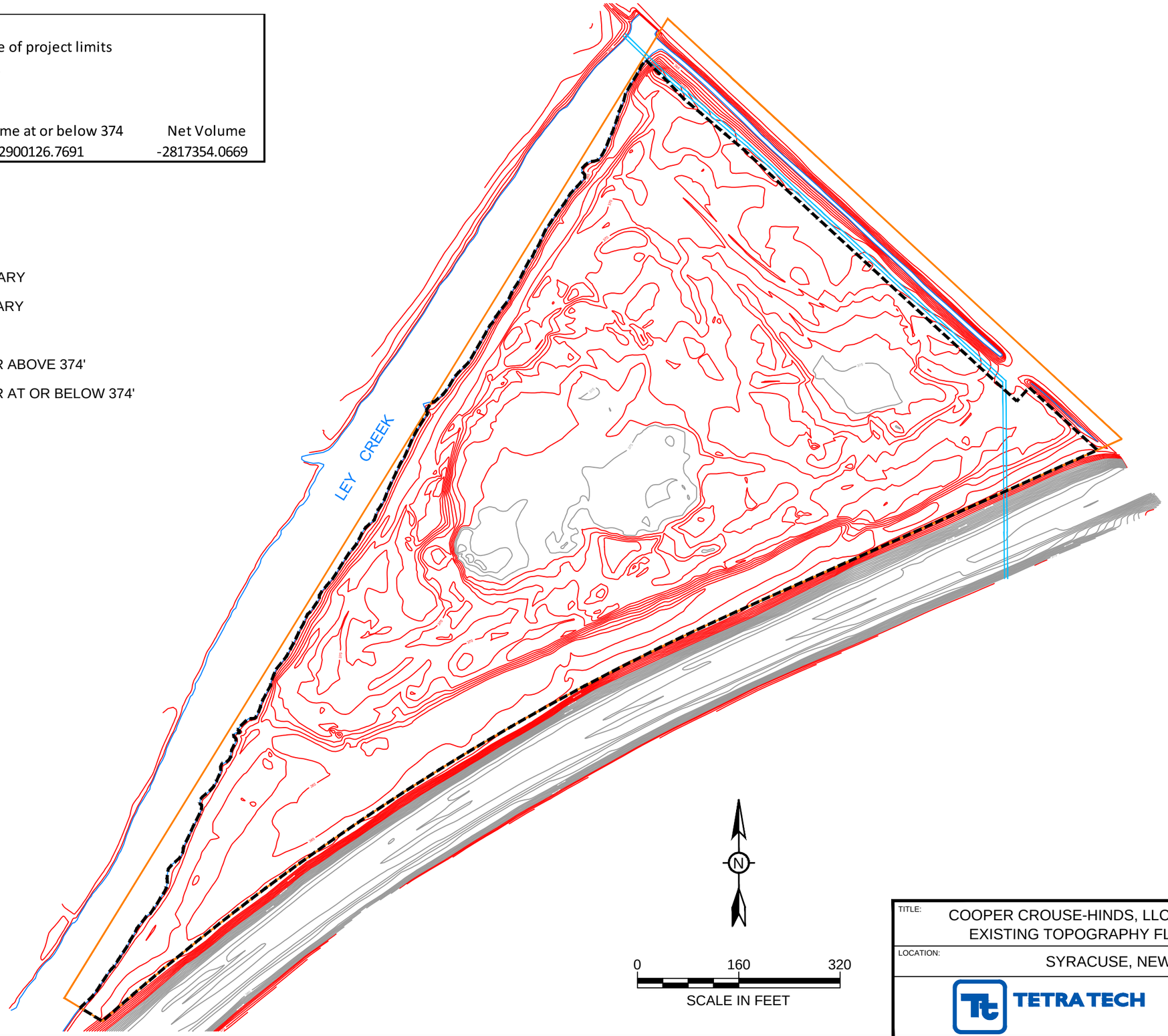
FIGURES 1-4

SOUTH LANDFILL EXISTING
Volume generated from topography inside of project limits
Volume of EXISTING based on a planar tin.
Cubic Feet

Surface	Volume above 374	Volume at or below 374	Net Volume
EXISTING	82772.7022	-2900126.7691	-2817354.0669

EXPLANATION

- LEY CREEK BOUNDARY
- PROPERTY BOUNDARY
- PROJECT LIMITS
- EXISTING CONTOUR ABOVE 374'
- EXISTING CONTOUR AT OR BELOW 374'
- WATER MAIN



TITLE: COOPER CROUSE-HINDS, LLC LANDFILL FACILITY
EXISTING TOPOGRAPHY FLOOD STORAGE

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN	FIGURE:
DRAFTED	HJW	1
PROJECT	117-2202046	
DATE	11/26/13	

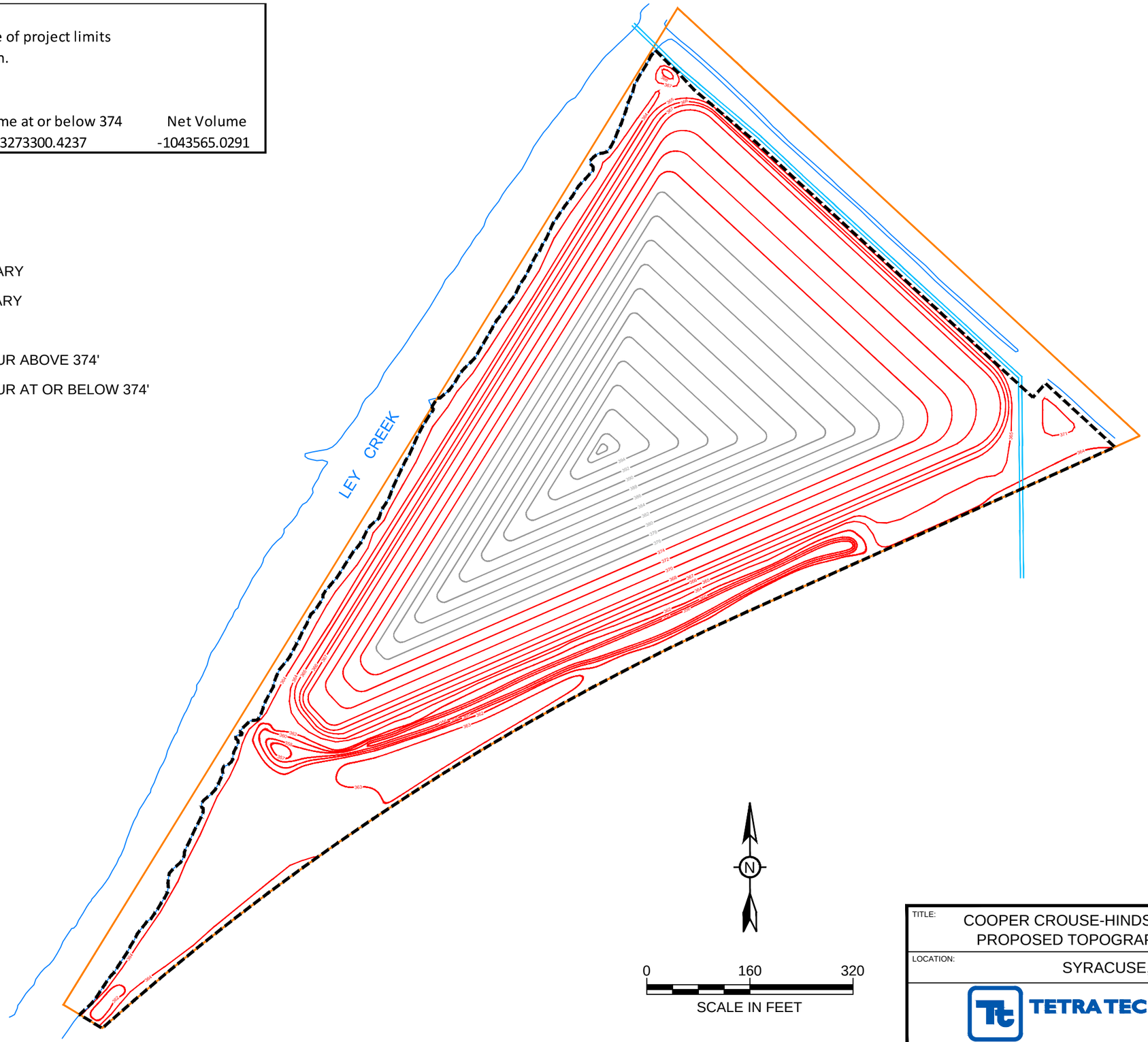
S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\STORMWATER CALCULATIONS\SOUTH LANDFILL 1.DWG

SOUTH LANDFILL PROPOSED
Volume generated from topography inside of project limits
Volume of PROPOSED based on a planar tin.
Cubic Feet

Surface	Volume above 374	Volume at or below 374	Net Volume
PROPOSED	2229735.3947	-3273300.4237	-1043565.0291

EXPLANATION

- LEY CREEK BOUNDARY
- PROPERTY BOUNDARY
- PROJECT LIMITS
- PROPOSED CONTOUR ABOVE 374'
- PROPOSED CONTOUR AT OR BELOW 374'
- WATER MAIN



TITLE: COOPER CROUSE-HINDS, LLC LANDFILL FACILITY
PROPOSED TOPOGRAPHY FLOOD STORAGE

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN	FIGURE:
DRAFTED	HJW	2
PROJECT	117-2202046	
DATE	11/26/13	

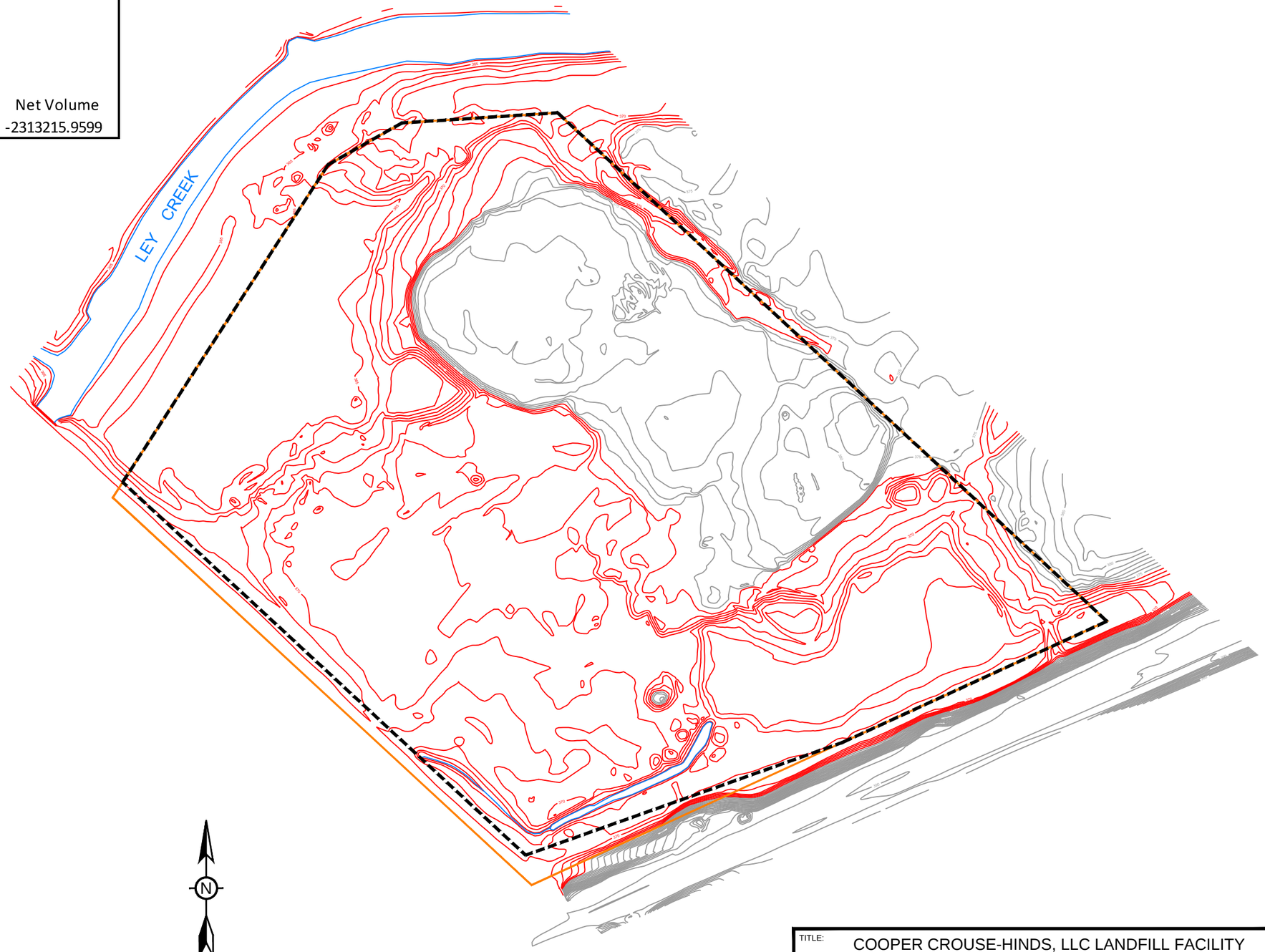
S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\STORMWATER CALCULATIONS\SOUTH LANDFILL 2.DWG

NORTH LANDFILL EXISTING
Volume generated from topography inside of project limits
Volume of EXISTING based on a planar tin.
Cubic Feet

Surface	Volume above 374	Volume at or below 374	Net Volume
EXISTING	882485.7672	-3195701.7271	-2313215.9599

EXPLANATION

- LEY CREEK BOUNDARY
- PROPERTY BOUNDARY
- PROJECT LIMITS
- EXISTING CONTOUR ABOVE 374'
- EXISTING CONTOUR AT OR BELOW 374'



N

0 160 320
SCALE IN FEET

TITLE: COOPER CROUSE-HINDS, LLC LANDFILL FACILITY
EXISTING TOPOGRAPHY FLOOD STORAGE

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN	FIGURE:
DRAFTED	HJW	3
PROJECT	117-2202046	
DATE	11/27/13	

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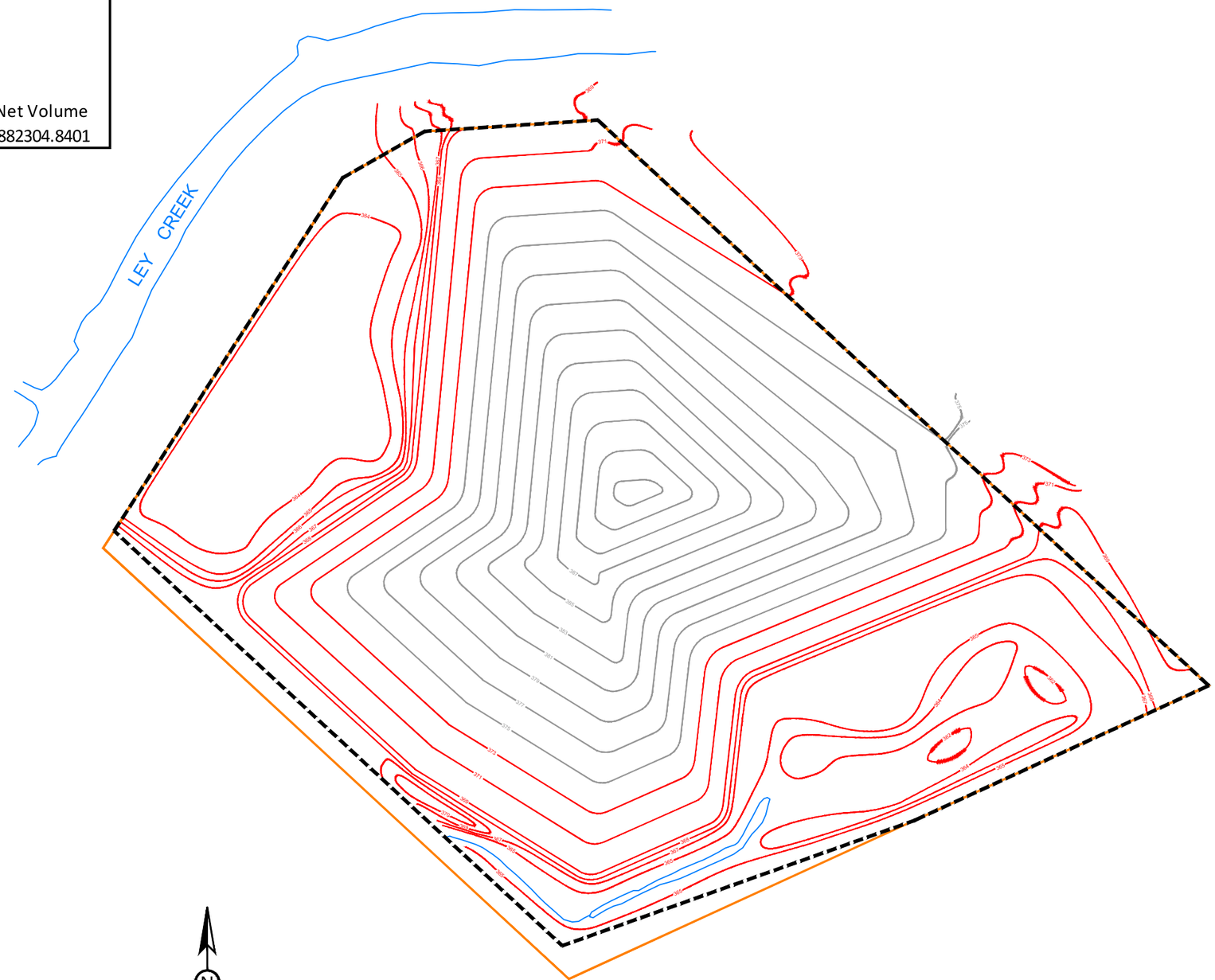
NORTH LANDFILL PROPOSED
Using conversion factor of 1.
Volume of PROPOSED based on a planar tin.
Cubic Feet

Surface	Volume above 374	Volume at or below 374	Net Volume
PROPOSED	2395385.1297	-3277689.9698	-882304.8401

EXPLANATION

- LEY CREEK BOUNDARY
- PROPERTY BOUNDARY
- PROJECT LIMITS
- PROPOSED CONTOUR ABOVE 374'
- PROPOSED CONTOUR AT OR BELOW 374'



N

0 160 320
SCALE IN FEET

TITLE: COOPER CROUSE-HINDS, LLC LANDFILL FACILITY
PROPOSED TOPOGRAPHY FLOOD STORAGE

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202046
DATE	11/25/13

FIGURE: 4

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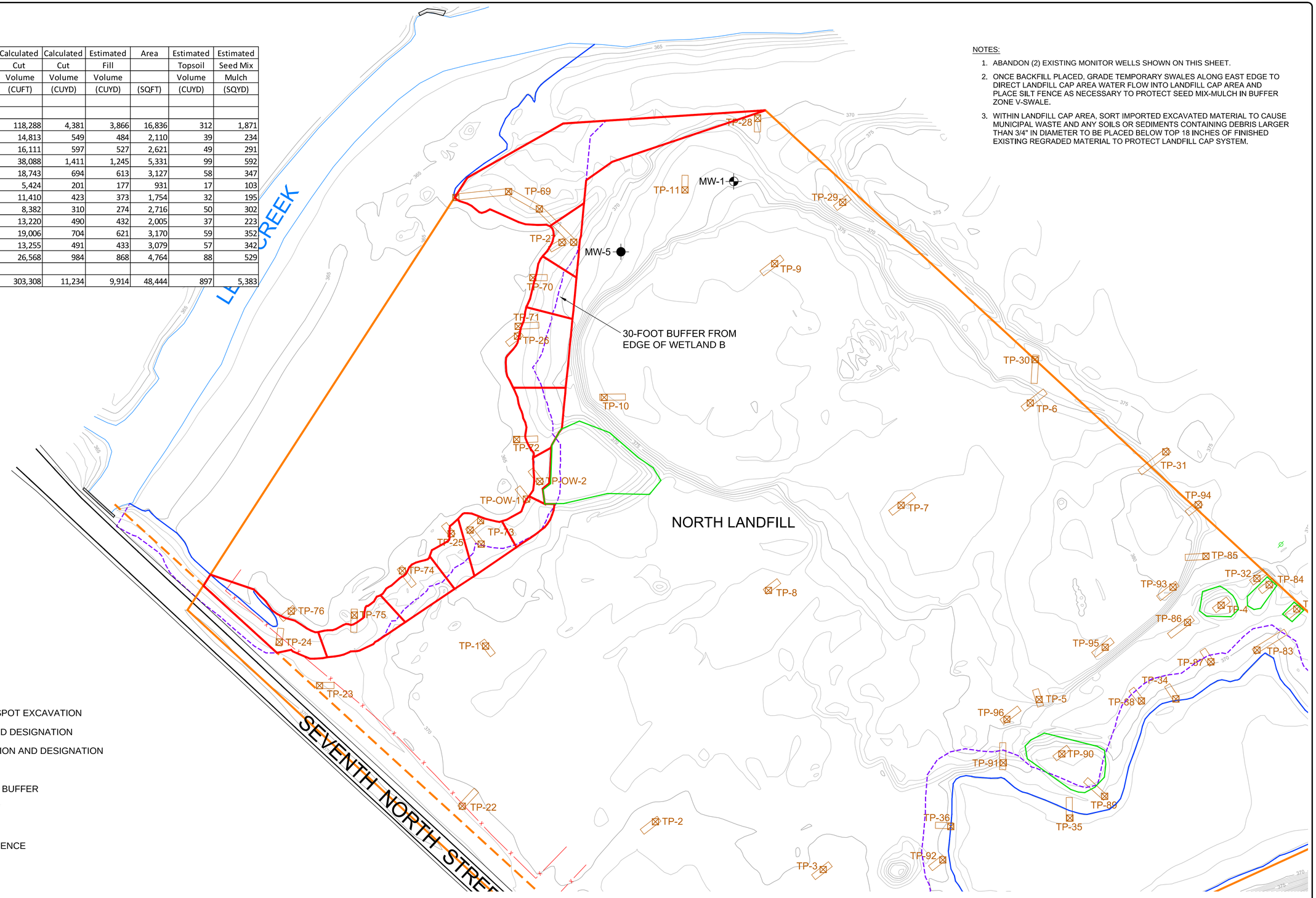
ATTACHMENT D

REVISED 95% DESIGN SHEETS 7A, 11, and 13

Test Pit	Excavation Sequence	Base of Excavation Elevation (FT MSL)	Calculated Cut Volume (CUFT)	Calculated Cut Volume (CUYD)	Estimated Fill Volume (CUYD)	Area (SQFT)	Estimated Topsoil Volume (CUYD)	Estimated Seed Mix Mulch (SQYD)
TP-69	701	361	118,288	4,381	3,866	16,836	312	1,871
TP-27	702	359	14,813	549	484	2,110	39	234
TP-70	703	361.3	16,111	597	527	2,621	49	291
TP-26	704	360	38,088	1,411	1,245	5,331	99	592
TP-72	705	361.1	18,743	694	613	3,127	58	347
TP-OW-2	706	360.7	5,424	201	177	931	17	103
TP-OW-1	707	360.3	11,410	423	373	1,754	32	195
TP-73	708	364	8,382	310	274	2,716	50	302
TP-25	709	360	13,220	490	432	2,005	37	223
TP-74	710	361.4	19,006	704	621	3,170	59	352
TP-75	711	361.8	13,255	491	433	3,079	57	342
TP-24	712	360.5	26,568	984	868	4,764	88	529
Total			303,308	11,234	9,914	48,444	897	5,383

NOTES:

1. ABANDON (2) EXISTING MONITOR WELLS SHOWN ON THIS SHEET.
2. ONCE BACKFILL PLACED, GRADE TEMPORARY SWALES ALONG EAST EDGE TO DIRECT LANDFILL CAP AREA WATER FLOW INTO LANDFILL CAP AREA AND PLACE SILT FENCE AS NECESSARY TO PROTECT SEED MIX-MULCH IN BUFFER ZONE V-SWALE.
3. WITHIN LANDFILL CAP AREA, SORT IMPORTED EXCAVATED MATERIAL TO CAUSE MUNICIPAL WASTE AND ANY SOILS OR SEDIMENTS CONTAINING DEBRIS LARGER THAN 3/4" IN DIAMETER TO BE PLACED BELOW TOP 18 INCHES OF FINISHED EXISTING REGRADED MATERIAL TO PROTECT LANDFILL CAP SYSTEM.



EXPLANATION

- EXCAVATION LIMITS
- NOVEMBER 2012 HOT SPOT EXCAVATION
- TP-48 TEST PIT LOCATION AND DESIGNATION
- MW-1 MONITOR WELL LOCATION AND DESIGNATION
- WETLAND BOUNDARY
- LEY CREEK / WETLAND BUFFER
- PROPERTY BOUNDARY
- EASEMENT
- EXISTING CHAIN LINK FENCE

0 50 100 150
SCALE IN FEET

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

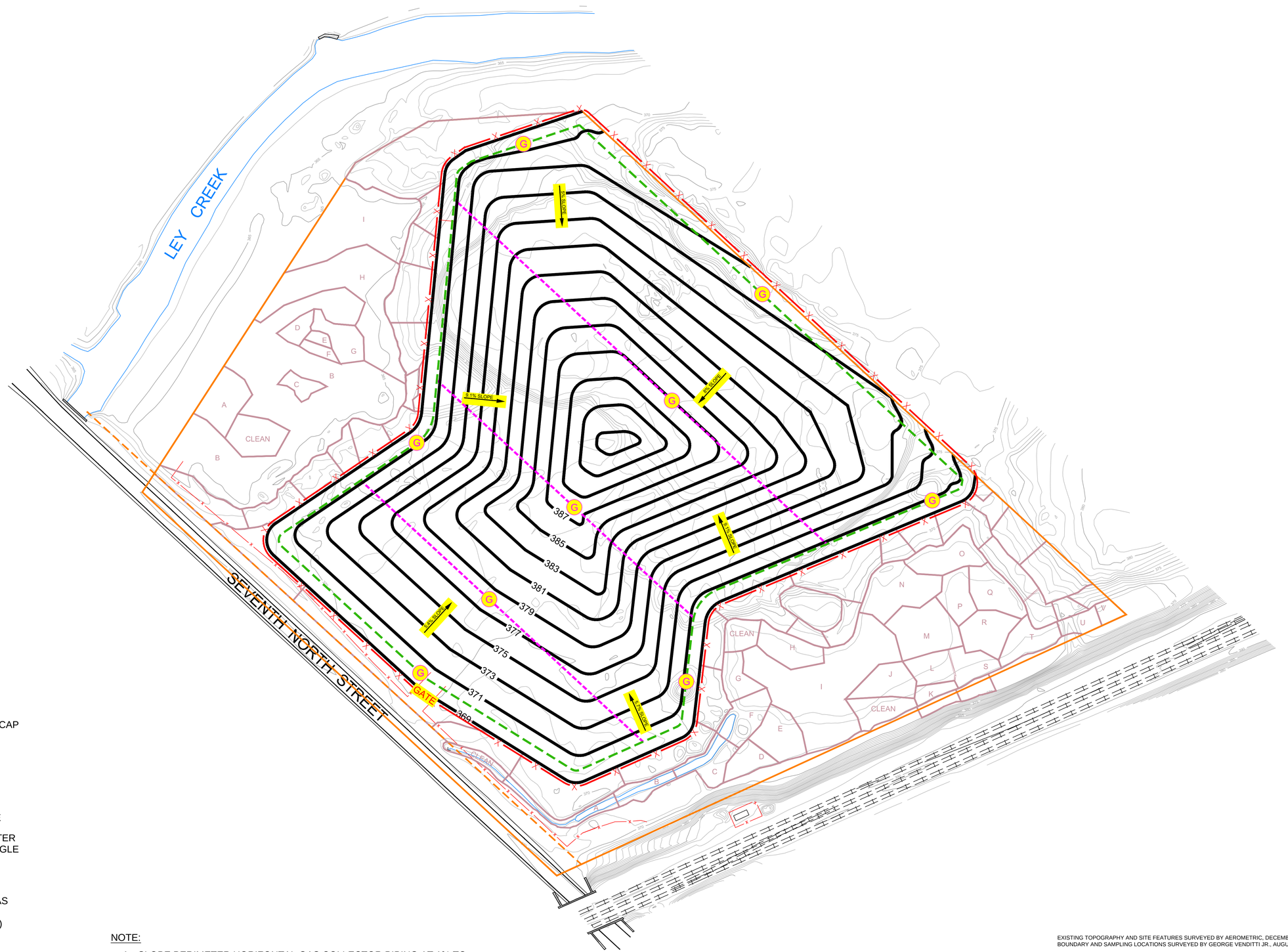
TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
WETLAND B 30' BUFFER ZONE EXCAVATIONS

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN	SHEET:
DRAFTED	HJW	7A
PROJECT	117-2202046	
DATE	12/11/13	

S:\SADACOOPER\SYRACUSE\CLOSURE DESIGN\100% FINAL DESIGN\SHEET 7A - WETLAND B TEST PIT EXCAVATIONS.DWG



EXPLANATION

- PROPOSED FINAL LANDFILL CAP
- EXCAVATION LIMITS
- PROPERTY BOUNDARY
- EASEMENT
- EXISTING CHAIN LINK FENCE
- NEW LANDFILL CAP PERIMETER CHAIN LINK FENCE WITH SINGLE GATE
- LANDFILL GAS VENT RISER
- PERIMETER HORIZONTAL GAS COLLECTOR TRENCH UP TO 5' DEEP (BELOW MEMBRANE)
- DECK HORIZONTAL GAS COLLECTOR TRENCH

NOTE:

1. SLOPE PERIMETER HORIZONTAL GAS COLLECTOR PIPING AT 1% TO VENTS (LOW POINT) FROM MIDPOINT BETWEEN PERIMETER HORIZONTAL GAS COLLECTOR PIPING VENTS (HIGH POINT).

0 70 140 210
SCALE IN FEET

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY
NORTH LANDFILL FINAL SURFACE PLAN

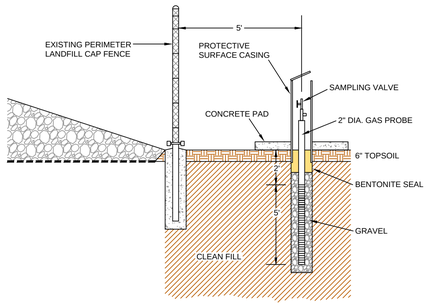
LOCATION: SYRACUSE, NEW YORK

TETRA TECH

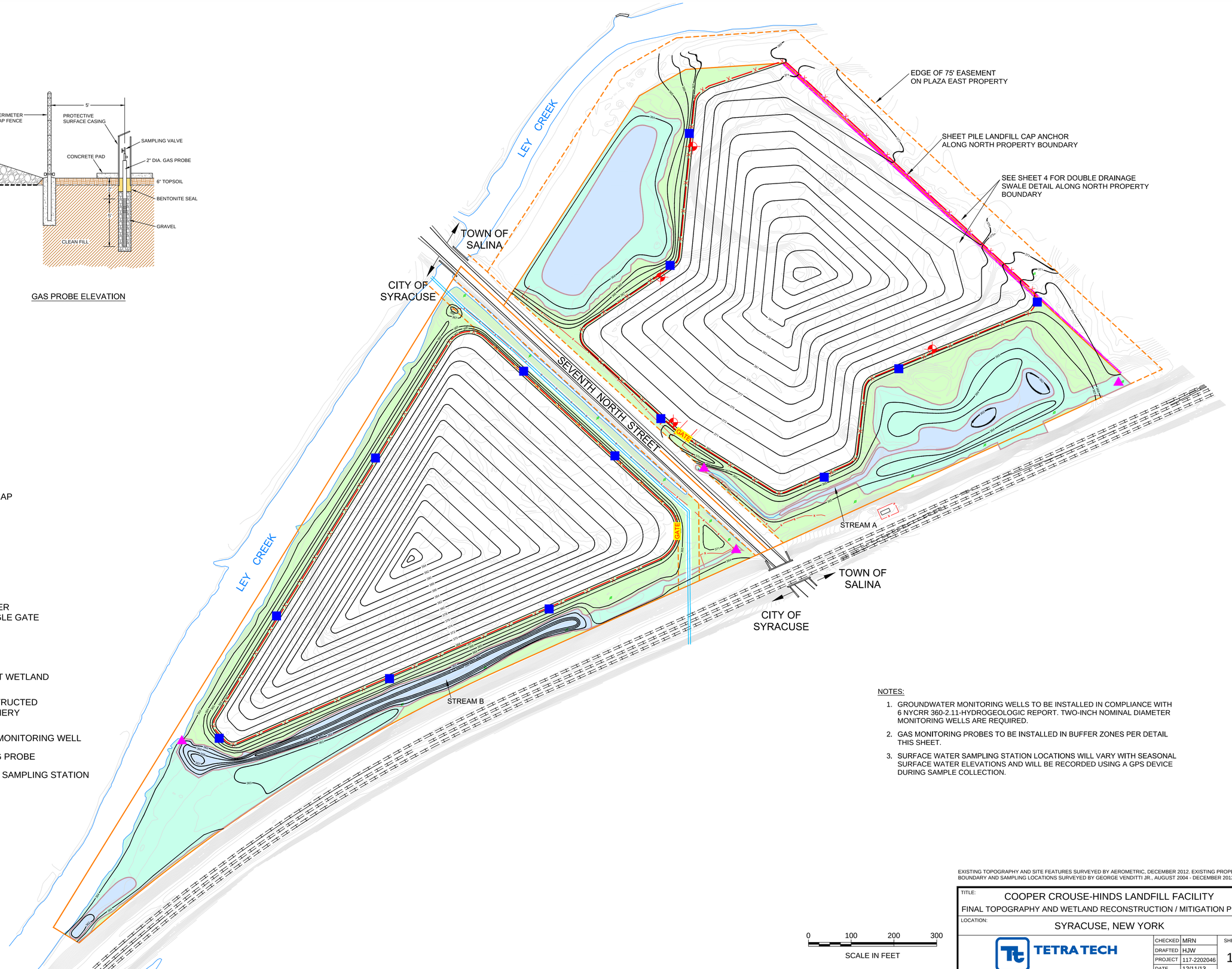
CHECKED	MRN
DRAFTED	HJW
PROJECT	117-2202046
DATE	12/11/13

SHEET: 11

S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\100% FINAL DESIGN\SHEET 11 - NORTH LANDFILL FINAL SURFACE PLAN.DWG



GAS PROBE ELEVATION



EXPLANATION

- PROPOSED FINAL LANDFILL CAP
- PROPERTY BOUNDARY
- EASEMENT
- WATER MAIN
- EXISTING CHAIN LINK FENCE
- ELECTRIC UTILITY POLE
- NEW LANDFILL CAP PERIMETER CHAIN LINK FENCE WITH SINGLE GATE
- BUFFER ZONE
- RECONSTRUCTED EMERGENT WETLAND
- OPEN WATER WITH RECONSTRUCTED EMERGENT WETLAND PERIPHERY
- PROPOSED GROUNDWATER MONITORING WELL
- PROPOSED GAS MONITORING PROBE
- PROPOSED SURFACE WATER SAMPLING STATION

NOTES:

1. GROUNDWATER MONITORING WELLS TO BE INSTALLED IN COMPLIANCE WITH 6 NYCRR 360-2.11-HYDROGEOLOGIC REPORT. TWO-INCH NOMINAL DIAMETER MONITORING WELLS ARE REQUIRED.
2. GAS MONITORING PROBES TO BE INSTALLED IN BUFFER ZONES PER DETAIL THIS SHEET.
3. SURFACE WATER SAMPLING STATION LOCATIONS WILL VARY WITH SEASONAL SURFACE WATER ELEVATIONS AND WILL BE RECORDED USING A GPS DEVICE DURING SAMPLE COLLECTION.

0 100 200 300

SCALE IN FEET

EXISTING TOPOGRAPHY AND SITE FEATURES SURVEYED BY AEROMETRIC, DECEMBER 2012. EXISTING PROPERTY BOUNDARY AND SAMPLING LOCATIONS SURVEYED BY GEORGE VENDITTI JR., AUGUST 2004 - DECEMBER 2012.

TITLE: COOPER CROUSE-HINDS LANDFILL FACILITY

FINAL TOPOGRAPHY AND WETLAND RECONSTRUCTION / MITIGATION PLAN

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN	SHEET:
DRAFTED	HJW	13
PROJECT	117-2202046	
DATE	12/11/13	

S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\100% FINAL DESIGN\SHEET 13 - FINAL TOPOGRAPHY AND WETLAND RECONSTRUCTION-MITIGATION PLAN.DWG

APPENDIX F

INSPECTION FORMS

Construction Storm Water Inspection Report

Project Name and Location: Landfill Cap Construction, Cooper Crouse-Hinds, LLC Facility, South Landfill, Seventh North Street, City of Syracuse, Onondaga County, New York

Permit: SPDES General Permit GP-0-10-001

Date of this report:_____ Time of Entry _____ Time of Exit _____

Weather Conditions: _____

On-Site Representative: _____

Inspector Name: _____

Yes	No	N/A	
			Copy of NOI posted for public viewing
			Up-to-date and signed SWPPP on site
			Copy of SPDES General Permit on site
			Litter containers on site and maintained
			Access driveways in good condition
			50'/30' Buffer Zone vegetated and free of grubbed area soil and sediment
			Silt fence complete, vertical, and in good condition
			Local storm water convergence points contained using silt fence, straw bale dikes, and chipped mulch
			Any need for collected soil or sediment relocation?
			Any pooled water on site?
			Any need for additional silt fence?
			Any need for additional straw bale dike?
			Any need for additional wet swale for local storm water detention?
			Wetland C in good condition?
			Stream B in good condition

			Drain along Seventh North Street in good condition?
			East zone along RR right-of-way in good condition?
			Ley Creek east bank in good condition?

Notes on inspection:

_____
_____
_____
_____
_____
_____
_____
_____
_____

Number of photographs taken: _____

Contractor contact information for remedies/repairs as required by this inspection:

Name: _____

Address:

_____
_____

Telephone: _____

Email: _____

CC this report to:

Tom.Bonk@cooperindustries.com

Nelson.Olavarria@cooperindustries.com

Mike.Noel@tetratech.com

Construction Storm Water Inspection Report

Project Name and Location: Landfill Cap Construction, Cooper Crouse-Hinds, LLC Facility, North Landfill, Seventh North Street, Town of Salina, Onondaga County, New York

Permit: SPDES General Permit GP-0-10-001

Date of this report:_____ Time of Entry _____ Time of Exit _____

Weather Conditions: _____

On-Site Representative: _____

Inspector Name: _____

Yes	No	N/A	
			Copy of NOI posted for public viewing
			Up-to-date and signed SWPPP on site
			Copy of SPDES General Permit on site
			Litter containers on site and maintained
			Access driveways in good condition
			30' Buffer Zone vegetated and free of grubbed area soil and sediment
			Silt fence complete, vertical, and in good condition
			Local storm water convergence points contained using silt fence, straw bale dikes, and chipped mulch
			Any need for collected soil or sediment relocation?
			Any pooled water on site?
			Any need for additional silt fence?
			Any need for additional straw bale dike?
			Any need for additional wet swale for local storm water detention?
			Wetland A in good condition?
			Stream A in good condition

			Wetland B in good condition?
			East zone along RR right-of-way in good condition?

Notes on inspection:

_____
_____
_____
_____
_____
_____
_____
_____
_____

Number of photographs taken: _____

Contractor contact information for remedies/repairs as required by this inspection:

Name: _____

Address:

_____
_____

Telephone: _____

Email: _____

CC this report to:

Tom.Bonk@cooperindustries.com

Nelson.Olavarria@cooperindustries.com

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SWPPP Cut Sheet:

Filtrexx® Sediment Control

Sediment & Perimeter Control Technology

PURPOSE & DESCRIPTION

Filtrexx® Sediment control is a three-dimensional tubular sediment control and storm water runoff filtration device typically used for **perimeter control** of sediment and other soluble pollutants (such as phosphorus and petroleum hydrocarbons), on and around construction activities.

APPLICATION

Filtrexx® Sediment control is to be installed down slope of any disturbed area requiring erosion and sediment control and filtration of soluble pollutants from runoff. Sediment control is effective when installed perpendicular to sheet or low concentrated flow. Acceptable applications include:

- Site perimeters
- Above and below disturbed areas subject to sheet runoff, interrill and rill erosion
- Above and below exposed and erodable slopes
- Around area drains or inlets located in a 'sump'
- On compacted soils where trenching of silt fence is difficult or impossible
- Around sensitive trees where trenching of silt fence is not beneficial for tree survival or may unnecessarily disturb established vegetation.
- On frozen ground where trenching of silt fence is impossible.
- On paved surfaces where trenching of silt fence is impossible.

INSTALLATION

1. Sediment control used for perimeter control of sediment and soluble pollutants in storm runoff shall meet Filtrexx® Soxx™ Material Specifications and use Certified Filtrexx® FilterMedia™.
2. Contractor is required to be Filtrexx® Certified™ as determined by Filtrexx® International, LLC (440-926-2607 or visit website at www.filtrexx.com). Certification shall be considered current if appropriate identification is shown during time of bid or at time of application (current listing can be found at www.filtrexx.com). Look for the Filtrexx® Certified™ Seal.
3. Sediment control will be placed at locations indicated on plans as directed by the Engineer.
4. Sediment control should be installed parallel to the base of the slope or other disturbed area. In extreme conditions (i.e., 2:1 slopes), a second Sediment control shall be constructed at the top of the slope.
5. Effective Soxx™ height in the field should be as follows: 8" Diameter Sediment control = 6.5" high, 12" Diameter Sediment control = 9.5" high, 18" Diameter SiltSoxx™ = 14.5" high, 24" Diameter Sediment control = 19" high.
6. Stakes shall be installed through the middle of the Sediment control on 10 ft (3m) centers, using 2 in (50mm) by 2 in (50mm) by 3 ft (1m) hard wood stakes. In the event staking is not possible, i.e., when Sediment control is used on pavement, heavy concrete blocks shall be used behind the Sediment control to help stabilize during rainfall/runoff events.
7. Staking depth for sand and silt loam soils shall be 12 in (300mm), and 8 in (200mm) for clay soils.
8. Loose compost may be backfilled along the upslope side of the Sediment control, filling the seam between the soil surface and the device, improving filtration and sediment retention.
9. If the Sediment control is to be left as a permanent filter or part of the natural landscape, it may be seeded at time of installation for establishment of permanent vegetation. The Engineer will specify seed requirements.

10. Filtrexx® Sediment control is not to be used in perennial, ephemeral, or intermittent streams.

See design drawing schematic for correct Filtrexx® Sediment control installation (Figure 1.1).

INSPECTION AND MAINTENANCE

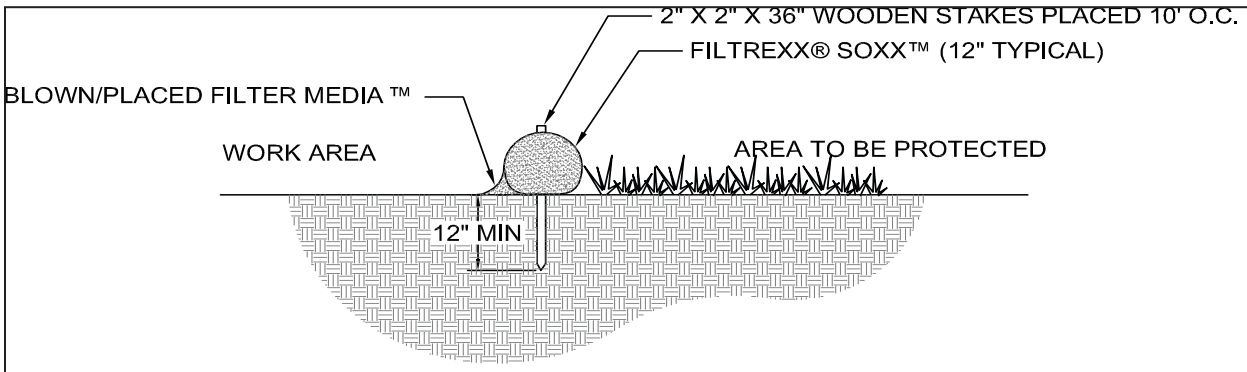
Routine inspection should be conducted within 24 hrs of a runoff event or as designated by the regulating authority. Sediment control should be regularly inspected to make sure they maintain their shape and are producing adequate hydraulic flow-through. If ponding becomes excessive, additional Sediment control may be required to reduce effective slope length or sediment removal may be necessary. Sediment control shall be inspected until area above has been permanently stabilized and construction activity has ceased

1. The Contractor shall maintain the Sediment control in a functional condition at all times and it shall be routinely inspected.
2. If the Sediment control has been damaged, it shall be repaired, or replaced if beyond repair.
3. The Contractor shall remove sediment at the base of the upslope side of the Sediment control when accumulation has reached 1/2 of the effective height of the Sediment control, or as directed by the Engineer. Alternatively, a new Sediment control can be placed on top of and slightly behind the original one creating more sediment storage capacity without soil disturbance.
4. Sediment control shall be maintained until disturbed area above the device has been permanently stabilized and construction activity has ceased.
5. The FilterMedia™ will be dispersed on site once disturbed area has been permanently stabilized, construction activity has ceased, or as determined by the Engineer.
6. For long-term sediment and pollution control applications, Sediment control can be seeded at the time of installation to create a vegetative filtering system for prolonged and increased filtration of sediment and soluble pollutants (contained vegetative filter strip). The appropriate seed mix shall be determined by the Engineer.

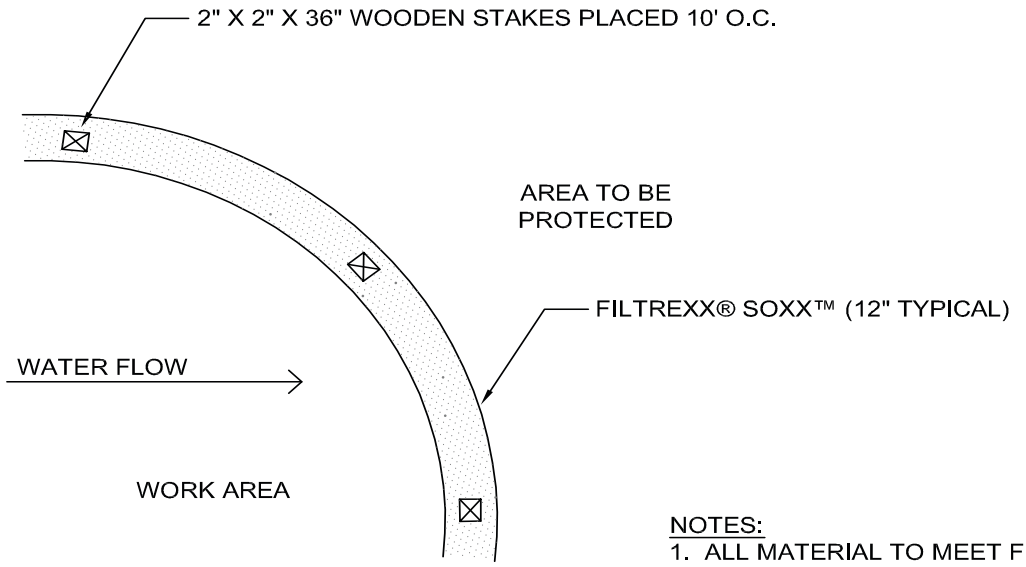
Slope Percent	Maximum Slope Length Above Sediment Control in Feet (meters)*				
	8 in (200 mm) Sediment control	12 in (300 mm) Sediment control	18 in (450 mm) Sediment control	24 in (600mm) Sediment control	32 in (800mm) Sediment control
	6.5 in (160 mm)**	9.5 in (240 mm) **	14.5 in (360 mm) **	19 in (480 mm) **	26 in (650 mm) **
2 (or less)	600 (180)	750 (225)	1000 (300)	1300 (400)	1650 (500)
5	400 (120)	500 (150)	550 (165)	650 (200)	750 (225)
10	200 (60)	250 (75)	300 (90)	400 (120)	500 (150)
15	140 (40)	170 (50)	200 (60)	325 (100)	450 (140)
20	100 (30)	125 (38)	140 (42)	260 (80)	400 (120)
25	80 (24)	100 (30)	110 (33)	200 (60)	275 (85)
30	60 (18)	75 (23)	90 (27)	130 (40)	200 (60)
35	60 (18)	75 (23)	80 (24)	115 (35)	150 (45)
40	60 (18)	75 (23)	80 (24)	100 (30)	125 (38)
45	40 (12)	50 (15)	60 (18)	80 (24)	100 (30)
50	40 (12)	50 (15)	55 (17)	65 (20)	75 (23)

* Based on a failure point of 36 in (0.9 m) super silt fence (wire reinforced) at 1000 ft (303 m) of slope, watershed width equivalent to receiving length of sediment control device, 1 in/ 24 hr (25 mm/24 hr) rain event.

** Effective height of Sediment control after installation and with constant head from runoff as determined by Ohio State University.



SECTION NTS



PLAN NTS

NOTES:
1. ALL MATERIAL TO MEET FILTREXX® SPECIFICATIONS.
2. FILTER MEDIA™ FILL TO MEET APPLICATION REQUIREMENTS.
3. COMPOST MATERIAL TO BE DISPERSED ON SITE, AS DETERMINED BY ENGINEER.

FILTREXX® SEDIMENT CONTROL

NTS

August 27, 2013
(117-2202046)

Mr. Richard Mustico, P.E., Remedial Project Manager
New York State Department of Environmental Conservation
Division of Environmental Remediation
Bureau of Central Remedial Action, 12th Floor
625 Broadway
Albany, NY 12233-7016

RE: SPDES Permit Equivalent Application for Remediation Discharges to Surface or Groundwaters – North and South CCH Landfills, Syracuse, NY

This request includes the following information listed in an NYSDEC email of August 7, 2013.

1. **Discharge rate (i.e. treatment system design capacity)**: Discharge rate of 100 Gallons Per Minute. Treatment system design capacity: 20,000-Gallon Treated Water Holding Tank and 20,000-Gallon Untreated Water Holding Tank. Additional holding tanks may be staged on-site if necessary, however 100 gallon per minute discharge rate will not be exceeded.

2. **A brief description with flow diagram for the proposed treatment system**: The treatment system will consist of sediment filtration via settlement within the untreated water holding tank, sheen removal on the water surface using absorbent pads or booms, and sediment filtration/carbon filtration prior to storage in the treated water holding tank for discharge sample collection. A flow diagram is included as Figure 1.

3. **A description of the receiving stream, including an accurate USGS map showing the stream and discharge location. When available, provide latitude and longitude of discharge point**: the receiving stream is Ley Creek via an existing drainage ditch running east/west along the south edge of 7th North Street. The discharge locations will be at Points A and B on Figure 2. The discharge locations are along the existing man-made ditch which drains to Ley Creek.

Point A – South Landfill	Latitude: $43^0$05’04.48”N	Longitude: $76^0$09’37.60W
Point B – North Landfill	Latitude: $43^0$05’05.17”N	Longitude: $76^0$09’37.10W

4. **Available wastewater monitoring data in tabular format, prepared using Tables 6 – 10, including all the parameters detected in the aqueous phase even if the source is sludge dewatering.** Data is provided in attached application.

5. **The proposed first day of discharge**: October 1, 2013

6. **Proposed duration of discharge**: Periodically through December 31, 2015

7. **The DER Site number**: Site No. 7-34-004

TETRA TECH
175 North Corporate Drive, Suite 100, Brookfield, WI 53045
Tel 262.792.1282 Fax 262.792.1310 www.tetratechgeo.com www.tetratech.com

8. **For discharges that will have iron in excess of 0.3 mg/l:**

a. **Provide monitoring data for iron from both filtered and unfiltered samples.** Historical data for the CCH site includes eight sample results for iron in surface water over the range of 955 to 30,600 ppb with 8 of 8 samples exceeding the 300 ppb standards, criteria and guidance value (SCG). Historical iron in groundwater sample results included 25 of 50 results exceeding the SCG with a range of 706 to 53,000 ppb. These results are presumed to be from unfiltered samples.

b. **If the discharge is to groundwater please provide monitoring data for iron from both filtered and unfiltered samples from monitoring wells not influenced by site contamination**. No discharge to groundwater.

c. **If the discharge is to a relatively small stream compared to the discharge, please provide monitoring data for iron from both filtered and unfiltered samples from and upstream point of the receiving water**. Not applicable, Ley Creek is not a small stream compared to the discharge.

If any questions arise or additional information is needed, please contact me.

Sincerely,
Tetra Tech, Inc.

Michael R. Noel, P.G.
Vice President, Principal Hydrogeologist

cc: Mr. Nelson Olavarria, Cooper Industries, LLC

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Tel 262.792.1282 Fax 262.792.1310 www.tetratechgeo.com www.tetratech.com

APPLICATION FOR SPDES PERMIT EQUIVALENT REQUIREMENTS

1. Conventional Monitoring Information - Table 1

The following monitoring information must be included.

Parameter	Raw Wastewater or Monitoring Well				Projected or Actual Treated Wastewater (if available)		
	Units	Min	Max	Avg	Min	Max	Avg
Flow	Gallons Per Minute	100	100	100	100	100	100
pH	Std. Units	7.81	7.81	7.81	7.81	7.81	7.81
BOD5	NA	NA	NA	NA	NA	NA	NA
TSS	NA	NA	NA	NA	NA	NA	NA
TDS	NA	NA	NA	NA	NA	NA	NA
TKN	NA	NA	NA	NA	NA	NA	NA
Ammonia	NA	NA	NA	NA	NA	NA	NA

NA: Not Analyzed as a suspected contaminant at this site.

2. Sampling Information - Priority Pollutants, Toxic Pollutants, and Hazardous Substances

i. Do you know or have reason to believe that any of the pollutants listed in Tables 6, 7, or 8 of the instructions are present in the discharge from this outfall?

X	Yes - If yes, monitoring data must be included in table 2 (next pg)
	No - Go to Item ii. below.

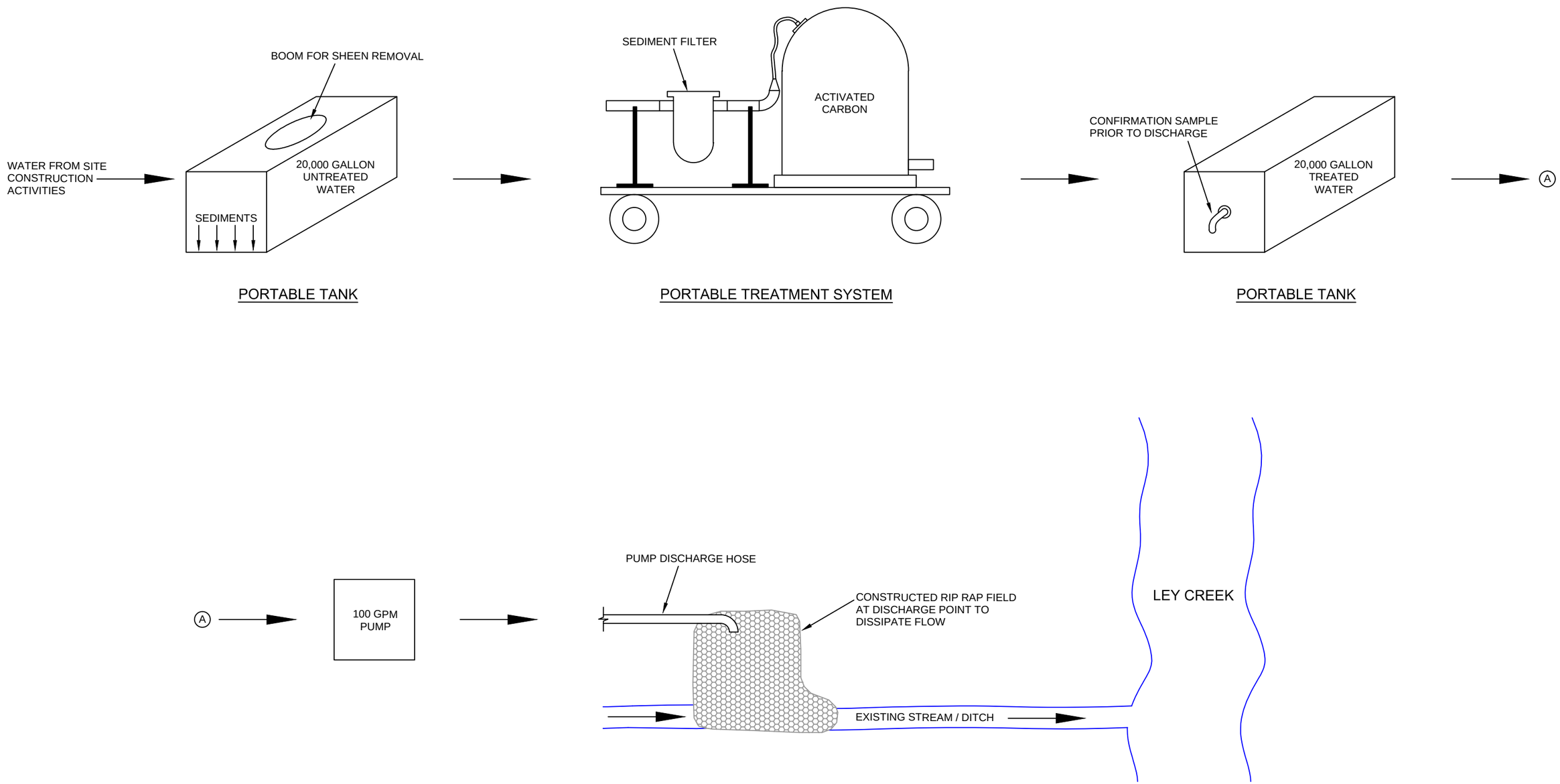
ii. Do you know or have reason to believe that any of the pollutants listed in Table 9 or Table 10 of the instructions, or any other toxic, harmful, or injurious chemical substances not listed in Tables 6-10, are present in the discharge from this outfall?

	Yes - Source or reason for presence in discharge attached
	Yes - Quantitative or qualitative data attached
X	No

2. Monitoring Information for Priority Pollutants, Toxic Pollutants, and Hazardous Substances - Table 2

CAS #	Parameter	Raw Wastewater or Monitoring Well				Projected or Actual Treated Wastewater (if available)		
		Units	Min	Max	Avg	Min	Max	Avg
00078-93-3	2-Butanone (MEK)	Ug/L	510	510	510	<10	<10	<10
00067-64-1	Acetone	Ug/L	960	960	960	11	14	12.5
00075-09-2	Methylene Chloride	Ug/L	72	72	72	<3	<3	<3
00108-88-3	Toluene	Ug/L	12	12	12	<3	<3	<3
53469-21-9	PCB-1242	Ug/L	0.062	0.062	0.062	<0.062	<0.062	<0.062
07440-43-9	Cadmium	Mg/L	0.00092	0.00092	0.00092	<0.00092	<0.00092	<0.00092
07440-47-3	Chromium	Mg/L	0.019	0.019	0.019	<0.019	<0.019	<0.019
07440-50-8	Copper	Mg/L	0.083	0.083	0.083	<0.083	<0.083	<0.083
07439-92-1	Lead	Mg/L	0.046	0.046	0.046	<0.046	<0.046	<0.046
07440-02-0	Nickel	Mg/L	0.015	0.015	0.015	<0.015	<0.015	<0.015
07440-66-6	Zinc	Mg/L	0.23	0.23	0.23	<0.23	<0.23	<0.23
07439-89-6	Iron	Ug/L	955	30,600	15,778	<955	<30,600	<15,778
07439-90-5	Aluminum	Ug/L	96.1	548	322	<96.1	<548	<322
00056-55-3	Benzo(a)anthracene	Ug/L	0.6	12	6.3	<0.03	<0.03	<0.03
00050-32-8	Benzo(apyrene	Ug/L	0.2	16	8.1	<0.0012	<0.0012	<0.0012

Sediment filtration may reduce metals. Activated carbon will remove/reduce VOCs, PCB-1242, and Base/Neutral fraction compounds.

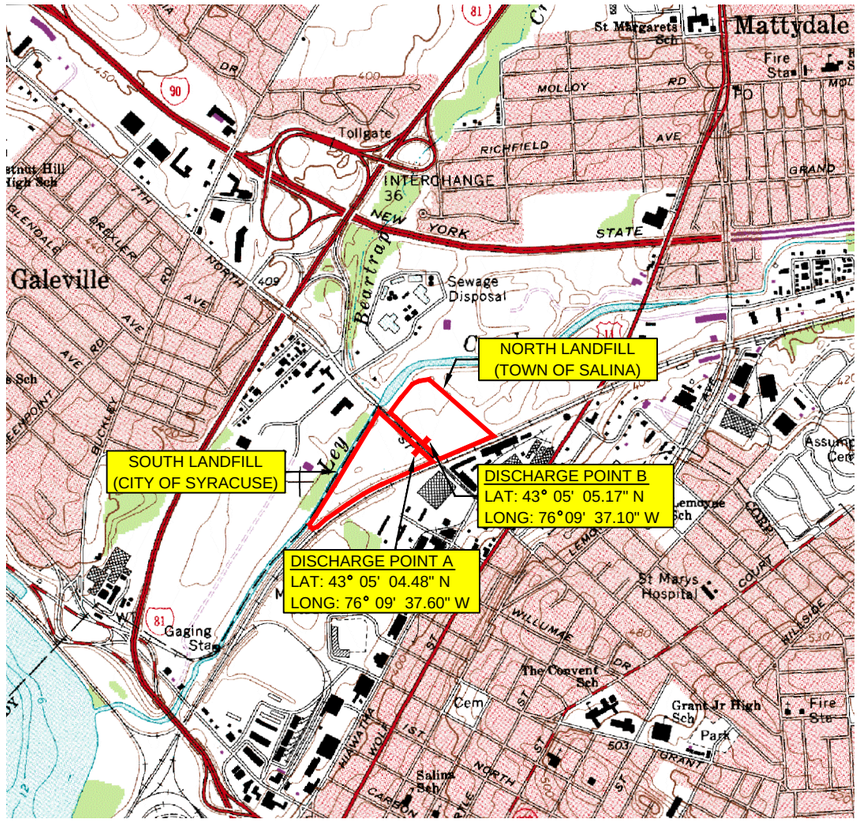


TITLE:	COOPER CROUSE-HINDS, LLC LANDFILL FACILITY SPDES PERMIT EQUIVALENT - FLOW DIAGRAM
LOCATION:	SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN	FIGURE:
DRAFTED	HJW	1
PROJECT	117-2202046	
DATE	8/26/13	

S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\8-22-13\FIG 1 DETAILS.DWG



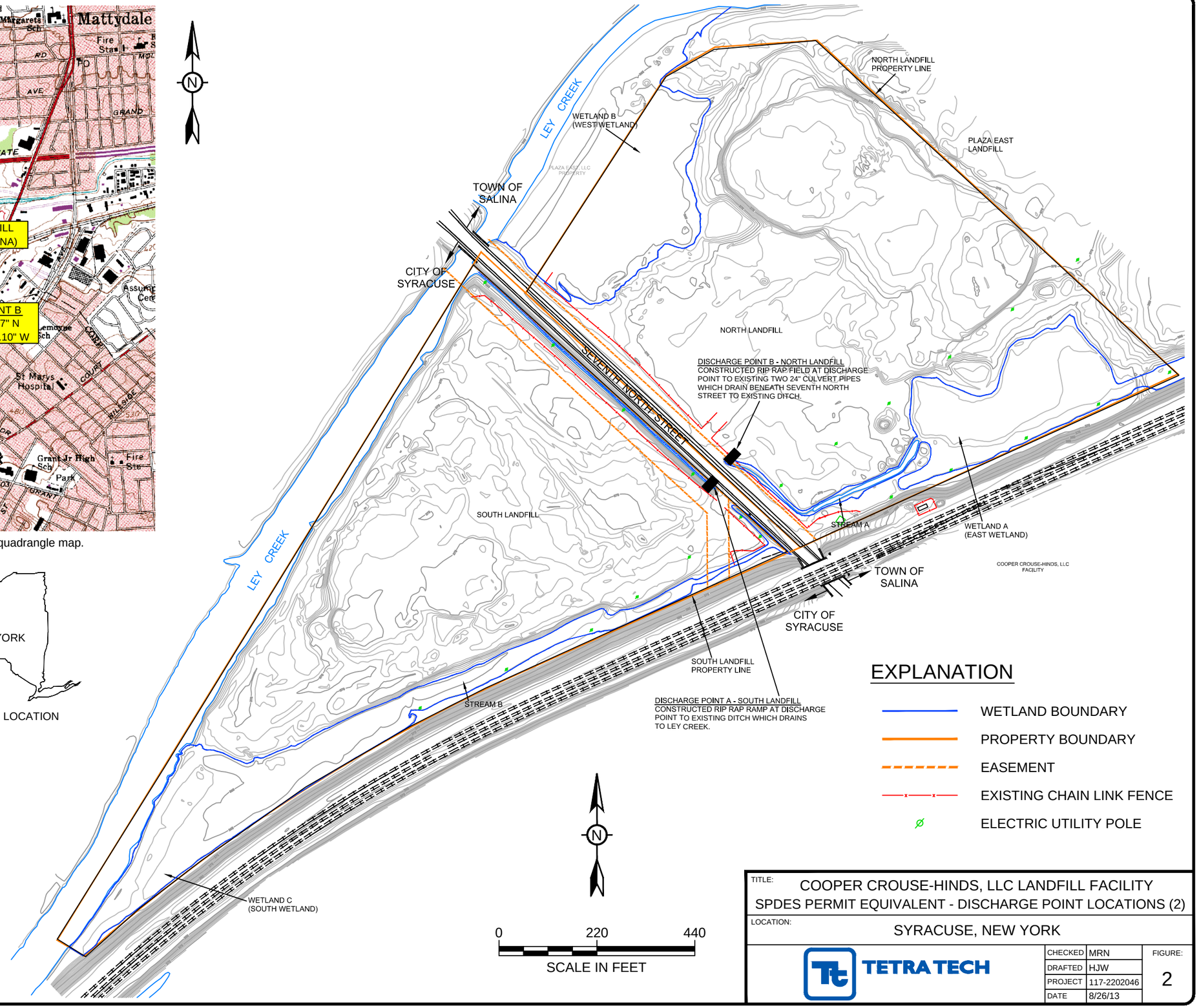
Base map from U.S.G.S. 7.5' SYRACUSE WEST, NEW YORK topographic quadrangle map.

0 2000 4000

SCALE IN FEET

National Geodetic Vertical Datum of 1929
Contour Interval 10 Feet

QUADRANGLE LOCATION



EXPLANATION

- WETLAND BOUNDARY
- PROPERTY BOUNDARY
- EASEMENT
- EXISTING CHAIN LINK FENCE
- ELECTRIC UTILITY POLE

TITLE: COOPER CROUSE-HINDS, LLC LANDFILL FACILITY
SPDES PERMIT EQUIVALENT - DISCHARGE POINT LOCATIONS (2)

LOCATION: SYRACUSE, NEW YORK

TETRA TECH

CHECKED	MRN	FIGURE:
DRAFTED	HJW	2
PROJECT	117-2202046	
DATE	8/26/13	

S:\CAD\COOPER\SYRACUSE\CLOSURE DESIGN\8-22-13\FIG 2 DISCHARGE POINTS.DWG

SECTION 31350
COMPOSITE DRAINAGE NETTING

PART 1 – GENERAL

1.1 DESCRIPTION

A. This Section includes installation of composite drainage netting consisting of geotextile heat bonded to both sides of high density polyethylene drainage netting.

B. All composite drainage netting shall be new, clean and in accordance with material specifications. In no instance shall second-hand or damaged materials be acceptable.

1.2 QUALITY ASSURANCE

A. Reference Standards:

1. The latest edition of the following standards, as referenced herein, shall be applicable.

a. American Society for Testing and Materials (ASTM).

B. Product Markings: Each roll shall be plainly and permanently marked with the following information:

1. Name or trademark of manufacturer

2. Date of manufacture

B. Qualifications: Installation Contractor including specific individuals who will participate in the installation project shall have demonstrated by previous experience their ability to do the work.

1.3 SUBMITTALS

A. Product Data:

1. Submit to the Engineer for approval manufacturer's catalog cuts, specifications and installation instructions.

B. Materials:

1. Submit to the Engineer for approval two (2) 1' x 1' samples of the composite drainage material prior to installation.

C. Layout Scheme:

1. Submit to the Engineer for approval a plan indicating the proposed panel layout.

1.4 PRODUCT DELIVERY, STORAGE, AND HANDLING

A. Delivery:

1. Deliver sufficient materials to the site to prevent interruption of the work.

2. All materials shall be inspected by Contractor upon delivery. Contractor shall notify Engineer of any damage. Damaged materials shall be removed from the site and replaced.

B. Storage:

1. The product shall be maintained in its protective wrapping until ready for use and stored to protect it from sunlight, heat, wind, and dust.

B. Handling:

1. The product and accessories shall be handled carefully with approved handling devices in strict conformance with the manufacturer's recommendations, as approved by the Engineer.

2. The product shall not be dropped or rolled off trucks, nor shall products be otherwise dragged, rolled or skidded.

3. The product shall be handled in such a manner as to prevent separation of individual components.

D. Products received at the site cracked, gouged, dented, ripped, separated, or otherwise damaged will not be approved and shall be returned and replaced at no expense to the Owner.

1.5 MATERIALS

A. The Contractor shall guarantee the composite drainage netting against defects in materials, fabrication, installation, and workmanship for 30 years commencing with the date of final acceptance.

PART 2 – PRODUCTS

A. Drainage Netting:

1. All drainage netting shall be high density polyethylene and exhibit the following properties:

Thickness	ASTM D 5199	MIL.	270+/-15
Carbon Black	ASTM D 4218	%	2 to 3
Tensile Strength	ASTM D 5035	LB/IN	75
Melt Flow	ASTM D 1238	G/10 MIN	1
Density	ASTM D 1505	G/CM^3	0.94
Transmissivity	ASTM D 4716	M^2/SEC	3 X 10-3

B. Geotextile:

1. The fabric shall be heat bonded to both sides of the geonet and meet specification section 31050.

PART 3 – EXECUTION

3.1 HANDLING AND PLACEMENT

A. The Installer shall handle composite drainage netting in such a manner as to ensure it is not damaged in any way, and the following shall be complied with:

1. On slopes, the composite drainage netting shall be secured in a manner recommended by the manufacturer, acceptable to the Engineer, and then rolled down the slope in such a manner as to continually keep the composite drainage netting in tension. If necessary, the composite drainage netting shall be stretched by hand after unrolled to minimize wrinkles.

2. All composite drainage netting shall be weighted with sandbags or the equivalent. Such sandbags shall be installed during placement and shall remain until replaced with cover material.

3. Unless otherwise specified, drainage netting shall not be welded to geomembrane.

4. The Contractor shall ensure that all necessary precautions are taken to prevent damage to the geosynthetic membrane and soil layers during placement of the composite drainage netting.

5. During placement of composite drainage netting, care shall be taken not to entrap dirt or excessive dust that could clog the drainage system, and/or stones that could damage adjacent geosynthetics.

6. Care shall be taken to remove tools from the surface of the composite drainage netting.

7. Composite drainage netting shall be anchored at the top of the slope as indicated in the Contract Drawings, or as recommended by the manufacturer and approved by the Engineer.

8. The upper edge of the composite drainage netting shall be wrapped with geotextile to prevent intrusion of soil particles.

B. The Composite drainage netting shall be placed on all slopes and shall extend over the cap surface as indicated on the Contract Drawings.

3.2 JOINING COMPOSITE DRAINAGE NETTING

A. Composite drainage netting shall always be laid in the same direction (i.e., composite drainage netting shall never be laid in perpendicular directions).

B. Adjacent composite drainage netting shall be joined according to the Contract Drawings and manufacturer's recommendations, as approved by the Engineer. As a minimum, the following requirements and procedures shall be met:

1. Peel back the upper filter fabric of adjacent rolls twelve (12) inches from the edges.

2. Overlap HDPE drainage netting by at least six (6) inches and secure with plastic ties.

3. Ties shall be every 5 feet along the slope and every 5 inches in the anchor trench.

4. Overlap the loose ends of the upper filter fabric of the adjacent rolls to create a complete seal over the HDPE netting.

5. The upper fabric layers shall be joined by tacking (sewing) at five (5) foot intervals along the seam.

6. In corners of the side slopes where overlaps between perpendicular geo-composite rolls are required, the adjacent rolls shall be cut as required to allow for a diagonal seam in the corner. Overlap shall be a minimum of one (1) foot for HDPE netting along diagonal seams.

3.3 GEOCOMPOSITE REPAIR

A. Any holes or tears in the composite drainage netting shall be repaired by placing a patch extending 2 feet beyond the edges of the hole or tear. The patch shall be secured to the original composite drainage netting by spot welding every 6 inches. If the hole or tear width across the roll is more than 50% the width of the roll, the damaged area shall be cut out and the two portions of the composite drainage netting shall be joined as indicated in the Joining section above.

3.4 COVER MATERIALS OVER COMPOSITE DRAINAGE NETTING

A. Granular materials shall be placed on composite drainage netting as shown on the Contract Drawings. During back dumping and spreading, a minimum depth of 6 inches of granular material shall be maintained at all times between the composite drainage netting and wheels of trucks or spreading equipment. All equipment used in spreading or traveling on the cover layer for any reason shall exert low ground pressures and shall be approved by the manufacturer and Engineer. Dozer blades, etc. shall not make direct contact with the composite drainage netting; however, if tears occur in the composite drainage netting during the spreading operation, the granular material shall be cleared from the composite drainage netting and the damaged area repaired as previously described.

B. The granular material shall be spread in the direction of overlap. Special care shall be taken to maintain proper overlap and continuity.

C. All equipment spreading cover material or travelling on the cover layer shall avoid making sharp turns, quick stops or quick starts.

D. Composite drainage netting shall be covered as soon as possible after placement to minimize exposure to sunlight. Composite drainage netting shall not be exposed for more than 7 days.

3.5 DISPOSAL OF SCRAP MATERIAL

A. On completion of installation, the Contractor shall dispose of all trash and scrap material off-site or in a location approved by the Owner and Engineer, remove equipment used in connection with the work herein, and shall leave the premises in a neat acceptable manner.

END OF SECTION

SECTION 31360
BARRIER PROTECTION LAYER

PART 1 – GENERAL

1.1 SUMMARY

A. This section includes the installation of the sand barrier protection layer as shown on the Contract Drawings and as specified herein.

B. The Contractor shall accept the site in the condition in which it exists at the time of the award of the Contract.

C. The Engineer will determine the suitability of materials that are to be used in the work and should any materials encountered be unsatisfactory for the purpose intended, they shall be removed from the site at the Contractor's expense.

1.2 QUALITY ASSURANCE

A. The latest edition of the following standards and regulations, as referenced herein, shall be applicable.

1. American Society for Testing and Materials (ASTM).

2. Standard Specification for Highway Materials and Methods of Sampling and Testing, American Association of State Highway and Transportation Officials (AASHTO).

3. 6 NYCRR Part 360 Solid Waste Management Facilities.

B. The Contractor shall comply with the requirements for soil erosion and sedimentation control, and other requirements of governmental authorities having jurisdiction, including the State of New York.

C. The Contractor shall provide and pay for all costs in connection with an approved independent testing facility to determine conformance of soils with the specifications, in accordance with Section "Quality Requirements."

D. All imported fill soils and aggregates will need to meet the Unrestricted Use Soil Cleanup Objectives set forth in Table 375-6.8(a) of 6NYCRR Part 375 for a minimum of two feet in measured depth measured from the finished surface grade (see table at end of Section 31180).

1.3 SUBMITTALS

A. The Contractor shall furnish representative earth materials to the testing laboratory for analysis and report, as directed by the Engineer or as outlined in the specifications.

B. Descriptive information on compaction equipment to be used for construction of the barrier layer, including equipment proposed for use in confined areas.

C. Plan detailing proposed borrow source, borrow source prequalification testing data, and estimated borrow source quantity.

D. Schedule of placement.

E. Test reports for prequalification and construction quality control/quality assurance testing shall be submitted to both the Contractor and Engineer.

1.4 PRODUCT HANDLING

A. Soil materials shall be excavated from the borrow source, transported, conditioned, placed, and stockpiled in such a manner so as to prevent contamination, segregation, and excessive wetting. Materials that have become contaminated, excessively wet, or segregated shall not be used and shall be removed from the site.

PART 2 – PRODUCTS

2.1 MATERIALS

A. Selected Fill (for use in barrier protection layer): Sound, durable, sand, gravel, stone, or blends of these materials, free from organic, frozen or other deleterious materials, conforming to the following gradation requirements:

Sieve	Percent Passing
1"	100
No. 40	30 – 70
No. 200	20 – 40

1. Particles retained on No. 4 sieve classified as sub-rounded to rounded.

2. Particle size analysis shall show no gap grading.

3. Shall have a Plasticity Index of at least 3.

4. Internal angle of soil friction shall be equal to or greater than 29° when compacted to 90% standard proctor maximum density.

5. Interface friction angle between barrier protection material and geo-synthetics shall be equal to or greater than 29° when compacted to 90% standard proctor minimum density.

B. Sub-drainage Lateral Piping – Nominal 12-inch wide by 1.5-inch deep lateral piping shall be installed at bottom of barrier layer resting on drainage layer to carry water to toe drainage. Sub-drainage lateral piping shall be oriented at 45 degrees to landfill contours and space at 50-foot intervals. Sub-drainage lateral piping shall be AdvanEDGE oblong corrugated pipe or Engineer-approved equal.

PART 3 – EXECUTION

3.1 BORROW SOIL PRECONSTRUCTION MATERIAL QUALIFICATION TESTING

A. General:

1. Sufficient size samples shall be obtained from the potential borrow source to allow completion of tests listed in paragraph B below. Samples may be obtained from test borings, test pits, or from borrow pit faces provided that surficial dry or wet soil is removed to expose undisturbed earth. Tests listed below shall be performed on each sample obtained. A minimum of three (3) representative samples from each potential borrow source shall be furnished to the testing laboratory for prequalification testing. Test data shall be provided to the Engineer a minimum of 2 weeks prior to start of barrier protection layer construction for approval of borrow source.

B. Material Tests:

1. Particle Size Analysis:

a. Method: ASTM D422

b. Number of Tests: One (1) per sample; three (3) per potential source.

c. Acceptance Criteria: Gradation within specified limits.

2. Atterberg Limits Determinations:

a. Method: ASTM D4318

b. Number of Tests: One (1) per sample; three (3) per potential source.

c. Acceptance Criteria: Plasticity index within specified limits.

3. Moisture Content:

a. Method: ASTM D2216

b. Number of Tests: One (1) per sample; three (3) per potential source. Test shall be performed on sample specimen preserved at natural (undisturbed) moisture condition.

4. Maximum Density Determination:

a. Method: ASTM D698 - Standard Proctor

b. Number of Tests: One (1) per sample, equaling three (3) per potential source.

5. Internal angle of soil friction and cohesion:

a. Method: ASTM 3080 - Direct shear test.

b. Number of Tests: One (1) test series per sample. Test series shall consist of three (3) identical specimens from each sample subjected to direct shear test using normal (vertical) stresses of approximately 1 pounds per square inch (psi), 2 psi and 4 psi. Test specimens shall be compacted to 90% of standard Proctor maximum dry density.

1.) Total number of specimens shear tested per sample: 3.

2.) Total number of specimens shear tested per potential borrow source: 9.

6. Interface Friction Angle:

a. Method: ASTM 3080 - Direct shear test with apparatus modified to test a minimum 12" by 12" (plan size) soil specimen and to firmly and uniformly hold geosynthetic material in place. Deformation of geosynthetic material shall not be permitted.

b. Number of Tests: One (1) test series per potential borrow source for each of the synthetic materials listed in paragraph 6-d below. Test series shall consist of three (3) identical specimens from one of the three borrow source samples subjected to direct shear test using normal (vertical) stresses of approximately 1 psi, 2 psi, and 4 psi. Test specimens shall be compacted to 90% of standard Proctor maximum dry density.

c. Acceptance Criteria: Friction angle greater than or equal to 29°. The purpose of the test is to verify design friction angles.

d. Synthetic to be used for interface shall be same type and manufacture used during construction.

1.) Geotextile filter fabric meeting specifications described in Section “Geotextiles.”

2.) Geomembrane materials meeting specification described in Section “Synthetic Geomembrane.”

3.) Composite drainage netting meeting specifications described in Section "Composite Drainage Netting."

3.2 PLACEMENT AND COMPACTION

A. General:

1. Remove or re-compact any soft or loose soils as determined by the Engineer prior to filling. Particular emphasis shall be placed on obtaining a firm, compacted surface on the landfill side slopes.

2. Do not place fill material on surfaces that are muddy, frozen, or contain frost, ice, ponded water or extraneous debris.

3. When work is suspended during periods of freezing weather, measures shall be taken to prevent fill already in place from freezing. Upon resumption of work after any inclement weather, prepare the exposed surface by proof rolling to identify any zones of soft/loose soils. Soft/loose materials or frozen soils shall be removed and replaced.

4. The distribution of materials throughout the sand barrier protection layer shall be such that the layer will be free from lenses, pockets, streaks, and layers of materials differing substantially from the surrounding materials.

5. The placing of material shall be done so as to obtain a layer of uniform thickness without spaces between successively deposited loads.

6. Compaction of each layer shall proceed in a systematic, orderly, and continuous manner so as to ensure the specified coverage by the compaction equipment.

7. Materials which cannot be compacted by the approved rolling compaction equipment because of interferences shall be compacted with smaller approved compactors to a density at least equal to the density achieved in adjacent areas by the rolling compaction equipment and methods. Single pad vibratory base plate compactors shall weigh not less than 200 lbs. and have a vibration frequency not less than 1600 cycles per minute.

8. Should the fill surface become rutted or uneven subsequent to compaction, it shall be re-leveled and re-compacted before placing the next layer of material.

9. Fill on landfill side slopes shall be placed in lifts parallel with the sloping surface.

B. Barrier Protection Layer Placement and Compaction:

1. Place fill materials in layers not more than 10" in loose depth. Lift height shall be governed by the ability of the compaction equipment to obtain the required compaction with 10" as a maximum lift height.

2. Moisture content of the material during compaction shall be between 3 percent dry and 3 percent wet of optimum moisture content as determined by ASTM D 698 (Standard Proctor).

3. All fill shall be thoroughly and satisfactorily compacted to at least 90 percent of the standard Proctor maximum dry density of the material used (ASTM D-698).

4. Where fill must be moisture conditioned before compaction, uniformly apply water to the surface of each layer of fill. Prevent ponding or other free water on the surface subsequent to, or during, compaction operations.

5. Remove and replace, or scarify and air dry, soil that is too wet to permit compaction to the specified density. Soil that has been removed because it is too wet to permit compaction may be stockpiled or spread and allowed to dry. Assist drying by discing, harrowing or pulverizing, until moisture content is reduced to a value which will permit compaction to the percentage of maximum density specified.

6. Rolling compaction equipment shall be heavy smooth drum in vibratory equipment capable of achieving the intended result. Any equipment not originally manufactured for compaction purposes and equipment which is not in proper working order will not be approved. Furnish manufacturer's specifications covering data not obvious from a visual inspection of the equipment and necessary to determine its classification and performance characteristics.

7. Compaction equipment shall make a minimum of 4 complete passes over the entire area of each lift.

8. The Contractor shall grade partially completed fill areas for drainage and thoroughly compact and smooth the surface at the end of each workday.

9. For areas not accessible to heavy rolling compaction equipment, fill materials shall be placed in horizontal layers not to exceed 6 inches in loose thickness and compacted with smaller rolling compaction equipment or hand operated equipment, as approved by the Engineer.

10. The final surface of the barrier layer shall be uniform and suitable for placement of the next subsequent layer.

3.3 FIELD QUALITY CONTROL

A. The Contractor's Testing Laboratory shall perform testing of sand barrier protection layer fill materials to insure compliance with these specifications in accordance with Section "Contractor Furnished Testing Laboratory Services."

B. In-place density and moisture content tests shall be performed on in- place fill material in accordance with ASTM D 1556, D 2167 or D 2922. In-place density shall be determined at a depth of 3 inches below grade. At least 9 tests shall be performed per acre per lift of material placed and at least one test shall be performed each day. Field test locations shall be subject to approval or relocation by the Engineer.

C. Tests for moisture content shall be performed on the in-place fill at a rate of nine tests per acre per lift. If nuclear methods or microwave methods are used to determine field moisture content, one oven-dry moisture content determination (ASTM D2216) shall be performed per acre per lift for calibration. Sample shall be obtained from a location immediately adjacent to an in-place density location.

D. One particle size analysis (ASTM D422) and one standard Proctor compaction test (ASTM D698) shall be completed for every 5,000 cubic yards of material placed.

E. The Engineer may direct additional tests to establish gradation, Atterberg limits, permeability, maximum density, in-place density, and water content as required by working conditions, or changes in borrow source material, at the Contractor's expense.

F. Acceptance Criteria:

1. Acceptance Criteria: The criteria for acceptability of in-place fill shall be in situ dry density and moisture content. Minimum dry density for all fill shall be 90 percent of the standard Proctor maximum dry density. The in-place moisture content shall be between 3 percent dry and 3 percent wet of optimum as determined by the standard Proctor compaction method (ASTM D-698). If a test fails to qualify, the fill shall be further reworked, compacted and re-tested. Subsequent test failures shall be followed by removal and replacement of the material.

3.4 CLEAN UP

A. Provide and maintain protection of newly filled areas against damage. Upon completion or when directed, correct all damaged and deficient work by building up low spots and remove temporary protections, fencing, shoring and bracing if any.

B. Remove all surplus excavated material not required for filling and backfilling and legally dispose of same away from premises.

C. Leave the premises and work in clean, satisfactory condition, ready to receive subsequent operations.

END OF SECTION

SECTION 31370
STONE FILL

PART 1 – GENERAL

1.1 SUMMARY

A This section includes provisions for the placement of stone fill on embankment slopes, drainage courses, culvert inlets and outlets, and stream banks.

1.2 REFERENCES

A. "Standard Specifications, Construction and Materials, New York State Department of Transportation, Office of Engineering."

B. "Standard Specifications for Highway Materials and Methods of Sampling and Testing, American Association of State Highway and Transportation Officials (AASHTO)."

1.3 SUBMITTALS

A. Material Certificates signed by material producer and Contractor, certifying that each material item complies with or exceeds specified requirements.

B. Results of all tests, investigations, including recommendations.

C. Manufacturer's catalog cuts, production data, and recommended installation procedures for geotextile fabric.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Stone fill shall conform with NYSDOT Section 620-2.02, and shall meet the following gradation requirements:

1. Fine

Stone Fill	Percent Passing by Weight
<8 inches	90 - 100
>3 inches	50 - 100
<#10 sieve	0 - 10

2. Light

Stone Fill	Percent Passing by Weight
<100 lbs	90 - 100
>6 inches	50 - 100
<1/2 inches	0 - 10

B. Bedding shall conform with NYSDOT Section 620-2.05, and shall meet the following gradation requirements:

Stone Fill	Percent Passing by Weight
4 inches	100
1 inch	15 – 60
¼ inch	0 - 25
No. 4	0 - 10

C. Geotextile: Shall conform to the requirements of Section "Geotextiles".

PART 3 - EXECUTION

3.1 SURFACE PREPARATION

A. Clear the surface on which any rip-rap is to be placed of brush, trees, or other objectionable material.

3.2 INSTALLATION

A. Geotextile Fabric: Shall be installed in conformance with the requirements of Section "Geotextiles."

B. Bedding

1. Place the bedding material on the geotextile to the full thickness, six (6) inch minimum, in one operation using methods that will not cause segregation of the aggregate.

2. Prevent contamination of bedding material by natural soils or other materials. Remove bedding materials that become contaminated and replace with uncontaminated bedding material.

3. Do not drop bedding material onto the geotextile from a height exceeding three (3) feet.

C. Stone Fill

1. Place the stones so that the dimension approximately equal to the layer thickness is perpendicular to the slope surface such that the weight of the stone is carried by the underlying material, not by the adjacent stones.

2. Place stone fill to minimize void spaces between adjacent stones.

3. On slopes the largest stones shall be placed at the bottom of the slope.

4. Place stone fill to avoid disruption and damage to the bedding material.

END OF SECTION

SECTION 32910
LANDFILL TOPSOIL

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes the placement of topsoil in conformance with the lines, grades and thicknesses as shown on the Drawings and as herein specified.

B. Minimum thickness is six (6) inches, for all areas disturbed during construction and not receiving other surface treatment.

1.2 SUBMITTALS

A. Samples: The Contractor shall furnish earth materials to the testing laboratory for analysis and report, as directed by the Engineer or as outlined in the specifications.

B. Quality Control Submittals:

1. Test Reports: The testing laboratory shall submit written reports of all tests, investigations, and recommendations to the Contractor and the Engineer. The test results should include gradation, pH, organic content, U.S.D.A soil texture classification and chemical make-up.

2. Submit manufacturer's or vender's certified analysis for soil amendments.

1.3 QUALITY ASSURANCE

A. Reference Standards: The latest edition of the following standards, as referenced herein, shall be applicable.

1. "Standard Specifications, Construction and Materials, New York State Department of Transportation, Office of Engineering."

2. "Standard Specifications for Highway Materials and Methods of Sampling and Testing, American Association of State Highway and Transportation Officials (AASHTO)."

B. The Contractor shall provide and pay for all costs in connection with an approved independent testing facility to determine conformance of soils with the specifications, in accordance with Section 01400 "Quality Control Services."

C. All imported fill soils and aggregates will need to meet the Unrestricted Use Soil Cleanup Objectives set forth in Table 375-6.8(a) of 6NYCRR Part 375 for a minimum of two feet in measured depth measured from the finished surface grade.

1.4 PROJECT CONDITIONS

A. Coordinate the placement of topsoil with the completion all underground work including that of the other trades.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Topsoil: Fertile, friable, natural non-contaminated loam free of subsoil, clay lumps, brush, stones, or other deleterious materials larger than two (2) inches in greatest dimension, meeting the following gradation requirements:

Sieve	Percent Passing
2"	100
1"	95 - 100
1/4"	70 - 95
No. 40	20 - 65
No. 200	10 - 20

1. pH range: 5.5 - 7.6

2. Organic Content: 5% - 25%

3. U.S.D.A Soil Texture: Sand loam, loam, clay loam, silt loam, or sandy clay loam.

B. The Contractor may amend natural topsoil with approved materials and by approved methods to meet the above specifications.

2.2 ACCESSORIES

A. Soil Amendments:

1. Soil amendments are not to be made without review and authorization by the Engineer.

2. Lime: Natural limestone containing not less than 85% of total carbonates, ground so that not less than 90% passes a 10-mesh sieve and not less than 50% passes a 100-mesh sieve.

3. Aluminum Sulfate: Commercial grade.

4. Peat Humus: FS Q-P-166 and with texture and pH range suitable for intended use.

5. Bone meal: Commercial, raw, finely ground; 4% nitrogen and 20% phosphoric acid.

6. Superphosphate: Soluble mixture of treated mixtures; 20% available phosphoric acid.

7. Sand: Clean, washed sand, free of toxic materials.

8. Perlite: Conforming to National Bureau of Standards PS 23.

9. Vermiculite: Horticultural grade, free of toxic substances.

10. Sawdust: Rotted sawdust, free of chips, stones, sticks, soil or toxic substances and with 7.5 lbs. nitrogen uniformly mixed into each cubic yard of sawdust.

11. Manure: Well-rotted, unleached stable or cattle manure containing not more than 25% by volume of straw, sawdust or other bedding materials and containing no chemicals or ingredients harmful to plants.

12. Commercial Fertilizer: Complete fertilizer of neutral character, with some elements derived from organic sources and containing available plant nutrients.

13. Commercial Compost: Containing no chemical or ingredients harmful to plants.

2.3 MATERIAL ACCEPTANCE

A. Topsoil may be acquired from approved sites that are designated on the Drawings or in the Proposal. If no sites are designated, material proposed for use as topsoil must be stockpiled, sampled, and tested prior to use.

B. Topsoil containing foreign or contaminated material may be rejected on the basis of visual examination by the Engineer, prior to testing.

C. Acceptance of topsoil shall be based upon test results. Tested topsoil must be approved in writing by the Engineer before any material is used.

PART 3 - EXECUTION

3.1 STOCKPILING

A. Topsoil shall be stockpiled from on-site sources or provided from off-site sources and stockpiled if on-site quantities are deficient.

B. Stockpiles shall contain not less than 200 cu. yds. or the minimum required for the project.

C. Stockpiles shall have a height of at least 4 feet and shall be trimmed to uniform surfaces and slopes.

D. The sites of all stockpiles and areas adjacent thereto which have been disturbed by the Contractor shall be graded and put into an acceptable condition by seeding as directed by the Engineer.

3.2 PREPARATION

A. Place topsoil on compacted subgrade conforming to Section 02200 “Earthwork” only after subgrades have been accepted by the Engineer.

B. Subgrades shall conform to the specified lines and grades.

C. Scarify the subgrade parallel to the contours to permit sufficient bonding with the topsoil. Do not scarify to the extent that the subgrade stability or density is disrupted.

D. Mix approved soil amendments into 6" inches of topsoil at necessary rates, if necessary.

3.3 TOPSOILING

A. Place topsoil in areas where seeding is to be performed. Place a 6" minimum depth to the finished grade elevations as shown on the Drawings.

B. Fine grade topsoil to eliminate uneven areas and to ensure proper drainage. Maintain finished grade elevations required.

C. Remove all stones, roots, grass, weeds or other foreign matter while placing.

D. Lightly compact the topsoil to ensure its stability.

E. Topsoil in an unworkable condition due to excessive moisture, frost, or other conditions shall not be placed until it is suitable for placement.

3.4 CLEANING

A. Remove all surplus subsoil and topsoil from project site.

B. Leave the site in clean, satisfactory condition ready to receive subsequent operations.

END OF SECTION

SECTION 32920
LANDFILL SEEDING

PART 1 – GENERAL

1.1 SUMMARY

A. The Contractor shall provide all labor, materials, equipment and services necessary for, and incidental to, preparation of ground surfaces, fertilizing, seeding, mulching, and maintenance of seeded areas as shown on the Drawings or as specified herein.

B. Seed shall be sown from April 1st to June 1st or from September 1st to October 15th, unless otherwise approved by the Engineer. Landfill seeding applies to landfill cap areas and buffer zones.

1.2 SUBMITTALS

A. Quality Control Submittals:

1. Certification:

a. Submit manufacturer's or vendor's certified analysis for fertilizer materials.

b. Submit vendor's certified analysis for each grass seed mixture required, stating botanical and common name, percentages by weight, percentages by purity, germination , and weed seed.

2. Maintenance Instructions: Submit instructions recommending procedures to be established for maintenance of landscaped work for one (1) full year. Submit prior to expiration of Contractor's maintenance period.

3. Submit description of planned mulching techniques and corresponding manufacturer's installation recommendation for approval by the Engineer.

1.3 QUALITY ASSURANCE

A. All landscaping work shall be performed by one (1) Contractor, with proven experience in this field.

B. Package standard products with the manufacturer's certified analysis. For other materials, provide analysis by recognized laboratory made in accordance with methods established by the Association of Official Agriculture Chemists, wherever applicable.

C. The Contractor shall provide and pay for all costs in connection with an approved independent testing facility to determine conformance of materials with the specifications, in accordance with Section 01400 "Quality Control Services."

1.4 DELIVERY, STORAGE, AND HANDLING

A. Deliver packaged materials in containers showing weight, analysis and name of manufacturer. Protect materials from deterioration during delivery, and while stored at site.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Fertilizer:

1. Commercial fertilizer (5-10-5) inorganic, or organic, containing not less than five (5) percent nitrogen, ten (10) percent available phosphoric acid, and five (5) percent water soluble potash.

2. If, as an alternative, the Contractor wishes to substitute for commercial fertilizer 5-10-5, another commercial fertilizer with a 1- 2-1 ratio, such as 10-20-10 or 6-12-6, he may do so with the approval of the Engineer and the rate of fertilizer to be used shall be whatever amount is required to furnish the same amount of nitrogen as would be supplied by the 5-10-5.

B. Seed:

1. Seed shall be fresh, clean, new-crop seed mixed in the proportions specified for species and variety, conforming to Federal and State Standards.

2. Use the following standard mixture, unless a special mixture is otherwise indicated or approved by the Engineer:

Species	% By Weight	% By Purity	% Germination
Creeping Red Fescue	40	95	85
Tall Fescue	30	95	85
Kentucky Bluegrass	15	95	85

3. Weed seed content shall not exceed 0.25%.

Species	% By Weight	% By Purity	% Germination
Perennial Rye	10	95	85
White Clover	5	80	80

C. Water: Clean, potable.

D. Mulch:

1. Provide and install a mulch adequate to protect the seeding during its growing period. It shall be the responsibility of the Contractor to determine the appropriate mulching techniques for the particular site conditions and acquire approval of the same from the Engineer.

2. Clean straw for gentle slopes, consisting of stalks of oats, wheat, rye, or other approved crops which are free of noxious weed seeds. Weight shall be based on a fifteen (15) percent moisture content.

3. Mulching blanket for steep slopes and drainage swales: “Curlex Blanket” by Amxco, “Ero- Mat” by Armco, or equal.

PART 3 - EXECUTION

3.1 PREPARATION OF TOPSOIL

A. Mix fertilizer into top 2 inches of topsoil at a rate of 20 lbs. per 1000 square feet.

B. Water dry topsoil to depth of 4 inches at least 48 hours prior to seeding to obtain a loose friable seed bed.

3.2 SEEDING

A. Apply seed only when wind velocities are less than five (5) miles per hour.

B. Sow half the seed with mechanical seeder.

C. Sow remaining half of seed at right angles to first seeding pattern, using the same method.

D. Apply seed at 5 lbs. per 1000 square feet.

E. Cover seed to a depth of 1/8 inch by raking, harrowing or cultipacking.

F. Roll seeded area with roller weighing no more than 150 lbs. per foot of roller width.

G. Water seeded areas to a depth of four (4) inches.

3.3 MULCHING

A. Spread straw uniformly over seeded area with 75% ground coverage and at least 1 1/2 inches loose depth.

1. If, in the opinion of the Engineer, wind will disrupt the mulching, apply asphalt emulsion at a rate of 10 gallons per 1000 square feet.

B. Place mulching blanket in accordance with submitted manufacturer's recommendations.

3.4 HYDROSEEDING

A. Mix specified seed, fertilizer and pulverized mulch in water, using equipment specifically designed for hydroseed application. Continue mixing until uniformly blended into homogeneous slurry suitable for hydraulic application.

B. Apply slurry uniformly to all areas to be seeded. Rate of application as required to obtain specified seed sowing rate.

3.5 PROTECTION

A. Immediately after seeding and sodding, erect barricades and warnings to protect seeded areas from traffic until grass is established.

B. Repair or replace damaged landscape work as directed by Engineer.

3.6 MAINTENANCE

A. Begin maintenance immediately after seed placement.

B. Watering:

1. Keep soil moist during seed germination period.

2. Supplement rainfall to produce a total depth penetration of 2 inches per day after germination.

C. Mowing:

1. When grass reaches 4 inches in height, mow to 2-1/2 inches in height.

2. Maintain grass between 1-1/2 inches and 2-1/2 inches in height.

3. Do not cut off more than 40% of grass leaf in a single mowing.

D. Reseed and mulch spots larger than 1 square foot not having uniform coverage.

E. Maintain lawns by watering, fertilizing, weeding, mowing, trimming, and other operations such as rolling, re-gardening and replanting as required to establish a smooth, acceptable lawn, free of eroded or bare areas.

F. Maintain and protect all seeded areas until final acceptance of the Contract. Final acceptance of "Seeding" will not be made until an acceptable uniform stand of grass is obtained in all new lawn areas, except that the Engineer at his discretion may accept a portion or portions of the "Seeding" at various times. Upon acceptance by the Engineer of a seeded area, the Owner will immediately assume responsibility for maintenance and protection of that portion of the Contract Seeding.

END OF SECTION

SECTION 33000
CHAIN LINK FENCE AND GATES

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes the installation of chain link fence and gates, as shown on the Drawings and as specified herein.

B. All chain link fence and gates shall be thermally-bonded polyvinyl chloride (PVC), plastic resin finish over galvanized steel wire. Comply with ASTM F668, Class 2, not less than 10 mils (.010") thick. Color: Black.

1.2 QUALITY ASSURANCE

A. Comply with standards of the Chain Link Fence Manufacturer's Institute.

B. Provide steel fence and related gates as a complete system produced by a single manufacturer, including necessary erection accessories, fittings and fastenings.

C. Comply with ASTM A-120 for requirements of Schedule 40 piping.

D. Height of fence shall be measured from the top of concrete footing to the top of post.

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1.3 SUBMITTALS

A. Shop Drawings: Show application to project, include gates.

B. Product Data: Manufacturer's catalog cuts, with printed specifications, and installation instructions.

C. Samples: One sq. ft. minimum of fence fabric, and two of each size post tops and extension arms.

PART 2 - PRODUCTS

2.1 STEEL FRAME WORK

A. Nominal Framework Sizes shall be the following:

Fence Height	Line Posts	End, Corner & Pull Posts	Rails & Braces	Gate Frames	*Gate Posts	Concrete Foundation Dia.		Depth
						Diameters	Corner/End	
						Line Posts	Pull & Gate Posts	
8'	2"	2-1/2"	1-1/4"	1-1/2"	3-1/2"	12"	18"	4'

Schedule 40 S/L Pipe Table		
Nominal Size (In.)	Actual Outside Diameter (In.)	Weight *(lb/ft)
1	1.315	1.67
1-1/4	1.660	2.27
1-1/2	1.900	2.71
2	2.375	3.65
2-1/2	2.875	5.79
3	3.500	7.58
3-1/2	4.000	9.11

50,000 psi Hot Dipped Aluminized Steel Tubing		
Nominal Size (In.)	Actual Outside Diameter (In.)	Weight *(lb/ft)
1	1.315	
1-1/4	1.660	1.83
1-1/2	1.900	2.28
2	2.375	3.12
2-1/2	2.875	4.64
3	3.500	5.71
3-1/2	4.000	6.56

2.2 CHAIN LINK FABRIC

A. One-piece fabric widths.

B. Chain link, No.9 gauge, 2 inch mesh.

C. Selvages: Knuckled top and bottom.

D. Thermally-bonded polyvinyl chloride (PVC), plastic resin finish over galvanized steel wire. Comply with ASTM F668, Class 2, not less than 10 mils (.010") thick. Color: Black.

2.3 SWING GATE FRAMES

A. Assemble gate frames by welding or with special steel fittings and rivets for rigid connections, as shown on the Drawings or on Shop Drawings approved by the Engineer.

B. Thermally-bonded polyvinyl chloride (PVC), plastic resin finish over galvanized steel wire. Comply with ASTM F668, Class 2, not less than 10 mils (.010") thick. Color: Black.

2.4 GATE HARDWARE

A. Hinges: Non-lift-off type, offset to permit 180 degree swing, and of suitable size and weight to support gate. Provide 1-1/2 pair of hinges for each leaf over 6 feet high.

B. Latch: Provide plunger bar type complete with flush plate set in concrete for all double gates and single gates over 10 feet. Padlock eye shall be an integral part of latch construction.

C. Keeper for Vehicle Gates: Provide keeper which automatically engages the gate leaf and holds it in open position until manually released.

2.5 MISCELLANEOUS MATERIALS AND ACCESSORIES

A. Post Tops: Steel, wrought iron, or malleable iron, thermally-bonded polyvinyl chloride (PVC), plastic resin finish over galvanized steel wire. Comply with ASTM F668, Class 2, not less than 10 mils (.010") thick. Color: Black.

B. Stretcher Bars: One piece equal to full height of fabric, minimum cross-section 3/16 inch x 3/4 inch.

C. Metal Bands (for stretcher bars): Steel, wrought iron, or malleable iron, to secure stretcher bars to end, corner, pull and gate posts.

D. Wire Ties:

1. For tying fabric to line posts, rails and braces: 9 gauge steel wire.

2. For tying fabric to tension wire: 11 gauge steel hog rings.

E. Truss Rods: 3/8 inch diameter.

F. Tension Wire: 7 gauge coiled spring steel wire.

G. Angle Beams, I Beams and Steel Shapes: ASTM A-36.

H. Bolts and Nuts: ASTM A-307, Grade A.

2.6 FINISHES

A. Steel Framework:

1. Pipe: Galvanized in accordance with F1083, 1.8 oz. zinc per sq. ft.

2. Class "B" Steel Tubing: Exterior; 1.0 oz zinc per sq. ft. plus a coating of chromate and polyurethane. Interior; zinc rich organic coating.

3. Thermally-bonded polyvinyl chloride (PVC), plastic resin finish over galvanized steel wire. Comply with ASTM F668, Class 2, not less than 10 mils (.010") thick. Color: Black.

B. Fabric:

1. Thermally-bonded polyvinyl chloride (PVC), plastic resin finish over galvanized steel wire. Comply with ASTM F668, Class 2, not less than 10 mils (.010") thick. Color: Black.

C. Fence and Gate Hardware, Miscellaneous Materials, Accessories:

1. Wire Ties: Galvanized Finish, ASTM A-90 2.0 oz. zinc per sq. ft.

2. Hardware and Other Miscellaneous Items: Galvanized Finish, ASTM A-153 (Table 1).

3. Angle Beams, I Beams, and Steel Shapes: Galvanized in accordance with ASTM A-123, 2.0-ounce zinc per sq. ft.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate fence and gate installation with completion of finished grading including top-soiling, and paving.

3.2 INSTALLATION

A. Space posts equidistant in the fence line with a maximum of 10 feet on center.

B. Earth: Excavate holes as indicated for fence and gate posts. Set posts in center of hole and fill hole with concrete. Plumb and align posts. Vibrate or tamp concrete for consolidation. Finish concrete in a dome shape above ground to shed water. Do not attach fabric to posts until concrete has cured a minimum of 7 days.

C. Locate corner posts at corners and at changes in direction. Use pull posts at all abrupt changes in grade and at intervals no greater than 500 feet. On runs over 500 feet, space pull posts evenly between corner or end posts. On long curves, space pull posts so that the strain of the fence will not bend the line posts.

D. Install top rail continuously through post caps or extension arms, bending to radius for curved runs. Install expansion couplings as recommended by fencing manufacturers.

E. Install intermediate rails in one piece between posts and flush with post on fabric side using special offset fittings where necessary.

F. Diagonally brace corner posts, pull posts, and terminal posts to adjacent line posts with truss rods and turnbuckles.

G. Attach fabric to security side of fence. Maintain a 1 inch clearance above finished grade except when indicated otherwise. Thread stretcher bars through fabric using one bar for each gate and end post and two for each corner and pull post. Pull fabric tight so that the maximum deflection of fabric is 2 inches when a 30 pound pull is exerted perpendicular to the center of a panel. Maintain tension by securing stretcher bars to posts with metal bands spaced 15 inches oc. Fasten fabric to steel framework with wire ties spaced 12 inches on-center for line posts and 24 inches on center for rails and braces. Bend back wire ends to prevent injury. Tighten stretcher bar bands, wire ties, and other fasteners securely.

H. Position bolts for securing metal bands and hardware so nuts are located opposite the fabric side of fence. Tighten nuts and score excess threads.

1. Secure post tops, extension arms, and caps with one-way cadmium plated steel screws.

I. Install gates plumb and level and adjust for full opening without interference. Install ground-set items in concrete for anchorage, as recommended by fence manufacturer. Adjust hardware for smooth operation and lubricate where necessary.

J. Tension Wire: Support bottom edge of fabric with coil spring tension wire. Weave tension wire through fabric or fasten with hog rings spaced 24 inches on-center. Tie tension wire to posts with 9 gauge wire ties.

END OF SECTION

SECTION 34000
SHEET PILING

PART 1 – GENERAL

1.1 SUMMARY

A. This Section includes the installation of sheet piling, as shown on the Drawings and as specified herein.

B. All sheet piling shall meet the service requirements along the north boundary of the North Landfill. The sheet piling shall stand as a vertical barrier along the north property line, penetrating up to two feet into the peat/clay layer approximately 10 feet below ground surface. The north-facing surface of the sheet pile wall shall be used to anchor the landfill cap geomembrane. The top edge of the sheet pile wall shall provide anchorage for the new chain- link fence surrounding the landfill cap.

1.2 QUALITY ASSURANCE

A. Provide sheet piling as a complete system produced by a single manufacturer, including necessary erection accessories, fittings, and fastenings.

B. Installer's Qualifications: The firm performing the Work of this Section shall have been regularly engaged in pile work for a period of not less than 5 years and shall be properly equipped to execute the Work. If directed by the Engineer, furnish a list of projects of a similar type and magnitude executed by the firm.

C. Welders' Qualifications: Any welding/seaming shall be performed only by welders who have been qualified the manufacturer.

D. Driving Equipment: Driving equipment shall match the selected sheet piling system and conform to the sheet piling manufacturer's specifications.

.

1.3 SUBMITTALS

A. Shop Drawings: Contractor shall submit sheet piling system including sheet pile material, accessories, and sizing along with engineering calculations to indicate adequacy of sheet piling system for the application.

B. Product Data: Manufacturer's catalog cuts, with printed specifications, and installation instructions.

C. Samples: One sq. ft. minimum of sheet pile section if requested by Engineer.

PART 2 - PRODUCTS

2.1 SHEET PILES

A. PVC/Synthetic Piles: Size and weight to meet the service requirements as shown on the Drawings and in this specification.

B. PVC/ Synthetic Pile Systems:

1. Crane Materials International
   Shoreguard Synthetic Sheet Piling
   Section SG-325

2. Engineer-Approved Equal

C. Splices: Splices are not allowed.

D. Vertical sheet pile edges to incorporate a locking joint to resist separation and decrease seepage.

E. A complete PVC/synthetic sheet pile system shall be installed.

PART 3 - EXECUTION

3.1 PREPARATION

A. Coordinate sheet pile system installation with completion of finished grading including landfill cap termination, top-soiling, and fencing.

B. Verification of Conditions: Verify that site conditions will support driving equipment.

C. Notify the Engineer of intent to drive piles at least 5 working days before scheduled start of pile driving.

D. Do not drive piles until excavation work in that area has been completed down to the finish elevation of the top of the pile.

E. Provide temporary site improvement, such as grillage, as necessary to protect property and safely perform the Work.

F. Fit and install any pile points as shown or in accordance with the reinforcing tip manufacturer's recommendations.

G. Measure piles and mark them with white paint. Indicate the overall length near top of pile. Mark the entire pile length at intervals as required by driving conditions or as directed. Measure and place graduated lines at closer intervals near top of pile

3.2 INSTALLATION

A. Drive each pile continuously from the time it is started until it is completed unless unusual occurrences are encountered during driving.

B. Avoid damaging piles by over driving. Contractor shall furnish manufacturer's driving mandrel.

C. If piles are forced up by the driving of adjacent piles, or by any other cause, drive them down again as directed and without additional cost to the Owner. Contractor to furnish sufficient pile length to meet required finish elevation if adjacent pile installation causes prior pile to drift downward.

D. Obstructions: If obstructions are encountered in the driving operation which cannot be displaced, break up or remove the obstructions to permit the unobstructed passage of the pile. If necessary, partially withdraw such a pile or remove it entirely as necessary to clear the obstruction and protect the pile from damage.

E. Splices: Splices are not allowed.

F. Cutting Off of Piles: Cut off top of piles at an elevation as shown on the drawings. Make the cut perpendicular to the longitudinal axis of the pile unless otherwise directed by Engineer. Cut off piles to provide uniform edge for geomembrane anchorage.

G. Tolerances:

1. Variation From Plan Location: Center of pile at cutoff elevation shall be not more than 3 inches from its designed position.

2. Variation From Vertical: Pile shall be not more than 2 degrees from the vertical.

3. Variation From Cutoff Elevation: Top of pile shall be not more than 2 inches from its designed cutoff elevation.

3.3 FIELD QUALITY CONTROL

A. Driving Records: Obtain and record the data on the Driving Records and submit to Engineer.

3.4 REMOVING MATERIALS

A. Remove from site property cutoff lengths of piles and excess piles.

END OF SECTION

APPENDIX G

SEPTEMBER 26, 2013 LANDFILL GAS DESIGN SUPPORT MEMO

TETRA TECH

MEMO

To:	*"CLIENT"*
Cc:	Mr. Mike Noel
From:	Mr. Caleb H. Moore, P.E.
Date:	September 30, 2013
Subject:	LANDFILL GAS DESIGN SUPPORT FOR THE COOPER CROUSE-HINDS I FACILITY

The final cover system and the above-referenced facility includes the following layers from top to bottom:

- 6-inch thick topsoil
- 12-inch thick select fill
- Geocomposite – subdrain layer
- Geomembrane
- Geocomposite – landfill gas venting layer
- Prepared subgrade

In 1989, disposal was halted. Therefore per Subtitle D (Title 40 of the Code of Federal Regulations (40 CFR), section 258.1(c)), prescriptive design requirements in New York's regulations do not apply to the final cover. The focus of this memorandum is to ensure that the site has adequate landfill gas controls.

1.0 LANDFILL GAS GENERATION

1.1 GAS GENERATION PARAMETERS

A calculation to estimate the gas generation flow rate was required to be performed to determine adequancy of the proposed gas collection and control system at the Cooper Crouse-Hinds Landfill (CC-H). This calculation requires that the sites' past waste acceptance rate and content be known. For this analysis the waste accepted by the CC-H was estimated and is shown in Table 1. To calculate the maximum gas flow rate the following equation was used (40 CFR §60.754):

$$Q_M = \sum_{i=1}^{n} 2kL_o M_i (e^{-kt} i)$$

Where: Q_m = maximum expected gas generation flow rate, cubic meters per year

k = methane generation rate constant, year $^{-1}$

M_i = mass of solid waste in the ith section, megagrams

L_o = methane generation potential, cubic meters per megagram of solid waste

t_i = age of the ith section, years

Model, e.g., LandGEM v302, input parameters were adjusted to reflect the presumed moisture content and varying rates of decomposition associated with different fractions of the waste stream. A landfill gas generation

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curve will be the result of this modeling with a correlating peak methane generation rate for the landfill by year, that will peak in 2027 and decline in production thereafter.

1.1.1 Methane Generation Potential

In the landfill gas generation equation, the methane generation potential is represented by the variable L_o. This value represents the theoretical maximum yield (expected volume of gas per unit mass of refuse). Determining the maximum theoretical yield of a unit mass of municipal solid waste can be complex. One of two methods can be used: 1) stoichiometry, or 2) biodegradability. Both methods require extensive sampling, time consuming lab analysis, and difficult analytical procedures. Both methods rely extensively on a characteristic sample of the waste stream.

For the CC-H, which accepted municipal solid waste from 1960 to 1972, a conservative organic material content in the range of 60% to 70% by weight was assumed. This range of organic material content was estimated to correlate with a methane generation potential of 114 m^3/Mg.

36,900 cubic yards of wetland sediments will be placed in the landfill during construction. The wetland sediments were assumed to have an organic material content in the range of 12 to 20 percent. This range of organic material content was estimated to not have a significant contribution to methane generation potential.

1.1.2 Methane Generation Rate Constant

The Clean Air Act recommends the use of a k value of 0.05/year for conventional landfills receiving more than 25 inches of rainfall per year. However, the CC-H also accepted an undetermined amount of sludge which would add moisture to the waste mass and accelerate decomposition. A k value of 0.10 per year represents a wetter than normal waste mass. See Appendix A for input and LFG generation spreadsheets.

Modeling was conducted to determine the methane generation rate, expressed in cubic feet of 100% CH4 generated. The model also calculated CH4 generated at a concentration of 50% methane by volume. Based on the age and composition of the waste in place, a relatively small amount of LFG was predicted to be generated in 2013 (38 standard cubic feet per minute for the South Cell of CC-H).

2.0 GAS COLLECTION AND CONTROL SYSTEM (GCCS) EVALUATION

The CC-H's GCCS consists of horizontal collectors with vent risers through the engineered final cover. These collectors are connected through perforated lateral pipes to a riser pipe at the ridge of the landfill which allows LFG to vent to the atmosphere. The capacity of the GCCS to vent LFG is limited to some degree because it is a passive system; therefore, a pressure gradient is required to move LFG to the collectors. For a passive system the pressure gradient consists of the difference between the positive pressure generated inside the landfill and atmospheric pressure outside the landfill. For this analysis it was assumed that a relatively small internal pressure of 4 inches water column was generated inside the landfill.

The critical parameters impacting the GCCS's performance are the collector spacing and the transmissivity of the geocomposite material used to convey LFG to the collector trenches. A collector spacing calculation indicated that a collector trench spacing of 200 feet is sufficient to collect the LFG generated (see Appendix B). Gas lateral vents should be placed along the ridge of the landfill (high point).

The CC-H's final cover section will include a geomembrane and a 250-mil geonet with 8-oz geotextile on both sides. This geonet has a hydraulic conductivity of 30 cm/s (with no reduction factors applied).

The correlation between air permeability and hydraulic conductivity is as follows:

$$Ka = Kw\left(\frac{\rho_a * \mu_w}{\rho_w * \mu_a}\right)$$

Where Ka = air permeability

Kw = hydraulic conductivity

μ_w = viscosity of water 10,000 μP @ 68 deg F

μ_m = viscosity of air 183 μP @ 68 deg F

ρ_m = density of air 0.0012

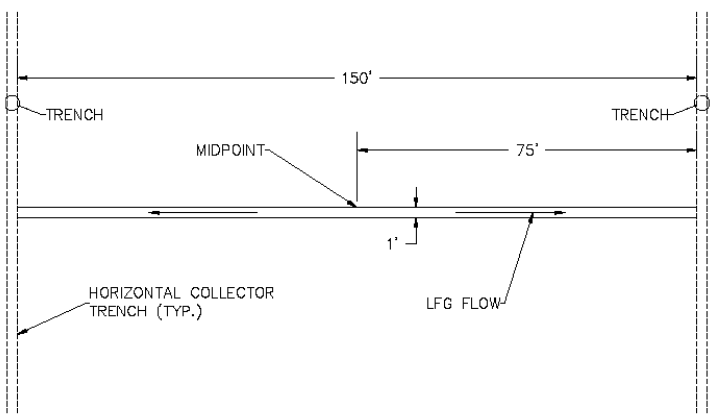
ρ_w = density of water 1.0

Ka = Kw [(0.0012/1)*(10,000/183)]

Ka = Kw * 0.0656

A literature value for hydraulic conductivity of the geonet is Kw = 30 cm/sec

Ka = 30 cm/sec * 0.0656 = 1.968 cm/sec, 0.0646 ft/sec.



The minimum area of the geonet is 3.06 in^2 per foot of width (.255 in x 12 in). Use Darcy's equation to determine air flow.

$$Q = kiA$$

Where k = 0.0646 ft/sec.

i = 4" water column or 0.333 feet per 75 feet = 0.0044 gradient

A = 3.06 in^2 or 0.0213 ft^2

Q = 6.054 x 10^{-6} ft^3/sec. per ft^2 of geocomposite

The south cell has an area of 10.02 acres or 436,712 sf. The LandGEM LFG flow is 38 ft^3/min or 0.633 ft^3/sec. The Q per ft^2 of geocomposite, assuming that the LFG is uniformly distributed is 0.633 ft^3/sec/436,712 ft^2 = 1.45 x 10^{-6} ft^3/sec. per ft^2.

The allowable flow (Q) in the geocomposite is four (4) times greater than the calculated peak LFG flow; therefore, the design is adequate to convey LFG and to protect the overlying membrane cover from uplift. Note that the LFG flow will continue to decline over time, making this design even more conservative.

3.0 CONCLUSION

The proposed passive venting system is adequate to vent gases generated from the existing waste and wetland sediments, which will be placed during construction.

The proposed passive venting system using a geocomposite is anticipated to function equivalent to or better than a 6-inch thick sand layer. The geocomposite layer has a hydraulic conductivity of 30 cm/s, whereas sand has a hydraulic conductivity on the order of magnitude of 10^{-4} cm/s. The airflow through a 6-inch thick sand layer would be on the order of magnitude of 10^{-9} to 10^{-10} ft^3/ft^2, which is significantly less than the flow of gas through a geocomposite, which was estimated at 6.054 x 10 -6 ft^3/ft^2 of geocomposite.

The passive venting system would be need to remain installed for the life of the cover to allow any landfill gas generated within the waste mass to vent without disturbing the geomembrane final cover, which is considered impermeable to landfill gas.

USER INPUTS

Landfill Name or Identifier: Cooper Crouse-Hinds Landfill - New York

Clear ALL Non-Parameter Inputs/Selections

1: PROVIDE LANDFILL CHARACTERISTICS

Landfill Open Year	1960	Landfill Closure Year entered is not used by the model unless 'Have Model Calculate Closure Year?' option is No.
Landfill Closure Year	1987	
Have Model Calculate Closure Year?	Yes / No	
Waste Design Capacity	1,742,040	*short tons*

Restore Default Model Parameters

2: DETERMINE MODEL PARAMETERS

Methane Generation Rate, k (*year*$^{-1}$)
User-specified

User-specified k value should be based on site-specific data and determined by EPA Method 2E.
User-specified value: 0.100

Potential Methane Generation Capacity, L_o (*m^3/Mg*)
User-specified

User-specified Lo value should be based on site-specific data and determined by waste type and composition.
User-specified value: 114

NMOC Concentration (*ppmv as hexane*)
CAA - 4,000

Methane Content (*% by volume*)
CAA - 50% by volume

3: SELECT GASES/POLLUTANTS

Default pollutant parameters are currently being used by model.

Gas / Pollutant #1
Total landfill gas

Gas / Pollutant #2
Methane

Gas / Pollutant #3
Carbon dioxide

Gas / Pollutant #4
NMOC

Edit Existing or Add New Pollutant Parameters

Restore Default Pollutant Parameters

Description/Comments:

The Cooper Crouse-Hinds Landfill accepted zinc hydroxide sludge from a wastewater treatment facility. However, no records exist regarding the quantity of sludge accepted. Because the LandGEM model typically overpredicts LFG flows and because the quantity of sludge accepted is not well knows, the input model paramenters do not reflect sludge acceptance.

Appendix A

RESULTS

Landfill Name or Identifier: Cooper Crouse-Hinds Landfill - New York

Closure Year (with 80-year limit) = 1987

Methane = 50 *% by volume*

Please choose a third unit of measure to represent all of the emission rates below.

User-specified Unit: *av ft^3/min*

Year	Waste Accepted		Waste-In-Place		Total landfill gas			Methane			Carbon dioxide			NMOC		
	(Mg/year)	*(short tons/year)*	*(Mg)*	*(short tons)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*	*(Mg/year)*	*(m^3/year)*	*(av ft^3/min)*
1960	102,109	112,320	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1961	102,109	112,320	102,109	112,320	2.781E+03	2.227E+06	1.496E+02	7.427E+02	1.113E+06	7.480E+01	2.038E+03	1.113E+06	7.480E+01	3.192E+01	8.906E+03	5.984E-01
1962	102,109	112,320	204,218	224,640	5.297E+03	4.241E+06	2.850E+02	1.415E+03	2.121E+06	1.425E+02	3.882E+03	2.121E+06	1.425E+02	6.081E+01	1.696E+04	1.140E+00
1963	102,109	112,320	306,327	336,960	7.573E+03	6.064E+06	4.075E+02	2.023E+03	3.032E+06	2.037E+02	5.550E+03	3.032E+06	2.037E+02	8.695E+01	2.426E+04	1.630E+00
1964	102,109	112,320	408,436	449,280	9.633E+03	7.714E+06	5.183E+02	2.573E+03	3.857E+06	2.591E+02	7.060E+03	3.857E+06	2.591E+02	1.106E+02	3.085E+04	2.073E+00
1965	102,109	112,320	510,545	561,600	1.150E+04	9.206E+06	6.186E+02	3.071E+03	4.603E+06	3.093E+02	8.426E+03	4.603E+06	3.093E+02	1.320E+02	3.682E+04	2.474E+00
1966	102,109	112,320	612,655	673,920	1.318E+04	1.056E+07	7.093E+02	3.521E+03	5.278E+06	3.547E+02	9.662E+03	5.278E+06	3.547E+02	1.514E+02	4.223E+04	2.837E+00
1967	102,109	112,320	714,764	786,240	1.471E+04	1.178E+07	7.914E+02	3.929E+03	5.889E+06	3.957E+02	1.078E+04	5.889E+06	3.957E+02	1.689E+02	4.711E+04	3.166E+00
1968	102,109	112,320	816,873	898,560	1.609E+04	1.288E+07	8.657E+02	4.298E+03	6.442E+06	4.328E+02	1.179E+04	6.442E+06	4.328E+02	1.847E+02	5.154E+04	3.463E+00
1969	102,109	112,320	918,982	1,010,880	1.734E+04	1.388E+07	9.329E+02	4.632E+03	6.942E+06	4.665E+02	1.271E+04	6.942E+06	4.665E+02	1.991E+02	5.554E+04	3.732E+00
1970	102,109	112,320	1,021,091	1,123,200	1.847E+04	1.479E+07	9.937E+02	4.934E+03	7.395E+06	4.969E+02	1.354E+04	7.395E+06	4.969E+02	2.121E+02	5.916E+04	3.975E+00
1971	102,109	112,320	1,123,200	1,235,520	1.949E+04	1.561E+07	1.049E+03	5.207E+03	7.805E+06	5.244E+02	1.429E+04	7.805E+06	5.244E+02	2.238E+02	6.244E+04	4.195E+00
1972	30,461	33,507	1,225,309	1,347,840	2.042E+04	1.635E+07	1.099E+03	5.454E+03	8.175E+06	5.493E+02	1.496E+04	8.175E+06	5.493E+02	2.344E+02	6.540E+04	4.394E+00
1973	30,461	33,507	1,255,770	1,381,347	1.931E+04	1.546E+07	1.039E+03	5.157E+03	7.729E+06	5.193E+02	1.415E+04	7.729E+06	5.193E+02	2.216E+02	6.183E+04	4.155E+00
1974	30,461	33,507	1,286,231	1,414,854	1.830E+04	1.465E+07	9.844E+02	4.887E+03	7.326E+06	4.922E+02	1.341E+04	7.326E+06	4.922E+02	2.101E+02	5.861E+04	3.938E+00
1975	30,461	33,507	1,316,692	1,448,361	1.739E+04	1.392E+07	9.354E+02	4.644E+03	6.961E+06	4.677E+02	1.274E+04	6.961E+06	4.677E+02	1.996E+02	5.569E+04	3.742E+00
1976	30,461	33,507	1,347,153	1,481,868	1.656E+04	1.326E+07	8.910E+02	4.424E+03	6.631E+06	4.455E+02	1.214E+04	6.631E+06	4.455E+02	1.901E+02	5.304E+04	3.564E+00
1977	30,461	33,507	1,377,614	1,515,375	1.581E+04	1.266E+07	8.508E+02	4.224E+03	6.332E+06	4.254E+02	1.159E+04	6.332E+06	4.254E+02	1.816E+02	5.065E+04	3.403E+00
1978	30,461	33,507	1,408,075	1,548,882	1.514E+04	1.212E+07	8.145E+02	4.044E+03	6.061E+06	4.073E+02	1.110E+04	6.061E+06	4.073E+02	1.738E+02	4.849E+04	3.258E+00
1979	30,461	33,507	1,438,535	1,582,389	1.453E+04	1.163E+07	7.816E+02	3.880E+03	5.817E+06	3.908E+02	1.065E+04	5.817E+06	3.908E+02	1.668E+02	4.653E+04	3.127E+00
1980	14,335	15,768	1,468,996	1,615,896	1.397E+04	1.119E+07	7.519E+02	3.733E+03	5.595E+06	3.759E+02	1.024E+04	5.595E+06	3.759E+02	1.604E+02	4.476E+04	3.007E+00
1981	14,335	15,768	1,483,331	1,631,664	1.304E+04	1.044E+07	7.013E+02	3.482E+03	5.219E+06	3.507E+02	9.553E+03	5.219E+06	3.507E+02	1.497E+02	4.175E+04	2.805E+00
1982	14,335	15,768	1,497,665	1,647,432	1.219E+04	9.757E+06	6.556E+02	3.255E+03	4.879E+06	3.278E+02	8.930E+03	4.879E+06	3.278E+02	1.399E+02	3.903E+04	2.622E+00
1983	14,335	15,768	1,512,000	1,663,200	1.142E+04	9.141E+06	6.142E+02	3.049E+03	4.571E+06	3.071E+02	8.367E+03	4.571E+06	3.071E+02	1.311E+02	3.657E+04	2.457E+00
1984	14,335	15,768	1,526,335	1,678,968	1.072E+04	8.584E+06	5.768E+02	2.863E+03	4.292E+06	2.884E+02	7.856E+03	4.292E+06	2.884E+02	1.231E+02	3.434E+04	2.307E+00
1985	14,335	15,768	1,540,669	1,694,736	1.009E+04	8.080E+06	5.429E+02	2.695E+03	4.040E+06	2.714E+02	7.395E+03	4.040E+06	2.714E+02	1.158E+02	3.232E+04	2.171E+00
1986	14,335	15,768	1,555,004	1,710,504	9.520E+03	7.623E+06	5.122E+02	2.543E+03	3.812E+06	2.561E+02	6.977E+03	3.812E+06	2.561E+02	1.093E+02	3.049E+04	2.049E+00
1987	14,335	15,768	1,569,338	1,726,272	9.005E+03	7.210E+06	4.845E+02	2.405E+03	3.605E+06	2.422E+02	6.599E+03	3.605E+06	2.422E+02	1.034E+02	2.884E+04	1.938E+00
1988	0	0	1,583,673	1,742,040	8.538E+03	6.837E+06	4.594E+02	2.281E+03	3.418E+06	2.297E+02	6.257E+03	3.418E+06	2.297E+02	9.803E+01	2.735E+04	1.837E+00
1989	0	0	1,583,673	1,742,040	7.726E+03	6.186E+06	4.157E+02	2.064E+03	3.093E+06	2.078E+02	5.662E+03	3.093E+06	2.078E+02	8.870E+01	2.475E+04	1.663E+00
1990	0	0	1,583,673	1,742,040	6.990E+03	5.598E+06	3.761E+02	1.867E+03	2.799E+06	1.880E+02	5.123E+03	2.799E+06	1.880E+02	8.026E+01	2.239E+04	1.504E+00
1991	0	0	1,583,673	1,742,040	6.325E+03	5.065E+06	3.403E+02	1.690E+03	2.532E+06	1.702E+02	4.636E+03	2.532E+06	1.702E+02	7.262E+01	2.026E+04	1.361E+00
1992	0	0	1,583,673	1,742,040	5.723E+03	4.583E+06	3.079E+02	1.529E+03	2.291E+06	1.540E+02	4.194E+03	2.291E+06	1.540E+02	6.571E+01	1.833E+04	1.232E+00
1993	0	0	1,583,673	1,742,040	5.179E+03	4.147E+06	2.786E+02	1.383E+03	2.073E+06	1.393E+02	3.795E+03	2.073E+06	1.393E+02	5.946E+01	1.659E+04	1.114E+00
1994	0	0	1,583,673	1,742,040	4.686E+03	3.752E+06	2.521E+02	1.252E+03	1.876E+06	1.261E+02	3.434E+03	1.876E+06	1.261E+02	5.380E+01	1.501E+04	1.008E+00
1995	0	0	1,583,673	1,742,040	4.240E+03	3.395E+06	2.281E+02	1.133E+03	1.698E+06	1.141E+02	3.107E+03	1.698E+06	1.141E+02	4.868E+01	1.358E+04	9.125E-01
1996	0	0	1,583,673	1,742,040	3.836E+03	3.072E+06	2.064E+02	1.025E+03	1.536E+06	1.032E+02	2.812E+03	1.536E+06	1.032E+02	4.405E+01	1.229E+04	8.256E-01
1997	0	0	1,583,673	1,742,040	3.471E+03	2.780E+06	1.868E+02	9.272E+02	1.390E+06	9.338E+01	2.544E+03	1.390E+06	9.338E+01	3.985E+01	1.112E+04	7.471E-01
1998	0	0	1,583,673	1,742,040	3.141E+03	2.515E+06	1.690E+02	8.390E+02	1.258E+06	8.450E+01	2.302E+03	1.258E+06	8.450E+01	3.606E+01	1.006E+04	6.760E-01
1999	0	0	1,583,673	1,742,040	2.842E+03	2.276E+06	1.529E+02	7.591E+02	1.138E+06	7.646E+01	2.083E+03	1.138E+06	7.646E+01	3.263E+01	9.103E+03	6.116E-01
2000	0	0	1,583,673	1,742,040	2.572E+03	2.059E+06	1.384E+02	6.869E+02	1.030E+06	6.918E+01	1.885E+03	1.030E+06	6.918E+01	2.952E+01	8.237E+03	5.534E-01
2001	0	0	1,583,673	1,742,040	2.327E+03	1.863E+06	1.252E+02	6.215E+02	9.316E+05	6.260E+01	1.705E+03	9.316E+05	6.260E+01	2.672E+01	7.453E+03	5.008E-01
2002	0	0	1,583,673	1,742,040	2.105E+03	1.686E+06	1.133E+02	5.624E+02	8.430E+05	5.664E+01	1.543E+03	8.430E+05	5.664E+01	2.417E+01	6.744E+03	4.531E-01
2003	0	0	1,583,673	1,742,040	1.905E+03	1.526E+06	1.025E+02	5.089E+02	7.628E+05	5.125E+01	1.396E+03	7.628E+05	5.125E+01	2.187E+01	6.102E+03	4.100E-01
2004	0	0	1,583,673	1,742,040	1.724E+03	1.380E+06	9.274E+01	4.604E+02	6.902E+05	4.637E+01	1.263E+03	6.902E+05	4.637E+01	1.979E+01	5.521E+03	3.710E-01
2005	0	0	1,583,673	1,742,040	1.560E+03	1.249E+06	8.392E+01	4.166E+02	6.245E+05	4.196E+01	1.143E+03	6.245E+05	4.196E+01	1.791E+01	4.996E+03	3.357E-01
2006	0	0	1,583,673	1,742,040	1.411E+03	1.130E+06	7.593E+01	3.770E+02	5.651E+05	3.797E+01	1.034E+03	5.651E+05	3.797E+01	1.620E+01	4.521E+03	3.037E-01
2007	0	0	1,583,673	1,742,040	1.277E+03	1.023E+06	6.871E+01	3.411E+02	5.113E+05	3.435E+01	9.359E+02	5.113E+05	3.435E+01	1.466E+01	4.090E+03	2.748E-01
2008	0	0	1,583,673	1,742,040	1.155E+03	9.253E+05	6.217E+01	3.086E+02	4.626E+05	3.108E+01	8.469E+02	4.626E+05	3.108E+01	1.327E+01	3.701E+03	2.487E-01
2009	0	0	1,583,673	1,742,040	1.046E+03	8.372E+05	5.625E+01	2.793E+02	4.186E+05	2.813E+01	7.663E+02	4.186E+05	2.813E+01	1.200E+01	3.349E+03	2.250E-01
2010	0	0	1,583,673	1,742,040	9.460E+02	7.575E+05	5.090E+01	2.527E+02	3.788E+05	2.545E+01	6.933E+02	3.788E+05	2.545E+01	1.086E+01	3.030E+03	2.036E-01
2011	0	0	1,583,673	1,742,040	8.560E+02	6.855E+05	4.606E+01	2.287E+02	3.427E+05	2.303E+01	6.274E+02	3.427E+05	2.303E+01	9.828E+00	2.742E+03	1.842E-01
2012	0	0	1,583,673	1,742,040	7.746E+02	6.202E+05	4.167E+01	2.069E+02	3.101E+05	2.084E+01	5.677E+02	3.101E+05	2.084E+01	8.893E+00	2.481E+03	1.667E-01
2013	0	0	1,583,673	1,742,040	7.008E+02	5.612E+05	3.771E+01	1.872E+02	2.806E+05	1.885E+01	5.136E+02	2.806E+05	1.885E+01	8.046E+00	2.245E+03	1.508E-01
2014	0	0	1,583,673	1,742,040	6.342E+02	5.078E+05	3.412E+01	1.694E+02	2.539E+05	1.706E+01	4.648E+02	2.539E+05	1.706E+01	7.281E+00	2.031E+03	1.365E-01
2015	0	0	1,583,673	1,742,040	5.738E+02	4.595E+05	3.087E+01	1.533E+02	2.297E+05	1.544E+01	4.205E+02	2.297E+05	1.544E+01	6.588E+00	1.838E+03	1.235E-01
2016	0	0	1,583,673	1,742,040	5.192E+02	4.158E+05	2.793E+01	1.387E+02	2.079E+05	1.397E+01	3.805E+02	2.079E+05	1.397E+01	5.961E+00	1.663E+03	1.117E-01
2017	0	0	1,583,673	1,742,040	4.698E+02	3.762E+05	2.528E+01	1.255E+02	1.881E+05	1.264E+01	3.443E+02	1.881E+05	1.264E+01	5.394E+00	1.505E+03	1.011E-01
2018	0	0	1,583,673	1,742,040	4.251E+02	3.404E+05	2.287E+01	1.135E+02	1.702E+05	1.144E+01	3.115E+02	1.702E+05	1.144E+01	4.880E+00	1.362E+03	9.148E-02
2019	0	0	1,583,673	1,742,040	3.846E+02	3.080E+05	2.069E+01	1.027E+02	1.540E+05	1.035E+01	2.819E+02	1.540E+05	1.035E+01	4.416E+00	1.232E+03	8.278E-02
2020	0	0	1,583,673	1,742,040	3.480E+02	2.787E+05	1.872E+01	9.296E+01	1.393E+05	9.362E+00	2.551E+02	1.393E+05	9.362E+00	3.996E+00	1.115E+03	7.490E-02
2021	0	0	1,583,673	1,742,040	3.149E+02	2.522E+05	1.694E+01	8.412E+01	1.261E+05	8.471E+00	2.308E+02	1.261E+05	8.471E+00	3.616E+00	1.009E+03	6.777E-02
2022	0	0	1,583,673	1,742,040	2.849E+02	2.282E+05	1.533E+01	7.611E+01	1.141E+05	7.665E+00	2.088E+02	1.141E+05	7.665E+00	3.271E+00	9.127E+02	6.132E-02
2023	0	0	1,583,673	1,742,040	2.578E+02	2.065E+05	1.387E+01	6.887E+01	1.032E+05	6.936E+00	1.890E+02	1.032E+05	6.936E+00	2.960E+00	8.258E+02	5.549E-02
2024	0	0	1,583,673	1,742,040	2.333E+02	1.868E+05	1.255E+01	6.231E+01	9.340E+04	6.276E+00	1.710E+02	9.340E+04	6.276E+00	2.678E+00	7.472E+02	5.021E-02
2025	0	0	1,583,673	1,742,040	2.111E+02	1.690E+05	1.136E+01	5.638E+01	8.452E+04	5.679E+00	1.547E+02	8.452E+04	5.679E+00	2.424E+00	6.761E+02	4.543E-02
2026	0	0	1,583,673	1,742,040	1.910E+02	1.529E+05	1.028E+01	5.102E+01	7.647E+04	5.138E+00	1.400E+02	7.647E+04	5.138E+00	2.193E+00	6.118E+02	4.111E-02
2027	0	0	1,583,673	1,742,040	1.728E+02	1.384E+05	9.298E+00	4.616E+01	6.920E+04	4.649E+00	1.267E+02	6.920E+04	4.649E+00	1.984E+00	5.536E+02	3.719E-02
2028	0	0	1,583,673	1,742,040	1.564E+02	1.252E+05	8.414E+00	4.177E+01	6.261E+04	4.207E+00	1.146E+02	6.261E+04	4.207E+00	1.795E+00	5.009E+02	3.365E-02
2029	0	0	1,583,673	1,742,040	1.415E+02	1.133E+05	7.613E+00	3.780E+01	5.665E+04	3.806E+00	1.037E+02	5.665E+04	3.806E+00	1.625E+00	4.532E+02	3.045E-02
2030	0	0	1,583,673	1,742,040	1.280E+02	1.025E+05	6.888E+00	3.420E+01	5.126E+04	3.444E+00	9.383E+01	5.126E+04	3.444E+00	1.470E+00	4.101E+02	2.755E-02
2031	0	0	1,583,673	1,742,040	1.158E+02	9.277E+04	6.233E+00	3.094E+01	4.638E+04	3.116E+00	8.490E+01	4.638E+04	3.116E+00	1.330E+00	3.711E+02	2.493E-02
2032	0	0	1,583,673	1,742,040	1.048E+02	8.394E+04	5.640E+00	2.800E+01	4.197E+04	2.820E+00	7.682E+01	4.197E+04	2.820E+00	1.204E+00	3.358E+02	2.256E-02
2033	0	0	1,583,673	1,742,040	9.485E+01	7.595E+04	5.103E+00	2.534E+01	3.798E+04	2.552E+00	6.951E+01	3.798E+04	2.552E+00	1.089E+00	3.038E+02	2.041E-02
2034	0	0	1,583,673	1,742,040	8.582E+01	6.872E+04	4.617E+00	2.292E+01	3.436E+04	2.309E+00	6.290E+01	3.436E+04	2.309E+00	9.853E-01	2.749E+02	1.847E-02
2035	0	0	1,583,673	1,742,040	7.766E+01	6.218E+04	4.178E+00	2.074E+01	3.109E+04	2.089E+00	5.691E+01	3.109E+04	2.089E+00	8.916E-01	2.487E+02	1.671E-02
2036	0	0	1,583,673	1,742,040	7.027E+01	5.627E+04	3.780E+00	1.877E+01	2.813E+04	1.890E+00	5.150E+01	2.813E+04	1.890E+00	8.067E-01	2.251E+02	1.512E-02
2037	0	0	1,583,673	1,742,040	6.358E+01	5.091E+04	3.421E+00	1.698E+01	2.546E+04	1.710E+00	4.660E+01	2.546E+04	1.710E+00	7.300E-01	2.036E+02	1.368E-02
2038	0	0	1,583,673	1,742,040	5.753E+01	4.607E+04	3.095E+00	1.537E+01	2.303E+04	1.548E+00	4.216E+01	2.303E+04	1.548E+00	6.605E-01	1.843E+02	1.238E-02

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SKAPS TRANSNET™ (TN)
HDPE GEOCOMPOSITE 270

SKAPS TRANSNET™ geocomposite consists of SKAPS GeoNet made from HDPE resin with non-woven polypropylene geotextile fabric heat bonded on both sides of the the geonet.

Property	Test Method	Unit	Required Value		Qualifier
			With 6 oz.	With 8 oz.	
Geonet					
Thickness	ASTM D 5199	mil.	270±15	270±15	Range
Carbon Black	ASTM D 4218	%	2 to 3	2 to 3	Range
Tensile Strength	ASTM D 5035	lb/in	75	75	Minimum
Melt Flow	ASTM D 1238[3]	g/10 min.	1	1	Minimum
Density	ASTM D 1505	g/cm^3	0.94	0.94	Minimum
Transmissivity[1]	ASTM D 4716	$m^2/sec.$	$3x10^{-3}$	$3x10^{-3}$	MARV[2]
Composite					
Ply Adhesion (Minimum)	ASTM D7005	lb/in	0.5	0.5	MARV
Ply Adhesion (Average)	ASTM D7005	lb/in	1	1	MARV
Transmissivity[1]	ASTM D 4716	m^2/sec	$5x10^{-4}$	$5x10^{-4}$	MARV
Geotextile					
Fabric Weight	ASTM D 5261	oz/yd^2	6	8	MARV
Grab Strength	ASTM D 4632	lbs	160	225	MARV
Grab Elongation	ASTM D 4632	%	50	50	MARV
Tear Strength	ASTM D 4533	lbs	65	90	MARV
Puncture Resistance	ASTM D 4833	lbs	95	130	MARV
CBR Puncture	ASTM D 6241	lbs	475	650	MARV
Water Flow Rate	ASTM D 4491	gpm/ft^2	125	100	MARV
Permittivity	ASTM D 4491	sec^{-1}	1.63	1.26	MARV
Permeability	ASTM D 4491	cm/sec	0.3	0.3	MARV
AOS	ASTM D 4751	US Sieve	70	80	MARV

.255" MIN.

.007"

Notes:

1. Transmissivity measured using water at 21 ± 2ºC (70 ± 4ºF) with a gradient of 0.1 and a confining pressure of 10000 psf between stainless steel plates after 15 minutes. Values may vary between individual labs.
2. MARV is statistically defined as mean minus two standard deviations and it is the value which is exceeded by 97.5% of all the test data.
3. Condition 190/2.16

This information is provided for reference purposes only and is not intended as a warranty or guarantee. SKAPS assumes no liability in connection with the use of this information.

$$\phi_a \cdot \frac{\partial}{\partial t}\left\{\frac{p(MW)}{RT}\right\} = \nabla\left\{\frac{\rho_a K_a}{\mu_a} \cdot \nabla p\right\}. \tag{3.4}$$

This equation is nonlinear because the air density, ρ_a, in the right-hand side of the equation is a function of pressure.

3.2.1.2 Soil Air Permeability

Air permeability describes how easily vapors flow through the soil pore space. Since the airflow and the air permeability are linearly dependent, a higher air permeability will result in a higher flow rate at the same vacuum. There are numerous methods that could be employed for the determination of air permeability.[2] The methods are listed below.

- Correlation to soil's physical properties
- Laboratory measurement
- Field barometric fluctuation test
- Air injection test
- Pressure buildup test
- Pressure drawdown test

Correlation to soil's physical properties. Soil air permeability is estimated from soil characteristics such as grain size distribution or hydraulic conductivity by assuming a linear correlation. This is a quick estimation method and provides only an order of magnitude estimate. This relationship is expressed by the following equation:

$$K_a = K_w\left\{\frac{\rho_a \cdot \mu_w}{\rho_w \cdot \mu_a}\right\} \tag{3.5}$$

where K_a = air permeability
K_w = hydraulic conductivity
ρ_a = density of air
ρ_w = density of water
μ_a = viscosity of air
μ_w = viscosity of water.

Example calculation:

At 68°F, for air and water, $\rho_a = 0.0012$, $\rho_w = 1$, $\mu_w = 10{,}000$ μP, and $\mu_a = 183$ μP. Therefore,

$$K_a = K_w \cdot \left\{\frac{0.0012}{1} \cdot \frac{10{,}000}{183}\right\}$$

$$= K_w\{0.0656\}.$$

If

$$K_w = 20 \text{ ft/day}$$

$$K_a = 20 \times 0.0656$$

$$= 1.31 \text{ ft/day}.$$

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4: ENTER WASTE ACCEPTANCE RATES

Input Units: *short tons/year*

Year	Input Units (short tons/year)	Calculated Units (Mg/year)
1960	112,320	102,109
1961	112,320	102,109
1962	112,320	102,109
1963	112,320	102,109
1964	112,320	102,109
1965	112,320	102,109
1966	112,320	102,109
1967	112,320	102,109
1968	112,320	102,109
1969	112,320	102,109
1970	112,320	102,109
1971	112,320	102,109
1972	33,507	30,461
1973	33,507	30,461
1974	33,507	30,461
1975	33,507	30,461
1976	33,507	30,461
1977	33,507	30,461
1978	33,507	30,461
1979	33,507	30,461
1980	15,768	14,335
1981	15,768	14,335
1982	15,768	14,335
1983	15,768	14,335
1984	15,768	14,335
1985	15,768	14,335
1986	15,768	14,335
1987	15,768	14,335
1988		
1989		
1990		
1991		
1992		
1993		
1994		
1995		
1996		
1997		
1998		
1999		

Appendix B

Landfill Gas Horizontal Trench Collector
Radius of Influence Calculation

$$L^2 = (K * (\frac{m_1}{m_2}) * (\frac{1}{\rho}) * (P_2 - P_1) * 8760) / (R * D)$$

Note: Based on Darcy's radial flow equation & assumes LFG flow is equal to gas production rate

Reference: Landtec Gas System Engineering Design Seminar, 1994

Where:	L = Slot Length (ft)		
	K = Refuse Conductivity (ft/hr)	1.0	assumed
	m_1 = Depth of Collector (ft)	0.5	
	m_2 = Depth of Refuse (ft)	30	
	ρ = LFG Density (lbm / ft^3)	0.0623	
	Pressure on the collector (inWC)	4	assumed
	Pressure in Refuse (inWC)	0	
	P_2 - P_1 = Pressure Gradient (lb_F/ft^2)	20.79	lb_F/ft^2
	R = LFG production rate (ft^3/lbm-yr)	0.032	
	D = Refuse Density (lbm/ft^3)	80	2,160 (lbm/CY)
	8760 = Time Conversion (hr/yr)		
	Gas Pressure, inWC	4	
	ρ = Actual LFG Density (lbm / ft^3)	0.0623	38% CH4/31% CO2/31% N2
	S = trench spacing (ft) = 2 * L	S = **276**	ft (result)
		L = 138	(ROI)
	k = Refuse Intrinsic Permeability (ft^2)	1.13E-09	106.15 darcys

APPENDIX H

OCTOBER 2, 2013 SLOPE STABILITY ANALYSES MEMO

TETRA TECH

MEMO

To:	*"CLIENT"*
Cc:	Mr. Mike Noel
From:	Mr. Caleb Moore, P.E.
Date:	October 2, 2013
Subject:	Slope Stability Analysis for the Composite Cover of the Cooper Crouse-Hinds Landfill Final Closure

1.0 INTRODUCTION

This presents the results of the slope stability analysis for the Cooper Crouse-Hinds Landfill (CCHLF) final closure. The project is located in Syracuse, New York and is made up of 2 waste disposal units, North Landfill and South Landifll separated by Seventh Noth Street. Ley Creek runs along the western property boundary and the eastern property boundary is wetland areas.

2.0 STABILITY ANALYSIS

New York Department of Environmental Conservation regulations require that a minimum Factor of Safety of 1.5 for the final cover be achieved for static conditions (Subpart 360-2.7(b)(6)(iii)) and 1 be achieved for seismic conditions (Subpart 360-2.7(b)(7)).

The stability analyses was performed using the Spencer Method in the Slope/W (Geo-Slope, 2007, version 7.21) software. Analyses were performed on the worst site case along a 16% in the South Landfill portion.

The following stability analysis were conducted:

1. Stability of the dry final slope cover during normal operational conditions with groundwater located below the toe of the slope.
2. The stability of the unsaturated final cover slope for seismic conditions. The seismic analysis was modeled with a horizontal acceleration of 0.09g based on USGS Seismic Hazard Map for New York for a maximum expected horizontal acceleration with a 90 percent or greater probability that the acceleration will not be exceeded in 250 years.[1]
3. Stability of the final cover when the site is immersed in a 100-year flood event. This configuration was evaluated as a static condition due to the unlikely probability of occurrence of simultaneious flood and earthquake.
4. Stability of final cover slope considering rapid drawdown of a 100-year flood.

[1]<http://cgsdocs.state.co.us/Docs/ERC/PROBABILISTIC%20EARTHQUAKE%20ACCELERATION%20VELOCITY%20MAPS-ALGERMISSEN%20AND%20OTHERS%201990.pdf> Map C. Horizontal Acceleration (90 Percent Probability of Not Being Exceeded in 250 Years), website accessed on May 7, 2013.

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3.0 MATERIALS

The final cover is assumed to be comprised of the following layers from top to bottom:

- 18-inch thick cover soil.
- Geocomposite subdrainage layer with non-woven geotextile on both sides.
- Impermeable Linear Low Density Polyethylene (LLDPE) geomembrane, textured on both sides.
- Geocomposite landfill gas venting layer.
- 4-Inch thick intermediate soil cover layer (in-place).
- Solid waste.

The final cover soil was assumed to consist of sandy soils. The following table illustrates material properties used for the analysis.

Table 1. Material Properties

Material	Unit Weight (lbs/cf)	Angle of Friction (deg)	Cohesion (lbs/sf)
Final Cover Soil	110**	29**	100**
Final Cover Soil Saturated	110**	16**	100**
Final Cover Soil/Geocomposite (non-woven geotextile component)	(this layer not analyzed in model, not critical interface)	21*	0
Geocomposite/Geomembrane Interface	59	17*	0
Intermediate Cover Soil	110	29	0
Municipal solid waste (MSW)	80	30	200

* From "Direct Shear Database of Geosynthetic-to-Geosynthetic and Geosynthetic-to-Soil Interfaces, GRI Report #30, Koerner and Narejo, June 14, 2005.
** Assumed based on specified cover soil properties.

The geocomposite/geomembrane is the critical interface. The values for the interface between the LLDPE Geomembrane and the geotextile component of the geocomposite are based the Direct Shear Database of Geosynthetic to Geosynthetic, and Geosynthetic to Soil Interfaces by Koerner and Narejo, 2005 as well as previous experience in observing test results from other projects. The material properties indicate that the failure is within the Geocomposite/LLDPE Geomembrane interface.

The material properties for cover soils and interface shear between the geocomposite and geomembrane interface must be verified prior to construction. Soil parameters were conservatively assigned as no site specific data was provided for the analysis.

4.0 RESULTS SUMMARY

Table 2. Calculated Factors of Safey

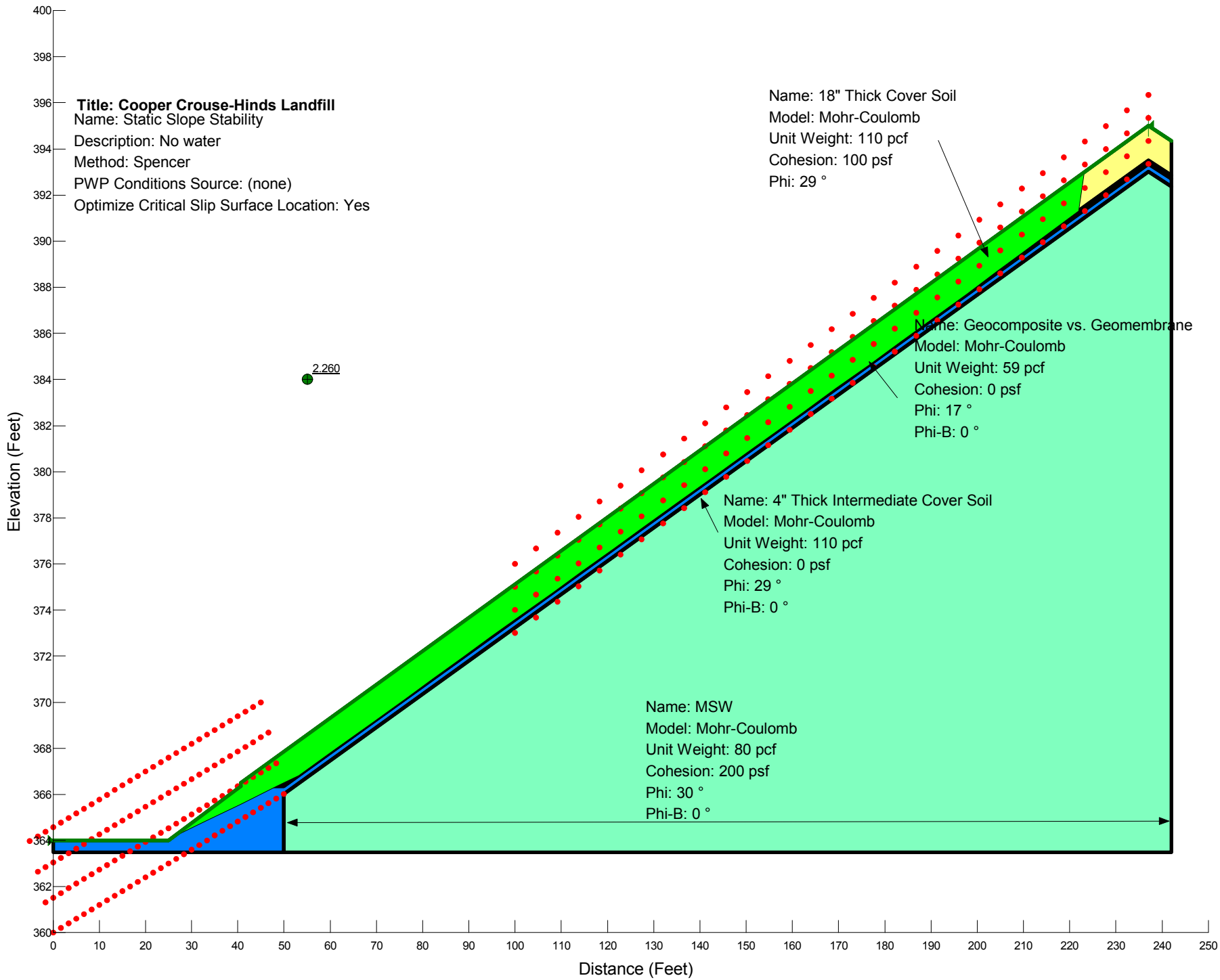
Condition	Minimim FS Required	Long Term - Dry Conditions	100-Year Flood	Rapid Drawdown
Static	1.5	2.260	2.179	1.761
Seismic	1.0	1.357	Seismic analysis not conducted for short term conditions	

The final cover meets stability requirements in state regulations with a factor of safety greater than 1.5 under normal static conditions and the seismic factor of safety is greater than 1.

5.0 CONCLUSIONS AND RECOMMENDATIONS

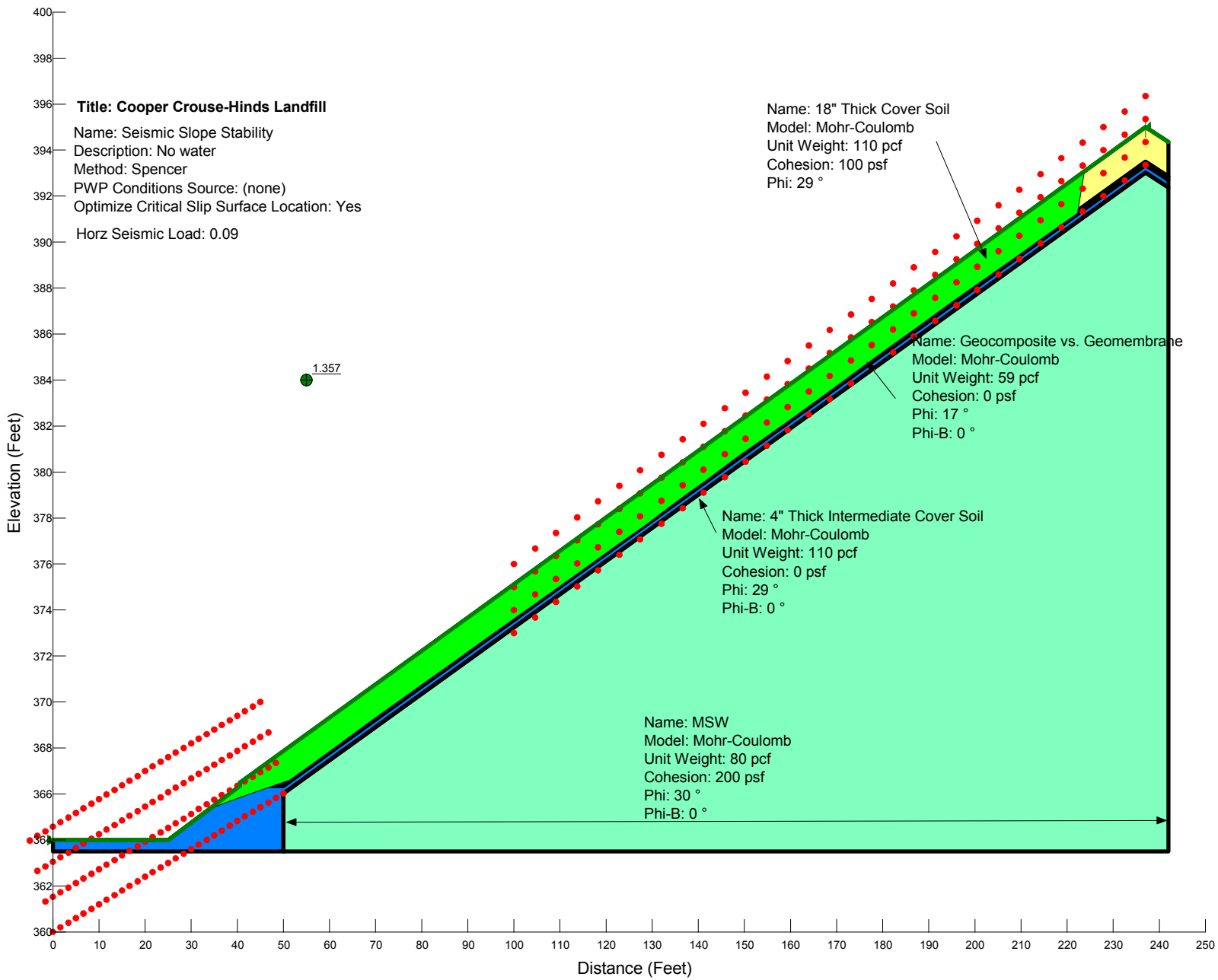
The proposed final slope configuration is considered satisfactory and acceptable in accordance with state requirements. The results in this report are limited in that no site specific data for cover soil material was available. The residual cohesion and friction angle properties for cover soils and the interface between the geosynthetics must be verified prior to construction via ASTM D 5321 Standard Test Method for Determining the Shear Strength of Soil-Geosynthetic and Geosynthetic-Geosynthetic Interfaces by Direct Shear.

TETRA TECH

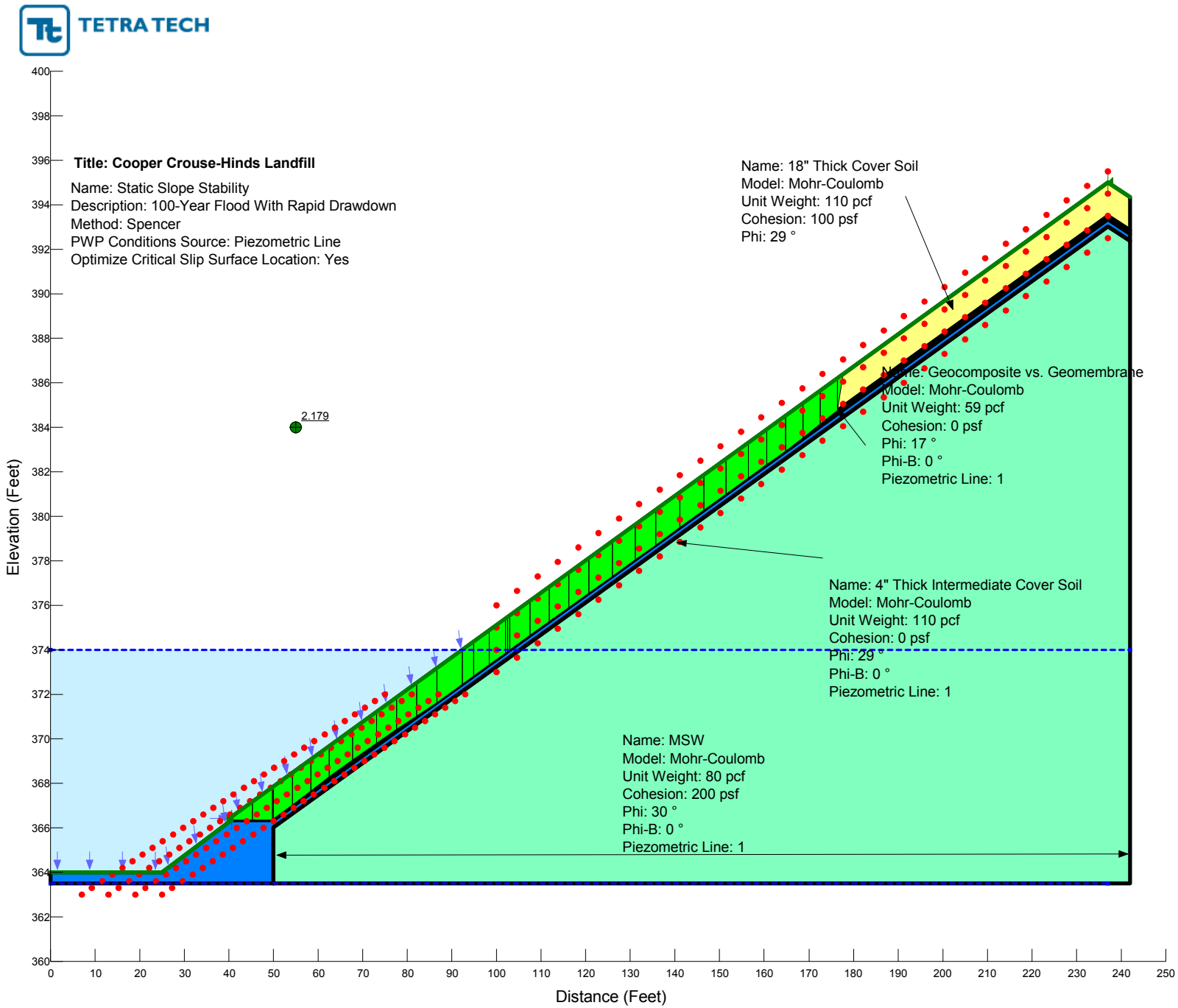


Directory: \\BASS302FS1.TT.LOCAL\client_data\TETRA TECH\2013-0030 Eaton Cooper CC-H Landfill, Syracue NY\Calcs\

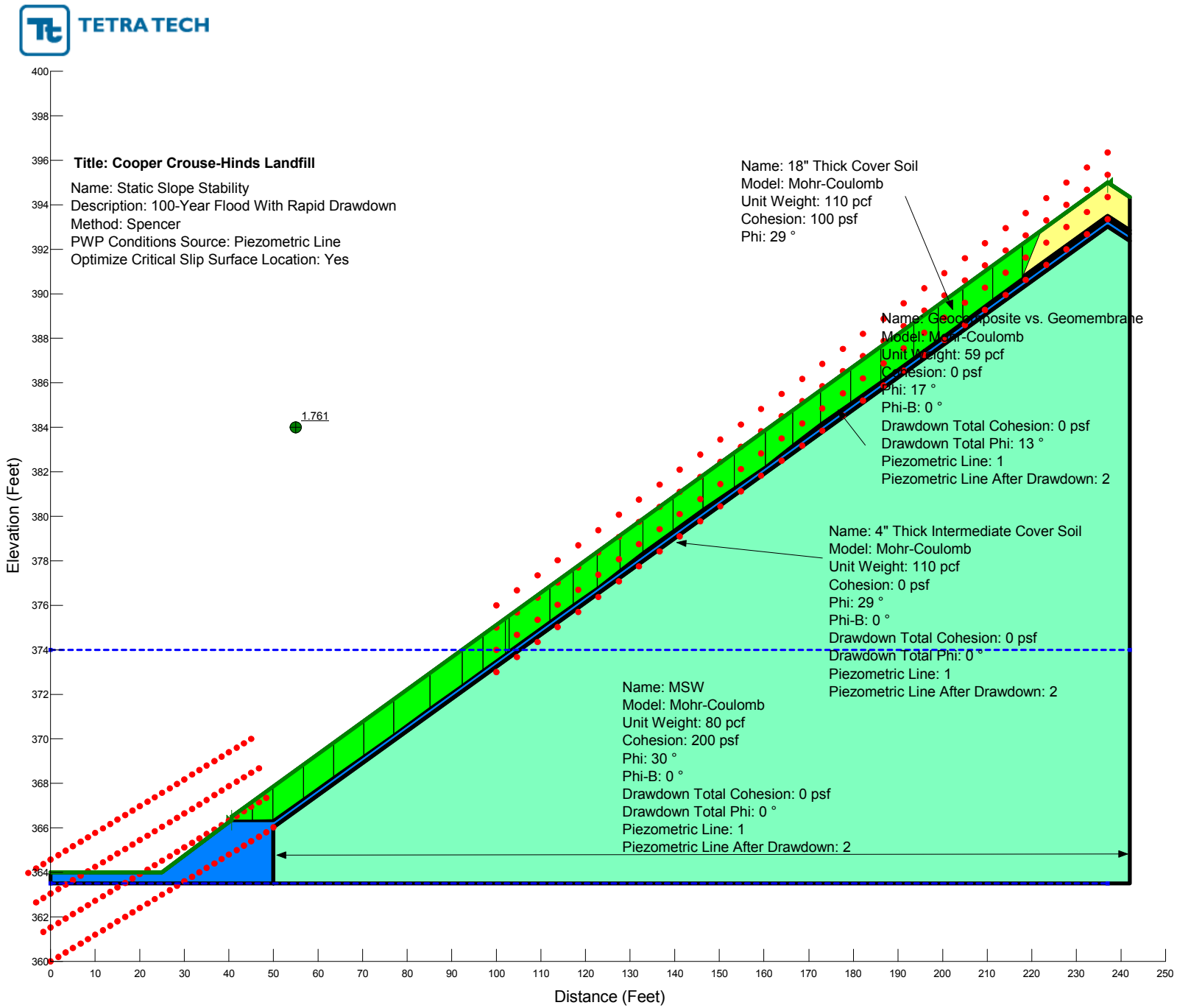
TETRA TECH



Directory: \\BASS302FS1.TT.LOCAL\client_data\TETRA TECH\2013-0030 Eaton Cooper CC-H Landfill, Syracue NY\Calcs\



Directory: \\BASS302FS1.TT.LOCAL\client_data\TETRA TECH\2013-0030 Eaton Cooper CC-H Landfill, Syracue NY\Calcs\



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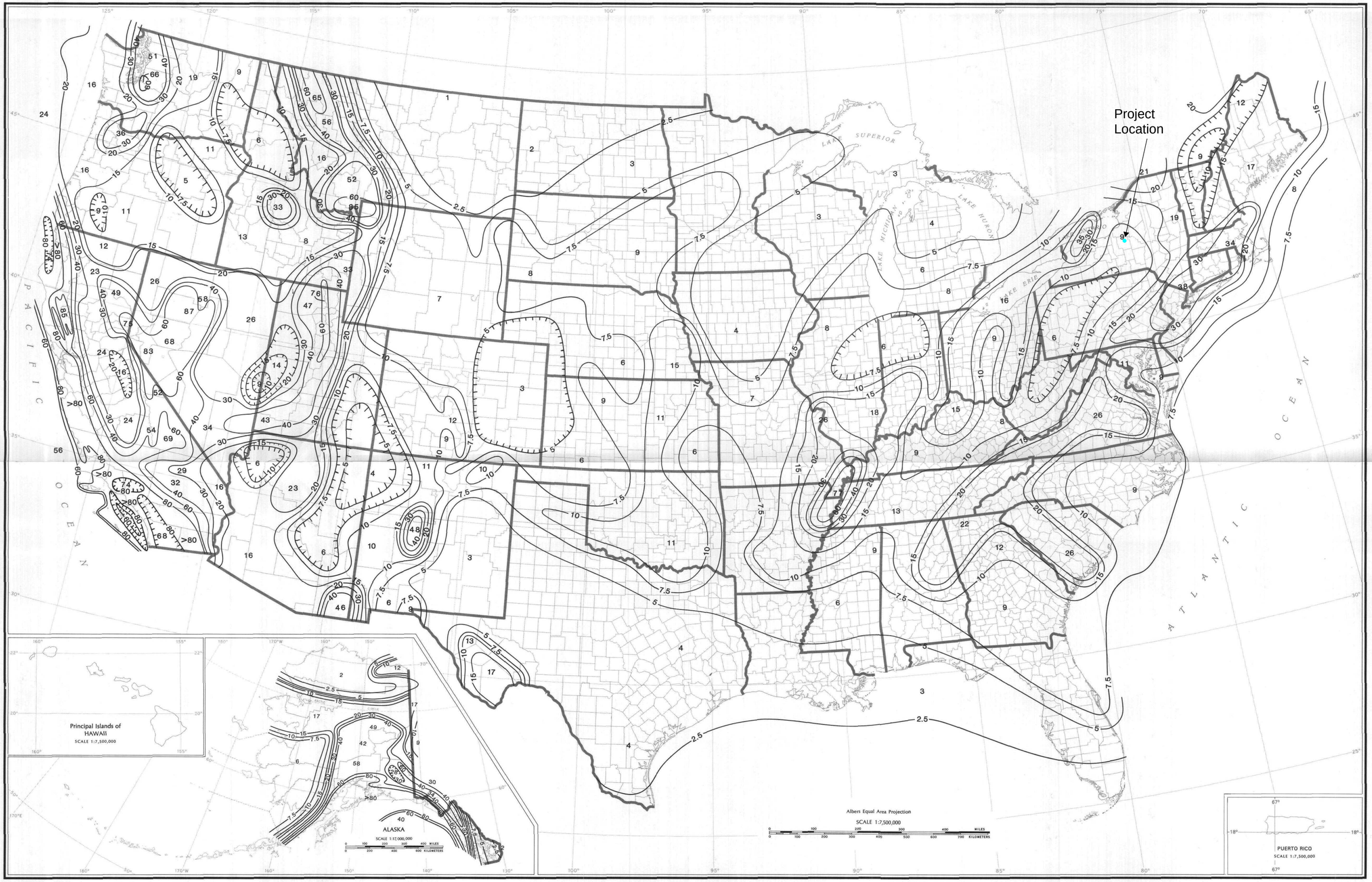

Base modified from U.S. Geological Survey
National Atlas, 1970

MAP C.-HORIZONTAL ACCELERATION (90 PERCENT PROBABILITY OF NOT BEING EXCEEDED IN 250 YEARS)

EXPLANATION

—5— Contour--Horizontal acceleration expressed as percent of gravity. Some areas show acceleration values without contours. Hachures indicate closed area of lower acceleration. No data available for Hawaii and Puerto Rico

APPENDIX I

OCTOBER 2, 2013 DRAINAGE DESIGN SUPPORT MEMO

TETRA TECH

MEMO

To:	*"CLIENT"*
Cc:	Mr. Mike Noel
From:	Mr. Caleb H. Moore, P.E.
Date:	October 2, 2013
Subject:	DRAINAGE DESIGN SUPPORT FOR THE COOPER CROUSE-HINDS I FACILITY

The final cover system and the above-referenced facility includes the following layers from top to bottom:

- 6-inch thick topsoil
- 12-inch thick select fill
- Geocomposite – subdrain layer
- Geomembrane
- Geocomposite – landfill gas venting layer
- Prepared subgrade

In 1989, disposal was halted. Therefore prescriptive design requirements in New York's regulations do not apply to the final cover. The focus of this memorandum is to ensure that the site has adequate surface and subdrainage controls for various soil types as a borrow source for the cover material has not yet been identified.

1.0 SURFACE DRAINAGE

1.1 EROSION CONTROLS

The final cover requires shallow rooting vegetation in an 18 inch thick cover soil to prevent the roots from impacting the drainage capacity of the drainage geocomposite. It is also recommended that a turf reinforcement material (TRM) be used on the portion of the slopes submerged in a 100-year flood event to provide soil stability, while assisting in vegetation establishment.

The surface water flow velocities are estimated to vary from 3.2 to 0.8 feet per second up to an elevation of approximately 374 feet (FEMA). At 3.2 feet per second and 1 meter depth (3.28 feet) of water, a particle 0.15 inches in diameter could be carried with the water.[1] In accordance with anticipated soil types to be used in construction and the soil specification, approximately 70 percent of cover soils may be less than 0.0165 inches inches in size and up to 40 percent may be less than 0.0029 inches.

[1] $Vc = 6.19\ y^{1/6}\ D^{1/3}$, where Vc = Critical velocity above which bed material of size D and smaller will be transported, m/s, y = depth of water, D=size of particle. From section 2.4.4 of Evaluating Scour at Bridges HEC 18 Third Edition, November 1995 at http://www.fhwa.dot.gov/engineering/hydraulics/pubs/hec/hec18SI.pdf, last accessed September 30, 2013.

Tetra Tech BAS
1360 Valley Vista Dr. | Diamond Bar, CA 91765
Tel 909.860.7777 Fax 909.860.8017 www.bas.com tetratech.com

According to an EPA Storm Water Technology Fact Sheet:

> "TRMs are composed of interwoven layers of non-degradable geosynthetic materials such as polypropylene, nylon and polyvinyl chloride (PVC) netting, stitched together to form a three-dimensional matrix. They are thick and porous enough to allow for soil filling and retention. In addition to providing scour protection, the mesh netting of TRMs is designed to enhance vegetative root and stem development. By protecting the soil from scouring forces and enhancing vegetative growth, TRMs can raise the threshold of natural vegetation to withstand higher hydraulic forces on stabilization slopes, streambanks, and channels. In addition to reducing flow velocities, the use of natural vegetation provides particulate contaminant removal through sedimentation and silt infiltration and improves the aesthetics of a site" (USEPA, 1999).

2.0 SUBDRAINAGE

Water that infiltrates into the final cover will be captured in the subdrainage system. The subdrainage system will consist of a drainage geocomposite above the geomembrane. Subdrainage laterals will be spaced to adequately capture all subdrainage flows to maintain a thickness of subdrainage liquids within the thickness of the drainage geocomposite. A HELP analysis was conducted to determine the peak daily impingement on the subdrainage system. A summary of the analysis is in 2.2.

2.1 HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE (HELP) MODELING

2.1.1 Climate Data

HELP was used to synthetically generate 30 years of climate data for precipitation, temperature, and solar radiation. HELP generates weather data based on historical data stored in the HELP model. A weather station in Syracuse, New York located approximately 4.5 miles from the project site was selected for the model.

Because the final cover will be vegetated, the maximum leaf area index was assumed to be 3, for a good stand of grass. Default data was used for the starting and ending of the growing season, average annual wind speed and average quarterly relative humidity. The evaporative zone depth was assumed to be the default value of 18.2 inches. Surface runoff was determined using the HELP model's calculation using the SCS curve number. A "fair stand of grass" cover was assumed on the surface with sandy soil types and slopes ranging from 5% to 16% A SCS curve number values ranging from 68.9 to 85.6 were the most appropriate based on the design intent and planned end use.

2.1.2 Layers

The cover soils have been modeled as a vertical percolation layer for a couple soil types with a plasticity index of at least 3 and meeting the following gradation:

Sieve	Percent Passing
1"	100
No. 40 (0.0165 inches)	30 – 70
No. 200 (0.0029 inches)	20 – 40

Based on these properties and properties of soils near the site, the anticipated USCS soil classifications used in construction are SM (sand with a significant amount of silt) and SC (sand with a significant amount of clay), based on known soil types in the area, although a specific borrow source has yet to be identified.

In the HELP model, these soils types are:

HELP No	USDA [1]	USCS [2]	Saturated Hydraulic Conductivity
10	SCL (sand, clay, loam)	SC	1.2×10^{-4} cm/s
6	SL (Silt Loam)	SM	7.2×10^{-4} cm/s

1) USDA soil classification: S = Sand, C = Clay, L = Loam.
2) USCS soil classification: S = Sand, C = Clay, M = Silt.

Geocomposite, consisting of a geonet core 250 mil thick with 8-oz geotextile non-woven layers on both sides, has been modeled as a lateral drainage layer. The lateral drainage layer was modeled for a 5% and 16% slope for each soil type. Reduction factors were applied to the hydraulic conductivity of the drainage geocomposite to account for overburden and installed slope in each scenario. The drainage length modeled in HELP is the distance between subdrainage pipes. Because the cover soil is highly porous, it is assumed that is would act as a drainage layer during peak subdrainage flows to convey water to the subdrainage system. The overburden pressure on the geomembrane is conservatively estimated based on an articulated truck, which is the largest piece of equipment anticipated to be used during construction. In addition, reduction factors were applied to account for biological clogging, chemical clogging, creep, and intrusion into the core.

The geomembrane layer was assumed to have 1 pinhole per acre and 3 installation defects per acre with a placement quality of good. The subdrainage pipes in the deck should be oriented approximately 45 degrees to the contours to capture subdrainage flow and drain toward the edge of the site.

3.0 ANALYSIS RESULTS SUMMARY AND RECOMMENDATIONS

Because the landfill will be covered with sandy soils, the subdrainage flows have been assumed to occur in the geocomposite and sand layers. The maximum acceptable head on the geomembrane final cover is assumed to be 12 inches. In addition, stability has been evaluated for a saturated condition and rapid drawdown condition with the entire final cover section saturated to ensure stability. The following table illustrates the results of the HELP analysis for various soil types in the 18-inch thick cover.

HELP Model File Name	Surface Slope	HELP Model Soil Type	Drainage Length - Subdrainage Lateral Pipe Spacing (feet)	Peak Daily Perm (cm/s)	Peak Daily Max Head (in)	Peak Daily Avg Head (in)
SKAPS Drainage Geocomposite (250 MIL, 8OZ)						
SC5	5%	10	50	4.65E-06	1.935	1.125
SM5	5%	6	50	6.72E-07	5.307	4.78
SC16-	16%	10	194	6.02E-07	0.106	0.052
SM16	16%	6	194	6.54E-07	0.092	0.047
GSE Drainage Geocomposite (250 MIL 8OZ)						
SC5GSE	5%	10	50	4.588E-06	2.789	2.393
SM5GSE	5%	6	50	8.73E-06	7.238	8.752
SC16GSE-	16%	10	50	2.77E-06	1.647	0.872
SM16GSE-	16%	6	50	5.59E-06	3.899	3.671

Based on the preliminary calculations, a 250 mil geocomposite with an 8-oz geotextile on both sides is adequate to convey subdrainage flows to the lateral pipes spaced 50 feet apart. Subdrainage lateral outlets are recommended to have backflow prevention valves.

4.0 REFERENCES

USEPA, 1999. Storm Water Technology Fact Sheet Turf Reinforcement Mats, Washington, DC. September.

FEMA. Federal Emergency Management Agency Floodway Data and Flood Profiles for Ley Creek.

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**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
**                    USAE WATERWAYS EXPERIMENT STATION                     **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
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PRECIPITATION DATA FILE:    A:\help3\NYLF\PRECIP.D4
TEMPERATURE DATA FILE:      A:\HELP3\NYLF\TEMP.D7
SOLAR RADIATION DATA FILE:  a:\help3\NYLF\SOLAR.D13
EVAPOTRANSPIRATION DATA:    a:\help3\NYLF\EVPO.D11
SOIL AND DESIGN DATA FILE:  a:\help3\NYLF\SC5.D10
OUTPUT DATA FILE:           a:\help3\NYLF\SC5.OUT


TIME:  20:29     DATE:   8/28/2013


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     TITLE:  COOPER CROUSE-HINDS LANDFILL

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     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                   LAYER  1
                                   --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
                         MATERIAL TEXTURE NUMBER  10
          THICKNESS                   =      6.00   INCHES
          POROSITY                    =      0.3980 VOL/VOL
          FIELD CAPACITY              =      0.2440 VOL/VOL
          WILTING POINT               =      0.1360 VOL/VOL
          INITIAL SOIL WATER CONTENT  =      0.2704 VOL/VOL
          EFFECTIVE SAT. HYD. COND.   =  0.119999997000E-03 CM/SEC
        NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  5.00
                 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.


                                   LAYER  2
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            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER  10
THICKNESS                    =     12.00   INCHES
POROSITY                     =      0.3980 VOL/VOL
FIELD CAPACITY               =      0.2440 VOL/VOL
WILTING POINT                =      0.1360 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.2544 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.119999997000E-03 CM/SEC


                        LAYER  3
                        --------

            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER   0
THICKNESS                    =      0.25   INCHES
POROSITY                     =      0.8500 VOL/VOL
FIELD CAPACITY               =      0.0100 VOL/VOL
WILTING POINT                =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.2256 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =   2.30999994000     CM/SEC
SLOPE                        =      5.00   PERCENT
DRAINAGE LENGTH              =     50.0    FEET


                        LAYER  4
                        --------

            TYPE 4 - FLEXIBLE MEMBRANE LINER
              MATERIAL TEXTURE NUMBER   0
THICKNESS                    =      0.04   INCHES
POROSITY                     =      0.0000 VOL/VOL
FIELD CAPACITY               =      0.0000 VOL/VOL
WILTING POINT                =      0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.000000000000E+00 CM/SEC
FML PINHOLE DENSITY          =      1.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      3.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  3 - GOOD


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT
          SOIL DATA BASE USING SOIL TEXTURE #10 WITH A
          FAIR STAND OF GRASS, A SURFACE SLOPE OF  5.%
          AND A SLOPE LENGTH OF  501. FEET.

SCS RUNOFF CURVE NUMBER              =     85.60
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =     18.2    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      4.732  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      7.377  INCHES
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LOWER LIMIT OF EVAPORATIVE STORAGE  =      2.449  INCHES
INITIAL SNOW WATER                  =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS    =      4.732  INCHES
TOTAL INITIAL WATER                 =      4.732  INCHES
TOTAL SUBSURFACE INFLOW             =      0.00   INCHES/YEAR
```

EVAPOTRANSPIRATION AND WEATHER DATA

```
NOTE:  EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
         Syracuse             NY

     STATION LATITUDE                        =  43.04 DEGREES
     MAXIMUM LEAF AREA INDEX                 =   9.77
     START OF GROWING SEASON (JULIAN DATE)   =    284
     END OF GROWING SEASON (JULIAN DATE)     =     38
     EVAPORATIVE ZONE DEPTH                  =  18.2  INCHES
     AVERAGE ANNUAL WIND SPEED               =   6.00 MPH
     AVERAGE 1ST QUARTER RELATIVE HUMIDITY   =   0.00 %
     AVERAGE 2ND QUARTER RELATIVE HUMIDITY   =   0.00 %
     AVERAGE 3RD QUARTER RELATIVE HUMIDITY   =   0.00 %
     AVERAGE 4TH QUARTER RELATIVE HUMIDITY   =   0.00 %
```

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR Syracuse NY

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
2.61	2.65	3.11	3.34	3.16	3.63
3.76	3.77	3.29	3.14	3.45	3.20

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR Syracuse NY

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
22.80	24.00	33.30	46.10	57.00	66.30
70.90	69.30	62.10	51.30	40.60	28.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING COEFFICIENTS FOR Syracuse NY AND STATION LATITUDE = 43.02 DEGREES

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 30

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.59	2.74	2.99	3.11	3.00	3.30
	3.44	4.00	3.33	3.14	3.32	3.24
STD. DEVIATIONS	0.76	0.91	1.25	1.15	1.31	1.13
	1.31	2.01	1.64	1.09	0.92	0.85
RUNOFF						
TOTALS	0.349	0.640	2.722	1.909	0.169	0.066
	0.060	0.127	0.113	0.035	0.049	0.167
STD. DEVIATIONS	0.450	0.569	1.540	1.036	0.409	0.114
	0.083	0.186	0.208	0.061	0.123	0.445
EVAPOTRANSPIRATION						
TOTALS	1.464	1.128	0.933	1.378	3.436	3.145
	3.312	3.500	3.147	2.765	2.891	1.880
STD. DEVIATIONS	0.275	0.233	0.339	1.005	1.161	0.807
	1.149	1.422	1.279	1.014	0.706	0.395
LATERAL DRAINAGE COLLECTED FROM LAYER 3						
TOTALS	0.0116	0.0000	0.0000	0.8963	0.4290	0.0741
	0.0363	0.2072	0.1136	0.0945	0.1318	0.1666
STD. DEVIATIONS	0.0374	0.0000	0.0000	0.6579	0.5707	0.1979
	0.1041	0.4052	0.2669	0.2285	0.3327	0.3458
PERCOLATION/LEAKAGE THROUGH LAYER 4						
TOTALS	0.0109	0.0000	0.0000	0.1820	0.1282	0.0307
	0.0202	0.0749	0.0425	0.0499	0.0493	0.0828
STD. DEVIATIONS	0.0320	0.0000	0.0000	0.1490	0.1323	0.0671
	0.0426	0.1189	0.0826	0.0967	0.0964	0.1363

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 4						
AVERAGES	0.0003	0.0000	0.0000	0.0278	0.0129	0.0023
	0.0011	0.0062	0.0035	0.0028	0.0041	0.0050
STD. DEVIATIONS	0.0011	0.0000	0.0000	0.0204	0.0171	0.0061
	0.0031	0.0122	0.0083	0.0069	0.0103	0.0104

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AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 30

	INCHES		CU. FEET	PERCENT
PRECIPITATION	38.21	(4.976)	138684.2	100.00
RUNOFF	6.406	(1.8071)	23254.66	16.768
EVAPOTRANSPIRATION	28.979	(3.8179)	105192.71	75.851
LATERAL DRAINAGE COLLECTED FROM LAYER 3	2.16116	(0.75728)	7844.997	5.65674
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.67149	(0.27680)	2437.525	1.75761
AVERAGE HEAD ON TOP OF LAYER 4	0.006	(0.002)		
CHANGE IN WATER STORAGE	-0.013	(1.2240)	-45.73	-0.033

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 30

	(INCHES)	(CU. FT.)
PRECIPITATION	2.64	9583.200
RUNOFF	1.913	6943.2070
DRAINAGE COLLECTED FROM LAYER 3	1.20860	4387.21777
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.107952	391.86438
AVERAGE HEAD ON TOP OF LAYER 4	1.125	
MAXIMUM HEAD ON TOP OF LAYER 4	1.935	
LOCATION OF MAXIMUM HEAD IN LAYER 3 (DISTANCE FROM DRAIN)	6.9 FEET	
SNOW WATER	5.59	20303.6777

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.3603

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1374

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

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FINAL WATER STORAGE AT END OF YEAR 30

LAYER	(INCHES)	(VOL/VOL)
1	1.3249	0.2208
2	2.6950	0.2246
3	0.0333	0.1330
4	0.0000	0.0000
SNOW WATER	0.301	

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**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
**                    USAE WATERWAYS EXPERIMENT STATION                     **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
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PRECIPITATION DATA FILE:    A:\help3\NYLF\PRECIP.D4
TEMPERATURE DATA FILE:      A:\HELP3\NYLF\TEMP.D7
SOLAR RADIATION DATA FILE:  a:\help3\NYLF\SOLAR.D13
EVAPOTRANSPIRATION DATA:    a:\help3\NYLF\EVPO.D11
SOIL AND DESIGN DATA FILE:  a:\help3\NYLF\SM5.D10
OUTPUT DATA FILE:           a:\help3\NYLF\SM5.OUT


TIME:  20:43     DATE:   8/28/2013


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     TITLE:  COOPER CROUSE-HINDS LANDFILL

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     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                   LAYER  1
                                   --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
                         MATERIAL TEXTURE NUMBER   6
          THICKNESS                   =      6.00   INCHES
          POROSITY                    =      0.4530 VOL/VOL
          FIELD CAPACITY              =      0.1900 VOL/VOL
          WILTING POINT               =      0.0850 VOL/VOL
          INITIAL SOIL WATER CONTENT  =      0.2220 VOL/VOL
          EFFECTIVE SAT. HYD. COND.   =  0.720000011000E-03 CM/SEC
        NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  5.00
                 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.


                                   LAYER  2
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            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER   6
THICKNESS                    =     12.00   INCHES
POROSITY                     =      0.4530 VOL/VOL
FIELD CAPACITY               =      0.1900 VOL/VOL
WILTING POINT                =      0.0850 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.2183 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.720000011000E-03 CM/SEC


                        LAYER  3
                        --------

            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER   0
THICKNESS                    =      0.25   INCHES
POROSITY                     =      0.8500 VOL/VOL
FIELD CAPACITY               =      0.0100 VOL/VOL
WILTING POINT                =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.1775 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =   2.28999996000     CM/SEC
SLOPE                        =      5.00   PERCENT
DRAINAGE LENGTH              =     50.0    FEET


                        LAYER  4
                        --------

            TYPE 4 - FLEXIBLE MEMBRANE LINER
              MATERIAL TEXTURE NUMBER  36
THICKNESS                    =      0.04   INCHES
POROSITY                     =      0.0000 VOL/VOL
FIELD CAPACITY               =      0.0000 VOL/VOL
WILTING POINT                =      0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.399999993000E-12 CM/SEC
FML PINHOLE DENSITY          =      1.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      3.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  3 - GOOD


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT
          SOIL DATA BASE USING SOIL TEXTURE # 6 WITH A
          FAIR STAND OF GRASS, A SURFACE SLOPE OF  5.%
          AND A SLOPE LENGTH OF  501. FEET.

SCS RUNOFF CURVE NUMBER              =     68.90
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =     18.2    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      3.996  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      8.367  INCHES
```

```
LOWER LIMIT OF EVAPORATIVE STORAGE  =      1.531  INCHES
INITIAL SNOW WATER                  =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS    =      3.996  INCHES
TOTAL INITIAL WATER                 =      3.996  INCHES
TOTAL SUBSURFACE INFLOW             =      0.00   INCHES/YEAR
```

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
Syracuse NY

```
STATION LATITUDE                        =  43.04 DEGREES
MAXIMUM LEAF AREA INDEX                 =   9.77
START OF GROWING SEASON (JULIAN DATE)   =    284
END OF GROWING SEASON (JULIAN DATE)     =     38
EVAPORATIVE ZONE DEPTH                  =  18.2  INCHES
AVERAGE ANNUAL WIND SPEED               =   6.00 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY   =   0.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY   =   0.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY   =   0.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY   =   0.00 %
```

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR Syracuse NY

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
2.61	2.65	3.11	3.34	3.16	3.63
3.76	3.77	3.29	3.14	3.45	3.20

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR Syracuse NY

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
22.80	24.00	33.30	46.10	57.00	66.30
70.90	69.30	62.10	51.30	40.60	28.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR Syracuse NY
AND STATION LATITUDE = 43.02 DEGREES

****

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 30

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.59	2.74	2.99	3.11	3.00	3.30
	3.44	4.00	3.33	3.14	3.32	3.24
STD. DEVIATIONS	0.76	0.91	1.25	1.15	1.31	1.13
	1.31	2.01	1.64	1.09	0.92	0.85
RUNOFF						
TOTALS	0.155	0.344	2.027	1.633	0.120	0.000
	0.000	0.001	0.000	0.000	0.001	0.074
STD. DEVIATIONS	0.265	0.387	1.267	0.957	0.378	0.001
	0.000	0.004	0.001	0.000	0.004	0.260
EVAPOTRANSPIRATION						
TOTALS	1.464	1.128	0.933	1.366	3.342	3.149
	3.298	3.468	3.141	2.747	2.878	1.884
STD. DEVIATIONS	0.275	0.233	0.339	0.991	1.177	0.851
	1.172	1.396	1.230	0.991	0.691	0.403
LATERAL DRAINAGE COLLECTED FROM LAYER 3						
TOTALS	0.0156	0.0000	0.0000	1.9303	0.8629	0.1262
	0.0634	0.3182	0.2284	0.1395	0.1828	0.1829
STD. DEVIATIONS	0.0481	0.0000	0.0000	1.2642	1.1756	0.2786
	0.1491	0.5235	0.4517	0.2944	0.4075	0.3482
PERCOLATION/LEAKAGE THROUGH LAYER 4						
TOTALS	0.0129	0.0000	0.0000	0.2772	0.1996	0.0507
	0.0377	0.1104	0.0814	0.0745	0.0695	0.0950
STD. DEVIATIONS	0.0376	0.0000	0.0000	0.2017	0.1835	0.0920
	0.0647	0.1502	0.1232	0.1215	0.1125	0.1429

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 4						
AVERAGES	0.0005	0.0000	0.0000	0.0835	0.0367	0.0039
	0.0019	0.0096	0.0071	0.0042	0.0057	0.0055
STD. DEVIATIONS	0.0015	0.0000	0.0000	0.0579	0.0572	0.0087
	0.0045	0.0158	0.0141	0.0089	0.0127	0.0105

****

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*******************************************************************************

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   30
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     38.21    (   4.976)     138684.2     100.00

 RUNOFF                             4.355   (  1.5949)      15810.21     11.400

 EVAPOTRANSPIRATION                28.800   (  3.7647)     104544.65     75.383

 LATERAL DRAINAGE COLLECTED         4.05010 (  1.01502)     14701.875   10.60098
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH        1.00892 (  0.33327)      3662.396     2.64082
   LAYER  4

 AVERAGE HEAD ON TOP                0.013 (    0.003)
   OF LAYER  4

 CHANGE IN WATER STORAGE           -0.010   (  1.3237)        -34.97     -0.025
*******************************************************************************


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*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   30
   ------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                              2.64          9583.200

      RUNOFF                                     1.788         6488.8086

      DRAINAGE COLLECTED FROM LAYER  3           2.43680       8845.59570

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.228490       829.41797

      AVERAGE HEAD ON TOP OF LAYER  4            4.780

      MAXIMUM HEAD ON TOP OF LAYER  4            5.307

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)               12.8 FEET

      SNOW WATER                                 5.59         20303.6777


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.4071

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0968

       ***  Maximum heads are computed using McEnroe's equations.  ***

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
                        ASCE Journal of Environmental Engineering
                        Vol. 119, No. 2, March 1993, pp. 262-270.
```

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FINAL WATER STORAGE AT END OF YEAR 30

LAYER	(INCHES)	(VOL/VOL)
1	1.0454	0.1742
2	2.3308	0.1942
3	0.0297	0.1187
4	0.0000	0.0000
SNOW WATER	0.301	

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**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
**                    USAE WATERWAYS EXPERIMENT STATION                     **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
******************************************************************************
******************************************************************************


PRECIPITATION DATA FILE:    A:\help3\NYLF\PRECIP.D4
TEMPERATURE DATA FILE:      A:\HELP3\NYLF\TEMP.D7
SOLAR RADIATION DATA FILE:  a:\help3\NYLF\SOLAR.D13
EVAPOTRANSPIRATION DATA:    a:\help3\NYLF\EVPO.D11
SOIL AND DESIGN DATA FILE:  a:\help3\NYLF\SC16-.D10
OUTPUT DATA FILE:           a:\help3\NYLF\SC16-.OUT


TIME:   7:44     DATE:   8/29/2013


******************************************************************************

     TITLE:  COOPER CROUSE-HINDS LF - 1

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     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                   LAYER  1
                                   --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
                         MATERIAL TEXTURE NUMBER  10
          THICKNESS                   =      6.00   INCHES
          POROSITY                    =      0.3980 VOL/VOL
          FIELD CAPACITY              =      0.2440 VOL/VOL
          WILTING POINT               =      0.1360 VOL/VOL
          INITIAL SOIL WATER CONTENT  =      0.2621 VOL/VOL
          EFFECTIVE SAT. HYD. COND.   =  0.119999997000E-03 CM/SEC
        NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  5.00
                 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.


                                   LAYER  2
                                   --------
```

```
            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER  10
THICKNESS                    =     12.00   INCHES
POROSITY                     =      0.3980 VOL/VOL
FIELD CAPACITY               =      0.2440 VOL/VOL
WILTING POINT                =      0.1360 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.1633 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.119999997000E-03 CM/SEC


                         LAYER  3
                         --------

            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER   0
THICKNESS                    =    250.00   INCHES
POROSITY                     =      0.8500 VOL/VOL
FIELD CAPACITY               =      0.0100 VOL/VOL
WILTING POINT                =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0421 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =   1.57000005000     CM/SEC
SLOPE                        =     16.00   PERCENT
DRAINAGE LENGTH              =    194.0    FEET


                         LAYER  4
                         --------

            TYPE 4 - FLEXIBLE MEMBRANE LINER
              MATERIAL TEXTURE NUMBER  35
THICKNESS                    =      0.06   INCHES
POROSITY                     =      0.0000 VOL/VOL
FIELD CAPACITY               =      0.0000 VOL/VOL
WILTING POINT                =      0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.199999996000E-12 CM/SEC
FML PINHOLE DENSITY          =      1.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      3.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  3 - GOOD


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT
          SOIL DATA BASE USING SOIL TEXTURE #10 WITH A
          FAIR STAND OF GRASS, A SURFACE SLOPE OF 16.%
          AND A SLOPE LENGTH OF  194. FEET.

SCS RUNOFF CURVE NUMBER              =     86.70
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =    268.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =     14.054  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =    219.664  INCHES
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LOWER LIMIT OF EVAPORATIVE STORAGE  =      3.698  INCHES
INITIAL SNOW WATER                  =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS    =     14.054  INCHES
TOTAL INITIAL WATER                 =     14.054  INCHES
TOTAL SUBSURFACE INFLOW             =      0.00   INCHES/YEAR
```

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
Syracuse NY

```
STATION LATITUDE                        =  43.04 DEGREES
MAXIMUM LEAF AREA INDEX                 =   9.77
START OF GROWING SEASON (JULIAN DATE)   =    284
END OF GROWING SEASON (JULIAN DATE)     =     38
EVAPORATIVE ZONE DEPTH                  = 268.0  INCHES
AVERAGE ANNUAL WIND SPEED               =   6.00 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY   =   0.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY   =   0.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY   =   0.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY   =   0.00 %
```

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR Syracuse NY

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
2.61	2.65	3.11	3.34	3.16	3.63
3.76	3.77	3.29	3.14	3.45	3.20

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR Syracuse NY

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
22.80	24.00	33.30	46.10	57.00	66.30
70.90	69.30	62.10	51.30	40.60	28.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR Syracuse NY
AND STATION LATITUDE = 43.02 DEGREES

****

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 30

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.59	2.74	2.99	3.11	3.00	3.30
	3.44	4.00	3.33	3.14	3.32	3.24
STD. DEVIATIONS	0.76	0.91	1.25	1.15	1.31	1.13
	1.31	2.01	1.64	1.09	0.92	0.85
RUNOFF						
TOTALS	0.238	0.402	1.527	0.939	0.085	0.072
	0.056	0.097	0.103	0.030	0.044	0.126
STD. DEVIATIONS	0.332	0.416	1.055	0.669	0.195	0.126
	0.069	0.145	0.206	0.060	0.126	0.327
EVAPOTRANSPIRATION						
TOTALS	1.464	1.129	0.934	1.290	2.989	2.950
	3.127	3.250	2.926	2.635	2.793	1.844
STD. DEVIATIONS	0.274	0.232	0.339	0.927	1.108	0.764
	1.139	1.326	1.141	0.878	0.605	0.389
LATERAL DRAINAGE COLLECTED FROM LAYER 3						
TOTALS	0.0209	0.0000	0.0000	0.1848	1.4560	1.1183
	0.7427	0.6792	0.6117	0.5454	0.5144	0.2838
STD. DEVIATIONS	0.0517	0.0000	0.0000	0.3293	0.8571	0.4075
	0.1707	0.2091	0.1582	0.1681	0.1554	0.1349
PERCOLATION/LEAKAGE THROUGH LAYER 4						
TOTALS	0.0047	0.0000	0.0000	0.0237	0.1504	0.1484
	0.1190	0.1131	0.1036	0.0984	0.0973	0.0597
STD. DEVIATIONS	0.0116	0.0000	0.0000	0.0288	0.0638	0.0334
	0.0214	0.0266	0.0167	0.0208	0.0189	0.0239

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 4						
AVERAGES	0.0001	0.0000	0.0000	0.0010	0.0076	0.0062
	0.0041	0.0038	0.0035	0.0031	0.0030	0.0016
STD. DEVIATIONS	0.0003	0.0000	0.0000	0.0018	0.0043	0.0022
	0.0009	0.0011	0.0008	0.0009	0.0008	0.0007

****

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*******************************************************************************

     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   30
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     38.21    (   4.976)     138684.2     100.00

 RUNOFF                             3.720   (  1.1360)      13501.89      9.736

 EVAPOTRANSPIRATION                27.330   (  3.4917)      99209.28     71.536

 LATERAL DRAINAGE COLLECTED         6.15729 (  1.42895)     22350.947   16.11644
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH        0.91836 (  0.11858)      3333.659     2.40378
   LAYER  4

 AVERAGE HEAD ON TOP                0.003 (    0.001)
   OF LAYER  4

 CHANGE IN WATER STORAGE            0.079   (  2.2073)        288.37      0.208
*******************************************************************************


*******************************************************************************

              PEAK DAILY VALUES FOR YEARS    1 THROUGH   30
   ----------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                              2.64          9583.200

      RUNOFF                                     1.605         5826.3604

      DRAINAGE COLLECTED FROM LAYER  3           0.35195       1277.58313

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.020481        74.34752

      AVERAGE HEAD ON TOP OF LAYER  4            0.052

      MAXIMUM HEAD ON TOP OF LAYER  4            0.106

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 5.59         20303.6777


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.0924

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0516

       ***  Maximum heads are computed using McEnroe's equations.  ***

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
                        ASCE Journal of Environmental Engineering
                        Vol. 119, No. 2, March 1993, pp. 262-270.
```

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FINAL WATER STORAGE AT END OF YEAR 30

LAYER	(INCHES)	(VOL/VOL)
1	1.1789	0.1965
2	1.2250	0.1021
3	13.7324	0.0549
4	0.0000	0.0000
SNOW WATER	0.301	

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******************************************************************************
**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
**                    USAE WATERWAYS EXPERIMENT STATION                     **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
******************************************************************************
******************************************************************************


PRECIPITATION DATA FILE:    A:\help3\NYLF\PRECIP.D4
TEMPERATURE DATA FILE:      A:\HELP3\NYLF\TEMP.D7
SOLAR RADIATION DATA FILE:  a:\help3\NYLF\SOLAR.D13
EVAPOTRANSPIRATION DATA:    a:\help3\NYLF\EVPO.D11
SOIL AND DESIGN DATA FILE:  a:\help3\NYLF\SM16.D10
OUTPUT DATA FILE:           a:\help3\NYLF\SM16.OUT


TIME:   7:51     DATE:   8/29/2013


******************************************************************************

     TITLE:  COOPER CROUSE-HINDS LF - 1

******************************************************************************


     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                   LAYER  1
                                   --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
                         MATERIAL TEXTURE NUMBER   6
          THICKNESS                   =      6.00   INCHES
          POROSITY                    =      0.4530 VOL/VOL
          FIELD CAPACITY              =      0.1900 VOL/VOL
          WILTING POINT               =      0.0850 VOL/VOL
          INITIAL SOIL WATER CONTENT  =      0.2205 VOL/VOL
          EFFECTIVE SAT. HYD. COND.   =  0.720000011000E-03 CM/SEC
        NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  5.00
                 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.


                                   LAYER  2
                                   --------
```

```
            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER   6
THICKNESS                    =     12.00   INCHES
POROSITY                     =      0.4530 VOL/VOL
FIELD CAPACITY               =      0.1900 VOL/VOL
WILTING POINT                =      0.0850 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.1529 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.720000011000E-03 CM/SEC


                         LAYER  3
                         --------

            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER   0
THICKNESS                    =    250.00   INCHES
POROSITY                     =      0.8500 VOL/VOL
FIELD CAPACITY               =      0.0100 VOL/VOL
WILTING POINT                =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0437 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =   1.57000005000     CM/SEC
SLOPE                        =     16.00   PERCENT
DRAINAGE LENGTH              =    194.0    FEET


                         LAYER  4
                         --------

            TYPE 4 - FLEXIBLE MEMBRANE LINER
              MATERIAL TEXTURE NUMBER  35
THICKNESS                    =      0.06   INCHES
POROSITY                     =      0.0000 VOL/VOL
FIELD CAPACITY               =      0.0000 VOL/VOL
WILTING POINT                =      0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.199999996000E-12 CM/SEC
FML PINHOLE DENSITY          =      1.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      3.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  3 - GOOD


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT
          SOIL DATA BASE USING SOIL TEXTURE # 6 WITH A
          FAIR STAND OF GRASS, A SURFACE SLOPE OF 16.%
          AND A SLOPE LENGTH OF  194. FEET.

SCS RUNOFF CURVE NUMBER              =     71.80
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =    268.0    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =     14.094  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =    220.654  INCHES
```

```
LOWER LIMIT OF EVAPORATIVE STORAGE  =      2.780  INCHES
INITIAL SNOW WATER                  =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS    =     14.094  INCHES
TOTAL INITIAL WATER                 =     14.094  INCHES
TOTAL SUBSURFACE INFLOW             =      0.00   INCHES/YEAR
```

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
Syracuse NY

```
STATION LATITUDE                        =  43.04 DEGREES
MAXIMUM LEAF AREA INDEX                 =   9.77
START OF GROWING SEASON (JULIAN DATE)   =    284
END OF GROWING SEASON (JULIAN DATE)     =     38
EVAPORATIVE ZONE DEPTH                  = 268.0  INCHES
AVERAGE ANNUAL WIND SPEED               =   6.00 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY   =   0.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY   =   0.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY   =   0.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY   =   0.00 %
```

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR Syracuse NY

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
2.61	2.65	3.11	3.34	3.16	3.63
3.76	3.77	3.29	3.14	3.45	3.20

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR Syracuse NY

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
22.80	24.00	33.30	46.10	57.00	66.30
70.90	69.30	62.10	51.30	40.60	28.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR Syracuse NY
AND STATION LATITUDE = 43.02 DEGREES

****

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 30

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.59	2.74	2.99	3.11	3.00	3.30
	3.44	4.00	3.33	3.14	3.32	3.24
STD. DEVIATIONS	0.76	0.91	1.25	1.15	1.31	1.13
	1.31	2.01	1.64	1.09	0.92	0.85
RUNOFF						
TOTALS	0.085	0.147	0.628	0.392	0.019	0.002
	0.000	0.001	0.003	0.000	0.002	0.043
STD. DEVIATIONS	0.178	0.227	0.558	0.383	0.079	0.010
	0.000	0.004	0.010	0.000	0.009	0.138
EVAPOTRANSPIRATION						
TOTALS	1.464	1.129	0.934	1.272	2.936	2.909
	3.013	3.244	2.904	2.554	2.747	1.847
STD. DEVIATIONS	0.274	0.232	0.339	0.914	1.070	0.789
	1.123	1.274	1.076	0.870	0.595	0.410
LATERAL DRAINAGE COLLECTED FROM LAYER 3						
TOTALS	0.0319	0.0000	0.0000	0.3365	2.4932	1.7119
	0.9927	0.7997	0.6859	0.6031	0.5841	0.3779
STD. DEVIATIONS	0.0823	0.0000	0.0000	0.6456	1.3039	0.4486
	0.1896	0.1725	0.2070	0.1725	0.2228	0.2063
PERCOLATION/LEAKAGE THROUGH LAYER 4						
TOTALS	0.0058	0.0000	0.0000	0.0324	0.2040	0.1865
	0.1399	0.1231	0.1093	0.1038	0.1006	0.0678
STD. DEVIATIONS	0.0137	0.0000	0.0000	0.0425	0.0783	0.0260
	0.0162	0.0173	0.0180	0.0184	0.0224	0.0294

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 4						
AVERAGES	0.0002	0.0000	0.0000	0.0018	0.0128	0.0094
	0.0055	0.0045	0.0040	0.0034	0.0034	0.0022
STD. DEVIATIONS	0.0005	0.0000	0.0000	0.0033	0.0066	0.0024
	0.0010	0.0009	0.0011	0.0009	0.0012	0.0011

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     AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS    1 THROUGH   30
-------------------------------------------------------------------------------
                                       INCHES            CU. FEET       PERCENT
                                  -------------------   -------------   ---------
 PRECIPITATION                     38.21    (   4.976)     138684.2     100.00

 RUNOFF                             1.321   (  0.5700)       4797.03      3.459

 EVAPOTRANSPIRATION                26.953   (  3.3901)      97838.59     70.548

 LATERAL DRAINAGE COLLECTED         8.61697 (  1.52660)     31279.602   22.55456
   FROM LAYER  3

 PERCOLATION/LEAKAGE THROUGH        1.07326 (  0.10077)      3895.921     2.80920
   LAYER  4

 AVERAGE HEAD ON TOP                0.004 (    0.001)
   OF LAYER  4

 CHANGE IN WATER STORAGE            0.240   (  2.4962)        873.01      0.629
*******************************************************************************


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*******************************************************************************

               PEAK DAILY VALUES FOR YEARS    1 THROUGH   30
   ------------------------------------------------------------------------
                                                (INCHES)      (CU. FT.)
                                               ----------   -------------
      PRECIPITATION                              2.64          9583.200

      RUNOFF                                     1.140         4136.9331

      DRAINAGE COLLECTED FROM LAYER  3           0.32353       1174.43066

      PERCOLATION/LEAKAGE THROUGH LAYER  4       0.022236        80.71542

      AVERAGE HEAD ON TOP OF LAYER  4            0.047

      MAXIMUM HEAD ON TOP OF LAYER  4            0.092

      LOCATION OF MAXIMUM HEAD IN LAYER  3
            (DISTANCE FROM DRAIN)                0.0 FEET

      SNOW WATER                                 5.59         20303.6777


      MAXIMUM VEG. SOIL WATER (VOL/VOL)                  0.1165

      MINIMUM VEG. SOIL WATER (VOL/VOL)                  0.0511

       ***  Maximum heads are computed using McEnroe's equations.  ***

            Reference:  Maximum Saturated Depth over Landfill Liner
                        by Bruce M. McEnroe, University of Kansas
                        ASCE Journal of Environmental Engineering
                        Vol. 119, No. 2, March 1993, pp. 262-270.
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FINAL WATER STORAGE AT END OF YEAR 30

LAYER	(INCHES)	(VOL/VOL)
1	0.9321	0.1553
2	1.1638	0.0970
3	18.9123	0.0756
4	0.0000	0.0000
SNOW WATER	0.301	

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**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
**                    USAE WATERWAYS EXPERIMENT STATION                     **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
******************************************************************************
******************************************************************************


PRECIPITATION DATA FILE:    A:\help3\NYLF\PRECIP.D4
TEMPERATURE DATA FILE:      A:\HELP3\NYLF\TEMP.D7
SOLAR RADIATION DATA FILE:  a:\help3\NYLF\SOLAR.D13
EVAPOTRANSPIRATION DATA:    a:\help3\NYLF\EVPO.D11
SOIL AND DESIGN DATA FILE:  a:\help3\NYLF\SC5GSE.D10
OUTPUT DATA FILE:           a:\help3\NYLF\SC5GSE.OUT


TIME:   7:58     DATE:   8/29/2013


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     TITLE:  COOPER CROUSE-HINDS LANDFILL

******************************************************************************


     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                   LAYER  1
                                   --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
                         MATERIAL TEXTURE NUMBER  10
          THICKNESS                   =      6.00   INCHES
          POROSITY                    =      0.3980 VOL/VOL
          FIELD CAPACITY              =      0.2440 VOL/VOL
          WILTING POINT               =      0.1360 VOL/VOL
          INITIAL SOIL WATER CONTENT  =      0.2685 VOL/VOL
          EFFECTIVE SAT. HYD. COND.   =  0.119999997000E-03 CM/SEC
        NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  5.00
                 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.


                                   LAYER  2
                                   --------
```

```
          TYPE 1 - VERTICAL PERCOLATION LAYER
              MATERIAL TEXTURE NUMBER  10
THICKNESS                    =     12.00   INCHES
POROSITY                     =      0.3980 VOL/VOL
FIELD CAPACITY               =      0.2440 VOL/VOL
WILTING POINT                =      0.1360 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.2547 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.119999997000E-03 CM/SEC


                        LAYER  3
                        --------

            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER   0
THICKNESS                    =      0.25   INCHES
POROSITY                     =      0.8500 VOL/VOL
FIELD CAPACITY               =      0.0100 VOL/VOL
WILTING POINT                =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.2259 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =   1.60000002000     CM/SEC
SLOPE                        =      5.00   PERCENT
DRAINAGE LENGTH              =     50.0    FEET


                        LAYER  4
                        --------

            TYPE 4 - FLEXIBLE MEMBRANE LINER
              MATERIAL TEXTURE NUMBER   0
THICKNESS                    =      0.04   INCHES
POROSITY                     =      0.0000 VOL/VOL
FIELD CAPACITY               =      0.0000 VOL/VOL
WILTING POINT                =      0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.000000000000E+00 CM/SEC
FML PINHOLE DENSITY          =      1.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      3.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  3 - GOOD


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT
          SOIL DATA BASE USING SOIL TEXTURE #10 WITH A
          FAIR STAND OF GRASS, A SURFACE SLOPE OF  5.%
          AND A SLOPE LENGTH OF  501. FEET.

SCS RUNOFF CURVE NUMBER              =     85.60
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =     18.2    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      4.724  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      7.377  INCHES
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LOWER LIMIT OF EVAPORATIVE STORAGE  =      2.449  INCHES
INITIAL SNOW WATER                  =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS    =      4.724  INCHES
TOTAL INITIAL WATER                 =      4.724  INCHES
TOTAL SUBSURFACE INFLOW             =      0.00   INCHES/YEAR
```

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
Syracuse NY

```
STATION LATITUDE                        =  43.04 DEGREES
MAXIMUM LEAF AREA INDEX                 =   9.77
START OF GROWING SEASON (JULIAN DATE)   =    284
END OF GROWING SEASON (JULIAN DATE)     =     38
EVAPORATIVE ZONE DEPTH                  =  18.2  INCHES
AVERAGE ANNUAL WIND SPEED               =   6.00 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY   =   0.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY   =   0.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY   =   0.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY   =   0.00 %
```

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR Syracuse NY

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
2.61	2.65	3.11	3.34	3.16	3.63
3.76	3.77	3.29	3.14	3.45	3.20

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR Syracuse NY

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
22.80	24.00	33.30	46.10	57.00	66.30
70.90	69.30	62.10	51.30	40.60	28.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR Syracuse NY
AND STATION LATITUDE = 43.02 DEGREES

****

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 30

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.59	2.74	2.99	3.11	3.00	3.30
	3.44	4.00	3.33	3.14	3.32	3.24
STD. DEVIATIONS	0.76	0.91	1.25	1.15	1.31	1.13
	1.31	2.01	1.64	1.09	0.92	0.85
RUNOFF						
TOTALS	0.349	0.639	2.722	1.908	0.168	0.065
	0.058	0.122	0.113	0.034	0.048	0.167
STD. DEVIATIONS	0.450	0.569	1.540	1.035	0.408	0.113
	0.080	0.181	0.209	0.058	0.121	0.444
EVAPOTRANSPIRATION						
TOTALS	1.464	1.128	0.933	1.378	3.436	3.147
	3.305	3.499	3.157	2.766	2.881	1.875
STD. DEVIATIONS	0.275	0.233	0.339	1.005	1.162	0.812
	1.162	1.418	1.259	1.028	0.709	0.391
LATERAL DRAINAGE COLLECTED FROM LAYER 3						
TOTALS	0.0101	0.0000	0.0000	0.8702	0.4110	0.0755
	0.0393	0.1968	0.1168	0.0815	0.1212	0.1550
STD. DEVIATIONS	0.0326	0.0000	0.0000	0.6440	0.5526	0.1959
	0.1045	0.3911	0.2733	0.2226	0.3166	0.3261
PERCOLATION/LEAKAGE THROUGH LAYER 4						
TOTALS	0.0121	0.0000	0.0000	0.2133	0.1477	0.0373
	0.0255	0.0874	0.0519	0.0528	0.0558	0.0941
STD. DEVIATIONS	0.0354	0.0000	0.0000	0.1728	0.1558	0.0801
	0.0526	0.1397	0.0950	0.1152	0.1159	0.1578

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 4						
AVERAGES	0.0004	0.0000	0.0000	0.0431	0.0199	0.0034
	0.0017	0.0085	0.0052	0.0035	0.0054	0.0067
STD. DEVIATIONS	0.0014	0.0000	0.0000	0.0322	0.0282	0.0088
	0.0045	0.0170	0.0122	0.0097	0.0142	0.0141

****

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 30

	INCHES		CU. FEET	PERCENT
PRECIPITATION	38.21	(4.976)	138684.2	100.00
RUNOFF	6.393	(1.8036)	23205.16	16.732
EVAPOTRANSPIRATION	28.968	(3.8357)	105154.04	75.823
LATERAL DRAINAGE COLLECTED FROM LAYER 3	2.07758	(0.72969)	7541.608	5.43797
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.77793	(0.32010)	2823.898	2.03621
AVERAGE HEAD ON TOP OF LAYER 4	0.008	(0.003)		
CHANGE IN WATER STORAGE	-0.011	(1.2313)	-40.56	-0.029

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 30

	(INCHES)	(CU. FT.)
PRECIPITATION	2.64	9583.200
RUNOFF	1.911	6938.1104
DRAINAGE COLLECTED FROM LAYER 3	1.26038	4575.19043
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.155845	565.71722
AVERAGE HEAD ON TOP OF LAYER 4	2.393	
MAXIMUM HEAD ON TOP OF LAYER 4	2.789	
LOCATION OF MAXIMUM HEAD IN LAYER 3 (DISTANCE FROM DRAIN)	8.7 FEET	
SNOW WATER	5.59	20303.6777

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.3604

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1363

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

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FINAL WATER STORAGE AT END OF YEAR 30

LAYER	(INCHES)	(VOL/VOL)
1	1.3304	0.2217
2	2.7217	0.2268
3	0.0354	0.1417
4	0.0000	0.0000
SNOW WATER	0.301	

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**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
**                    USAE WATERWAYS EXPERIMENT STATION                     **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
******************************************************************************
******************************************************************************


PRECIPITATION DATA FILE:    A:\help3\NYLF\PRECIP.D4
TEMPERATURE DATA FILE:      A:\HELP3\NYLF\TEMP.D7
SOLAR RADIATION DATA FILE:  a:\help3\NYLF\SOLAR.D13
EVAPOTRANSPIRATION DATA:    a:\help3\NYLF\EVPO.D11
SOIL AND DESIGN DATA FILE:  a:\help3\NYLF\SM5GSE.D10
OUTPUT DATA FILE:           a:\help3\NYLF\SM5GSE.OUT


TIME:   8:21     DATE:   8/29/2013


******************************************************************************

     TITLE:  COOPER CROUSE-HINDS LANDFILL

******************************************************************************


     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                   LAYER  1
                                   --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
                         MATERIAL TEXTURE NUMBER   6
          THICKNESS                   =      6.00   INCHES
          POROSITY                    =      0.4530 VOL/VOL
          FIELD CAPACITY              =      0.1900 VOL/VOL
          WILTING POINT               =      0.0850 VOL/VOL
          INITIAL SOIL WATER CONTENT  =      0.2215 VOL/VOL
          EFFECTIVE SAT. HYD. COND.   =  0.720000011000E-03 CM/SEC
        NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  5.00
                 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.


                                   LAYER  2
                                   --------
```

```
            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER   6
THICKNESS                    =     12.00   INCHES
POROSITY                     =      0.4530 VOL/VOL
FIELD CAPACITY               =      0.1900 VOL/VOL
WILTING POINT                =      0.0850 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.2182 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.720000011000E-03 CM/SEC


                         LAYER  3
                         --------

            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER   0
THICKNESS                    =      0.25   INCHES
POROSITY                     =      0.8500 VOL/VOL
FIELD CAPACITY               =      0.0100 VOL/VOL
WILTING POINT                =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.1780 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =   1.60000002000     CM/SEC
SLOPE                        =      5.00   PERCENT
DRAINAGE LENGTH              =     50.0    FEET


                         LAYER  4
                         --------

            TYPE 4 - FLEXIBLE MEMBRANE LINER
              MATERIAL TEXTURE NUMBER  36
THICKNESS                    =      0.04   INCHES
POROSITY                     =      0.0000 VOL/VOL
FIELD CAPACITY               =      0.0000 VOL/VOL
WILTING POINT                =      0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.399999993000E-12 CM/SEC
FML PINHOLE DENSITY          =      1.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      3.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  3 - GOOD


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT
          SOIL DATA BASE USING SOIL TEXTURE # 6 WITH A
          FAIR STAND OF GRASS, A SURFACE SLOPE OF  5.%
          AND A SLOPE LENGTH OF  501. FEET.

SCS RUNOFF CURVE NUMBER              =     68.90
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =     18.2    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      3.992  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      8.367  INCHES
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LOWER LIMIT OF EVAPORATIVE STORAGE  =      1.531  INCHES
INITIAL SNOW WATER                  =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS    =      3.992  INCHES
TOTAL INITIAL WATER                 =      3.992  INCHES
TOTAL SUBSURFACE INFLOW             =      0.00   INCHES/YEAR
```

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
Syracuse NY

```
STATION LATITUDE                        =  43.04 DEGREES
MAXIMUM LEAF AREA INDEX                 =   9.77
START OF GROWING SEASON (JULIAN DATE)   =    284
END OF GROWING SEASON (JULIAN DATE)     =     38
EVAPORATIVE ZONE DEPTH                  =  18.2  INCHES
AVERAGE ANNUAL WIND SPEED               =   6.00 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY   =   0.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY   =   0.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY   =   0.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY   =   0.00 %
```

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR Syracuse NY

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
2.61	2.65	3.11	3.34	3.16	3.63
3.76	3.77	3.29	3.14	3.45	3.20

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR Syracuse NY

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
22.80	24.00	33.30	46.10	57.00	66.30
70.90	69.30	62.10	51.30	40.60	28.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR Syracuse NY
AND STATION LATITUDE = 43.02 DEGREES

****

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 30

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.59	2.74	2.99	3.11	3.00	3.30
	3.44	4.00	3.33	3.14	3.32	3.24
STD. DEVIATIONS	0.76	0.91	1.25	1.15	1.31	1.13
	1.31	2.01	1.64	1.09	0.92	0.85
RUNOFF						
TOTALS	0.155	0.344	2.025	1.633	0.120	0.000
	0.000	0.001	0.000	0.000	0.001	0.074
STD. DEVIATIONS	0.264	0.387	1.266	0.957	0.378	0.001
	0.000	0.004	0.001	0.000	0.004	0.259
EVAPOTRANSPIRATION						
TOTALS	1.464	1.128	0.933	1.366	3.341	3.150
	3.297	3.467	3.142	2.746	2.878	1.884
STD. DEVIATIONS	0.275	0.233	0.339	0.991	1.178	0.852
	1.173	1.394	1.230	0.988	0.691	0.402
LATERAL DRAINAGE COLLECTED FROM LAYER 3						
TOTALS	0.0140	0.0000	0.0000	1.8657	0.8396	0.1163
	0.0571	0.3007	0.2141	0.1287	0.1713	0.1684
STD. DEVIATIONS	0.0436	0.0000	0.0000	1.2229	1.1424	0.2604
	0.1408	0.4973	0.4325	0.2737	0.3894	0.3249
PERCOLATION/LEAKAGE THROUGH LAYER 4						
TOTALS	0.0146	0.0000	0.0000	0.3463	0.2363	0.0572
	0.0418	0.1276	0.0937	0.0848	0.0793	0.1081
STD. DEVIATIONS	0.0427	0.0000	0.0000	0.2460	0.2242	0.1051
	0.0739	0.1745	0.1433	0.1400	0.1320	0.1642

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 4						
AVERAGES	0.0006	0.0000	0.0000	0.1294	0.0544	0.0052
	0.0025	0.0130	0.0096	0.0056	0.0076	0.0073
STD. DEVIATIONS	0.0019	0.0000	0.0000	0.0888	0.0847	0.0116
	0.0061	0.0215	0.0193	0.0118	0.0174	0.0140

****

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 30

	INCHES		CU. FEET	PERCENT
PRECIPITATION	38.21	(4.976)	138684.2	100.00
RUNOFF	4.352	(1.5949)	15798.92	11.392
EVAPOTRANSPIRATION	28.797	(3.7653)	104534.64	75.376
LATERAL DRAINAGE COLLECTED FROM LAYER 3	3.87595	(0.96036)	14069.685	10.14513
PERCOLATION/LEAKAGE THROUGH LAYER 4	1.18967	(0.38629)	4318.496	3.11391
AVERAGE HEAD ON TOP OF LAYER 4	0.020	(0.004)		
CHANGE IN WATER STORAGE	-0.010	(1.3215)	-37.59	-0.027

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 30

	(INCHES)	(CU. FT.)
PRECIPITATION	2.64	9583.200
RUNOFF	1.787	6488.2466
DRAINAGE COLLECTED FROM LAYER 3	2.08964	7585.37549
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.297049	1078.28638
AVERAGE HEAD ON TOP OF LAYER 4	7.238	
MAXIMUM HEAD ON TOP OF LAYER 4	8.752	
LOCATION OF MAXIMUM HEAD IN LAYER 3 (DISTANCE FROM DRAIN)	16.8 FEET	
SNOW WATER	5.59	20303.6777

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.4072

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.0954

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

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FINAL WATER STORAGE AT END OF YEAR 30

LAYER	(INCHES)	(VOL/VOL)
1	1.0464	0.1744
2	2.3055	0.1921
3	0.0282	0.1127
4	0.0000	0.0000
SNOW WATER	0.301	

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**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
**                    USAE WATERWAYS EXPERIMENT STATION                     **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
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PRECIPITATION DATA FILE:    A:\help3\NYLF\PRECIP.D4
TEMPERATURE DATA FILE:      A:\HELP3\NYLF\TEMP.D7
SOLAR RADIATION DATA FILE:  a:\help3\NYLF\SOLAR.D13
EVAPOTRANSPIRATION DATA:    a:\help3\NYLF\EVPO.D11
SOIL AND DESIGN DATA FILE:  a:\help3\NYLF\sc16gse-.D10
OUTPUT DATA FILE:           a:\help3\NYLF\sc16gse-.OUT


TIME:  10:14     DATE:   8/29/2013


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     TITLE:  COOPER CROUSE-HINDS LANDFILL

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     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                   LAYER  1
                                   --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
                         MATERIAL TEXTURE NUMBER  10
          THICKNESS                   =      6.00   INCHES
          POROSITY                    =      0.3980 VOL/VOL
          FIELD CAPACITY              =      0.2440 VOL/VOL
          WILTING POINT               =      0.1360 VOL/VOL
          INITIAL SOIL WATER CONTENT  =      0.2703 VOL/VOL
          EFFECTIVE SAT. HYD. COND.   =  0.119999997000E-03 CM/SEC
        NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  5.00
                 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.


                                   LAYER  2
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```
            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER  10
THICKNESS                    =     12.00   INCHES
POROSITY                     =      0.3980 VOL/VOL
FIELD CAPACITY               =      0.2440 VOL/VOL
WILTING POINT                =      0.1360 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.2551 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.119999997000E-03 CM/SEC


                        LAYER  3
                        --------

            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER   0
THICKNESS                    =      0.25   INCHES
POROSITY                     =      0.8500 VOL/VOL
FIELD CAPACITY               =      0.0100 VOL/VOL
WILTING POINT                =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.2255 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.970000029000     CM/SEC
SLOPE                        =     16.00   PERCENT
DRAINAGE LENGTH              =     50.0    FEET


                        LAYER  4
                        --------

            TYPE 4 - FLEXIBLE MEMBRANE LINER
              MATERIAL TEXTURE NUMBER  36
THICKNESS                    =      0.04   INCHES
POROSITY                     =      0.0000 VOL/VOL
FIELD CAPACITY               =      0.0000 VOL/VOL
WILTING POINT                =      0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.399999993000E-12 CM/SEC
FML PINHOLE DENSITY          =      1.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      3.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  3 - GOOD


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT
          SOIL DATA BASE USING SOIL TEXTURE #10 WITH A
          FAIR STAND OF GRASS, A SURFACE SLOPE OF  5.%
          AND A SLOPE LENGTH OF  501. FEET.

SCS RUNOFF CURVE NUMBER             =     85.60
FRACTION OF AREA ALLOWING RUNOFF    =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE  =      1.000  ACRES
EVAPORATIVE ZONE DEPTH              =     18.2    INCHES
INITIAL WATER IN EVAPORATIVE ZONE   =      4.740  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE  =      7.377  INCHES
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LOWER LIMIT OF EVAPORATIVE STORAGE  =      2.449  INCHES
INITIAL SNOW WATER                  =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS    =      4.740  INCHES
TOTAL INITIAL WATER                 =      4.740  INCHES
TOTAL SUBSURFACE INFLOW             =      0.00   INCHES/YEAR
```

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
Syracuse NY

```
STATION LATITUDE                        =  43.04 DEGREES
MAXIMUM LEAF AREA INDEX                 =   9.77
START OF GROWING SEASON (JULIAN DATE)   =    284
END OF GROWING SEASON (JULIAN DATE)     =     38
EVAPORATIVE ZONE DEPTH                  =  18.2  INCHES
AVERAGE ANNUAL WIND SPEED               =   6.00 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY   =   0.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY   =   0.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY   =   0.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY   =   0.00 %
```

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR Syracuse NY

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
2.61	2.65	3.11	3.34	3.16	3.63
3.76	3.77	3.29	3.14	3.45	3.20

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR Syracuse NY

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
22.80	24.00	33.30	46.10	57.00	66.30
70.90	69.30	62.10	51.30	40.60	28.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR Syracuse NY
AND STATION LATITUDE = 43.02 DEGREES

****

AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 30

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.59	2.74	2.99	3.11	3.00	3.30
	3.44	4.00	3.33	3.14	3.32	3.24
STD. DEVIATIONS	0.76	0.91	1.25	1.15	1.31	1.13
	1.31	2.01	1.64	1.09	0.92	0.85
RUNOFF						
TOTALS	0.349	0.640	2.724	1.909	0.169	0.067
	0.062	0.129	0.113	0.035	0.050	0.168
STD. DEVIATIONS	0.451	0.569	1.541	1.036	0.409	0.115
	0.086	0.188	0.209	0.061	0.124	0.446
EVAPOTRANSPIRATION						
TOTALS	1.464	1.128	0.933	1.378	3.435	3.145
	3.322	3.499	3.149	2.773	2.888	1.880
STD. DEVIATIONS	0.275	0.233	0.339	1.004	1.159	0.809
	1.154	1.421	1.278	1.019	0.704	0.394
LATERAL DRAINAGE COLLECTED FROM LAYER 3						
TOTALS	0.0128	0.0000	0.0000	0.9106	0.4436	0.0768
	0.0354	0.2129	0.1073	0.1009	0.1354	0.1724
STD. DEVIATIONS	0.0408	0.0000	0.0000	0.6710	0.5831	0.2044
	0.1058	0.4139	0.2611	0.2518	0.3415	0.3564
PERCOLATION/LEAKAGE THROUGH LAYER 4						
TOTALS	0.0101	0.0000	0.0000	0.1621	0.1158	0.0274
	0.0170	0.0661	0.0368	0.0455	0.0437	0.0743
STD. DEVIATIONS	0.0295	0.0000	0.0000	0.1316	0.1177	0.0596
	0.0374	0.1050	0.0736	0.0909	0.0861	0.1220

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 4						
AVERAGES	0.0003	0.0000	0.0000	0.0215	0.0101	0.0018
	0.0008	0.0049	0.0025	0.0023	0.0032	0.0039
STD. DEVIATIONS	0.0009	0.0000	0.0000	0.0158	0.0133	0.0048
	0.0024	0.0095	0.0062	0.0058	0.0081	0.0081

****

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 30

	INCHES		CU. FEET	PERCENT
PRECIPITATION	38.21	(4.976)	138684.2	100.00
RUNOFF	6.417	(1.8083)	23293.17	16.796
EVAPOTRANSPIRATION	28.994	(3.8139)	105248.25	75.891
LATERAL DRAINAGE COLLECTED FROM LAYER 3	2.20802	(0.77258)	8015.104	5.77939
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.59879	(0.24389)	2173.606	1.56731
AVERAGE HEAD ON TOP OF LAYER 4	0.004	(0.001)		
CHANGE IN WATER STORAGE	-0.013	(1.2234)	-45.99	-0.033

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 30

	(INCHES)	(CU. FT.)
PRECIPITATION	2.64	9583.200
RUNOFF	1.913	6943.6450
DRAINAGE COLLECTED FROM LAYER 3	1.23188	4471.73877
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.094145	341.74506
AVERAGE HEAD ON TOP OF LAYER 4	0.872	
MAXIMUM HEAD ON TOP OF LAYER 4	1.647	
LOCATION OF MAXIMUM HEAD IN LAYER 3 (DISTANCE FROM DRAIN)	1.6 FEET	
SNOW WATER	5.59	20303.6777

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.3604

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.1367

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

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FINAL WATER STORAGE AT END OF YEAR 30

LAYER	(INCHES)	(VOL/VOL)
1	1.3391	0.2232
2	2.6871	0.2239
3	0.0328	0.1312
4	0.0000	0.0000
SNOW WATER	0.301	

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**                                                                          **
**                                                                          **
**              HYDROLOGIC EVALUATION OF LANDFILL PERFORMANCE               **
**                HELP MODEL VERSION 3.07  (1 NOVEMBER 1997)                **
**                  DEVELOPED BY ENVIRONMENTAL LABORATORY                   **
**                    USAE WATERWAYS EXPERIMENT STATION                     **
**             FOR USEPA RISK REDUCTION ENGINEERING LABORATORY              **
**                                                                          **
**                                                                          **
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PRECIPITATION DATA FILE:    A:\help3\NYLF\PRECIP.D4
TEMPERATURE DATA FILE:      A:\HELP3\NYLF\TEMP.D7
SOLAR RADIATION DATA FILE:  a:\help3\NYLF\SOLAR.D13
EVAPOTRANSPIRATION DATA:    a:\help3\NYLF\EVPO.D11
SOIL AND DESIGN DATA FILE:  a:\help3\NYLF\sm16gse-.D10
OUTPUT DATA FILE:           a:\help3\NYLF\sm16gse-.OUT


TIME:   9:41     DATE:   8/29/2013


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     TITLE:  COOPER CROUSE-HINDS LANDFILL

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     NOTE:  INITIAL MOISTURE CONTENT OF THE LAYERS AND SNOW WATER WERE
              COMPUTED AS NEARLY STEADY-STATE VALUES BY THE PROGRAM.


                                   LAYER  1
                                   --------

                     TYPE 1 - VERTICAL PERCOLATION LAYER
                         MATERIAL TEXTURE NUMBER   6
          THICKNESS                   =      6.00   INCHES
          POROSITY                    =      0.4530 VOL/VOL
          FIELD CAPACITY              =      0.1900 VOL/VOL
          WILTING POINT               =      0.0850 VOL/VOL
          INITIAL SOIL WATER CONTENT  =      0.2221 VOL/VOL
          EFFECTIVE SAT. HYD. COND.   =  0.720000011000E-03 CM/SEC
        NOTE:  SATURATED HYDRAULIC CONDUCTIVITY IS MULTIPLIED BY  5.00
                 FOR ROOT CHANNELS IN TOP HALF OF EVAPORATIVE ZONE.


                                   LAYER  2
                                   --------
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            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER   6
THICKNESS                    =     12.00   INCHES
POROSITY                     =      0.4530 VOL/VOL
FIELD CAPACITY               =      0.1900 VOL/VOL
WILTING POINT                =      0.0850 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.2185 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.720000011000E-03 CM/SEC


                         LAYER  3
                         --------

            TYPE 2 - LATERAL DRAINAGE LAYER
              MATERIAL TEXTURE NUMBER   0
THICKNESS                    =      0.25   INCHES
POROSITY                     =      0.8500 VOL/VOL
FIELD CAPACITY               =      0.0100 VOL/VOL
WILTING POINT                =      0.0050 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.1771 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.970000029000     CM/SEC
SLOPE                        =     16.00   PERCENT
DRAINAGE LENGTH              =     50.0    FEET


                         LAYER  4
                         --------

            TYPE 4 - FLEXIBLE MEMBRANE LINER
              MATERIAL TEXTURE NUMBER  36
THICKNESS                    =      0.04   INCHES
POROSITY                     =      0.0000 VOL/VOL
FIELD CAPACITY               =      0.0000 VOL/VOL
WILTING POINT                =      0.0000 VOL/VOL
INITIAL SOIL WATER CONTENT   =      0.0000 VOL/VOL
EFFECTIVE SAT. HYD. COND.    =  0.399999993000E-12 CM/SEC
FML PINHOLE DENSITY          =      1.00   HOLES/ACRE
FML INSTALLATION DEFECTS     =      3.00   HOLES/ACRE
FML PLACEMENT QUALITY        =  3 - GOOD


          GENERAL DESIGN AND EVAPORATIVE ZONE DATA
          ----------------------------------------

 NOTE:  SCS RUNOFF CURVE NUMBER WAS COMPUTED FROM DEFAULT
          SOIL DATA BASE USING SOIL TEXTURE # 6 WITH A
          FAIR STAND OF GRASS, A SURFACE SLOPE OF  5.%
          AND A SLOPE LENGTH OF  501. FEET.

SCS RUNOFF CURVE NUMBER              =     68.90
FRACTION OF AREA ALLOWING RUNOFF     =    100.0    PERCENT
AREA PROJECTED ON HORIZONTAL PLANE   =      1.000  ACRES
EVAPORATIVE ZONE DEPTH               =     18.2    INCHES
INITIAL WATER IN EVAPORATIVE ZONE    =      3.999  INCHES
UPPER LIMIT OF EVAPORATIVE STORAGE   =      8.367  INCHES
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LOWER LIMIT OF EVAPORATIVE STORAGE  =      1.531  INCHES
INITIAL SNOW WATER                  =      0.000  INCHES
INITIAL WATER IN LAYER MATERIALS    =      3.999  INCHES
TOTAL INITIAL WATER                 =      3.999  INCHES
TOTAL SUBSURFACE INFLOW             =      0.00   INCHES/YEAR
```

EVAPOTRANSPIRATION AND WEATHER DATA

NOTE: EVAPOTRANSPIRATION DATA WAS OBTAINED FROM
Syracuse NY

```
STATION LATITUDE                        =  43.04 DEGREES
MAXIMUM LEAF AREA INDEX                 =   9.77
START OF GROWING SEASON (JULIAN DATE)   =    284
END OF GROWING SEASON (JULIAN DATE)     =     38
EVAPORATIVE ZONE DEPTH                  =  18.2  INCHES
AVERAGE ANNUAL WIND SPEED               =   6.00 MPH
AVERAGE 1ST QUARTER RELATIVE HUMIDITY   =   0.00 %
AVERAGE 2ND QUARTER RELATIVE HUMIDITY   =   0.00 %
AVERAGE 3RD QUARTER RELATIVE HUMIDITY   =   0.00 %
AVERAGE 4TH QUARTER RELATIVE HUMIDITY   =   0.00 %
```

NOTE: PRECIPITATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR Syracuse NY

NORMAL MEAN MONTHLY PRECIPITATION (INCHES)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
2.61	2.65	3.11	3.34	3.16	3.63
3.76	3.77	3.29	3.14	3.45	3.20

NOTE: TEMPERATURE DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR Syracuse NY

NORMAL MEAN MONTHLY TEMPERATURE (DEGREES FAHRENHEIT)

JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
22.80	24.00	33.30	46.10	57.00	66.30
70.90	69.30	62.10	51.30	40.60	28.30

NOTE: SOLAR RADIATION DATA WAS SYNTHETICALLY GENERATED USING
COEFFICIENTS FOR Syracuse NY
AND STATION LATITUDE = 43.02 DEGREES

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AVERAGE MONTHLY VALUES IN INCHES FOR YEARS 1 THROUGH 30

	JAN/JUL	FEB/AUG	MAR/SEP	APR/OCT	MAY/NOV	JUN/DEC
PRECIPITATION						
TOTALS	2.59	2.74	2.99	3.11	3.00	3.30
	3.44	4.00	3.33	3.14	3.32	3.24
STD. DEVIATIONS	0.76	0.91	1.25	1.15	1.31	1.13
	1.31	2.01	1.64	1.09	0.92	0.85
RUNOFF						
TOTALS	0.156	0.345	2.028	1.634	0.120	0.000
	0.000	0.001	0.000	0.000	0.001	0.074
STD. DEVIATIONS	0.265	0.388	1.268	0.957	0.378	0.001
	0.000	0.004	0.001	0.000	0.004	0.260
EVAPOTRANSPIRATION						
TOTALS	1.464	1.128	0.933	1.366	3.342	3.149
	3.298	3.469	3.135	2.753	2.878	1.884
STD. DEVIATIONS	0.275	0.233	0.339	0.991	1.178	0.849
	1.173	1.396	1.240	1.002	0.691	0.403
LATERAL DRAINAGE COLLECTED FROM LAYER 3						
TOTALS	0.0170	0.0000	0.0000	1.9703	0.8844	0.1322
	0.0672	0.3326	0.2353	0.1495	0.1911	0.1931
STD. DEVIATIONS	0.0523	0.0000	0.0000	1.2916	1.1997	0.2899
	0.1567	0.5435	0.4647	0.3095	0.4209	0.3640
PERCOLATION/LEAKAGE THROUGH LAYER 4						
TOTALS	0.0117	0.0000	0.0000	0.2336	0.1746	0.0452
	0.0339	0.0985	0.0720	0.0674	0.0623	0.0854
STD. DEVIATIONS	0.0342	0.0000	0.0000	0.1724	0.1559	0.0816
	0.0579	0.1334	0.1079	0.1095	0.0995	0.1274

AVERAGES OF MONTHLY AVERAGED DAILY HEADS (INCHES)

DAILY AVERAGE HEAD ON TOP OF LAYER 4						
AVERAGES	0.0004	0.0000	0.0000	0.0594	0.0263	0.0031
	0.0015	0.0075	0.0055	0.0034	0.0045	0.0044
STD. DEVIATIONS	0.0012	0.0000	0.0000	0.0408	0.0402	0.0068
	0.0036	0.0123	0.0109	0.0070	0.0099	0.0083

****

AVERAGE ANNUAL TOTALS & (STD. DEVIATIONS) FOR YEARS 1 THROUGH 30

	INCHES		CU. FEET	PERCENT
PRECIPITATION	38.21	(4.976)	138684.2	100.00
RUNOFF	4.358	(1.5960)	15819.25	11.407
EVAPOTRANSPIRATION	28.800	(3.7645)	104542.24	75.382
LATERAL DRAINAGE COLLECTED FROM LAYER 3	4.17265	(1.05465)	15146.716	10.92173
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.88469	(0.29757)	3211.408	2.31563
AVERAGE HEAD ON TOP OF LAYER 4	0.010	(0.002)		
CHANGE IN WATER STORAGE	-0.010	(1.3240)	-35.47	-0.026

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PEAK DAILY VALUES FOR YEARS 1 THROUGH 30

	(INCHES)	(CU. FT.)
PRECIPITATION	2.64	9583.200
RUNOFF	1.788	6491.1807
DRAINAGE COLLECTED FROM LAYER 3	2.56408	9307.60742
PERCOLATION/LEAKAGE THROUGH LAYER 4	0.190211	690.46436
AVERAGE HEAD ON TOP OF LAYER 4	3.671	
MAXIMUM HEAD ON TOP OF LAYER 4	3.899	
LOCATION OF MAXIMUM HEAD IN LAYER 3 (DISTANCE FROM DRAIN)	4.0 FEET	
SNOW WATER	5.59	20303.6777

MAXIMUM VEG. SOIL WATER (VOL/VOL) 0.4070

MINIMUM VEG. SOIL WATER (VOL/VOL) 0.0970

*** Maximum heads are computed using McEnroe's equations. ***

Reference: Maximum Saturated Depth over Landfill Liner
by Bruce M. McEnroe, University of Kansas
ASCE Journal of Environmental Engineering
Vol. 119, No. 2, March 1993, pp. 262-270.

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FINAL WATER STORAGE AT END OF YEAR 30

LAYER	(INCHES)	(VOL/VOL)
1	1.0475	0.1746
2	2.3278	0.1940
3	0.0293	0.1174
4	0.0000	0.0000
SNOW WATER	0.301	

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Calculate Allowable Transmissivity of Skaps Geocomposite, θ_{allow}, given by Koerner & Koerner's equation and reduction values (see Part III of reference 2):

$$\theta_{allow} = \frac{\theta_{ultimate}}{RF_{IN} \times RF_{CR} \times RF_{CC} \times RF_{BC}}$$

where θ_{allow} = allowable transmissivity of drainage geocomposite to be supplied
$\theta_{ultimate}$ = index transmissivity measured in accordance with ASTM

RF_{IN} = Reduction factor for intrusion into the core (ranges from 1.2 to 2.0)
= 1.3
Intrusion occurs when the geotextile is pushed into the open spaces in the drainage core, the worst case is when a lightweight nonwoven needle-punched geotextile is used, since the pressure on the geocomposite is relatively low a value of 1.3 was used.

RF_{CR} = Reduction factor for creep (Ranges from 1.4 to 2.0)
= 1.4
The geocomposite core compression strength requirement is twice the maximum load in order to minimize the effects of creep. A value of 1.33 was determined under 10,000 psf extrapolated to a 50-year design life, but the range for RF_{CR} is only between 1.4 and 2.0 therefore a the lower value of 1.4 was used.

RF_{CC} = Reduction factor for chemical clogging (ranges from 1.5 to 2.0)
= 1.5
Chemical clogging results when the drainage core is clogged with precipitates. High values are used when there is high alkalinity groundwater or total suspended solids (TSS) values greater than 5,000. A reduction factor of 1.5 was chosen.

RF_{BC} = reduction factor for biological clogging (rages from 1.5 to 2.0)
= 2
Biological clogging occurs when growth of organisms and roots extend through the geotextile. Biological clogging is likely due to potential for roots in the vegetation to extend through the drainage layer.

Reduction Factors = 5.5

The ultimate transmissivity of a Geocomposite 250 mil double sided 8oz/yd^2 geocomposite is for a confining stress of 4,000 psf and a gradient of 0.2 is 0.00055 m^2/sec (provided by Skaps on April 18, 2013):

$\theta_{ultimate}$ = **5.50E-04** m^2/s
θ_{allow} = $\theta_{ultimate}$ / Reduction Factors
θ_{allow} = 1.01E-04 m^2/s
θ_{allow} = 1.01 cm^2/s
effective saturated hydraulic conductivity= θ_{allow} /thickness of drainage layer
1.59 cm/s = Input in HELP

The ultimate transmissivity of a Geocomposite 250 mil double sided 8oz/yd^2 geocomposite is for a confining stress of 4,000 psf and a gradient of 0.05 is 0.0008 m^2/sec (provided by Skaps on April 18, 2013):

$\theta_{ultimate}$ = **8.00E-04** m^2/s
θ_{allow} = $\theta_{ultimate}$ / Reduction Factors
θ_{allow} = 1.47E-04 m^2/s
θ_{allow} = 1.47 cm^2/s
effective saturated hydraulic conductivity= θ_{allow} /thickness of drainage layer
2.88 cm/s = Input in HELP

REFERENCES:

1. Koerner, R.M., 2005. Designing with Geosynthetics, 5th Edition, Pearson/Prentice Hall, New Jersey.

2. Koerner, R.M., and Koerner, G.R. 2007. GSI White Paper #4, Reduction Factors Used in Geosynthetic Design, Revision 1, Geosynthetic Institute, Folsom, PA.

Calculate Allowable Transmissivity of GSE Geocomposite, θ_{allow}, given by Koerner & Koerner's equation and reduction values (see Part III of reference 2):

$$\theta_{allow} = \frac{\theta_{ultimate}}{RF_{IN} \times RF_{CR} \times RF_{CC} \times RF_{BC}}$$

where θ_{allow} = allowable transmissivity of drainage geocomposite to be supplied
$\theta_{ultimate}$ = index transmissivity measured in accordance with ASTM

RF_{IN} = Reduction factor for intrusion into the core (ranges from 1.2 to 2.0)
= 1.3
Intrusion occurs when the geotextile is pushed into the open spaces in the drainage core, the worst case is when a lightweight nonwoven needle-punched geotextile is used, since the pressure on the geocomposite is relatively low a value of 1.3 was used.

RF_{CR} = Reduction factor for creep (Ranges from 1.4 to 2.0)
= 1.4
The geocomposite core compression strength requirement is twice the maximum load in order to minimize the effects of creep. A value of 1.33 was determined under 10,000 psf extrapolated to a 50-year design life, but the range for RF_{CR} is only between 1.4 and 2.0 therefore a the lower value of 1.4 was used.

RF_{CC} = Reduction factor for chemical clogging (ranges from 1.5 to 2.0)
= 1.5
Chemical clogging results when the drainage core is clogged with precipitates. High values are used when there is high alkalinity groundwater or total suspended solids (TSS) values greater than 5,000. A reduction factor of 1.5 was chosen.

RF_{BC} = reduction factor for biological clogging (rages from 1.5 to 2.0)
= 2
Biological clogging occurs when growth of organisms and roots extend through the geotextile. Biological clogging is likely due to potential for roots in the vegetation to extend through the drainage layer.

Reduction Factors = 5.5

The ultimate transmissivity of a Geocomposite 250 mil double sided 8oz/yd^2 geocomposite is for a confining stress of 4,000 psf and a gradient of 0.16 is 0.000335 m^2/sec (provided by Skaps on April 18, 2013):

$\theta_{ultimate}$ = **3.35E-04** m^2/s
θ_{allow} = $\theta_{ultimate}$ / Reduction Factors
θ_{allow} = 6.14E-05 m^2/s
θ_{allow} = 0.61 cm^2/s
effective saturated hydraulic conductivity= θ_{allow} /thickness of drainage layer
0.97 cm/s = Input in HELP

The ultimate transmissivity of a Geocomposite 250 mil double sided 8oz/yd^2 geocomposite is for a confining stress of 3,812 psf and a gradient of 0.05 is 0.000555 m^2/sec (provided by Skaps on April 18, 2013):

$\theta_{ultimate}$ = **5.55E-04** m^2/s
θ_{allow} = $\theta_{ultimate}$ / Reduction Factors
θ_{allow} = 1.02E-04 m^2/s
θ_{allow} = 1.02 cm^2/s
effective saturated hydraulic conductivity= θ_{allow} /thickness of drainage layer
1.60 cm/s = Input in HELP

REFERENCES:

1. Koerner, R.M., 2005. Designing with Geosynthetics, 5th Edition, Pearson/Prentice Hall, New Jersey.

2. Koerner, R.M., and Koerner, G.R. 2007. GSI White Paper #4, Reduction Factors Used in Geosynthetic Design, Revision 1, Geosynthetic Institute, Folsom, PA.

DATE	4/17/2013	**JOB**	Cooper Crouse-Hinds Landfill
CALC BY	MMO	**Description**	Overburden Stress on Geomembrane (14-Inch Thick Cover)
JN	2013-0030	**Checked By**	CHM

Step 1 - Calculate the allowable pressure on the 8 oz/yd^2 geotextile on floor

$$P'_{allow} = \left(450\,\frac{M_A}{H^2}\right)\left(\frac{1}{MF_S \bullet MF_{PC} \bullet MF_A}\right)\frac{1}{FS_{CR} \bullet FS_{CBD}}$$

Formula from Smart Solutions Technical Note SM-116. (Reference 1)

attached to each side.

P'_{allow}= Allowable pressure on geomembrane (kPa)

450 = Empirical constant (kPA * mm^2/(g/m^2))

M_A = Required mass per unit area (g/m^2)

H = Effective height of protrusion. It may be estimated as half of the maximum particle diameter of stones where protection is sought from uniformly packed stones (mm). Assumed stones would be 1-inch or less

MF_S = Modification factor for protrusion (dimensionless)

MF_{PC} = Modification factor for protrusion configuration (dimensionless)

MF_A = Modification factor for overburden arching effect (dimensionless)

FS_{CR} = Factor of safety for geotextile creep (dimensionless)

Used FS_{CR} for nonwoven, needle=-punched geotextile mass per unit area of 270g/m^2.

FS_{CBD} = Factor of safety for geotextile chemical/biological degradation (dimensionless)

M_A =	Unknown	g/m^2
H =	12.7	mm
MF_S =	1	most conservative value for angular protrusion shape
MF_{PC} =	0.5	for uniformly packed protrusions
MF_A =	0.25	maximum
FS_{CR} =	1.77959	
FS_{CBD} =	1	normal for 3<pH<10
P'_{allow}=	**12.54**	M_A kPa

Step 2 - Estimate the Anticipated Pressure on the geomembrane
Determine the overburden stress from equipment load.
Per equation 2.1, *Geomembrane Protection Design Manual,* Narejo & Corcoran (1996). Chapter

Calculate the overburden stress caused by a D-9 dozer

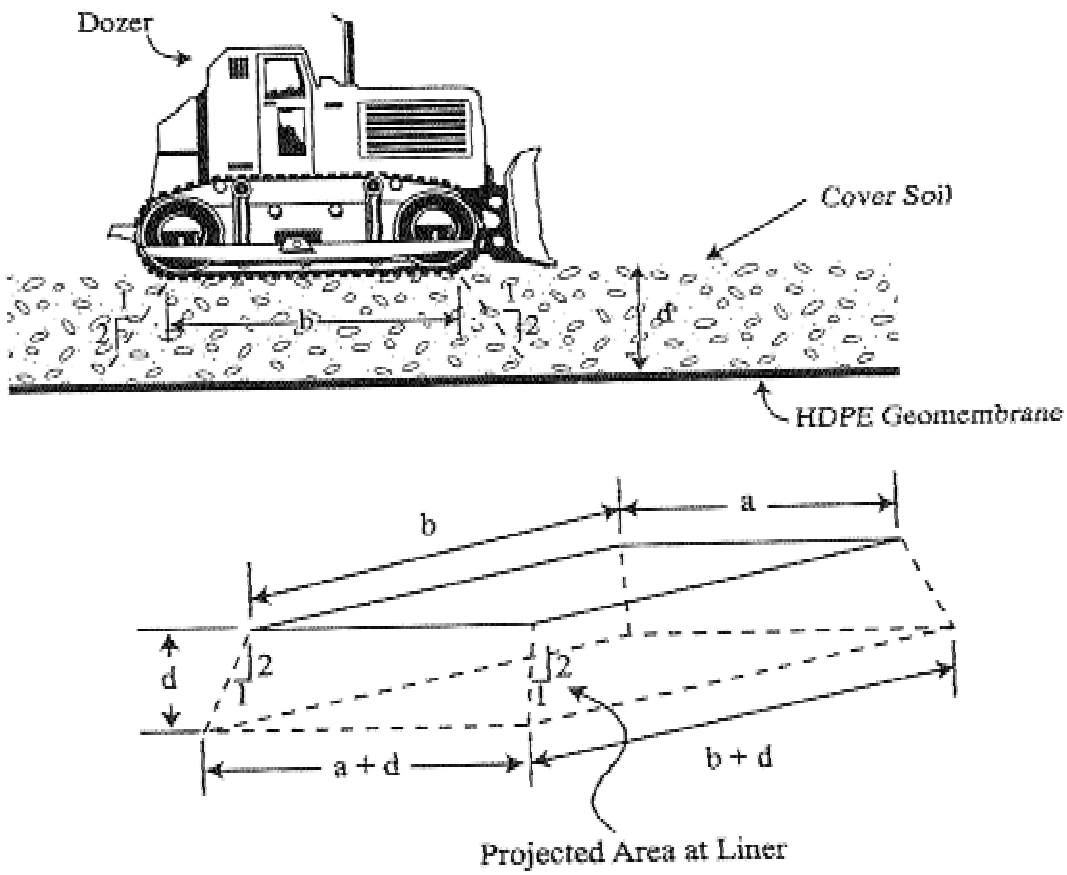

Figure 2.4 Calculation of Stress on Geomembrane for Track Type Vehicles.

Where,

W = Operating weight of dozer (lb)	W=	105,630
Ag = Track area at geomembrane surface (ft^2)	Ag=	40.14
= (a+d) x (b+d)		
a= 1.833333333 d= 18 inches		
b= 10.54166667		
d = Depth of Soil	d (feet) =	1.50
(6-inches topsoil + 12 inches of select fill)		
γ_{soil} = Unit weight of the overlying soil (lb/ft^3)	γ_{soil} =	120

γ_{soil} = estimated conservative value.

$\sigma_{geomembrane}$= **2,811.61** lb/ft^2

Calculate overburden stress caused by a 40-ton articulated truck

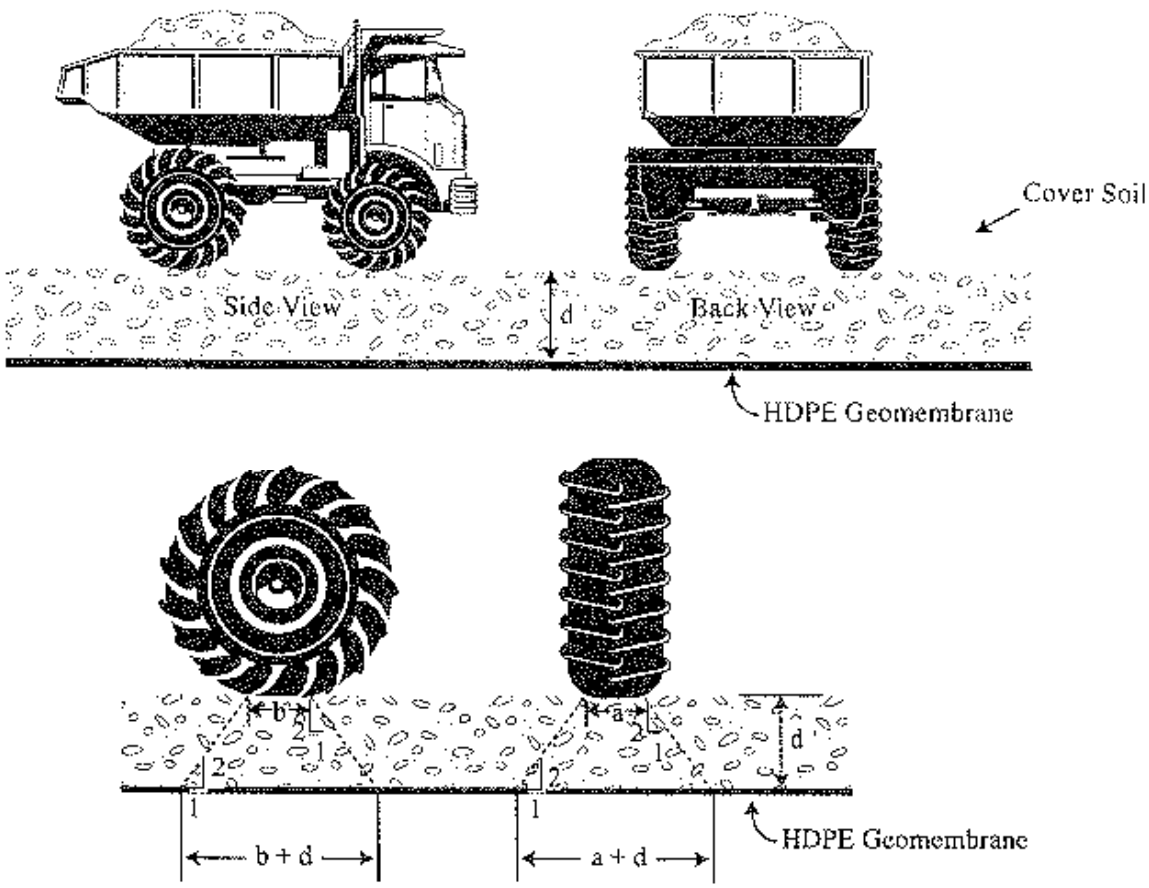

Figure 2.5 Stress Over Liner from Rubber Tire Vehicles.

Where,

m = Load distribution factor m= 0.34

34% of the load is on the front wheels. 33% is on the center and rear.

W = Operating weight of truck + Load (lb) W= 144,512

assume largest truck (worst case) = CAT D400E

Empty Operating Weight = 64,152 lb

Max Rated Load = 80,000 lb

Max Tire Load =(0.34W)/(2 Tires)= 24,567 lb per tire

Ground Pressure of the tire caused by this tire load of an articulated truck assurming Flat Plate

Tire Ground Pressure 50 psi

Contact Area of Tire 3.41 (ft^2)

Ag = Area of Tire at geomembrane surface (ft^2)

Tires are 29.5R25 Radials. Width = 29.5 inches.

Ag = (a+d) x (b+d)

a= 2.46 d= 1.50

b= calculated contact area of tire 3.41 ft^2/a

b= 1.39

Ag=	11.43

d = Depth of Soil	d=	1.50
γ_{soil} = Unit weight of the overlying soil (lb/ft^3)	γ_{soil} =	120
I_{if} = Impact factor	I_{if} =	1.3
I_{ol} = Overload factor	I_{ol} =	1.3

$\sigma_{geomembrane}$ =	**3,811.9**	lb/ft^2

The truck load governs

Use 250 mil fabriNetHF. Compression Strength of up to 10,000 psf. For a factor of safety greater than 2. Reference 3 Appendix A

σ_{truck} =	**182.5**	kPa

Step 3 - Calculate required mass per unit area

$P'_{allow} = FS_{gmin} * P_{actual}$

P'_{allow} = Allowable pressure on the geomembrane in terms of M_A (Step 1)

FS_{gmin}=Global Factor of Safety (dimensionless) for a uniform packed surface

FS_{gmin}=	3		
P_{actual}=	182.5	kPa	$P_{actual}=\sigma_{truck}$ from step 2
$FS_{gmin} * P_{actual}$ =	547.5	kPa	
P'_{allow}=	**12.5**	M_A kPa	

Solve for M_A, required mass per unit

$M_A=(FS_{gmin} * P_{actual})/P'_{allow}$

$M_{A=}$	**43.7**	**g/m^2**
$M_{A=}$	**1.83**	**oz/yd^2**

Actual Mass Per Unit Area for Selected Materials: 8 oz/yd^2

<u>Geocomposite</u>

8 oz/yd^2 of nonwoven, needle punched geotextile on both sides

8 oz/yd^2 >M_A of 1.83 oz/yd^2, Okay

The geotextile above the geomembrane layer will act as a protective cushion barrier. The geocomposite 8 oz/yd^2 geotextile exceeds the minimum required mass per unit area for protection of the geomembrane layer calculated in step 3

REFERENCES

1. Koerner, R.M., 2005. Designing with Geosynthetics, 5th Edition, Pearson/Prentice Hall, New Jersey.
2. SI Geosolutions, 1999. Smart Solutions Technical Note SM-116.
3. GSE, 2007. Drainage Design Manual, Second Edition