Sterling Environmental Engineering, P.C.

ORANGE COUNTY LANDFILL
ROUTE 17M, GOSHEN, NEW YORK
(NYSDEC SITE NO. 336007)

LONG-TERM SEEP ELIMINATION FEASIBILITY STUDY

Prepared for:

Orange County Department of Public Works
Division of Environmental Facilities and Services
P.O. Box 637
2455-2459 Route 17M
Goshen, New York 10924

Prepared by:

Sterling Environmental Engineering, P.C.
24 Wade Road
Latham, New York 12110

January 29, 2015

"Serving our clients and the environment since 1993"

ORANGE COUNTY LANDFILL
ROUTE 17M, GOSHEN, NEW YORK
(NYSDEC SITE NO. 336007)

LONG-TERM SEEP ELIMINATION FEASIBILITY STUDY

TABLE OF CONTENTS

Tables

Figures

Appendices

CERTIFICATION

I, Mark P. Millspaugh, P.E., certify that I am currently a New York State registered professional engineer and that this Long-term Seep Elimination Feasibility Study was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the Division of Environmental Remediation (DER) Technical Guidance for Site Investigation and Remediation (DER-10).

Mark P. Millspaugh, P.E.

1/29/15
Date

LIST OF ACRONYMS

Acronym	Definition
BMPs	Best Management Practices
CAMP	Community Air Monitoring Plan
COC	Contaminants of Concern
DER-10	Division of Environmental Remediation/Technical Guidance for Site Investigation and Remediation
EC	Engineering Control
FS	Feasibility Study
GHG	Greenhouse Gas
GPD	Gallons Per Day
GPM	Gallons Per Minute
HASP	Health and Safety Plan
IC	Institutional Control
IRM	Interim Remedial Measure
MRC©	Metals Remediation Compound
NWP	Nationwide Permit
NYSDEC	New York State Department of Environmental Conservation
NYSDOT	New York State Department of Transportation
O&M	Operation & Maintenance
OCDPW	Orange County Department of Public Works
OMH	New York State Office of Mental Health
Order	Order on Consent
OSHA	Occupational Safety and Health Administration
PPE	Personal Protective Equipment
PRAP	Preliminary Remedial Action Plan
PRR	Periodic Review Report
RAO	Remedial Action Objective
RD/RA	Remedial Design/Remedial Action
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SCG	Standards, Criteria, and Guidance
SCO	Soil Cleanup Objective
SMP	Site Management Plan
SPDES	State Pollutant Discharge Elimination System
USACOE	Unites States Army Corps of Engineers
WWTP	Wastewater Treatment Plant

1.0 INTRODUCTION

1.1 Background

The New York State Department of Environmental Conservation (NYSDEC) and Orange County have entered into an Order on Consent (Order) requiring Orange County to undertake specific action with regards to seeps of groundwater adjacent to the existing Orange County Landfill. A copy of the Order is provided as Appendix A.

Paragraph II.D. of the Order requires preparation of a Long-term Seep Elimination Feasibility Study (FS) to evaluate discrete remedial actions to respond to the seeps.

The Order also requires submission of a Long-term Seep Evaluation Report which contains a detailed assessment of the seeps along with the environmental and hydrogeologic setting. Lastly, the Order requires submission of an Expedited Interim Remedial Measures (IRM) Work Plan. These documents were previously submitted to the NYSDEC on December 3, 2014.

1.2 Purpose of the Feasibility Study

This FS is in response to a citizen complaint that seeps were observed adjacent to the Landfill. Due to the Canal's proximity to the Landfill, the NYSDEC notified Orange County that the seeps may indicate the Landfill perimeter leachate collection system is not functioning properly. The County immediately responded, and has continued to respond, as documented in the Long-term Seep Evaluation Report. Site characterizations regarding the seeps are documented in the Long-term Seep Evaluation Report.

This FS serves to provide rationale for selection of a remedy that will eliminate seeps of impacted groundwater and be protective of public health and the environment. Remediation alternatives for the site are developed by combining site-specific and appropriate remedial technologies. A detailed analysis of each alternative is performed as part of the FS.

The objectives of this FS are to: 1) identify whether the seep area, or specific media, requires remediation; 2) define remedial objectives for the seep area, 3) develop general response actions that will satisfy the remedial objectives; and, 4) develop and screen remedial alternatives for the seep area.

1.3 Historical Perspective

The Landfill footprint totals approximately 75-acres owned by Orange County approximately three (3) miles west of the Village of Goshen, south of NYS Route 17M. The property is bound by the Cheechunk Canal to the southeast and by the old channel of the Wallkill River to the northwest and southwest. The site location is presented on Figure 1. Property features are presented on the aerial photograph provided as Figure 2.

The Orange County Department of Public Works (OCDPW) operated the Landfill between 1974 and January 1992. In March 1992, the Landfill was classified by the NYSDEC as a "Class 2" Inactive Hazardous Waste Disposal Site, indicating "a site which the disposal of hazardous waste constitutes a threat to human health or environment". The "threat" was the possibility of the contamination of a principal aquifer underlying the site. The County initiated a comprehensive Remedial Investigation and Feasibility Study (RI/FS) which was finalized in 1996. A Record of Decision (ROD) dated January 28, 1994 was adopted addressing the immediate capping of the wastemass, Operable Unit No. 2, as a means of source control. A perimeter leachate collection system and surface water runoff collection system were installed in November 1995, prior to the capping of the Landfill. Construction of the Landfill cap was

completed in November 1995. The final cap directed surface water runoff to onsite recharge/settling basins, eventually discharging into the Wallkill River and Cheechunk Canal. Leachate collected by the perimeter leachate collection system is pumped into leachate tanks and transported offsite for treatment and disposal at permitted wastewater treatment plant (WWTP) facilities.

The March 26, 1998 ROD was issued based on the results of the RI/FS in 1996 and required the continued operation and monitoring of the leachate collection system, leachate disposal and continued environmental monitoring of the site, Operable Unit 01, as a whole.

2.0 INTERIM REMEDIAL MEASURES (IRM)

Paragraph II.C. of the Order required submission of an Expedited IRM Work Plan. A Work Plan dated December 3, 2014 evaluated potential interim response measures and was submitted to the NYSDEC. The IRMs in the following sections were identified in the Expedited IRM Work Plan in accordance with Section 1.11 of DER-10. These are remedial actions which could be implemented prior to the completion of a permanent remedy to mitigate environmental and human exposure; however, due to certain logistics and time constraints, it is likely that the identified IRMs could not be implemented any sooner than a final remedy proposed by this FS. The IRMs identified in the Expedited IRM Work Plan include the following.

2.1 Erosion Control

This option provides for controlling erosion of the Canal at the location of the seeps. Obvious seep areas will be armored to control erosion and further sloughing. Existing, active seeps would be properly armored by overlaying each seep with a medium to heavy woven geotextile filter fabric and covered by at least twenty-four (24) inches of NYSDOT medium stone fill rip-rap. Stabilization is a recognized Best Management Practice (BMP) in the Wallkill Watershed.[1]

Armoring would be performed by use of a crane. Soft sediments and steep slopes preclude use of heavy earth moving equipment.

2.2 Excavation

The red stained soil and iron floc can be excavated and disposed of at a permitted facility. Due to the soft sediments in this area, hand excavation of stained sediments is proposed. The excavated material would be placed in containers to be removed by crane. The material removed would require characterization for disposal. Following receipt of laboratory data, arrangements would be completed to remove the soil for disposal at a permitted facility. Any such excavation should be followed with appropriate armoring.

[1] Wallkill River Watershed Conservation and Management Plan.

2.3 Focused Groundwater Collection and Treatment

2.3.1 Groundwater Extraction

Groundwater collection would consist of groundwater removal immediately upgradient of the seeps by depressing the water table to flatten the groundwater gradient. This would effectively halt the migration of groundwater toward the seeps. One or more recovery wells would be installed upgradient of the seeps outside of the flood zone of the Canal, and continually pumped to maintain a specific drawdown in the well(s). Creating a zone of influence around the recovery well(s) would remove the hydraulic gradient and eliminate groundwater flow towards the seeps.

Based on the aquifer characteristics at the proposed groundwater collection well, initial pumping rates of 6 to 10 gallons per minute (gpm) are projected (estimated at approximately 9,000 to 14,000 gallons per day (gpd)). Upon facilitating the desired drawdown conditions, lower pumping rates are anticipated to maintain the drawdown condition. The collected groundwater would be temporarily stored in aboveground storage tank(s).

2.3.2 Groundwater Treatment

The Work Plan recommended the County simultaneously pursue two options to treat the collected groundwater, including treatment in a constructed wetland treatment system and treatment via the existing, permitted Mid-Hudson Forensic Psychiatric Center WWTP located near the Landfill. Collecting and trucking all collected groundwater to distant offsite permitted WWTPs was not considered.

2.3.3 Treatability Evaluation

The groundwater to be collected upgradient of the seeps is minimally impacted with ammonia as the most significant parameter requiring treatment. Landfill leachate treatability studies conducted on low strength leachates and groundwater demonstrate treatment system operations are most challenging where the strength and volume of water to be treated vary significantly. Neither appears to be the case at the Orange County Landfill. As reported in the Long-term Seep Evaluation Report, the groundwater elevation and contaminant concentrations upgradient of the seeps are relatively stable. Based on historical data, the concentration range of dissolved iron and ammonia in groundwater south of the Landfill has remained relatively stable. Heavy metals have not been reported in the groundwater to be treated. For this reason, a site specific treatability study is not envisioned.

2.4 Seep Source Collection

This option involves collection of groundwater directly from the identified seep locations. Shallow collection trenches (one to two feet deep) would be excavated at the seep locations, and plumbed to drain by gravity flow to a sump equipped with a pump. The groundwater would be temporarily stored and treated.

The installation would require ground disturbance and excavation into previously dredged materials. The installed collection system would be at a location that is submerged much of the year and regularly subjected to high water conditions. Accordingly, the design must provide for protection from inundation and the system operation would be designed to terminate operations when the stage of the Canal exceeds the elevation of the collection trench. Such is necessary as the pumping system cannot be sized to operate when surcharged by Canal waters.

2.5 Containment

This option involves construction of a low permeable slurry wall or installation of sheet piles to impede the groundwater flow path to the seeps at the Canal. Recovery wells or a collection trench would be installed upgradient of the barrier to remove groundwater upgradient of the barrier.

Groundwater collected upgradient of the containment would be treated.

2.6 In-Situ Groundwater Treatment

Several technologies are available to provide in-situ treatment of the groundwater before it discharges to the ground surface.

2.6.1 Chemical Injection

This option involves the installation of groundwater injection wells to inject substances into the groundwater for subsurface treatment before the seeps discharge to the ground surface.

Proprietary products such as Metals Remediation Compound (MRC©) by Regenesis can be used to reduce metals contamination through precipitation and/or absorption to soil particles.

Ammonia in groundwater is typically treated by groundwater extraction and injection of treated water back to the subsurface. Accordingly, this option would require additional installation of groundwater extraction wells along with the injection wells.

2.6.2 Permeable Reactive Zone

This option involves the construction of a permeable reactive zone or trench upgradient of the groundwater seeps, which would passively treat groundwater and remove or breakdown contaminants, releasing treated water downgradient of the treatment zone.

A trench would be installed uphill from the seeps along the Canal, and the trench would be backfilled with reactive media. Proprietary reactive media are available such as Nitrex™ (a mixture of wood chips and lime) for treatment of nitrate, ammonia, and dissolved organic nitrogen through denitrification, and Phosphex™ (a mixture of by-product of the steel industry and limestone) for metals removal via precipitation and adsorption.

2.7 No Action

Under this option, no specific IRM would be implemented ahead of and separate from the permanent remedy.

IRMs requiring collection and treatment of impacted groundwater require available, viable wastewater treatment facilities as discussed in the Expedited IRM Work Plan. Additional time is needed to allow Orange County to pursue onsite treatment by way of a constructed wetland system and/or to pursue a permit modification of the existing wastewater treatment facility serving the Mid-Hudson Forensic Psychiatric Center.

Due to time of year, high water conditions in the Canal, the duration of time needed to obtain legal access and permits, as well as the need to develop treatment options required to perform interim actions, the

Expedited IRM Work Plan recommended the No Action alternative. Further, the public health and environmental risks posed by the seeps do not warrant an expedited response.

3.0 REMEDIAL ACTION OBJECTIVES

3.1 General

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375 and DER-10. At a minimum, the remedy selected must eliminate or mitigate significant threats to public health and/or the environment presented by the hazardous substances disposed at the site through the proper application of scientific and engineering principles. The remedial goals for the seep area are specified by the programmatic requirements of the New York State Inactive Hazardous Waste Disposal Site Remedial Program (State Superfund Program). The remediation goals for the identified seeps are to eliminate or reduce to the extent practicable:

- Exposures of persons both onsite and offsite to subsurface or surface soils and groundwater that contains elevated levels of Landfill derived contaminants at and proximal to the seeps; and

- Migration of contaminants to the environment.

Remedial action objectives (RAOs) were developed for the purpose of developing remedial alternatives according to the process provided in DER-10, Section 4.1(c). RAOs are specific objectives for protection of public health and the environment and are based on contaminant-specific Standards, Criteria, and Guidance (SCG) to address contamination identified in the seep area. RAOs guide the remedy selection process by considering site-specific conditions such as the types of contamination, physical site conditions, applicable SCGs, the type of media impacted, the extent of impact, and the actual or potential human exposures and/or environmental impacts. The information required to develop the RAOs was presented in the Long-term Seep Evaluation Report (STERLING, December 3, 2014).

The potential RAOs will address the requirements of DER-10, which include:

- Elimination, to the extent practicable, of potential significant threats posed by exposed, uncontrolled seeps;
- Reduction, to the extent practicable, of potential significant threat of direct human contact with surface water, surface soils, sediment, and leachate seeps where contaminant criteria are exceeded;
- Elimination, to the extent practicable, of ingestion of surface water and seep groundwater;
- Elimination, to the extent practicable, of release of groundwater that does not attain NYSDEC Class GA Ambient Water Quality Standards;
- Elimination, to the extent practicable, of migration of contaminants into the Cheechunk Canal via erosion of contaminated soils, transport of suspended sediment, and flow of impacted groundwater;
- Elimination, to the extent practicable, of exposure of humans, fish and wildlife to contaminant concentrations in impacted groundwater that exceed applicable standards/guidance values; and,
- Elimination, to the extent practicable, of exceedances of applicable environmental quality standards related to releases of impacts to waters of the State.

3.2 Identification of SCGs

Review and identification of SCGs that may be applicable to the site and/or contemplated remedial alternatives is performed to identify, evaluate, and select remedial alternatives. Evaluating the extent to which specific remedial alternatives comply with the applicable SCGs allows for the development of each alternative to a reasonably accurate level of detail and provides a common basis for comparison among alternatives.

SCGs may be grouped into three categories:

1) Location-specific requirements: Restrictions placed on the concentration of hazardous substances or the conduct of activities solely because they occur in special locations.

2) Chemical-specific requirements: Health-based or risk-based numerical values or methodologies which, when applied to site-specific conditions, result in the establishment of numerical values. These values establish the acceptable amount or concentration of a chemical that may be found in or discharged to the ambient environment.

3) Action-specific requirements: Technology-based or activity-based requirements or limitations on actions, such as performance and design, taken with respect to hazardous wastes.

The purpose of implementing a remedial action at a site is to protect human health and the environment. Cleanup goals for the selected remedial alternatives are determined by the SCG values that apply to the seep area. The SCGs identified for the seep remediation include the following.

3.2.1 6 NYCRR Part 700-703 - Groundwater Classifications and Standards, Quality Standards, and Effluent Standards and/or Limitations

New York State water quality regulations have defined the following groundwater class applicable to this site:

1) Class GA. The best usage of Class GA water is a source of potable water supply. Class GA waters are fresh groundwaters found in the saturated zone or unconsolidated deposits and consolidated rock or bedrock. Quality standards for Class GA waters are required to be the most stringent levels set by the following:

   a. Specifications in 6 NYCRR Part 703.5 and 703.6.
   b. Maximum contaminant levels promulgated in 10 NYCRR Subpart 5-1.
   c. Maximum contaminant levels promulgated by the Safe Drinking Water Act and 40 CFR Part 141.
   d. Standards for raw water quality provided in 10 NYCRR Part 170.

3.2.2 NYSDEC TOGS 1.1.1. - Ambient Water Quality Standards and Guidance Values

This document was prepared to provide guidance for water quality programs, including the State Pollutant Discharge Elimination System (SPDES) permit program, for setting limits for toxic and non-conventional pollutants.

3.2.3 6 NYCRR Part 360 - New York State Solid Waste Management Facilities Regulations

The requirements of 6 NYCRR Part 360 regulate all aspects of solid waste management facilities, including construction, operation, closure and post-closure. The most pertinent requirements of 6 NYCRR Part 360 which pertain to the Landfill are those that specify post-closure procedures. Part 360 regulations provide that all regulated facilities must develop a closure plan and a long-term post-closure plan with pre-planned response measures to address potential releases.

3.2.4 6 NYCRR Parts 370-375, New York State Hazardous Waste Management Regulations

The requirements of 6 NYCRR Parts 370-375 regulate all aspects of hazardous waste management and establish use-based SCGs for remediation projects.

The Part 370 regulations contain requirements for closure and post-closure activities. Closure performance standards require that facilities must be closed in a manner which minimizes the need for further maintenance and controls, and minimizes or eliminates release of contaminants in the future. The Part 370 regulations also address releases from solid waste management units, groundwater protection standards, monitoring requirements, and standards for management of specific hazardous wastes and specific types of hazardous waste management facilities, including incinerators and energy recovery facilities that burn hazardous waste.

Part 375 of 6 NYCRR addresses remedial actions at inactive hazardous waste sites. Such items as public participation and other steps required before implementation of a remedial action, including any IRM, are detailed. A significant item of this subpart is the specification that permits are not required for remedial actions, but these actions must meet the substantial requirements of the permitting process.

3.2.5 29 CFR Parts 1900-1999, Occupational Safety and Health Administration (OSHA) Requirements

OSHA requirements are applicable to workers implementing the remedial alternatives.

3.2.6 NYSDEC DER-10 - DER Technical Guidance for Site Investigation and Remediation (Issued 05/03/2010; Effective 06/18/2010)

This Guidance outlines the generic RAOs for public health and groundwater protection in media of concern (groundwater, soil, surface water and sediment). Chapter 4 of DER-10 addresses remedy selection, detailing the development of remedial alternatives, their evaluation, and selection of the remedy. Each of the remedial alternatives are evaluated using the evaluation criteria set forth in Section 4.2 of DER-10.

3.2.7 40 CFR Part 264 Subpart I (Sections 264.170-264.179)

This regulation establishes requirements for containerized storage of hazardous waste. The substantive provisions are applicable to temporary storage containers and onsite treatment systems. The applicable substantive provisions of this subpart are applicable for temporary storage containers and onsite treatment systems.

3.2.8 NYSDEC DER-31 - Green Remediation (Issued 08/11/2010; Effective 09/17/2010)

This policy document provides concepts and techniques of green remediation and guidance on application to NYSDEC DER's remedial programs. The concepts will be considered and implemented to the extent feasible, and documented.

3.2.9 NYSDEC TAGM CP-51 - Soil Cleanup Guidance Policy (Issued: 10/21/2010; Effective: 12/3/2010)

This Policy document provides for a uniform and consistent process for the selection of soil cleanup levels appropriate for this remedial program in conjunction with applicable statutes, regulations and guidance.

3.2.10 NYSDEC Site Management Plan (SMP)

Required elements of a SMP are set forth in DER-10 and include implementation of Institutional Controls (ICs) and Engineering Controls (ECs) along with annual certification procedures to ensure the ICs/ECs are followed. The SMP also includes an updated Long-term Monitoring Plan, Contingency Plan, and an Operation and Maintenance (O&M) Manual for the Landfill. The site SMP (STERLING, June 6, 2014) was prepared to manage remaining contamination at the site until the Environmental Easement is extinguished in accordance with ECL Article 71, Title 36.

4.0 DEVELOPMENT AND SCREENING OF REMEDIAL ALTERNATIVES

Chapter 4 of NYSDEC DER-10 provides the process and criteria to be used in selecting an appropriate remedy for an impacted site, and for presenting the results of the remedy selection process in a FS report. The selection process occurs in sequential steps consisting of identifying and screening applicable technologies, development and screening of remedial alternatives, and detailed evaluation of alternatives. The remedial alternatives are developed by combining the appropriate remedial technology options. During the initial screening, technologies are evaluated for inclusion as part of a remedial alternative (source control or groundwater control option) based on the ability of the technology to effectively remediate contamination and whether the technology can be effectively implemented.

4.1 General Response Actions

General response actions are actions that will satisfy the remedial action objectives for a site. The general response actions for the seep area include actions that control the source of the seeps (i.e. Landfill-derived groundwater), and the impacted areas and affected media (i.e., soil and groundwater). Response actions include a range of technologies that:

1) Provide permanent solutions to the contaminant source so long-term management is not required;
2) Provide treatment which results in reduction in contaminant volume, toxicity, or mobility; and
3) Provide containment of the contaminant source.

Groundwater control actions address both cleanup levels and the timeframe within which the RAOs are to be achieved. Depending on site conditions, alternatives are developed which achieve chemical-specific regulatory cleanup levels within varying timeframes using different methodologies.

A "No Action" alternative is used as a basis of comparison to other actions and remedial alternatives developed during the remedy selection process.

General response actions established for the seep area in order to be protective of human health and the environment are as follows:

1) Prevent direct contact with impacted soil and groundwater in the seep area.

2) Minimize erosion and control runoff from the seep area.

3) Minimize the migration of Landfill-derived chemistry through groundwater.

4) Reduce or eliminate contaminant concentration in environmental media.

The development of remedial alternatives consists of narrowing the number of potentially applicable technologies by evaluating options primarily with respect to implementability and effectiveness. Evaluation and screening of technologies for applicability considers factors such as the type of contaminant present, the subsurface soil and groundwater conditions, and the physical site conditions.

The December 3, 2014 Expedited IRM Work Plan identified multiple technologies that were initially deemed applicable to mitigating the seeps of impacted groundwater (see Section 2.0). In accordance with the process provided in Chapter 4 of DER-10, these potentially applicable technologies were further screened with respect to the following criteria:

- implementability with respect to physical site conditions;
- the potential effectiveness of the technology in handling the estimated areas or volumes of media;
- the ability of the technology to meet RAOs and the general response actions; and
- the effectiveness of the technology in reducing or eliminating contamination.

The technologies retained for further evaluation and development of remedial alternatives for seep elimination include:

- Armoring the seep area for isolation and erosion control.
- Excavation and disposal of impacted soil in the seep area.
- Groundwater and seep source control and collection:
  - Groundwater collection using a shallow collection trench at the seeps.
  - Groundwater collection using recovery wells upgradient of the seeps.
- Treatment and disposal of collected groundwater at an onsite constructed wetland, or at the Mid-Hudson Forensic Psychiatric Center WWTP.

5.0 DEVELOPMENT AND SCREENING OF REMEDIAL ALTERNATIVES

Development and screening of remedial alternatives is accomplished by combining appropriate and effective remedial technologies after RAOs and SCGs have been established and general response actions have been identified. The following sections provide a detailed description of the retained technologies followed by a brief description of remedial alternatives developed from these technologies.

5.1 Description of Remedial Technologies

5.1.1 Armoring Area of Seeps

Armoring of the area of the seeps provides protection from further erosion due to the seeps, isolates potentially impacted soil and groundwater, and stabilizes the area of the seeps and surficial soils. The areas of the seeps will be protected by rip-rap armoring as shown on Figure 3. The presence of soft sediments and steep slopes in the area of concern precludes use of heavy earth moving equipment. Accordingly, armoring would be performed using a crane to remove and place materials during low water condition in the Canal.

The active seeps will be overlain with a medium to heavy woven geotextile filter fabric and covered by at least twenty-four (24) inches of NYSDOT medium stone fill rip-rap. An estimated 120 cubic yards of stone rip-rap will be required. Details of these measures are shown on Figure 3. Stabilization is a recognized BMP in the Wallkill Watershed. The placement of stone rip-rap will be subject to a United States Army Corps of Engineers (USACOE) Nationwide Permit (NWP), and Pre-Construction Notice is required. This remedial work is expected to qualify for a NWP No. 38 because the work will proceed as part of the remedy approved by the NYSDEC subject to an Administrative Order.

5.1.2 Impacted Soil Removal

Soil in the immediate vicinity of the seeps is stained and may be impacted by Landfill-related chemistry. The stained soil and iron flocculants will be excavated and disposed at a permitted facility. The areas of soil that will be removed correspond to the areas where stone rip-rap will be placed and are shown on Figure 3. Hand excavation of stained sediments is proposed due to the soft sediments in this area and poor access for construction equipment. The excavated material will be placed in containers which will be removed by crane. The material removed will require characterization for disposal. Following receipt of laboratory data, arrangements will be made to remove the soil for disposal at a permitted facility. As such, excavated areas will be armored with rip-rap after soil excavation is complete.

5.1.3 Groundwater Collection Trench

Shallow groundwater collection trenches (one to two feet deep) will be excavated at the seep locations, and plumbed to drain by gravity flow to a sump equipped with a pump. A plan view and the details for the proposed collection trench are shown in Figures 4 and 5, respectively. Installation of the collection trench will require ground disturbance and excavation of previously dredged material. The installed collection system will be at a location submerged much of the year and regularly subjected to high water conditions. The shallow groundwater collection system cannot operate when the water level in the Canal is higher than the collection trench. Accordingly, the design of the trench and associated infrastructure will provide for protection from inundation, and the system operation will be designed to terminate when the stage of the Canal exceeds the elevation of the collection trench.

5.1.4 Groundwater Collection with Recovery Well

Subsurface investigations were previously performed in the vicinity of the seeps to further evaluate the geologic and hydrogeologic conditions in this area. Piezometers were installed in February 2014 to monitor hydraulic head and further define the stratigraphy. The results of the investigation were reported in the October 31, 2014 Seep Mitigation Plan and Engineering Report and the December 3, 2014 Long-term Seep Evaluation Report. These investigations provide the information and data that confirm groundwater collection as a viable and appropriate technology.

Control of the groundwater can be accomplished by pumping from one or more recovery wells. Groundwater pumping will reduce the hydraulic head to effectively stop the seep of groundwater at the ground surface. The groundwater collection system will consist of one (1) or more six (6) inch diameter recovery wells with submersible pumps to lower the water table upgradient from the seeps.

A plan view and details for installation of one or more recovery wells is shown in Figures 6 and 7, respectively. Prior to system startup, pump tests will be performed with measurements obtained at the nearby piezometers to further evaluate the hydraulic conductivity of the groundwater aquifer, as well as to verify the radius of influence.

The pump test results will be used to optimize pumping and system operation and to assess the need for additional recovery wells to produce the desired cone of depression at the established drawdown level, and to correctly size the permanent pump installation(s). Additional recovery wells will be installed cross-gradient from the initial recovery well as shown on Figure 6, if necessary.

The recovery well(s) will be equipped with a submersible pump, water level pressure transducer, and pump controller. The pump controller will be capable of adjusting the drawdown level in the well, and will automatically control the pump to maintain the water level. Groundwater discharged from the recovery well(s) will be conveyed to a temporary holding tank via forcemain, as shown on Figures 6 and 7. The forcemain will be sized following the initial pump test and aquifer characterization based upon the anticipated groundwater pumping rates and volume of water to be collected.

An existing aboveground 20,000 gallon steel tank will be used to collect and hold groundwater pending treatment. The tank will be equipped with a high level alarm that will automatically shut off the recovery well pump(s) and notify site personnel that the tank is full. Details of the proposed recovery well(s), forcemain, and storage tank are provided on Figure 7.

5.1.5 Groundwater Treatment

Groundwater treatment will be performed by an onsite constructed wetland, or treatment and disposal at the Mid-Hudson Forensic Psychiatric Center WWTP. Either option will be used in conjunction with technologies that produce impacted groundwater requiring treatment and disposal.

5.1.5.1 Constructed Wetland Treatment System

Constructed wetlands and biofilters are very effective in treating landfill impacted groundwater. Two (2) locations have been identified on the Landfill property as suitable for construction of lined wetlands. One location totals 1.7 acres in area; the other location totals 1.9 acres (see Figure 8).

Initially, collected groundwater will be trucked to a constructed wetland at one or more of the identified locations. Groundwater will be discharged to a lined forebay sized to initially receive groundwater delivery by tank truck in 6,000 gallon batch deliveries (later to be hard-piped once pumping rates and daily treatment volumes are established).

The constructed wetland will be developed by stripping existing vegetation and grading the area to prevent run-on of stormwater. The constructed wetland treatment system will be configured as presented on Figure 8. The wetland will be underlined with a 20 mil flexible membrane liner. Above the liner, a suitable wetland substrate will be installed to an average depth of 12 to 24 inches, depending on the chosen wetland vegetation, to provide the media for growth.

The collected groundwater will be slowly unloaded onto the forebay of the wetland biofilter. Influent to the wetland will flow from the forebay via wetland treatment cell via perforated pipe, where the ammonia will be removed through nitrification. Hearty wetland vegetation consisting of phragmites (common reed) and typhya (cattails) will be employed for biological degradation.

5.1.5.2 Mid-Hudson Forensic Psychiatric Center Wastewater Treatment Plant

The existing WWTP is located north of the Mid-Hudson Forensic Psychiatric Center, approximately 4,600 feet north of the Landfill. The existing WWTP is reportedly permitted for 80,000 gpd of sanitary wastewater. Reportedly, the plant is currently operating at 45,000 gpd average daily flow. Accordingly, there appears to be sufficient capacity to treat groundwater from the seep mitigation efforts.

Discussions have been initiated between Orange County and New York State Office of Mental Health (OMH) with respect to utilizing this surplus wastewater treatment capacity to treat the collected groundwater. If the Mid-Hudson Forensic Psychiatric Center WWTP is agreeable, initial treatment of groundwater could commence upon NYSDEC Division of Water concurrence that the groundwater may be accepted for treatment. In such case, groundwater would be initially trucked and unloaded into the plant headworks utilizing Orange County's 6,000 gallon tank truck (potentially to be hard-piped in the future).

Approximately 9,000 to 14,000 gpd of groundwater are estimated to be initially collected for treatment. The volume is expected to decrease once the desired drawdown is achieved. Therefore, there may initially be two (2) tank truck loads per day on average, later reducing to one (1) load per day.

If necessary, the tank truck would slowly unload into the headworks of the WWTP to minimally impact the treatment process. Unloading over a six (6) hour period amounts to an incremental flow of approximately 16 gpm.

Batch delivery to the treatment works can be timed such that a delivery at the start of the work day can be allowed to slowly unload until mid-afternoon. The afternoon delivery can be timed to unload overnight. Operating in this manner will provide for equalization of the flow into the WWTP minimizing potential impacts on the plant and treatment process.

5.2 Development of Remedial Alternatives

The retained remedial technologies described above are combined to develop remedial alternatives that are then evaluated using the criteria contained in DER-10, Section 4.2. Each remedial alternative varies depending on the technologies incorporated into the alternative. Accordingly, each remedial alternative meets the RAOs and achieves the various SCGs to a greater or lesser extent. The purpose of the detailed evaluation of the alternatives (Section 6.0) is to compare the various remedial alternatives with respect to the evaluation criteria. The following remedial alternatives have been developed from the retained technologies. A brief description of each alternative is provided below and a detailed description and evaluation of each is presented in Section 6.0.

5.2.1 Alternative No. 1: No Action

No remedial action will be undertaken. The seeps and groundwater at the Landfill site will continue to be monitored as provided by the SMP.

5.2.2 Alternative No. 2: Armoring Area of Seeps with Impacted Soil Removal

Armoring will be undertaken to control future erosion of the soils at the location of the seeps. Prior to armoring, obviously stained, impacted soils will be excavated and removed for proper offsite disposal.

5.2.3 Alternative Nos. 3A and 3B: Seep Groundwater Collection by Shallow Trench, Armoring Area of Seeps, Impacted Soil Removal, and A) Disposal of Impacted Water by Constructed Wetland, or B) Disposal of Impacted Water at the Mid-Hudson Forensic Psychiatric Center WWTP

This alternative consists of the elements of Alternative No. 2 plus collection of impacted groundwater using a shallow collector trench. Impacted groundwater will be treated and disposed either at a constructed wetland, or at the Mid-Hudson Forensic Psychiatric Center WWTP.

5.2.4 Alternative Nos. 4A and 4B: Seep Elimination by Groundwater Collection using Upgradient Recovery Well(s), Armoring Area of Seeps, Impacted Soil Removal, and A) Disposal of Impacted Water by Constructed Wetland or B) Disposal of Impacted Water at the Mid-Hudson Forensic Psychiatric Center WWTP

This alternative consists of the elements of Alternative No. 2 plus collection of impacted groundwater using recovery wells installed upgradient of the seeps. Impacted groundwater will be treated and disposed either at a constructed wetland, or at the Mid-Hudson Forensic Psychiatric Center WWTP.

5.3 Screening Criteria

The detailed evaluation of each alternative is undertaken with the goal of selecting a preferred remedial alternative. The detailed evaluation is conducted using evaluating criteria specified in DER-10, Section 4.2. The evaluating criteria are as follows:

1) Overall protection of human health and the environment;
2) Compliance with SCGs;
3) Long-term effectiveness and permanence;
4) Reduction of toxicity, mobility, and volume of contamination;
5) Short-term impact and effectiveness;
6) Implementability;
7) Cost Effectiveness;
8) Land use; and,
9) Community acceptance.

Although community acceptance is specified as a component of the evaluating criteria, this issue is not addressed in this FS report. The community acceptance criteria are addressed by virtue of the public comment period that is part of the development of the decision documents prepared by the NYSDEC, including the Preliminary Remedial Action Plan (PRAP) and the Record of Decision (ROD).

6.0 DETAILED ANALYSIS OF ALTERNATIVES

The selected remedy must be protective of human health and the environment, cost effective, comply with other statutory laws, and utilize permanent solutions, alternative technologies, or resource recovery technologies to the maximum extent practicable. Potential remedial alternatives for the seeps at the Landfill were identified, screened, and evaluated and the summary of the detailed analysis follows. As presented below, the time to implement reflects only the time required to implement the remedy and does

not include the time required to design the remedy, procure contracts for design and construction, or to negotiate with responsible parties for implementation of the remedy.

In accordance with DER-10, the mitigation alternatives are evaluated primarily on the basis of implementability, effectiveness, permanence and cost for construction, operation and maintenance. An evaluation summary of the seep mitigation alternatives is provided in Section 6.5 below. The following table shows the components of each of the alternatives for which a detailed analysis is performed in this section.

	Remedial Alternative No.					
Remedial Technologies	**1**	**2**	**3A**	**3B**	**4A**	**4B**
No Action (with monitoring)	X					
Armoring Area of Seeps		X	X	X	X	X
Hot Spot Soil Removal		X	X	X	X	X
Groundwater Collection Options						
Groundwater Collection; Seep Control using Shallow Trench			X		X	
Groundwater Collection; Seep Control using Recovery Wells				X		X
Groundwater Treatment Options						
Groundwater Treatment/Disposal using Constructed Wetlands Treatment System			X		X	
Groundwater Treatment/Disposal using Mid-Hudson Forensic Psych. Center WWTP				X		X

6.1 Alternative No. 1: No Action

This alternative would leave the site in its present condition. Impacted soil and groundwater would remain in place with no treatment. Further migration of contaminants of concern (COCs) would not be prevented and there would be no measure implemented to further protect human health and the environment. The existing cover material (i.e., grass/vegetation) would likely be maintained. Impacted soil would remain in isolated areas where seeps of impacted groundwater occur.

Environmental monitoring would be implemented as part of the No Action alternative. The monitoring program would consist of collecting and analyzing two impacted groundwater samples from the seeps on a schedule corresponding to the groundwater, surface water and leachate monitoring program required by the SMP, and visual inspection of the seep area to monitor and track any physical variations to the area that might indicate a change in conditions. Samples of impacted groundwater from the seeps would be analyzed for the COCs specific to the seep area.

This alternative is retained as a baseline condition for comparison of other alternatives.

6.1.1 Overall Protection of Public Health and the Environment

The No Action alternative is not considered an effective or "stand alone" means of achieving the RAOs. The No Action alternative does not include any additional activities to address site-related constituents; therefore, the alternative would not be effective in meeting the RAOs established for the site. However, to the extent to which current Landfill closure conditions are already protective of human health and the environment, and such conditions remain in the future, aspects of the RAOs would be achieved. This alternative would not address exposure to construction workers performing subsurface excavation/construction activities. This alternative would not result in a reduction of concentrations of COCs in soil or groundwater.

6.1.2 Compliance with SCGs

Chemical-Specific SCGs: Removal or treatment is not included as part of this alternative. RAOs that relate to chemical-specific SCGs would not be met.

Action-Specific SCGs: Action-specific SCGs are not applicable because the No Action alternative does not involve the implementation of active remedial measures.

Location-Specific SCGs: Location-specific SCGs are not applicable because the No Action alternative does not involve the implementation of active remedial measures.

6.1.3 Long-Term Effectiveness and Permanence

Based on current conditions, there is a potential for maintenance or construction workers exposure to impacted subsurface soil/groundwater during potential future intrusive activities (e.g., during excavation to repair or replace existing subsurface utilities/structures or install new underground trenches/borings). The No Action alternative does not include actions or measures to address site-related impacts in subsurface soil or potential human exposure. Therefore, the No Action alternative is not considered to be effective at addressing RAOs related to potential direct contact, ingestion, or inhalation (human health exposure pathways), and would not meet the RAO related to preventing the migration of chemical constituents from soil.

6.1.4 Reduction of Toxicity, Mobility and/or Volume

It is anticipated that natural attenuation would not reduce the toxicity, mobility, and/or volume of COCs in subsurface soil and groundwater.

6.1.5 Short-Term Effectiveness

No remedial activities would be performed under the No Action alternative. Therefore, there would be no short-term environmental impacts or risks to onsite workers, construction/remediation workers (since there are no remedial activities proposed), or the community associated with implementation of the alternative.

6.1.6 Implementability

The No Action alternative does not involve any active remedial response and poses no technical or administrative implementability concerns.

6.1.7 Land Use

Alternative No. 1 consists of no action being taken, other than environmental monitoring. This alternative would have the least impact on the existing land use; however, known contamination remains in place. The seep area is a relatively small area bound by the closed Landfill and the Cheechunk Canal and is subject to frequent high water conditions. Development or use of the land for other purposes is highly unlikely.

6.1.8 Cost

There is no capital cost associated with the No Action alternative. Table 6.1 presents the costs associated with this alternative which are for environmental monitoring as part of annual operation and maintenance.

6.2 Alternative No. 2: Armoring Area of Seeps with Impacted Soil Removal

Alternative No. 2 includes:

- Armoring of the area of the seeps as described in Section 5.1.1;
- Impacted soil removal and disposal, as described in Section 5.1.2;
- Excavation of unsaturated soil containing iron at concentrations exceeding SCGs;
- Offsite disposal of the excavated soil at a permitted landfill; and,
- Maintenance of existing engineering controls (ECs) to prevent or further restrict contact with impacted soil and existing institutional controls (ICs) to restrict exposure to impacted soil or groundwater.

Alternative No. 2 (Figure 3) would address unsaturated and saturated soil in the seep area that has been impacted by Landfill-related COCs through localized removal of the visually impacted soil (i.e. soil exhibiting red iron staining), and armoring the area of the seeps and isolation of the remaining soil. The soil removal would be performed within an approximately 1,620 SF area to depths of up to 2.0 feet bgs, depending on location. The approximate soil removal volume is 120 yds^3.

Visually impacted soil will be excavated and will be sampled and characterized for offsite disposal. It is anticipated that laboratory characterization of the subsurface soil and existing soil cover/other debris removed from the seep area will indicate that the soil is classified as non-hazardous for disposal purposes. Clearing and grubbing of the area(s) to be excavated will be performed, as necessary, to access and remove impacted soil.

Upon reaching target depths, confirmatory soil samples will be collected from the excavation for laboratory analysis. Collection of post-excavation samples is included within the cost estimate for this alternative. The excavated areas would be backfilled, compacted, restored to grade, and covered with rip-rap. Work areas along the perimeter road and other soil cover (topsoil and grass) would then be restored.

A Community Air Monitoring Plan (CAMP) would be prepared and implemented in conjunction with the remedial activities to document airborne particulate and volatile organic vapor concentrations in the work area during site work.

Environmental monitoring would be implemented as part of this alternative. The monitoring program would consist of collecting and analyzing two impacted groundwater samples from the seeps on a schedule corresponding to the groundwater, surface water and leachate monitoring program required by the SMP, and visual inspection of the seep area to monitor and track any physical variations to the area that might indicate a change in conditions. Samples of impacted groundwater from the seeps would be analyzed for the COCs specific to the seep area.

6.2.1 Overall Protection of Public Health and the Environment

Implementation of this alternative would partially meet the soil RAOs related to protecting human health and the environment by armoring the area of the seeps and selectively removing impacted soil and flocculants.

Potential exposure to soil at the site by identifying known locations of impact and setting forth actions to address possible future disturbances of subsurface soil is addressed in the SMP. The soil excavation would minimize future impacts to groundwater since the most impacted material would have been removed and impacted groundwater in the area of the impacted soil excavation would be captured and removed during excavation. BMPs described in NYSDEC's DER-31 such as the sequencing of work to mitigate unnecessary movement of construction equipment should be used to reduce the estimated Greenhouse Gas (GHG) emissions and traffic impacts.

Maintaining the existing Canal bank via ECs, existing Landfill ICs, and monitoring would be protective of human health by preventing potential exposure to contaminated soil. The potential future risk to the environment would be reduced by remedial Alternative No. 2 by armoring the area of the seeps and reducing or eliminating erosion potential in the remediated area. These measures would effectively keep impacted soil and sediment from eroding into the Cheechunk Canal during periods of heavy precipitation and/or high water conditions.

6.2.2 Compliance with SCGs

Chemical-Specific SCGs: Chemical SCGs would be addressed through the removal of iron-impacted media and backfill with rip-rap. Groundwater collection would not be performed under this alternative. As a result, compliance with groundwater related SCGs would not be achieved. Alternative No. 2 would partially achieve the chemical-specific SCGs for organic constituents that apply to soil through the natural attenuation processes, and to the extent that impacted soil near the surface of the seeps will be excavated and removed. SCGs would not be achieved for metals in soil or groundwater.

Action-Specific SCGs: Action-specific SCGs are applicable because this alternative involves specific technology-based or activity-based measures designed to address the impacts from the seeps. Remedial construction activities would be designed and conducted in accordance with local codes and ordinances.

Location-Specific SCGs: Location-specific SCGs are applicable because this alternative involves the implementation of active remedial measures designed to address the seeps where they occur. Remedial construction activities would be designed and conducted in accordance with local codes and ordinances.

6.2.3 Long-Term Effectiveness and Permanence

Excavation of the impacted media is a permanent solution and would meet soil RAOs related to protecting human health and the environment over the long-term. Contact with, or ingestion of, impacted soil would be minimized because the excavation would result in permanent removal of impacted soil and the isolation of the remaining soil beneath rip-rap. Dissolution of constituents from the soil to groundwater or surface water (during high water conditions) would be minimized because the iron-impacted soil would be removed and replaced with clean aggregate (rip-rap). The additional ECs and ICs established for Alternative No. 2 would make this alternative effective in the long-term as long as the controls are enforced until soil has been restored to the extent necessary for the intended future land use.

6.2.4 Reduction of Toxicity, Mobility and/or Volume

Alternative No. 2 would provide reductions in toxicity and volume of the COCs in impacted soil by removing and disposing the soil. No reduction in toxicity or volume of impacted groundwater would be achieved by the alternative. The mobility of the COCs would not be reduced through the implementation of Alternative No. 2.

6.2.5 Short-Term Effectiveness

Alternative No. 2 is considered effective in the short-term by removing impacted soil, armoring the area of the seeps, and isolating the impacted area. Short-term effectiveness is achievable because risks associated with implementation of Alternative No. 2 are manageable. Risk to workers conducting the monitoring program would be mitigated by implementing safe work practices and proper personal protective equipment (PPE). Traffic resulting from the transportation of impacted soil for offsite disposal and importing clean backfill would be minimal and not pose a potential nuisance to the community and would not significantly increase the risk for accidents and spills. The transportation activities would be performed in accordance with NYSDOT and NYSDEC transportation regulations to minimize enroute risks to the community.

6.2.6 Implementability

Impacted soil removal and armoring the area of the seeps is technically feasible and can promptly be implemented. However, construction must be conducted during low water conditions in the Canal. Remedial construction contractors for the removal of the seep impacted soil are readily available. Placement and movement of heavy equipment on embankments must be considered. Use of a crane to move materials from a nearby area makes this alternative fully implementable.

6.2.7 Land Use

Current land use and the contemplated future land use would be unaffected by this alternative. The seep area is a relatively small area bound by the closed Landfill and the Cheechunk Canal and is subject to frequent high water in the Canal. Development or use of the land for other purposes is highly unlikely.

6.2.8 Cost

Detailed costing of this alternative is provided in Table 6.2 and is compared to costs for other alternatives in Table 6.5.

6.3 Alternative Nos. 3A and 3B: Seep Groundwater Collection by Shallow Trench, Armoring Area of the Seeps, Impacted Soil Removal, and A) Disposal of Impacted Water by Constructed Wetland, or B) Disposal of Impacted Water at the Mid-Hudson Forensic Psychiatric Center WWTP

Alternative Nos. 3A and 3B (Figures 4 and 5) are the same as Alternative No. 2 with the exception that shallow groundwater collection trenches (one to two feet deep) will be excavated at the seep locations, and plumbed to drain by gravity flow to a sump equipped with a pump, as described in Section 5.1.3. Removal of site COCs from the collected groundwater would be accomplished through construction of an onsite wetland treatment system or using a permitted WWTP.

As described in Section 5.1.4, shallow groundwater collection trenches will be excavated at the seep locations, and plumbed to drain by gravity flow to a sump equipped with a pump. The location of the seeps, the shallow collection trench, and related infrastructure is in an area prone to regular inundation. The design of the trench and associated infrastructure will provide protection from inundation, and the system operation will be designed to terminate when the water level in the Canal exceeds the elevation of the collection trench.

Initially, the groundwater would be pumped from the trench sump, temporarily stored in tank(s), and trucked to the treatment location. A pipeline likely would be constructed to transport the water once conditions stabilize and actual collection volumes are established. Groundwater treatment would be provided by a lined, constructed wetland system or by treating the water at the nearby Mid-Hudson Forensic Psychiatric Center WWTP. A description of these two treatment and disposal options is provided in Sections 5.1.5.1 and 5.1.5.2, respectively.

Maintenance of existing ECs would prevent or further restrict contact with impacted soil and implementation of ICs would restrict exposure to and migration of impacted subsurface soil or groundwater.

Environmental monitoring would be implemented as part of this alternative. The monitoring program would consist of collecting and analyzing one impacted groundwater sample annually from the groundwater collection trench sump on a schedule corresponding to the groundwater, surface water and leachate monitoring program required by the SMP, and visual inspection of the seep area to monitor and track any physical variations to the area that might indicate a change in conditions. Samples of impacted groundwater from the seeps would be analyzed for the COCs specific to the seep area.

6.3.1 Overall Protection of Public Health and the Environment

Alternative Nos. 3A and 3B are protective of the public health and the environment. The potential future risk to the environment would be reduced by armoring the area of the seeps and reducing or eliminating erosion potential in the remediated area. These measures would effectively keep impacted soil and sediment from eroding into the Cheechunk Canal during periods of heavy precipitation and/or high water conditions.

This alternative removes and isolates impacted soil from the seep area and isolates the remaining soil from public exposure and the environment. Collection of groundwater effectively eliminates the seeps thereby eliminating a potential exposure pathway to the public. Elimination of the seeps prevents impacted groundwater from reaching the ground surface and impacting soil and/or surface water. Treatment of impacted groundwater removes COCs from the water.

Implementation of this alternative would meet the groundwater RAOs related to protecting human health and the environment because groundwater would be treated by bioremediation, or physical and chemical treatment techniques. Concentrations of COCs in groundwater would be reduced or eliminated by sequestering the COCs in sludge for offsite disposal, or by converting contaminants to non-hazardous compounds.

6.3.2 Compliance with SCGs

Chemical-Specific SCGs: Removal and treatment is included as part of this alternative, although cessation of system operations during high water conditions would limit its overall effectiveness. SCGs are satisfied by this remedial alternative. Contaminants in the subsurface soil would remain onsite, and the concentrations would be below the Industrial Soil Cleanup Objectives (SCOs) of Part 375. The proposed treatment option(s), as part of this alternative would result in reduced concentrations of COC-related constituents in groundwater resulting in water that meets groundwater quality standards.

Action-Specific SCGs: Action-specific SCGs are applicable because this alternative involves the implementation of active remedial measures. Action-specific SCGs that apply to this alternative are associated with constructing a shallow trench and sump, installing pump(s), monitoring groundwater conditions, and transporting waste materials for onsite or near site disposal and treatment. Workers, and work activities that occur during implementation of this alternative, must comply with OSHA requirements for training, safety equipment and procedures, monitoring, recordkeeping, and reporting as identified in 29 CFR 1904, 29 CFR 1910 and 29 CFR 1926. Compliance with action-specific SCGs would be accomplished by following a NYSDEC approved Remedial Design/Remedial Action (RD/RA) Plan and site-specific Health and Safety Plan (HASP). Measures would be taken, as appropriate, to control levels of airborne particulate matter during activities that disturb soil (soil removal, trench and sump drain installation), in accordance with 40 CFR 50 National Ambient Air Quality Standards. Other action-specific SCGs that potentially apply to this alternative are associated with periodic groundwater monitoring, including the handling, transportation, and disposal of waste material (i.e., collected groundwater) in accordance with the NYSDEC-approved SMP and NYSDOT requirements. The potentially applicable action-specific SCGs that also apply to Alternative No. 3 is storage of impacted liquids per the requirements of 40 CFR Part 264 Subpart I (Sections 264.170-264.179) and 6 NYCRR Part 364 regulations for waste transporters.

Location-Specific SCGs: Location-specific SCGs are applicable because this alternative involves the implementation of active remedial measures designed to address the seeps where they occur. Remedial activities at the site would be conducted in accordance with Federal, State, and local building/construction codes and ordinances.

6.3.3 Long-Term Effectiveness and Permanence

The implementation of Alternative No. 3 will achieve the groundwater RAOs. This alternative would reduce COC concentrations to meet the soil RAOs by removing impacted soil in the seep area. This alternative provides an effective long-term solution, as a result of 1) contamination source being addressed through removal of impacted soil and groundwater collection, 2) eliminating the impacted groundwater seeps, and 3) COCs in groundwater being reduced or eliminated by sequestering the COCs in sludge for offsite disposal, or by converting contaminants to non-hazardous compounds. This alternative permanently reduces concentrations of COC-related constituents in collected groundwater, except during periods when groundwater collection is not feasible due to high water level in the Canal. Environmental monitoring would be performed to evaluate changes in groundwater conditions. Direct contact, ingestion, and inhalation (human health exposures to impacted groundwater) would be reduced or eliminated in the long-term because pubic and environmental exposure will be minimized or eliminated.

6.3.4 Reduction of Toxicity, Mobility and/or Volume

Alternative No. 3 will provide reductions in toxicity and volume of the COCs in impacted soil by removing and disposing the soil. No reduction in toxicity or volume of impacted groundwater would be achieved by the alternative. However, treatment of groundwater after it is collected will result in COCs in groundwater being reduced or eliminated by sequestering the COCs in sludge for offsite disposal, or by converting contaminants to non-hazardous compounds. The mobility of the COCs in the groundwater, prior to groundwater collection, will not be reduced through the implementation of Alternative No. 3.

6.3.5 Short-Term Effectiveness

This alternative will provide benefits in the short term by removing the seeps via groundwater collection and treating the collected groundwater. The short-term (and long-term) effectiveness of this alternative may be reduced when the system must be shut down during high water conditions in the Canal.

6.3.6 Implementability

Impacted soil removal and armoring the area of the seeps is technically feasible and can promptly be implemented. However, construction must be conducted during low water conditions in the Canal. Remedial construction contractors for the removal of the seep impacted soil are readily available. Placement and movement of heavy equipment on embankments must be considered. Use of a crane to move materials from a nearby area makes this alternative fully implementable. The time to coordinate the work, install the groundwater collection system, and apply treatment can be completed over a period of several days. Installation of the groundwater collection system may be complicated by saturated soil, however proven engineering techniques are available to manage such conditions.

6.3.7 Land Use

Current land use and the contemplated future land use would be unaffected by this alternative. The seep area is a relatively small area bound by the closed Landfill and the Cheechunk Canal and is subject to frequent high water in the Canal. Development or use of the land for other purposes is highly unlikely.

6.3.8 Cost

Detailed costing of this alternative is provided in Tables 6.3A and 6.3B and is compared to costs for other alternatives in Table 6.5.

6.4 Alternative Nos. 4A and 4B: Seep Elimination by Groundwater Collection using Upgradient Recovery Well(s), Armoring Areas of the Seeps, Impacted Soil Removal, and A) Disposal of Impacted Water by Constructed Wetland or B) Disposal of Impacted Water at the Mid-Hudson Forensic Psychiatric Center WWTP

Alternative Nos. 4A and 4B (Figures 6 and 7) includes the same elements as Alternative No. 2 and Alternative Nos. 3A and 3B, except that groundwater collection will be accomplished using one or more recovery wells upgradient of the seeps. In addition to armoring the seep area and removing impacted soil, groundwater will be collected using at least one recovery well and collected groundwater will be treated and disposed.

At least one groundwater collection well will depress the water table to flatten the groundwater gradient, decrease the hydraulic head, and effectively halt the flow of groundwater creating the seeps. The

collection well(s) would be located upgradient of the seeps outside of the flood zone of the Canal. Based on the aquifer characteristics at the proposed groundwater collection well, initial pumping rates of 6 to 10 gpm are projected (approximately 9,000 to 14,000 gpd). Upon facilitating the desired drawdown conditions, lower pumping rates are anticipated to maintain the drawdown condition.

Initially, the groundwater would be pumped from the well(s), temporarily stored in tank(s), and trucked to the treatment location. A pipeline likely would be constructed to transport the water once conditions stabilize and actual collection volumes are established. Groundwater treatment would be provided by a lined, constructed wetland system or by treating the water at the nearby Mid-Hudson Forensic Psychiatric Center WWTP. A description of these two treatment and disposal options is provided in Sections 5.1.5.1 and 5.1.5.2, respectively.

This alternative provides the same advantages as Alternative Nos. 3A and 3B, however has the added advantage of not being susceptible high water conditions in the Canal. Unlike Alternative Nos. 3A and 3B, this alternative could continue to operate during high water conditions.

Environmental monitoring would be implemented as part of this alternative. The monitoring program would consist of collecting and analyzing one impacted groundwater sample from the groundwater recovery well on a schedule corresponding to the groundwater, surface water and leachate monitoring program required by the SMP, and visual inspection of the seep area to monitor and track any physical variations to the area that might indicate a change in conditions. Samples of impacted groundwater from the seeps would be analyzed for the COCs specific to the seep area.

6.4.1 Overall Protection of Public Health and the Environment

Alternative Nos. 4A and 4B is protective of the public health and the environment. The potential future risk to the environment would be reduced by armoring the area of the seeps and reducing or eliminating erosion potential in the remediated area. These measures would effectively keep impacted soil and sediment from eroding into the Cheechunk Canal during periods of heavy precipitation and/or high water conditions.

This alternative removes and isolates impacted soil from the seep area and isolates the remaining soil from public exposure and the environment. Collection of groundwater effectively eliminates the seeps thereby eliminating a potential exposure pathway to the public. Elimination of the seeps prevents impacted groundwater from reaching the ground surface and impacting soil and/or surface water.

Implementation of this alternative would meet the groundwater RAOs related to protecting human health and the environment because groundwater will be treated by bioremediation, or physical and chemical treatment techniques. Concentrations of COCs in groundwater would be reduced or eliminated by sequestering the COCs in sludge for offsite disposal, or by converting contaminants to non-hazardous compounds.

6.4.2 Compliance with SCGs

Chemical-Specific SCGs: Removal and treatment is included as part of this alternative, although cessation of system operations during high water conditions would limit its overall effectiveness. SCGs are satisfied by this remedial alternative. Contaminants in the subsurface soil would remain onsite, and the concentrations would be below the Industrial SCOs of Part 375. The proposed treatment option(s), as part of this alternative would result in reduced concentrations of COC-related constituents in groundwater resulting in water that meets groundwater quality standards.

Action-Specific SCGs: Action-specific SCGs are applicable because this alternative involves the implementation of active remedial measures. Action-specific SCGs that apply to this alternative are associated with constructing a recovery well, installing pump(s), monitoring groundwater conditions, and transporting waste materials for onsite or near site disposal and treatment. Workers, and work activities that occur during implementation of this alternative, must comply with OSHA requirements for training, safety equipment and procedures, monitoring, recordkeeping, and reporting as identified in 29 CFR 1904, 29 CFR 1910 and 29 CFR 1926. Compliance with action-specific SCGs would be accomplished by following a NYSDEC approved RD/RA Plan and site-specific HASP. Measures would be taken, as appropriate, to control levels of airborne particulate matter during activities that disturb soil (soil removal, recovery well installation), in accordance with 40 CFR 50 National Ambient Air Quality Standards. Other action-specific SCGs that potentially apply to this alternative are associated with periodic groundwater monitoring, including the handling, transportation, and disposal of waste material (i.e., collected groundwater) in accordance with the NYSDEC-approved SMP and NYSDOT requirements. The potentially applicable action-specific SCGs that also apply to Alternative No. 4 is storage of impacted liquids per the requirements of 40 CFR Part 264 Subpart I (Sections 264.170-264.179) and 6 NYCRR Part 364 regulations for waste transporters.

Location-Specific SCGs: Location-specific SCGs are applicable because this alternative involves the implementation of active remedial measures designed to address the seeps where they occur. Remedial activities at the site would be conducted in accordance with Federal, State, and local building/construction codes and ordinances.

6.4.3 Long-Term Effectiveness and Permanence

The implementation of Alternative Nos. 4A and 4B will achieve the groundwater RAOs. This alternative would reduce COC concentrations to meet the soil RAOs by removing impacted soil in the seep area. This alternative will constitute an effective long-term solution, as a result of 1) contamination source being addressed through removal of impacted soil and groundwater collection, 2) eliminating the impacted groundwater seeps, and 3) COCs in groundwater being reduced or eliminated by sequestering the COCs in sludge for offsite disposal, or by converting contaminants to non-hazardous compounds. This alternative would permanently reduce concentrations of COC-related constituents in collected groundwater. Environmental monitoring would be performed to evaluate changes in groundwater conditions. Direct contact, ingestion, and inhalation (human health exposures to impacted groundwater) would be reduced or eliminated in the long-term because pubic and environmental exposure will be minimized or eliminated.

6.4.4 Reduction of Toxicity, Mobility and/or Volume

Alternative Nos. 4A and 4B will provide reductions in toxicity and volume of the COCs in impacted soil by removing and disposing the soil. No reduction in toxicity or volume of impacted groundwater would be achieved by the alternative. However, treatment of groundwater after it is collected will result in COCs in groundwater being reduced or eliminated by sequestering the COCs in sludge for offsite disposal, or by converting contaminants to non-hazardous compounds. The mobility of the COCs in the groundwater, prior to groundwater collection, will not be reduced through the implementation of Alternative Nos. 4A and 4B.

6.4.5 Short-Term Effectiveness

This alternative will provide benefits in the short-term by removing the seeps via groundwater collection and treating the collected groundwater. The short-term (and long-term) effectiveness of this alternative

may be reduced when the system must be shut down for maintenance; otherwise, the system is expected to be effective.

6.4.6 Implementability

Impacted soil removal and armoring the area of the seeps is technically feasible and can promptly be implemented. However, construction must be conducted during low water conditions in the Canal. Remedial construction contractors for the removal of the locally impacted soil are readily available. Placement and movement of heavy equipment on embankments must be considered. Use of a crane to move materials from a nearby area makes this alternative fully implementable. The time to coordinate the work, install the groundwater collection system, and apply treatment can be completed over a period of several days. Installation of the recovery wells may be complicated by saturated soil, however proven engineering and drilling techniques are available to manage such conditions.

6.4.7 Land Use

Current land use and the contemplated future land use would be unaffected by this alternative. The seep area is a relatively small area bound by the closed Landfill and the Cheechunk Canal and is subject to frequent high water in the Canal. Development or use of the land for other purposes is highly unlikely.

6.4.8 Cost

Detailed costing of this alternative is provided in Tables 6.4A and 6.4B and is compared to costs for other alternatives in Table 6.5.

6.5 Comparative Analysis of Alternatives

A comparative analysis was conducted to evaluate the relative performance of each alternative retained for consideration following the individual analysis of each alternative. The purpose of the analysis is to identify the advantages and disadvantages of each alternative relative to the others. Overall protection of human health and the environment and compliance with SCGs must be met by any selected alternative. The other criteria that are considered include achievement of SCGs; long-term effectiveness and permanence; reduction of toxicity, mobility and volume of contamination; short-term impact and effectiveness; implementability; cost effectiveness; land use; and community acceptance.

6.5.1 Overall Protection of Human Health and the Environment

All alternatives, with the exception of the No Action alternative, would be protective of human health and the environment by eliminating potential exposure pathways, either by removal and/or treatment in addition to limiting or eliminating exposure pathways. Alternative Nos. 2, 3 (3A and 3B), and 4 (4A and 4B) include common elements that would result in overall protection of human health and the environment. All alternatives assume environmental monitoring will be performed and that existing ICs associated with the Landfill apply to the seep area(s).

6.5.2 Compliance with SCGs

All alternatives, except Alternative Nos. 1 and 2, would meet the SCGs for groundwater by collecting and treating impacted groundwater. Different alternatives would meet SCGs to varying degrees depending on the measures employed for each alternative and not all SCGs are applicable to every alternative. Chemical-specific SCGs would be met with implementation of excavation, groundwater collection and disposal/treatment with Alternative Nos. 3 (3A and 3B) and 4 (4A and 4B). Some chemical-specific

SCGs would not be met with Alternative No. 1 or Alternative No. 2. All alternatives would be implemented such that action-specific and location-specific SCGs would be met.

6.5.3 Long-Term Effectiveness and Permanence

All of the alternatives, except the No Action alternative (No. 1), would result in permanent reduction and/or containment of impacted media. The No Action alternative would not be effective because it would involve no removal, immobilization, or containment of impacted materials, with only continued environmental monitoring. The long-term effectiveness of Alternative No. 2 is moderate while the permanence of features built within a floodplain render Alternative No. 3 as less preferred in comparison to Alternative No. 4. Use of either the permitted Mid-Hudson Forensic Psychiatric Center WWTP or an onsite constructed wetland is considered equally effective and permanent with respect to treatment of collected groundwater.

6.5.4 Reduction of Toxicity, Mobility and/or Volume

Alternative Nos. 1 and 2 do not provide a reduction in toxicity or volume of COCs in excavated soil or groundwater. Alternative Nos. 3 and 4 will reduce the toxicity and volume of COCs by removing impacted soil. Collection of groundwater as part of Alternative Nos. 3 and 4 do not reduce the toxicity, mobility and/or volume of COCs in the groundwater; however, treatment of the water after collection would result in a reduction of the COCs. Alternative No. 4 is expected to collect a greater volume of groundwater than Alternative No. 3 for treatment.

6.5.5 Short-Term Impact and Effectiveness

Alternative No. 1 (No Action) will have no positive short-term impact or effectiveness. There are potential negative short-term impacts associated with implementing the other alternatives, including GHG emissions from construction equipment, Landfill capacity impacts from disposed soil, and potential direct exposure of workers and the environment to COCs. Alternative No. 2 would provide a positive short-term impact by eliminating exposure of impacted soil and would be effective in the short-term. However, discharge of impacted groundwater would continue under Alternative No. 2. Alternative Nos. 3 and 4 would provide the same short-term positive impacts as Alternative No. 2, but also would eliminate the discharge of impacted groundwater. On this basis, Alternative Nos. 3 and 4 would be more effective and have a greater short-term impact than Alternative No. 2.

6.5.6 Implementability

Each of the presented alternatives could be implemented; although, the degree of difficulty of implementation varies between each of the alternatives. The implementability of the No Action alternative (No. 1) is high. The implementability of Alternative No. 2 also is high; however certain engineering challenges associated with saturated soil conditions and water level of the Canal are present. Alternative Nos. 3 and 4 face the same challenges with respect to soil conditions and water level of the Canal; however Alternative No. 3 has the additional difficulties of installing a collection trench, sump, and appurtenances in saturated soil subject to normal high water conditions in the Canal. The recovery well(s) installed as part of Alternative No. 4 preclude the need for the construction of the collection trench and sump that is part of Alternative No. 3. Implementability is therefore greater for Alternative No. 4 than for Alternative No. 3. Treatment of collected groundwater is considered to be implementable at either the Mid-Hudson Forensic Psychiatric Center WWTP or at an onsite constructed wetland, both of which are part of both Alternative Nos. 3 and 4.

6.5.7 Land Use

Each of the presented alternatives includes some degree of controls that would alter land use to be protective of human health and the environment, except for the No Action alternative. In addition to controls, each alternative would have a varying degree of impact on land use. Excavation alternative (Alternative No. 2) would have the lowest impact on future land use by, in part, removing the source material. Groundwater collection systems (Alternative Nos. 3 and 4) would present the greatest impacts to future land use; however, the seep area is a relatively small area bound by the closed Landfill and the Cheechunk Canal and is subject to frequent high water in the Canal. Development or use of the land for other purposes is highly unlikely.

6.5.8 Cost Effectiveness

Evaluation of cost effectiveness considers both the magnitude of the cost, and the benefit gained compared to the expenditure. The FS cost estimates for each of the alternatives are summarized and compared in Table 6.5. Net present value costs for Alternative Nos. 1 and 2 are approximately $11,000 per year and $161,900, respectively. Alternative Nos. 3A and 3B ranged between approximately $625,000 and $929,000 when assuming that long-term monitoring and controls will be included in the remedy. The cost for seep elimination by recovery wells (groundwater collection) with treatment through a constructed wetland (Alternative No. 4A) is estimated to be $1.3 million, while Alternative No. 4B with treatment at the Mid-Hudson Forensic Psychiatric Center WWTP is estimated to be approximately $1.07 million.

The following table provides a subjective comparison of the retained remedial alternatives and ranks each alternative with respect to each of the evaluation criteria. Alternative Nos. 4A and 4B ranks highest among the alternatives. State and community acceptance would be addressed following regulatory review and a public comment period after a remedy has been recommended and is not included on the ranking/evaluation table.

Subjective Ranking/Evaluation of Alternatives

	Remedial Alternative No.					
Evaluation Criteria	**1**	**2**	**3A**	**3B**	**4A**	**4B**
Protection of Human Health and the Environment	1	2	3	3	3	3
Standards, Criteria, and Guidance (SCGs)	1	2	3	3	3	3
Long-Term Effectiveness and Permanence	1	2	2	2	3	3
Reduction of Toxicity, Mobility and Volume of Contamination	1	2	3	3	3	3
Short-Term Impact and Effectiveness	1	2	2	2	3	3
Implementability	3	3	2	2	3	3
Cost Effectiveness	3	2	3	2	2	3
Land Use	2	3	3	3	3	3
TOTALS	**13**	**18**	**21**	**20**	**23**	**24**

1 = does not meet the indicated evaluation criteria.

2 = meets most, but not all of the indicated evaluation criteria.

3 = meets or exceeds the indicated evaluation criteria.

6.6 Recommended Alternative

The recommended remedial alternative is Alternative No. 4B for the seep area(s). This alternative includes armoring the area of the seep with impacted soil removal, groundwater collection by recovery wells, and disposal/treatment of the collected groundwater at the Mid-Hudson Forensic Psychiatric Center WWTP. Orange County is proposing to simultaneously pursue two options to treat the collected groundwater, including treatment in a constructed wetland treatment system and treatment via the existing, permitted Mid-Hudson Forensic Psychiatric Center WWTP located near the Landfill.

ICs, Environmental Easements, and a NYSDEC-approved SMP are in place to guide the work and monitoring that would occur for the alternative. This alternative is the best out of the evaluated alternatives at achieving the evaluation criteria. Importantly, this alternative was deemed likely to be more effective than the other alternatives because of the use of recovery wells to collect groundwater and eliminate the seeps. Alternative No. 4B can be completed in a shorter duration than Alternative No. 4A because the Mid-Hudson Forensic Psychiatric Center WWTP is in place, has a proven record of wastewater treatment, and has operated under an existing SPDES permit. A new SPDES permit would be required for discharge from a constructed wetland (Alternative No. 4A)

Environmental monitoring would be performed under this alternative to evaluate the effectiveness and performance of the selected remedy. Results of the monitoring would be summarized and presented to the NYSDEC in conjunction with annual Landfill Periodic Review Reports (PRRs).

S:\Sterling\Projects\2010 Projects\Orange County - 2010-15\Report\Long-term Seep Elimination FS\Final FS\OCLF Long-term Seep Elimination Feasibility Study Report_txt 2015-01-29.docx

TABLES

Table 6.1
Cost Estimate for Alternative No. 1:
No Action

Orange County Landfill Long Term Seep Elimination Feasibility Study

Item #	Description	Estimated Quantity	Units	Unit Price (materials and labor)	Estimated Amount
CAPITAL COSTS					
1	(None)	1	LS	$0.00	$0.00
				Total Capital Cost:	$0.00
				Engineering Design, Permitting and Certification (25%):	$0.00
				Legal and Administration (5%):	$0.00
				Contingency (20%):	$0.00
				Subtotal Cost:	$0.00
OPERATION AND MAINTENANCE COSTS (30 YEAR)					
2	Additional Cost for Annual Sampling	2	sample	$375.00	$750.00
				Total Annual O&M Cost:	$750.00
				Contingency (20%):	$150.00
				Subtotal Annual Cost:	$900.00
3	30-Year Total Present Worth Cost of O&M:				$11,168.14
				Total Estimated Cost:	$11,168.14

Notes:

- Cost estimate is based on STERLING's experience in the project area and vendor estimates using 2015 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding site investigation and the anticipated scope of the remedial alternative.
- Changes in cost estimates are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative.
- This cost estimate is expected to be within -20% to +50% of the actual project cost.
- Utilization of this cost estimate information beyond the stated purpose is not recommended.

Assumptions:

Item 1 Cost estimate assumes that "No Action" alternative will not incur any capital costs.

Item 2 Cost estimate for annual sampling assumes that the Site Management Plan will be modified to require two (2) seep locations to be added to the post-closure monitoring locations sampled on an annual basis for post-closure surface water monitoring parameters.

Item 3 Present worth is estimated based on a 7% beginning-of-year discount rate (adjusted for inflation). "Year zero" for present worth calculations is 2015.

Table 6.2
Cost Estimate for Alternative No. 2:
Armoring Area of Seeps, Impacted Soil Removal

Orange County Landfill Long Term Seep Elimination Feasibility Study

Item #	Description	Estimated Quantity	Units	Unit Price (materials and labor)	Estimated Amount
CAPITAL COSTS					
1	Mobilization/Demobilization	1	LS	$50,000.00	$50,000.00
2	Erosion and Sediment Control	1	LS	$2,000.00	$2,000.00
3	Clearing and Grubbing	1	LS	$1,000.00	$1,000.00
4	Impacted Soil Excavation and Handling of Excavated Materials	60	CY	$50.00	$3,000.00
5	Post-Excavation Sampling	4	each	$100.00	$400.00
6	Geotextile Installation	198	SY	$0.95	$188.10
7	Riprap Importation, Placement, Grading & Compaction	120	CY	$65.00	$7,800.00
8	Solid Waste Characterization	1	each	$1,500.00	$1,500.00
9	Solid Waste Transportation and Offsite Management (RCRA Landfill)	90	ton	$150.00	$13,500.00
10	Site Restoration	0.25	acre	$5,000.00	$1,250.00
				Total Capital Cost:	$80,638.10
				Engineering Design, CAMP, Permitting and Certification (25%):	$20,159.53
				Legal and Administration (5%):	$4,031.91
				Contingency (20%):	$16,127.62
				Subtotal Capital Cost:	$120,957.15
OPERATION AND MAINTENANCE COSTS (30 YEAR)					
11	Annual Inspection & Maintenance	1	LS	$2,000.00	$2,000.00
12	Additional Cost for Annual Sampling	2	sample	$375.00	$750.00
				Total Annual O&M Cost:	$2,750.00
				Contingency (20%):	$550.00
				Subtotal Annual Cost:	$3,300.00
13	30-Year Total Present Worth Cost of O&M:				$40,949.84
				Total Estimated Cost:	$161,906.99

Notes:

- Cost estimate is based on STERLING's experience in the project area and vendor estimates using 2015 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding site investigation and the anticipated scope of the remedial alternative.
- Changes in cost estimates are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative.
- This cost estimate is expected to be within -20% to +50% of the actual project cost.
- Utilization of this cost estimate information beyond the stated purpose is not recommended.

Assumptions:

Item 1 Mobilization/demobilization cost estimate includes mobilization and demobilization of all equipment, materials, and labor necessary to facilitate soil excavation and place select fill. Assumes that a crane will be utilized to access work areas.

Item 2 Erosion and sediment control cost estimate includes all labor, equipment and materials necessary to purchase and install erosion control practices.

Item 3 Clearing and grubbing cost estimate includes all labor, equipment and materials necessary to clear the work area for access and visibility.

Item 4 Impacted soil excavation and handling of excavated materials cost estimate includes all labor, equipment and materials necessary to excavate material and transfer excavated material to vehicles or containers for offsite transportation.

Item 5 Post-excavation sampling cost estimate includes all labor, equipment and laboratory fees necessary to sample soil excavation areas for contaminants of concern to verify that impacted soil has been removed to Soil Cleanup Objectives. Cost estimate assumes that one (1) soil sample is to be collected from each excavation area.

Item 6 Geotextile installation cost estimate includes all labor, equipment and materials necessary to purchase and install geotextile filter fabric in the excavated areas, under riprap stone fill. Cost estimate includes an additional 10% of material for folding, wrinkles and overlaps.

Table 6.2 (Cont.)
Cost Estimate for Alternative No. 2:
Armoring Area of Seeps, Impacted Soil Removal

Orange County Landfill Long Term Seep Elimination Feasibility Study

Assumptions (Continued):

Item 7 Riprap importation, placement, grading and compaction cost estimate includes all labor, equipment and materials necessary to purchase, place, grade and compact riprap select stone fill in the excavation areas.

Item 8 Solid waste characterization cost estimate includes all labor, equipment and laboratory fees necessary to analyze excavated soils for disposal. Costs assumes that waste characterization samples are to be taken at a frequency of one (1) sample for every 500 tons of material destined for offsite management.

Item 9 Solid waste transportation and offsite management cost estimate includes all labor, equipment and materials necessary to transport excavated material offsite for disposal at an appropriately permitted RCRA landfill. Weight based on assumed density of 1.5 tons per cubic yard.

Item 10 Site restoration cost estimate includes all labor, equipment and materials necessary to restore the site to existing conditions. Cost estimate includes seed, mulch and fertilizer.

Item 11 Annual inspection and maintenance cost estimate includes all labor, equipment and materials necessary to maintain clear access to and inspection of the remediated areas for erosion, settlement and integrity.

Item 12 Cost estimate for annual sampling assumes that the Site Management Plan will be modified to require two (2) seep locations to be added to the post-closure monitoring locations sampled on an annual basis. Includes all labor, equipment and laboratory fees necessary to conduct sampling of the seeps and have the samples analyzed for post-closure surface water sampling parameters.

Item 13 Present worth is estimated based on a 7% beginning-of-year discount rate (adjusted for inflation). "Year zero" for present worth calculations is 2015.

Table 6.3A
Cost Estimate for Alternative No. 3A:
Groundwater Collection/Seep Control - Shallow Trench; Armoring Area of Seeps, Impacted Soil Removal
Groundwater Disposal at Onsite Constructed Wetland Treatment System

Orange County Landfill Long Term Seep Elimination Feasibility Study

Item #	Description	Estimated Quantity	Units	Unit Price (materials and labor)	Estimated Amount
CAPITAL COSTS					
1	Mobilization/Demobilization	1	LS	$65,000.00	$65,000.00
2	Erosion and Sediment Control, Prepare SWPPP	1	LS	$7,500.00	$7,500.00
3	Clearing and Grubbing	1	LS	$3,000.00	$3,000.00
4	Impacted Soil Excavation and Handling of Excavated Materials	60	CY	$50.00	$3,000.00
5	Post-Excavation Sampling	4	each	$100.00	$400.00
6	Geotextile Installation	198	SY	$0.95	$188.10
7	Riprap Importation, Placement & Grading & Compaction	120	CY	$65.00	$7,800.00
8	Solid Waste Characterization	1	each	$1,500.00	$1,500.00
9	Solid Waste Transportation and Offsite Management (RCRA Landfill)	90	ton	$150.00	$13,500.00
10	Groundwater Collection Trench Construction and Handling of Excavated Materials	160	LF	$35.00	$5,600.00
11	Groundwater Collection Sump, Pump and Controls Installation	1	each	$9,000.00	$9,000.00
12	Groundwater Collection Sump Forcemain	100	LF	$24.00	$2,400.00
13	Groundwater Collection Sump Electric Service	120	LF	$20.00	$2,400.00
14	Aboveground Storage Tank	1	LS	$2,500.00	$2,500.00
15	Aboveground Storage Tank Pad	70	CY	$35.00	$2,450.00
16	Duplex Pump Station, Pumps and Controls Installation	1	LS	$30,000.00	$30,000.00
17	Duplex Pump Station Electric Service	25	LF	$22.00	$550.00
18	Forcemain to Constructed Wetland	3,000	LF	$24.00	$72,000.00
19	Constructed Wetland Site Preparation	0.13	acre	$10,000.00	$1,300.00
20	Constructed Wetland Geomembrane Liner	5,663	SF	$1.30	$7,361.90
21	Constructed Wetland Select Fill Installation	419	CY	$50.00	$20,950.00
22	Constructed Wetland Vegetation Plantings	0.13	acre	$130,680.00	$16,988.40
23	Constructed Wetland Piping & Appurtenances	1	LS	$5,000.00	$5,000.00
24	Site Restoration	1.2	acre	$5,000.00	$6,000.00
				Total Capital Cost:	$286,388.40
				Engineering Design, CAMP, Permitting and Certification (25%):	$71,597.10
				Legal and Administration (5%):	$14,319.42
				Contingency (20%):	$57,277.68
				Subtotal Capital Cost:	$429,582.60
OPERATION AND MAINTENANCE COSTS (30 YEAR)					
25	Annual Inspection & Maintenance	1	LS	$12,000.00	$12,000.00
26	Annual Electricity Usage	904	kWh	$0.088	$79.55
27	SPDES Discharge Sampling	1	LS	$1,000.00	$1,000.00
				Total Annual O&M Cost:	$13,079.55
				Contingency (20%):	$2,615.91
				Subtotal Annual Cost:	$15,695.46
28	30-Year Total Present Worth Cost of O&M:				$194,765.61
				Total Estimated Cost:	$624,348.21

Notes:

- Cost estimate is based on STERLING's experience in the project area and vendor estimates using 2015 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding site investigation and the anticipated scope of the remedial alternative.
- Changes in cost estimates are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative.
- This cost estimate is expected to be within -20% to +50% of the actual project cost.
- Utilization of this cost estimate information beyond the stated purpose is not recommended.

Table 6.3A (Cont.)
Cost Estimate for Alternative No. 3A:
Groundwater Collection/Seep Control - Shallow Trench; Armoring Area of Seeps, Impacted Soil Removal
Groundwater Disposal at Onsite Constructed Wetland Treatment System

Orange County Landfill Long Term Seep Elimination Feasibility Study

Assumptions:

Item 1 Mobilization/demobilization cost estimate includes mobilization and demobilization of all equipment, materials, and labor necessary to facilitate soil excavation and place select fill, and install groundwater collection trench, pump station and forcemain, and construct the wetland treatment system. Assumes that a crane will be utilized to access work areas.

Item 2 Erosion and sediment control cost estimate includes all labor, equipment and materials necessary to prepare a Storm Water Pollution Prevention Plan (SWPPP), and to purchase and install erosion control practices.

Item 3 Clearing and grubbing cost estimate includes all labor, equipment and materials necessary to clear the work area for access and visibility.

Item 4 Impacted soil excavation and handling of excavated materials cost estimate includes all labor, equipment and materials necessary to excavate material and transfer excavated material to vehicles or containers for offsite transportation.

Item 5 Post-excavation sampling cost estimate includes all labor, equipment and laboratory fees necessary to sample soil excavation areas for contaminants of concern to verify that impacted soil has been removed to Soil Cleanup Objectives. Cost estimate assumes that one (1) soil sample is to be collected from each excavation area.

Item 6 Geotextile installation cost estimate includes all labor, equipment and materials necessary to purchase and install geotextile filter fabric in the excavated areas, under riprap stone fill. Cost estimate includes an additional 10% of material for folding, wrinkles and overlaps.

Item 7 Riprap importation, placement, grading and compaction cost estimate includes all labor, equipment and materials necessary to purchase, place, grade and compact riprap select stone fill in the excavation areas.

Item 8 Solid waste characterization cost estimate includes all labor, equipment and laboratory fees necessary to analyze excavated soils for disposal. Costs assumes that waste characterization samples are to be taken at a frequency of one (1) sample for every 500 tons of material destined for offsite management.

Item 9 Solid waste transportation and offsite management cost estimate includes all labor, equipment and materials necessary to transport excavated material offsite for disposal at an appropriately permitted RCRA landfill. Weight based on assumed density of 1.5 tons per cubic yard.

Item 10 Groundwater collection trench construction cost estimate includes all labor, equipment and materials necessary to excavate, construct and backfill groundwater collection trenches at seep areas and handle excavated materials.

Item 11 Groundwater collection sump, pump and controls installation cost estimate includes all labor, equipment and materials necessary to purchase and install groundwater collection sump structure, pump and controls.

Item 12 Groundwater collection sump forcemain cost estimate includes all labor, equipment and materials necessary for trench excavation and backfill, and purchase and installation of select backfill materials and piping from the groundwater collection sump to the aboveground storage tank.

Item 13 Groundwater collection sump electric service includes all labor, equipment and materials necessary to purchase and install underground electric utilities. Assumes tying into nearest point of existing leachate collection pump electric service.

Item 14 Aboveground storage tank cost estimate includes all labor, equipment and materials necessary to relocate and set up an existing County-owned 20,000 gallon aboveground storage tank.

Item 15 Aboveground storage tank pad cost estimate includes all labor, equipment and materials necessary to construct a gravel pad for placement of the aboveground storage tank.

Item 16 Duplex pump station cost estimate includes all labor, equipment and materials necessary to purchase and install a concrete wet well duplex pump station, including pumps and controls.

Item 17 Duplex pump station electric service includes all labor, equipment and materials necessary to purchase and install underground electric utilities. Assumes tying into nearest point of existing leachate collection pump electric service.

Item 18 Forcemain to constructed wetland cost estimate includes all labor, equipment and materials necessary for trench excavation and backfill, and purchase and installation of select backfill materials and piping from the duplex pump station.

Item 19 Constructed wetland site preparation cost estimate includes all labor, equipment and materials necessary to grade the constructed wetland area and prepare the sub base for installation of the geomembrane liner.

Item 20 Constructed wetland geomembrane liner cost estimate includes all labor, equipment and materials necessary to purchase and install the 20 mil PVC impermeable geomembrane liner.

Item 21 Constructed wetland select fill installation cost estimate includes all labor, equipment and materials necessary to purchase, deliver, place and grade 24 inch deep sand layer.

Item 22 Constructed wetland vegetation plantings cost estimate includes all labor, equipment and materials necessary to purchase and install wetland vegetation. Assumes one (1) planting per square foot.

Item 23 Constructed wetland piping and appurtenances cost estimate includes all labor, equipment and materials necessary to purchase and install piping and miscellaneous appurtenances for the constructed wetland system.

Item 24 Site restoration cost estimate includes all labor, equipment and materials necessary to restore the site to existing conditions. Cost estimate includes seed, mulch and fertilizer.

Item 25 Annual inspection and maintenance cost estimate includes all labor, equipment and materials necessary to maintain clear access to and inspection of the remediated areas for erosion, settlement and integrity.

Table 6.3A (Cont.)
Cost Estimate for Alternative No. 3A:
Groundwater Collection/Seep Control - Shallow Trench; Armoring Area of Seeps, Impacted Soil Removal
Groundwater Disposal at Onsite Constructed Wetland Treatment System

Orange County Landfill Long Term Seep Elimination Feasibility Study

Assumptions (Cont.):

Item 26 Annual electricity usage cost estimate includes electric utility cost for groundwater collection sump and duplex pumping station pumps to pump 525,600 gallons per year (average flow rate from seeps assumed to be 1 gallon per minute).

Item 27 SPDES discharge sampling cost estimate includes all labor, equipment, materials and laboratory fees to collect annual effluent samples from the constructed wetlands. Assumes samples will be analyzed for BOD, TSS, TDS, ammonia, iron and manganese.

Item 28 Present worth is estimated based on a 7% beginning-of-year discount rate (adjusted for inflation). "Year zero" for present worth calculations is 2015.

Table 6.3B
Cost Estimate for Alternative No. 3B:
Groundwater Collection/Seep Control - Shallow Trench; Armoring Area of Seeps, Impacted Soil Removal
Groundwater Disposal at Mid-Hudson Forensic Psychiatric Center (MHFPC) WWTP

Orange County Landfill Long Term Seep Elimination Feasibility Study

Item #	Description	Estimated Quantity	Units	Unit Price (materials and labor)	Estimated Amount
CAPITAL COSTS					
1	Mobilization/Demobilization	1	LS	$60,000.00	$60,000.00
2	Erosion and Sediment Control, Prepare SWPPP	1	LS	$7,500.00	$7,500.00
3	Clearing and Grubbing	1	LS	$2,000.00	$2,000.00
4	Impacted Soil Excavation and Handling of Excavated Materials	60	CY	$50.00	$3,000.00
5	Post-Excavation Sampling	4	each	$100.00	$400.00
6	Geotextile Installation	198	SY	$0.95	$188.10
7	Riprap Importation, Placement, Grading & Compaction	120	CY	$65.00	$7,800.00
8	Solid Waste Characterization	1	each	$1,500.00	$1,500.00
9	Solid Waste Transportation and Offsite Management (RCRA Landfill)	90	ton	$150.00	$13,500.00
10	Groundwater Collection Trench Construction and Handling of Excavated Materials	160	LF	$35.00	$5,600.00
11	Groundwater Collection Sump, Pump and Controls Installation	1	each	$9,000.00	$9,000.00
12	Groundwater Collection Sump Forcemain	100	LF	$24.00	$2,400.00
13	Groundwater Collection Sump Electric Service	120	LF	$20.00	$2,400.00
14	Aboveground Storage Tank	1	LS	$2,500.00	$2,500.00
15	Aboveground Storage Tank Pad	70	CY	$35.00	$2,450.00
16	Duplex Pump Station, Pumps and Controls Installation	1	LS	$30,000.00	$30,000.00
17	Duplex Pump Station Electric Service	25	LF	$22.00	$550.00
18	Forcemain to MHFPC WWTP	6,500	LF	$24.00	$156,000.00
19	Improvements to MHFPC WWTP	1	LS	$25,000.00	$25,000.00
20	Site Restoration	1.7	acre	$5,000.00	$8,500.00
				Total Capital Cost:	$340,288.10
				Engineering Design, CAMP, Permitting and Certification (25%):	$85,072.03
				Legal and Administration (5%):	$17,014.41
				Contingency (20%):	$68,057.62
				Subtotal Capital Cost:	$510,432.16
OPERATION AND MAINTENANCE COSTS (30 YEAR)					
21	Annual Inspection & Maintenance	1	LS	$10,000.00	$10,000.00
22	Annual Electricity Usage	904	kWh	$0.088	$79.55
23	Annual O&M of WWTP	1	LS	$18,000.00	$18,000.00
				Total Annual O&M Cost:	$28,079.55
				Contingency (20%):	$5,615.91
				Subtotal Annual Cost:	$33,695.46
24	30-Year Total Present Worth Cost of O&M:				$418,128.35
				Total Estimated Cost:	$928,560.51

Notes:

- Cost estimate is based on STERLING's experience in the project area and vendor estimates using 2015 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding site investigation and the anticipated scope of the remedial alternative.
- Changes in cost estimates are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative.
- This cost estimate is expected to be within -20% to +50% of the actual project cost.
- Utilization of this cost estimate information beyond the stated purpose is not recommended.

Table 6.3B (Cont.)
Cost Estimate for Alternative No. 3B:
Groundwater Collection/Seep Control - Shallow Trench; Armoring Area of Seeps, Impacted Soil Removal
Groundwater Disposal at Mid-Hudson Forensic Psychiatric Center (MHFPC) WWTP

Orange County Landfill Long Term Seep Elimination Feasibility Study

Assumptions:

Item 1 Mobilization/demobilization cost estimate includes mobilization and demobilization of all equipment, materials, and labor necessary to facilitate soil excavation and place select fill, and install groundwater collection trench, pump station and forcemain, and construct the wetland treatment system. Assumes that a crane will be utilized to access work areas.

Item 2 Erosion and sediment control cost estimate includes all labor, equipment and materials necessary to prepare a Storm Water Pollution Prevention Plan (SWPPP), and to purchase and install erosion control practices.

Item 3 Clearing and grubbing cost estimate includes all labor, equipment and materials necessary to clear the work area for access and visibility.

Item 4 Impacted soil excavation and handling of excavated materials cost estimate includes all labor, equipment and materials necessary to excavate material and transfer excavated material to vehicles or containers for offsite transportation.

Item 5 Post-excavation sampling cost estimate includes all labor, equipment and laboratory fees necessary to sample soil excavation areas for contaminants of concern to verify that impacted soil has been removed to Soil Cleanup Objectives. Cost estimate assumes that one (1) soil sample is to be collected from each excavation area.

Item 6 Geotextile installation cost estimate includes all labor, equipment and materials necessary to purchase and install geotextile filter fabric in the excavated areas, under riprap stone fill. Cost estimate includes an additional 10% of material for folding, wrinkles and overlaps.

Item 7 Riprap importation, placement, grading and compaction cost estimate includes all labor, equipment and materials necessary to purchase, place, grade and compact riprap select stone fill in the excavation areas.

Item 8 Solid waste characterization cost estimate includes all labor, equipment and laboratory fees necessary to analyze excavated soils for disposal. Costs assumes that waste characterization samples are to be taken at a frequency of one (1) sample for every 500 tons of material destined for offsite management.

Item 9 Solid waste transportation and offsite management cost estimate includes all labor, equipment and materials necessary to transport excavated material offsite for disposal at an appropriately permitted RCRA landfill. Weight based on assumed density of 1.5 tons per cubic yard.

Item 10 Groundwater collection trench construction cost estimate includes all labor, equipment and materials necessary to excavate, construct and backfill groundwater collection trenches at seep areas and handle excavated materials.

Item 11 Groundwater collection sump, pump and controls installation cost estimate includes all labor, equipment and materials necessary to purchase and install groundwater collection sump structure, pump and controls.

Item 12 Groundwater collection sump forcemain cost estimate includes all labor, equipment and materials necessary for trench excavation and backfill, and purchase and installation of select backfill materials and piping from the groundwater collection sump to the aboveground storage tank.

Item 13 Groundwater collection sump electric service includes all labor, equipment and materials necessary to purchase and install underground electric utilities. Assumes tying into nearest point of existing leachate collection pump electric service.

Item 14 Aboveground storage tank cost estimate includes all labor, equipment and materials necessary to relocate and set up an existing County-owned 20,000 gallon aboveground storage tank.

Item 15 Aboveground storage tank pad cost estimate includes all labor, equipment and materials necessary to construct a gravel pad for placement of the aboveground storage tank.

Item 16 Duplex pump station cost estimate includes all labor, equipment and materials necessary to purchase and install a concrete wet well duplex pump station, including pumps and controls.

Item 17 Duplex pump station electric service includes all labor, equipment and materials necessary to purchase and install underground electric utilities. Assumes tying into nearest point of existing leachate collection pump electric service.

Item 18 Forcemain to Mid Hudson Forensic Psychiatric Center (MHFPC) wastewater treatment plant (WWTP) cost estimate includes all labor, equipment and materials necessary for trench excavation and backfill, and purchase and installation of select backfill materials and piping, from the duplex pump station to the WWTP.

Item 19 Improvements to the MHFPC WWTP cost estimate provides an allowance for headworks improvements and process modifications (to be determined) to receive and treat the collected groundwater. These costs do not include the purchase and assumption of operation of the MHFPC WWTP by Orance County. These costs represent capital modifications of the WWTP necessary to receive the incremental flow from the Seep Remediation System.

Item 20 Site restoration cost estimate includes all labor, equipment and materials necessary to restore the site to existing conditions. Cost estimate includes seed, mulch and fertilizer.

Item 21 Annual inspection and maintenance cost estimate includes all labor, equipment and materials necessary to maintain clear access to and inspection of the remediated areas for erosion, settlement and integrity.

Item 22 Annual electricity usage cost estimate includes electric utility cost for groundwater collection sump and duplex pumping station pumps to pump 525,600 gallons per year (average flow rate from seeps assumed to be 1 gallon per minute).

Item 23 Annual operation and maintenance (O&M) of the MHFPC WWTP cost estimate includes all labor, equipment and materials to operate and maintain the facility. Includes SPDES Permit discharge sampling and reporting.

Item 24 Present worth is estimated based on a 7% beginning-of-year discount rate (adjusted for inflation). "Year zero" for present worth calculations is 2015.

Table 6.4A
Cost Estimate for Alternative No. 4A:
Groundwater Collection/Seep Control - Recovery Wells; Armoring Area of Seeps, Impacted Soil Removal
Groundwater Disposal at Onsite Constructed Wetland Treatment System

Orange County Landfill Long Term Seep Elimination Feasibility Study

Item #	Description	Estimated Quantity	Units	Unit Price (materials and labor)	Estimated Amount
CAPITAL COSTS					
1	Mobilization/Demobilization	1	LS	$65,000.00	$65,000.00
2	Erosion and Sediment Control, Prepare SWPPP	1	LS	$10,000.00	$10,000.00
3	Clearing and Grubbing	1	LS	$4,000.00	$4,000.00
4	Impacted Soil Excavation and Handling of Excavated Materials	60	CY	$50.00	$3,000.00
5	Post-Excavation Sampling	4	each	$100.00	$400.00
6	Geotextile Installation	198	SY	$0.95	$188.10
7	Riprap Importation, Placement, Grading and Compaction	120	CY	$65.00	$7,800.00
8	Solid Waste Characterization	1	each	$1,500.00	$1,500.00
9	Solid Waste Transportation and Offsite Management (RCRA Landfill)	90	ton	$150.00	$13,500.00
10	Recovery Well Installation	1	each	$5,000.00	$5,000.00
11	Recovery Well Pump and Controller	1	each	$12,000.00	$12,000.00
12	Recovery Well Forcemain	50	LF	$24.00	$1,200.00
13	Recovery Well Electric Service	70	LF	$20.00	$1,400.00
14	Aboveground Storage Tank	1	LS	$2,500.00	$2,500.00
15	Aboveground Storage Tank Pad	70	CY	$35.00	$2,450.00
16	Duplex Pump Station, Pumps and Controls Installation	1	LS	$30,000.00	$30,000.00
17	Duplex Pump Station Electric Service	25	LF	$22.00	$550.00
18	Forcemain to Constructed Wetland	3,000	LF	$24.00	$72,000.00
19	Constructed Wetland Site Preparation	1.3	acre	$10,000.00	$13,000.00
20	Constructed Wetland Geomembrane Liner	56,628	SF	$1.50	$84,942.00
21	Constructed Wetland Select Fill Installation	4,195	CY	$50.00	$209,750.00
22	Constructed Wetland Vegetation Plantings	1.3	acre	$130,680.00	$169,884.00
23	Constructed Wetland Piping & Appurtenances	1	LS	$7,500.00	$7,500.00
24	Site Restoration	1.4	acre	$5,000.00	$7,000.00
				Total Capital Cost:	$724,564.10
				Engineering Design, CAMP, Permitting and Certification (25%):	$181,141.03
				Legal and Administration (5%):	$36,228.21
				Contingency (20%):	$144,912.82
				Subtotal Capital Cost:	$1,086,846.16
OPERATION AND MAINTENANCE COSTS (30 YEAR)					
25	Annual Inspection & Maintenance	1	LS	$12,000.00	$12,000.00
26	Annual Electricity Usage	14,602	kWh	$0.088	$1,284.98
27	SPDES Discharge Sampling	1	LS	$1,000.00	$1,000.00
				Total Annual O&M Cost:	$14,284.98
				Contingency (20%):	$2,857.00
				Subtotal Annual Cost:	$17,141.98
28	30-Year Total Present Worth Cost of O&M:				$212,715.49
				Total Estimated Cost:	$1,299,561.65

Notes:

- Cost estimate is based on STERLING's experience in the project area and vendor estimates using 2015 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding site investigation and the anticipated scope of the remedial alternative.
- Changes in cost estimates are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative.
- This cost estimate is expected to be within -20% to +50% of the actual project cost.
- Utilization of this cost estimate information beyond the stated purpose is not recommended.

Table 6.4A (Cont.)
Cost Estimate for Alternative No. 4A:
Groundwater Collection/Seep Control - Recovery Wells; Armoring Area of Seeps, Impacted Soil Removal
Groundwater Disposal at Onsite Constructed Wetland Treatment System

Orange County Landfill Long Term Seep Elimination Feasibility Study

Assumptions:

Item 1 Mobilization/demobilization cost estimate includes mobilization and demobilization of all equipment, materials, and labor necessary to facilitate soil excavation and place select fill, and install groundwater collection trench, pump station and forcemain, and construct the wetland treatment system. Assumes that a crane will be utilized to access work areas.

Item 2 Erosion and sediment control cost estimate includes all labor, equipment and materials necessary to prepare a Storm Water Pollution Prevention Plan (SWPPP), and to purchase and install erosion control practices.

Item 3 Clearing and grubbing cost estimate includes all labor, equipment and materials necessary to clear the work area for access and visibility.

Item 4 Impacted soil excavation and handling of excavated materials cost estimate includes all labor, equipment and materials necessary to excavate material and transfer excavated material to vehicles or containers for offsite transportation.

Item 5 Post-excavation sampling cost estimate includes all labor, equipment and laboratory fees necessary to sample soil excavation areas for contaminants of concern to verify that impacted soil has been removed to Soil Cleanup Objectives. Cost estimate assumes that one (1) soil sample is to be collected from each excavation area.

Item 6 Geotextile installation cost estimate includes all labor, equipment and materials necessary to purchase and install geotextile filter fabric in the excavated areas, under riprap stone fill. Cost estimate includes an additional 10% of material for folding, wrinkles and overlaps.

Item 7 Riprap importation, placement, grading and compaction cost estimate includes all labor, equipment and materials necessary to purchase, place, grade and compact riprap select stone fill in the excavation areas.

Item 8 Solid waste characterization cost estimate includes all labor, equipment and laboratory fees necessary to analyze excavated soils for disposal. Costs assumes that waste characterization samples are to be taken at a frequency of one (1) sample for every 500 tons of material destined for offsite management.

Item 9 Solid waste transportation and offsite management cost estimate includes all labor, equipment and materials necessary to transport excavated material offsite for disposal at an appropriately permitted RCRA landfill. Weight based on assumed density of 1.5 tons per cubic yard.

Item 10 Recovery well installation cost estimate includes all labor, equipment and materials necessary for trench excavation and backfill, and purchase and installation of select backfill materials and piping from the recovery well to the aboveground storage tank.

Item 11 Recovery well pump and controller cost estimate includes all labor, equipment and materials necessary to purchase and install a recovery well pump and controls.

Item 12 Recovery well forcemain cost estimate includes all labor, equipment and materials necessary for trench excavation and backfill, and purchase and installation of select backfill materials and piping from the recovery well to the aboveground storage tank.

Item 13 Recovery well electric service cost estimate includes all labor, equipment and materials necessary to purchase and install underground electric utilities. Assumes tying into nearest point of existing leachate collection pump electric service.

Item 14 Aboveground storage tank cost estimate includes all labor, equipment and materials necessary to relocate and set up an existing County-owned 20,000 gallon aboveground storage tank.

Item 15 Aboveground storage tank pad cost estimate includes all labor, equipment and materials necessary to construct a gravel pad for placement of the aboveground storage tank.

Item 16 Duplex pump station cost estimate includes all labor, equipment and materials necessary to purchase and install a concrete wet well duplex pump station, including pumps and controls.

Item 17 Duplex pump station electric service includes all labor, equipment and materials necessary to purchase and install underground electric utilities. Assumes tying into nearest point of existing leachate collection pump electric service.

Item 18 Forcemain to constructed wetland cost estimate includes all labor, equipment and materials necessary for trench excavation and backfill, and purchase and installation of select backfill materials and piping from the duplex pump station.

Item 19 Constructed wetland site preparation cost estimate includes all labor, equipment and materials necessary to grade the constructed wetland area and prepare the sub base for installation of the geomembrane liner.

Item 20 Constructed wetland geomembrane liner cost estimate includes all labor, equipment and materials necessary to purchase and install the 20 mil PVC impermeable geomembrane liner.

Item 21 Constructed wetland select fill installation cost estimate includes all labor, equipment and materials necessary to purchase, deliver, place and grade 24 inch deep sand layer.

Item 22 Constructed wetland vegetation plantings cost estimate includes all labor, equipment and materials necessary to purchase and install wetland vegetation. Assumes one (1) planting per square foot.

Item 23 Constructed wetland piping and appurtenances cost estimate includes all labor, equipment and materials necessary to purchase and install piping and miscellaneous appurtenances for the constructed wetland system.

Item 24 Site restoration cost estimate includes all labor, equipment and materials necessary to restore the site to existing conditions. Cost estimate includes seed, mulch and fertilizer.

Item 25 Annual inspection and maintenance cost estimate includes all labor, equipment and materials necessary to maintain clear access to and inspection of the remediated areas for erosion, settlement and integrity.

Table 6.4A (Cont.)
Cost Estimate for Alternative No. 4A:
Groundwater Collection/Seep Control - Recovery Wells; Armoring Area of Seeps, Impacted Soil Removal
Groundwater Disposal at Onsite Constructed Wetland Treatment System

Orange County Landfill Long Term Seep Elimination Feasibility Study

Assumptions (Cont.):

Item 26 Annual electricity usage cost estimate includes electric utility cost for groundwater collection sump and duplex pumping station pumps to pump 5,256,000 gallons per year (average flow rate from recovery well(s) assumed to be 10 gallons per minute).

Item 27 SPDES discharge sampling cost estimate includes all labor, equipment, materials and laboratory fees to collect annual effluent samples from the constructed wetlands. Assumes samples will be analyzed for BOD, TSS, TDS, ammonia, iron and manganese.

Item 28 Present worth is estimated based on a 7% beginning-of-year discount rate (adjusted for inflation). "Year zero" for present worth calculations is 2015.

Table 6.4B
Cost Estimate for Alternative No. 4B:
Groundwater Collection/Seep Control - Recovery Wells; Armoring Area of Seeps, Impacted Soil Removal
Groundwater Disposal at Mid-Hudson Forensic Psych. Center WWTP

Orange County Landfill Long Term Seep Elimination Feasibility Study

Item #	Description	Estimated Quantity	Units	Unit Price (materials and labor)	Estimated Amount
CAPITAL COSTS					
1	Mobilization/Demobilization	1	LS	$65,000.00	$65,000.00
2	Erosion and Sediment Control, Prepare SWPPP	1	LS	$10,000.00	$10,000.00
3	Clearing and Grubbing	1	LS	$4,000.00	$4,000.00
4	Impacted Soil Excavation and Handling of Excavated Materials	60	CY	$50.00	$3,000.00
5	Post-Excavation Sampling	4	each	$100.00	$400.00
6	Geotextile Installation	198	SY	$0.95	$188.10
7	Riprap Importation, Placement, Grading & Compaction	120	CY	$65.00	$7,800.00
8	Solid Waste Characterization	1	each	$1,500.00	$1,500.00
9	Solid Waste Transportation and Offsite Management (RCRA Landfill)	90	ton	$150.00	$13,500.00
10	Recovery Well Installation	1	each	$5,000.00	$5,000.00
11	Recovery Well Pump and Controller	1	each	$12,000.00	$12,000.00
12	Recovery Well Forcemain	3,050	LF	$24.00	$73,200.00
13	Recovery Well Electric Service	70	LF	$20.00	$1,400.00
14	Aboveground Storage Tank	1	LS	$2,500.00	$2,500.00
15	Aboveground Storage Tank Pad	70	CY	$35.00	$2,450.00
16	Duplex Pump Station, Pumps and Controls Installation	1	LS	$30,000.00	$30,000.00
17	Duplex Pump Station Electric Service	25	LF	$22.00	$550.00
18	Forcemain to MHFPC WWTP	6,500	LF	$24.00	$156,000.00
19	Improvements to MHFPC WWTP	1	LS	$25,000.00	$25,000.00
20	Site Restoration	1.7	acre	$5,000.00	$8,500.00
				Total Capital Cost:	$421,988.10
				Engineering Design, CAMP, Permitting and Certification (25%):	$105,497.03
				Legal and Administration (5%):	$21,099.41
				Contingency (20%):	$84,397.62
				Subtotal Capital Cost:	$632,982.16
OPERATION AND MAINTENANCE COSTS (30 YEAR)					
21	Annual Inspection & Maintenance	1	LS	$10,000.00	$10,000.00
22	Annual Electricity Usage	14,602	kWh	$0.088	$1,284.98
23	Annual O&M of WWTP	1	LS	$18,000.00	$18,000.00
				Total Annual O&M Cost:	$29,284.98
				Contingency (20%):	$5,857.00
				Subtotal Annual Cost:	$35,141.98
24	30-Year Total Present Worth Cost of O&M:				$436,078.23
				Total Estimated Cost:	$1,069,060.39

Notes:

- Cost estimate is based on STERLING's experience in the project area and vendor estimates using 2015 dollars.
- This estimate has been prepared for the purposes of comparing potential remedial alternatives. The information in this cost estimate is based on the available information regarding site investigation and the anticipated scope of the remedial alternative.
- Changes in cost estimates are likely to occur as a result of new information and data collected during the engineering design of the remedial alternative.
- This cost estimate is expected to be within -20% to +50% of the actual project cost.
- Utilization of this cost estimate information beyond the stated purpose is not recommended.

Assumptions:

Item 1 Mobilization/demobilization cost estimate includes mobilization and demobilization of all equipment, materials, and labor necessary to facilitate soil excavation and place select fill, and install groundwater collection trench, pump station and forcemain, and construct the wetland treatment system. Assumes that a crane will be utilized to access work areas.

Table 6.4B (Cont.)
Cost Estimate for Alternative No. 4B:
Groundwater Collection/Seep Control - Recovery Wells; Armoring Area of Seeps, Impacted Soil Removal
Groundwater Disposal at Mid-Hudson Forensic Psych. Center WWTP

Orange County Landfill Long Term Seep Elimination Feasibility Study

Assumptions (Cont.):

Item 2 Erosion and sediment control cost estimate includes all labor, equipment and materials necessary to prepare a Storm Water Pollution Prevention Plan (SWPPP), and to purchase and install erosion control practices.

Item 3 Clearing and grubbing cost estimate includes all labor, equipment and materials necessary to clear the work area for access and visibility.

Item 4 Impacted soil excavation and handling of excavated materials cost estimate includes all labor, equipment and materials necessary to excavate material and transfer excavated material to vehicles or containers for offsite transportation.

Item 5 Post-excavation sampling cost estimate includes all labor, equipment and laboratory fees necessary to sample soil excavation areas for contaminants of concern to verify that impacted soil has been removed to Soil Cleanup Objectives. Cost estimate assumes that one (1) soil sample is to be collected from each excavation area.

Item 6 Geotextile installation cost estimate includes all labor, equipment and materials necessary to purchase and install geotextile filter fabric in the excavated areas, under riprap stone fill. Cost estimate includes an additional 10% of material for folding, wrinkles and overlaps.

Item 7 Riprap importation, placement, grading and compaction cost estimate includes all labor, equipment and materials necessary to purchase, place, grade and compact riprap select stone fill in the excavation areas.

Item 8 Solid waste characterization cost estimate includes all labor, equipment and laboratory fees necessary to analyze excavated soils for disposal. Costs assumes that waste characterization samples are to be taken at a frequency of one (1) sample for every 500 tons of material destined for offsite management.

Item 9 Solid waste transportation and offsite management cost estimate includes all labor, equipment and materials necessary to transport excavated material offsite for disposal at an appropriately permitted RCRA landfill. Weight based on assumed density of 1.5 tons per cubic yard.

Item 10 Recovery well installation cost estimate includes all labor, equipment and materials necessary for trench excavation and backfill, and purchase and installation of select backfill materials and piping from the recovery well to the aboveground storage tank.

Item 11 Recovery well pump and controller cost estimate includes all labor, equipment and materials necessary to purchase and install a recovery well pump and controls.

Item 12 Recovery well forcemain cost estimate includes all labor, equipment and materials necessary for trench excavation and backfill, and purchase and installation of select backfill materials and piping from the recovery well to the aboveground storage tank.

Item 13 Recovery well electric service cost estimate includes all labor, equipment and materials necessary to purchase and install underground electric utilities. Assumes tying into nearest point of existing leachate collection pump electric service.

Item 14 Aboveground storage tank cost estimate includes all labor, equipment and materials necessary to relocate and set up an existing County-owned 20,000 gallon aboveground storage tank.

Item 15 Aboveground storage tank pad cost estimate includes all labor, equipment and materials necessary to construct a gravel pad for placement of the aboveground storage tank.

Item 16 Duplex pump station cost estimate includes all labor, equipment and materials necessary to purchase and install a concrete wet well duplex pump station, including pumps and controls.

Item 17 Duplex pump station electric service includes all labor, equipment and materials necessary to purchase and install underground electric utilities. Assumes tying into nearest point of existing leachate collection pump electric service.

Item 18 Forcemain to Mid Hudson Forensic Psychiatric Center (MHFPC) wastewater treatment plant (WWTP) cost estimate includes all labor, equipment and materials necessary for trench excavation and backfill, and purchase and installation of select backfill materials and piping, from the duplex pump station to the WWTP.

Item 19 Improvements to the MHFPC WWTP cost estimate provides an allowance for headworks improvements and process modifications (to be determined) to receive and treat the collected groundwater. These costs do not include the purchase ans assumption of operation of the MHFPC WWTP by Orance County. These costs represent capital modifications of the WWTP necessary to receive the incremental flow from the Seep Remediation System.

Item 20 Site restoration cost estimate includes all labor, equipment and materials necessary to restore the site to existing conditions. Cost estimate includes seed, mulch and fertilizer.

Item 21 Annual inspection and maintenance cost estimate includes all labor, equipment and materials necessary to maintain clear access to and inspection of the remediated areas for erosion, settlement and integrity.

Item 22 Annual electricity usage cost estimate includes electric utility cost for groundwater collection sump and duplex pumping station pumps to pump 5,256,000 gallons per year (average flow rate from recovery well(s) assumed to be 10 gallons per minute).

Item 23 Annual operation and maintenance (O&M) of the MHFPC WWTP cost estimate includes all labor, equipment and materials to operate and maintain the facility. Includes SPDES Permit discharge sampling and reporting.

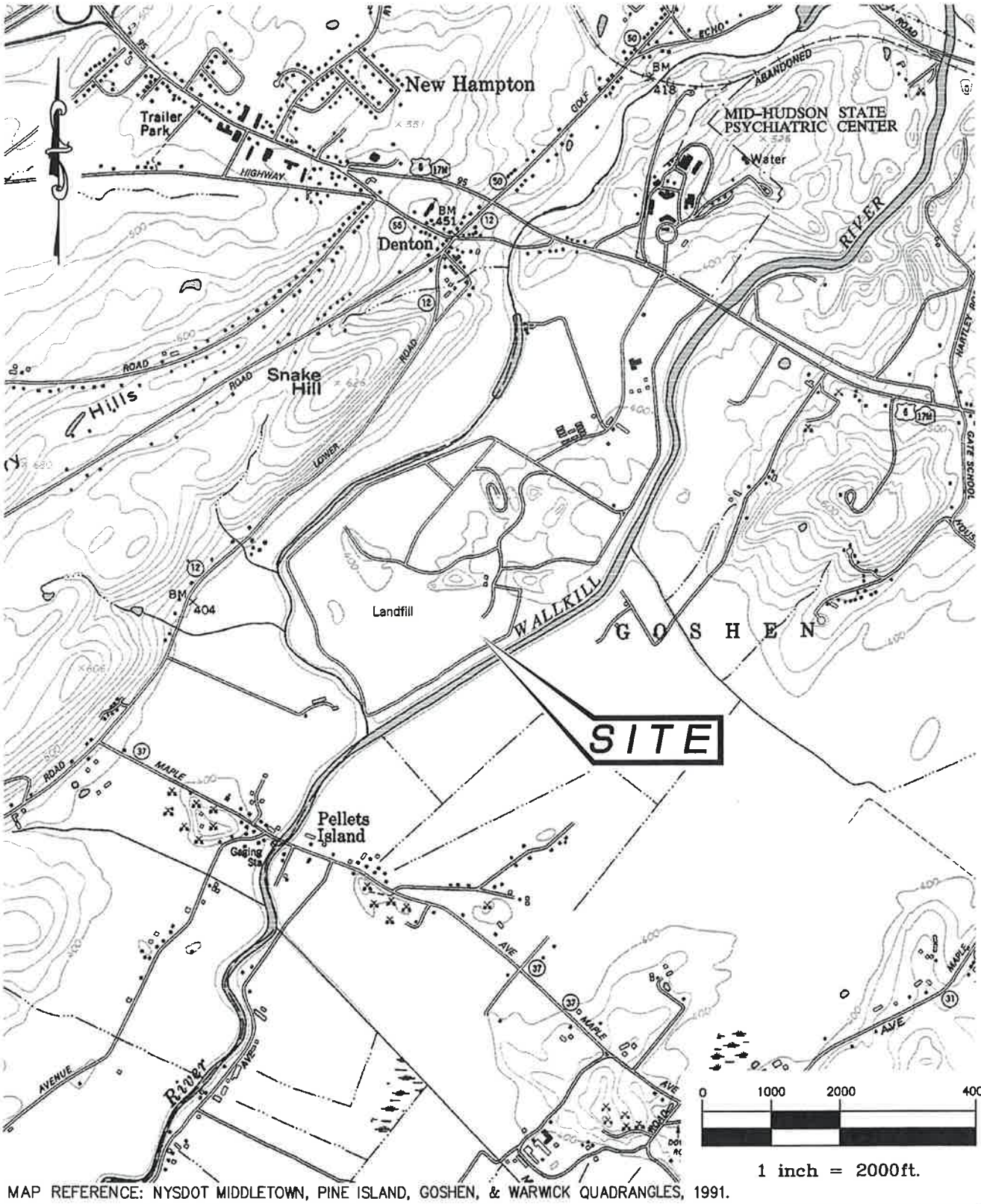
Item 24 Present worth is estimated based on a 7% beginning-of-year discount rate (adjusted for inflation). "Year zero" for present worth calculations is 2015.

Table 6.5
Cost Estimate Comparison

Orange County Landfill Long Term Seep Elimination Feasibility Study

Alternative No.	Description	Capital Cost	O&M (30-Year Present Worth)	Total Estimated Cost
1	No Action	$0.00	$11,168.14	**$11,168.14**
2	Armoring Area of Seeps, Impacted Soil Removal	$120,957.15	$40,949.84	**$161,906.99**
3A	Armoring Area of Seep, Impacted Soil Removal; Groundwater Collection/Seep Control - Shallow Trench; and Groundwater Disposal at Onsite Constructed Wetland Treatment System	$429,582.60	$194,765.61	**$624,348.21**
3B	Armoring Area of Seep, Impacted Soil Removal; Groundwater Collection/Seep Control - Shallow Trench; and Groundwater Disposal at MHFPC WWTP	$510,432.16	$418,128.35	**$928,560.51**
4A	Armoring Area of Seep, Impacted Soil Removal; Groundwater Collection/Seep Control - Recovery Well(s); and Groundwater Disposal at Onsite Constructed Wetland Treatment System	$1,086,846.16	$212,715.49	**$1,299,561.65**
4B	Armoring Area of Seep, Impacted Soil Removal; Groundwater Collection/Seep Control - Recovery Well(s); and Groundwater Disposal at MHFPC WWTP	$632,982.16	$436,078.23	**$1,069,060.39**

FIGURES



MAP REFERENCE: NYSDOT MIDDLETOWN, PINE ISLAND, GOSHEN, & WARWICK QUADRANGLES, 1991.

STERLING

Sterling Environmental Engineering, P.C.

24 Wade Road • Latham, New York 12110

SITE LOCATION MAP

ORANGE CO. DEPT. OF PUBLIC WORKS

ORANGE COUNTY LANDFILL

TOWN OF GOSHEN ORANGE CO., N.Y.

PROJ. No.: 2013-29	DATE: 1/30/15	SCALE: 1" = 2000'	DWG. NO. 2010-15054	FIGURE 1

LEGEND:

APPROXIMATE PROPERTY BOUNDARY

APPROXIMATE LIMIT OF LANDFILL GEOMEMBRANE COVER

0 1000 2000 4000

1 inch = 2000ft.

MAP REFERENCES:

1. PROPERTY BOUNDARY AND LIMIT OF WASTE FROM DRAWINGS ENTITLED "OVERALL PLAN AND RESTRICTED PARCEL," BY THOMAS J. BARRY, DATED FEBRUARY 14, 2013.
2. AERIAL PHOTOGRAPH FROM NYSGIS ORTHOIMAGERY, DATED 2013.

C:\Users\burtons\Desktop\SDB\Temp-Projects\2010-15 - Orange County\2010-15055_SiteVicinity.dwg 1/28/2015 3:45 PM

STERLING

Sterling Environmental Engineering, P.C.

24 Wade Road ♦ Latham, New York 12110

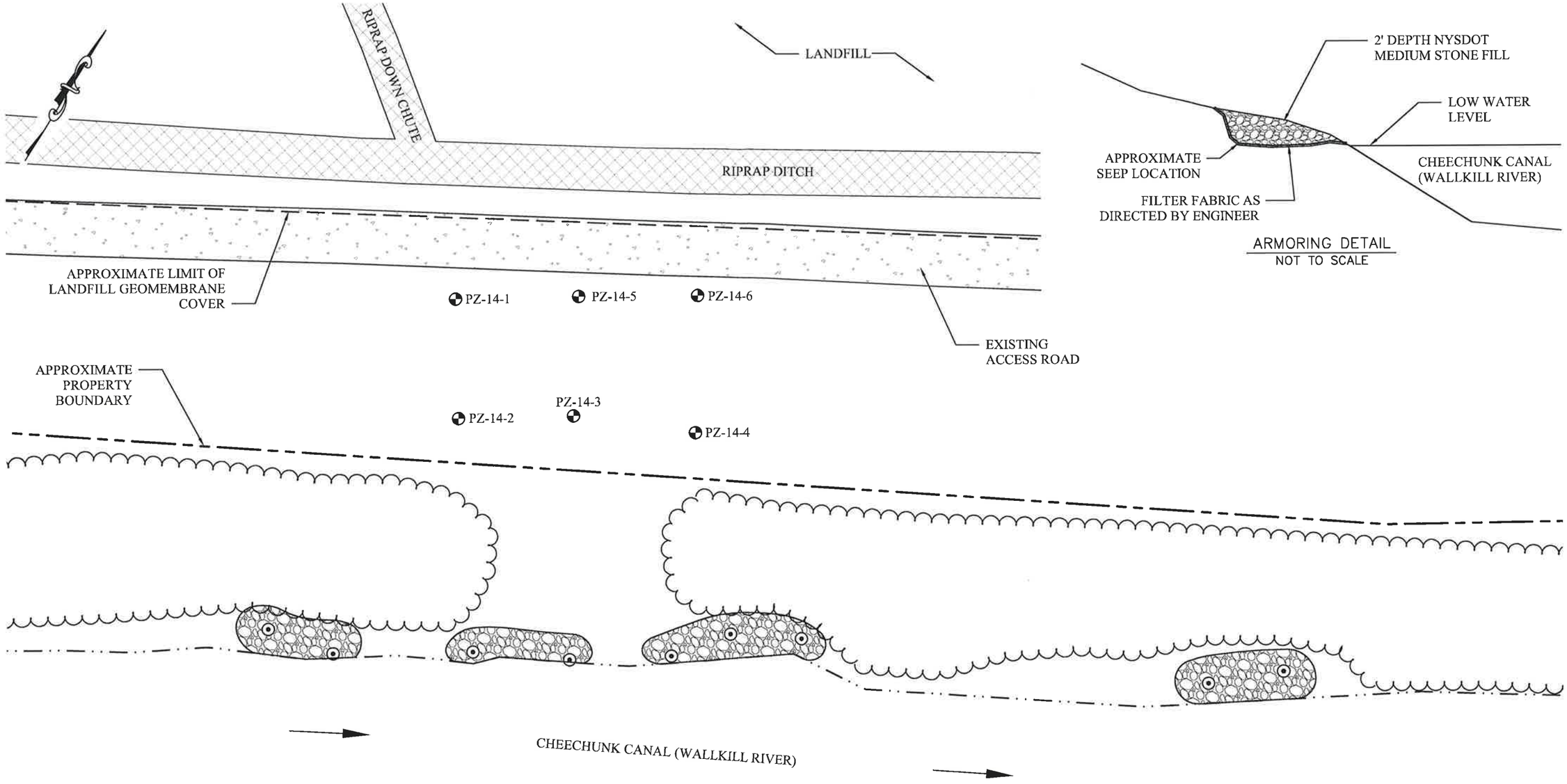
SITE VICINITY MAP

ORANGE CO. DEPT. OF PUBLIC WORKS

ORANGE COUNTY LANDFILL

TOWN OF GOSHEN ORANGE CO., N.Y.

PROJ. No.: 2010–15	DATE: 1/30/15	SCALE: 1" = 1000'	DWG. NO. 2010–15055	FIGURE 2



ARMORING DETAIL
NOT TO SCALE

LEGEND:

- PROPOSED RIPRAP ARMORING
- PZ–14–1 EXISTING PIEZOMETER LOCATIONS
- APPROXIMATE SEEP LOCATIONS
- PROPERTY BOUNDARY
- LIMIT OF LANDFILL GEOMEMBRANE COVER
- EDGE OF STREAM
- TREE LINE

0 15 30 60

(IN FEET)
1 inch = 30 ft.

MAP REFERENCES:
1. PROPERTY BOUNDARY AND LIMIT OF WASTE FROM DRAWINGS ENTITLED "OVERALL PLAN AND RESTRICTED PARCEL," BY THOMAS J. BARRY, DATED FEBRUARY 14, 2013.

STERLING
Sterling Environmental Engineering, P.C.
24 Wade Road ♦ Latham, New York 12110

REMEDIAL ALTERNATIVE NO. 2:
ARMORING AREA OF SEEPS AND IMPACTED SOIL REMOVAL
ORANGE CO. DEPT. OF PUBLIC WORKS
ORANGE COUNTY LANDFILL
TOWN OF GOSHEN ORANGE CO., .N.Y.

PROJ. No.: 2010–15	DATE: 10/31/14	SCALE: 1" = 30'	DWG. NO. 2010–15062	FIGURE 3

C:\Users\burtons\Desktop\SDB\Temp-Projects\2010-15 - Orange County\2010-15062.SeepMitigationPlan.dwg 1/29/2015 2:39 PM

RIPRAP DOWN CHUTE

LANDFILL

APPROXIMATE LOCATION OF EXISTING UNDERGROUND ELECTRIC SERVICE

20,000 GALLON ABOVE GROUND GROUNDWATER STORAGE TANK

RIPRAP DITCH

APPROXIMATE LIMIT OF LANDFILL GEOMEMBRANE COVER

EXISTING ACCESS ROAD

PZ-14-1 PZ-14-5 PZ-14-6

ELECTRIC SERVICE TO PUMP STATION

UNDERGROUND FORCEMAIN

ELECTRIC SUPPLY TO SUMP

GRAVEL TANK PAD

DUPLEX PUMP STATION

APPROXIMATE PROPERTY BOUNDARY

PZ-14-2 PZ-14-3 PZ-14-4

UNDERGROUND FORCEMAIN

3" SOLID SCH 40 PVC PIPE (TYPICAL)

SEEP 5B

3" PERFORATED SCH 40 PVC PIPE (TYPICAL AT SEEP LOCATIONS)

3" PERFORATED SCH 40 PVC PIPE (TYPICAL AT SEEP LOCATIONS)

GROUNDWATER COLLECTION SUMP AND PUMP

CHEECHUNK CANAL (WALLKILL RIVER)

LEGEND:

- PROPOSED RIPRAP ARMORING
- PZ-14-1 EXISTING PIEZOMETER LOCATIONS
- APPROXIMATE SEEP LOCATIONS
- PROPERTY BOUNDARY
- LIMIT OF LANDFILL GEOMEMBRANE COVER
- EDGE OF STREAM
- TREE LINE

0 15 30 60

(IN FEET)
1 inch = 30 ft.

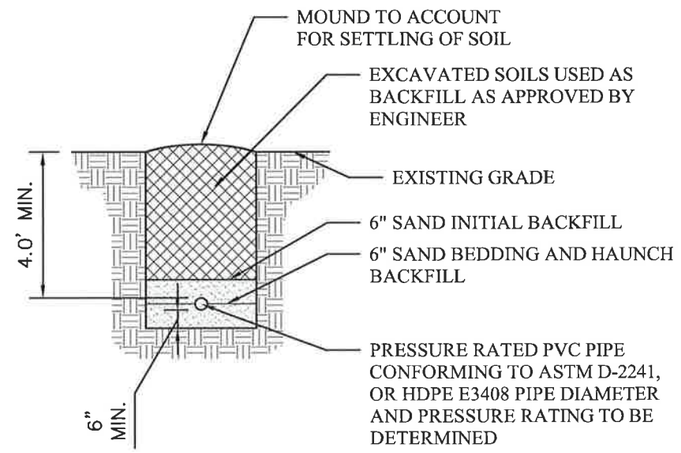
MAP REFERENCES:
1. PROPERTY BOUNDARY AND LIMIT OF WASTE FROM DRAWINGS ENTITLED "OVERALL PLAN AND RESTRICTED PARCEL," BY THOMAS J. BARRY, DATED FEBRUARY 14, 2013.

STERLING
Sterling Environmental Engineering, P.C.
24 Wade Road • Latham, New York 12110

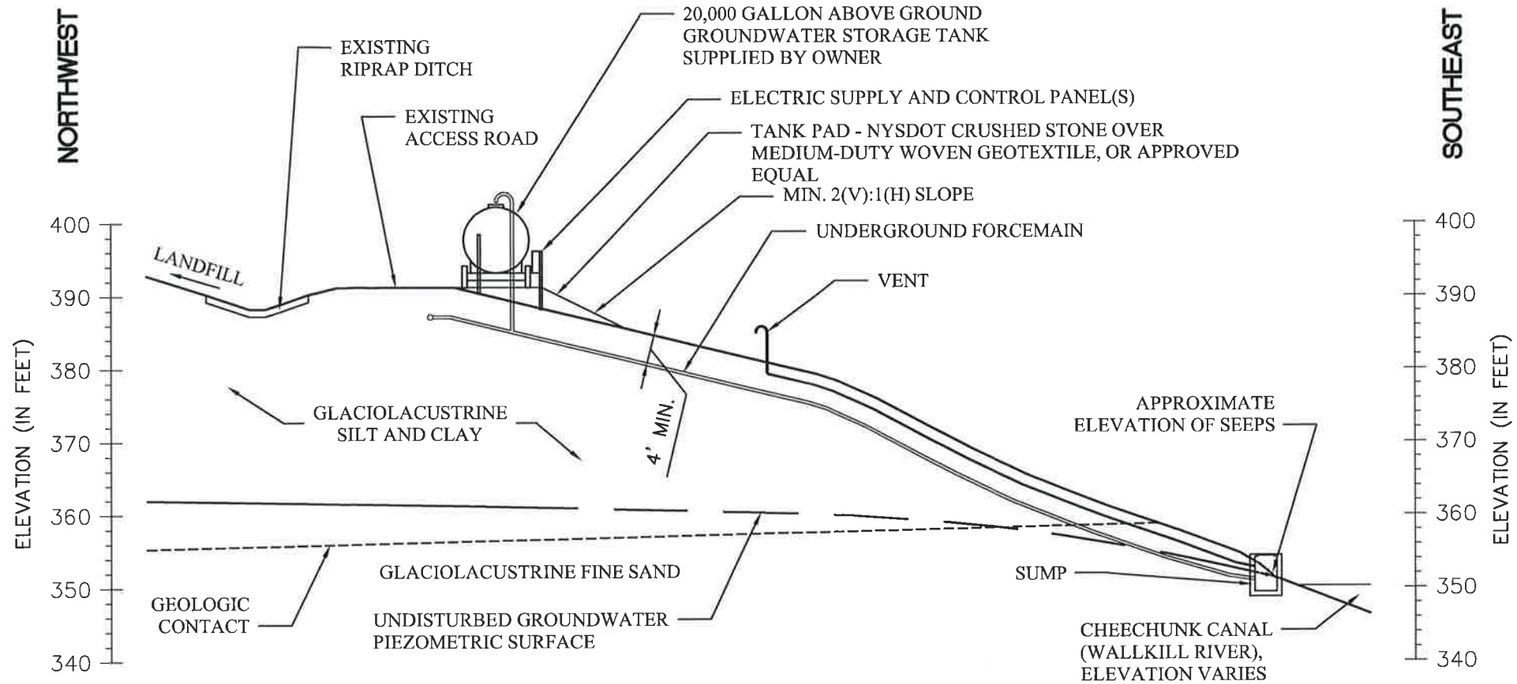
REMEDIAL ALTERNATIVE NO. 3: PLAN VIEW OF GROUNDWATER COLLECTION BY SHALLOW TRENCH WITH ARMORING AREA OF SEEPS AND IMPACTED SOIL REMOVAL
ORANGE CO. DEPT. OF PUBLIC WORKS
ORANGE COUNTY LANDFILL
TOWN OF GOSHEN ORANGE CO., .N.Y.

PROJ. No.: 2010-15	DATE: 1/30/15	SCALE: 1" = 30'	DWG. NO. 2010-15063A	FIGURE 4

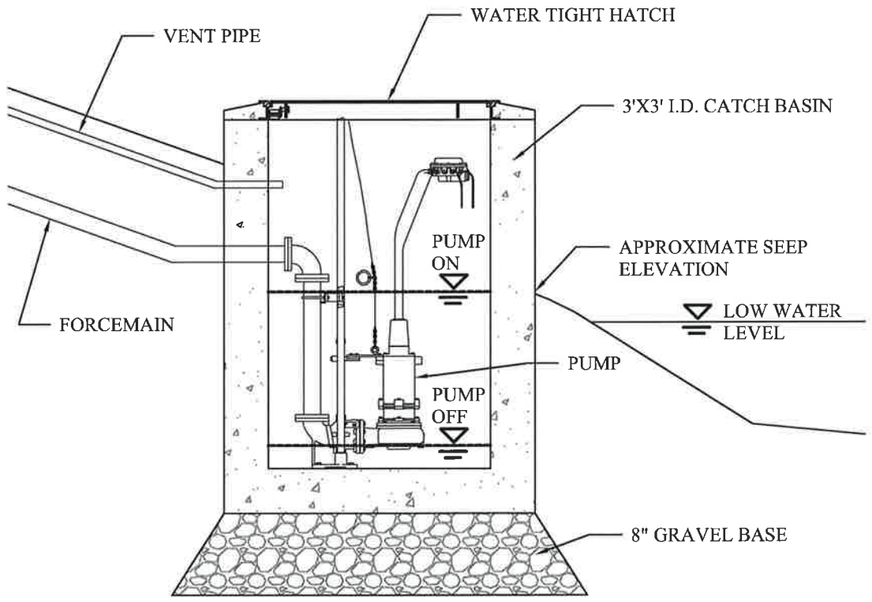
C:\Users\burtons\Desktop\SDB\Temp-Projects\2010-15 - Orange County\2010-15063A-B.SeepMitigationPlan.dwg 1/29/2015 3:18 PM



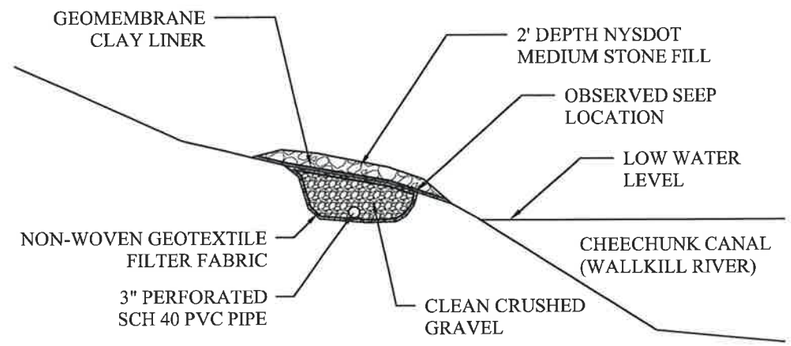
FORCEMAIN TRENCH DETAIL
NOT TO SCALE



CROSS SECTION
HORIZONTAL AND VERTICAL SCALE: 1" = 20'



GROUNDWATER COLLECTION SUMP
NOT TO SCALE



ARMORING DETAIL AND
GROUNDWATER COLLECTION TRENCH
NOT TO SCALE

STERLING
Sterling Environmental Engineering, P.C.
24 Wade Road • Latham, New York 12110

REMEDIAL ALTERNATIVE NO. 3: DETAILS OF GROUNDWATER COLLECTION BY SHALLOW TRENCH WITH ARMORING AREA OF SEEPS AND IMPACTED SOIL REMOVAL
ORANGE CO. DEPT. OF PUBLIC WORKS
ORANGE COUNTY LANDFILL
TOWN OF GOSHEN ORANGE CO., .N.Y.

PROJ. No.: 2010-15	DATE: 1/30/15	SCALE: AS NOTED	DWG. NO. 2010-15063B	FIGURE 5

RIPRAP DOWNCHUTE

LANDFILL

20,000 GALLON ABOVE GROUND GROUNDWATER STORAGE TANK

RIPRAP DITCH

APPROXIMATE LIMIT OF LANDFILL GEOMEMBRANE COVER

PZ-14-1 PZ-14-5 PZ-14-6

GRAVEL TANK PAD

EXISTING ACCESS ROAD

APPROXIMATE PROPERTY BOUNDARY

FM FM FM FM

PZ-14-2 PZ-14-3 PZ-14-4

UNDERGROUND FORCEMAIN TO STORAGE TANK. SIZE TO BE DETERMINED BY NUMBER OF RECOVERY WELLS AND EXPECTED FLOW RATE.

NUMBER OF AND DISTANCE BETWEEN ADDITIONAL RECOVERY WELLS TO BE DETERMINED BY RESULTS OF PILOT WELL PUMP TEST.

CHEECHUNK CANAL (WALLKILL RIVER)

LEGEND:

- PROPOSED PILOT RECOVERY WELL
- ADDITIONAL RECOVERY WELLS (IF NECESSARY)
- PROPOSED RIPRAP ARMORING
- PZ-14-1 EXISTING PIEZOMETER LOCATIONS
- APPROXIMATE SEEP LOCATIONS
- PROPERTY BOUNDARY
- LIMIT OF LANDFILL GEOMEMBRANE COVER
- EDGE OF STREAM
- TREE LINE

0 15 30 60

(IN FEET)
1 inch = 30 ft.

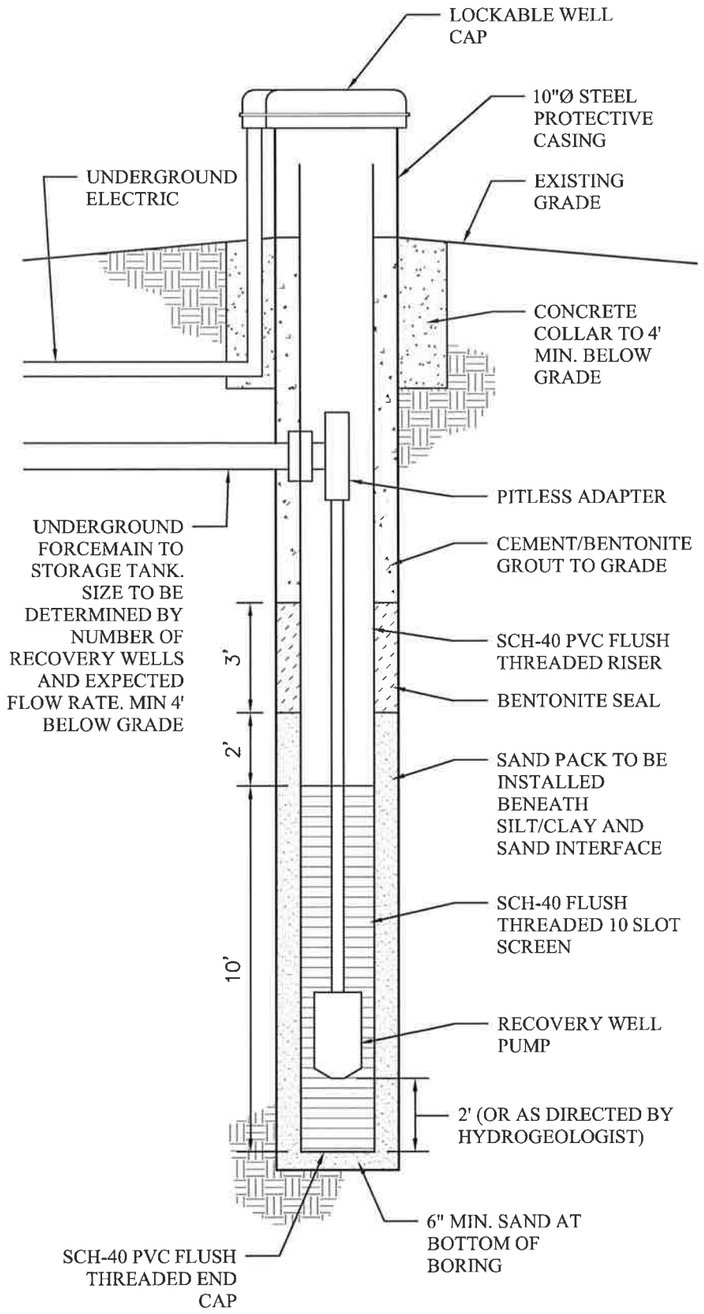
MAP REFERENCES:
1. PROPERTY BOUNDARY AND LIMIT OF WASTE FROM DRAWINGS ENTITLED "OVERALL PLAN AND RESTRICTED PARCEL," BY THOMAS J. BARRY, DATED FEBRUARY 14, 2013.

STERLING
Sterling Environmental Engineering, P.C.
24 Wade Road ♦ Latham, New York 12110

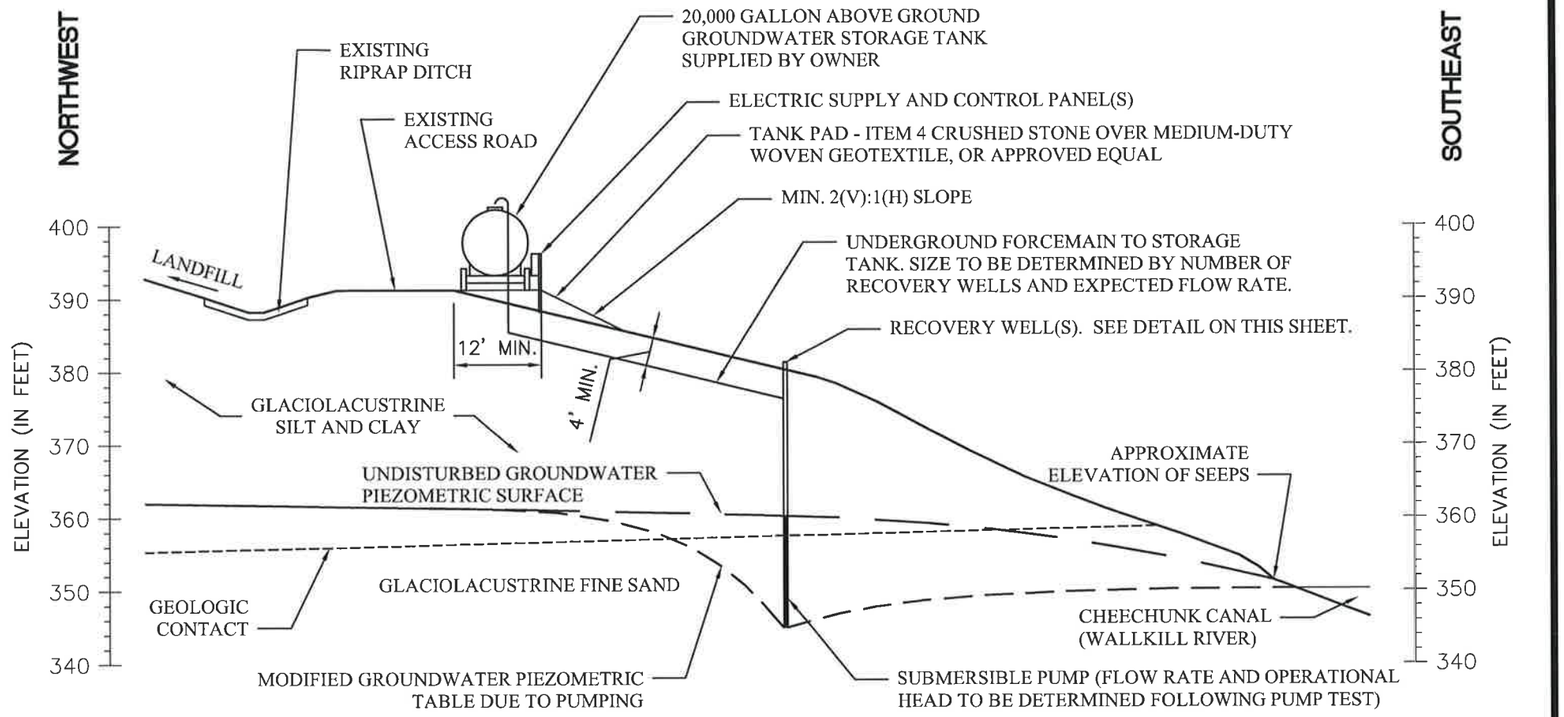
REMEDIAL ALTERNATIVE NO. 4: PLAN VIEW OF SEEP ELIMINATION BY RECOVERY WELL AND ARMORING AREA OF SEEPS
ORANGE CO. DEPT. OF PUBLIC WORKS
ORANGE COUNTY LANDFILL
TOWN OF GOSHEN ORANGE CO., .N.Y.

PROJ. No.: 2010-15	DATE: 1/30/15	SCALE: 1" = 30'	DWG. NO. 2010-15065A	FIGURE 6

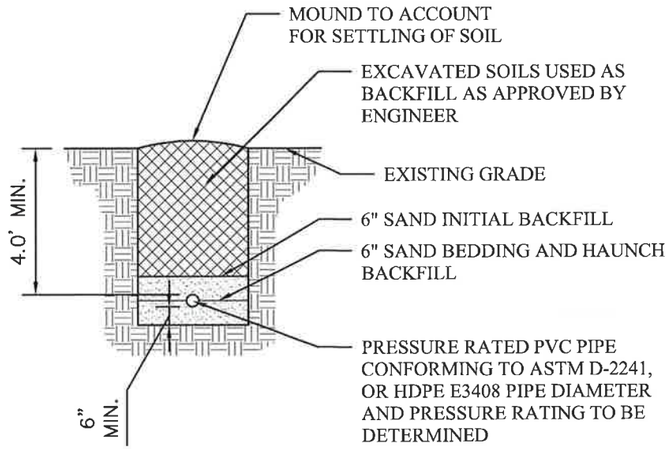
C:\Users\burtons\Desktop\SDB\Temp-Projects\2010-15 - Orange County\2010-15065.SeepMitigationPlan.dwg 1/29/2015 2:45 PM



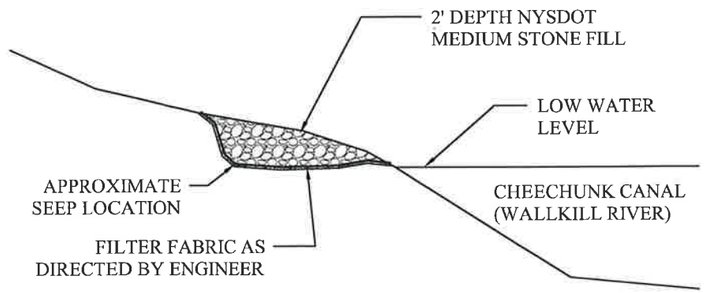
RECOVERY WELL DETAIL
NOT TO SCALE



CROSS SECTION
HORIZONTAL AND VERTICAL SCALE: 1" = 20'



FORCEMAIN TRENCH DETAIL
NOT TO SCALE



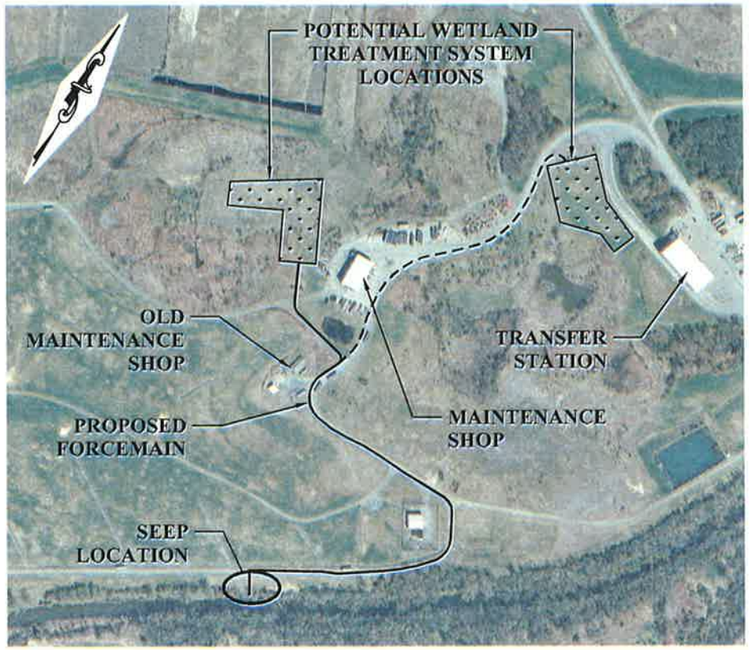
ARMORING DETAIL
NOT TO SCALE

C:\Users\burtons\Desktop\SDB\Temp-Projects\2010-15 - Orange County\2010-15065.SecpMitigationPlan.dwg1/29/2015 3:13 PM

STERLING
Sterling Environmental Engineering, P.C.
24 Wade Road ♦ Latham, New York 12110

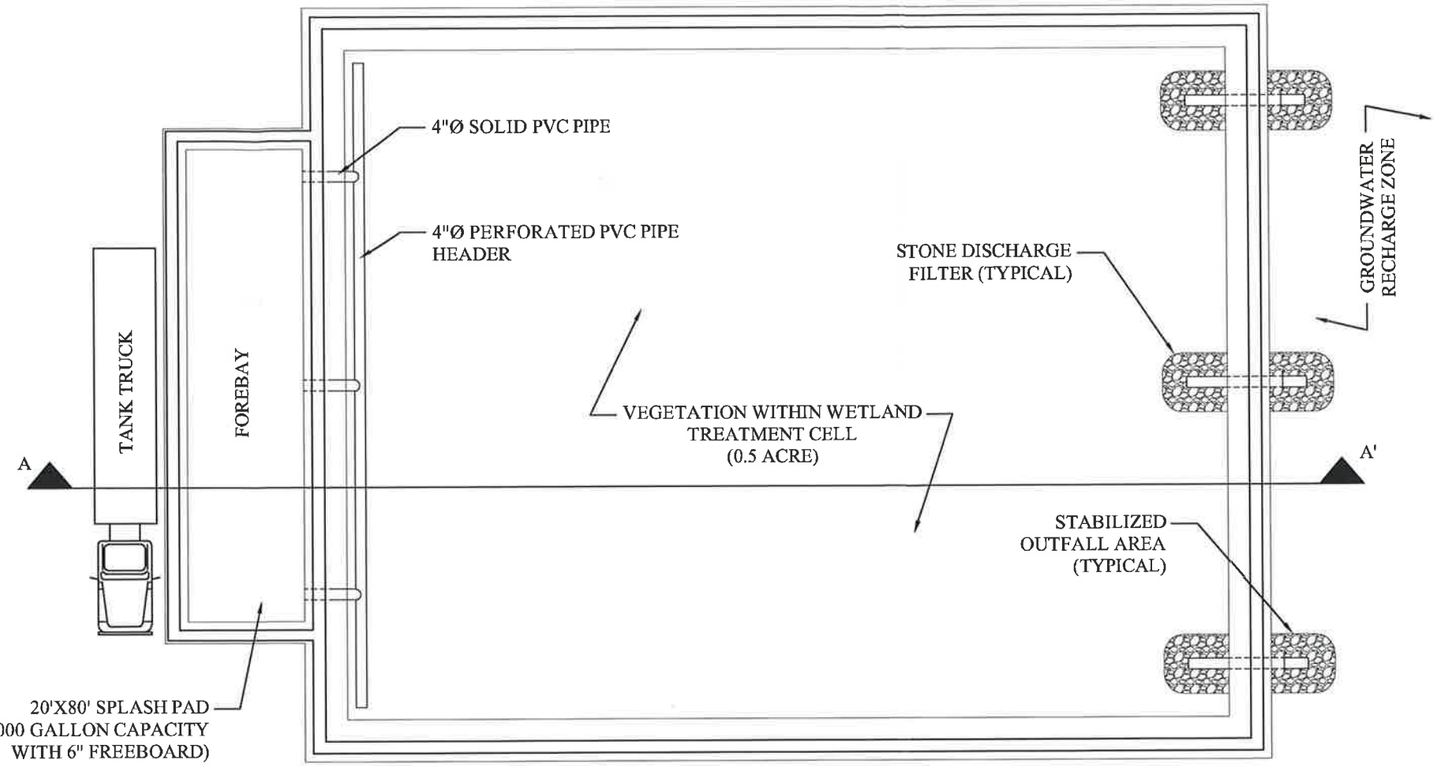
REMEDIAL ALTERNATIVE NO. 4: DETAILS OF SEEP ELIMINATION BY RECOVERY WELL AND ARMORING AREA OF SEEPS
ORANGE CO. DEPT. OF PUBLIC WORKS
ORANGE COUNTY LANDFILL
TOWN OF GOSHEN ORANGE CO., .N.Y.

PROJ. No.: 2010–15	DATE: 1/30/15	SCALE: AS NOTED	DWG. NO. 2010–15065B	FIGURE 7



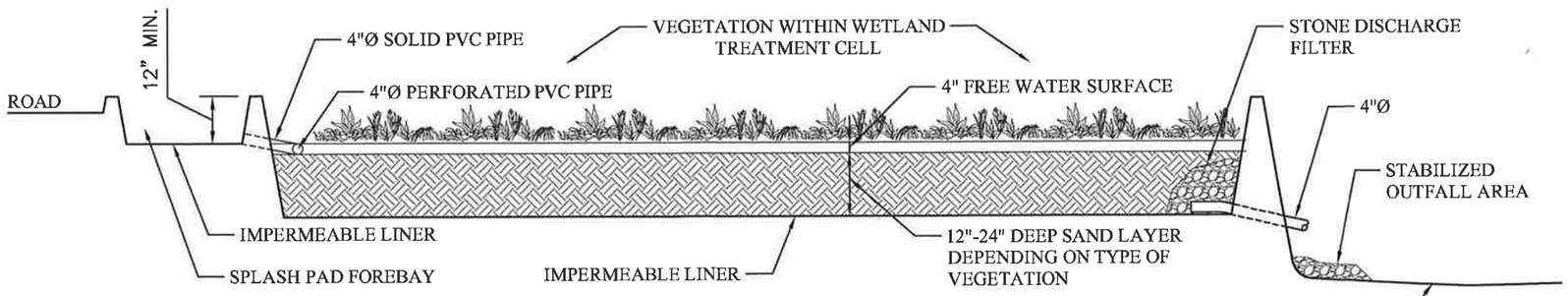
POTENTIAL WETLAND TREATMENT LOCATIONS

SCALE: 1" = 1000'



WETLAND TREATMENT SYSTEM - PLAN

NOT TO SCALE



WETLAND TREATMENT SYSTEM - SECTION A-A'

NOT TO SCALE

STERLING

Sterling Environmental Engineering, P.C.

24 Wade Road ♦ Latham, New York 12110

GROUNDWATER TREATMENT OPTION:
WETLAND TREATMENT SYSTEM PLAN VIEW AND DETAIL
ORANGE CO. DEPT. OF PUBLIC WORKS
ORANGE COUNTY LANDFILL

TOWN OF GOSHEN ORANGE CO., .N.Y.

PROJ. No.: 2010–15	DATE: 1/30/15	SCALE: NOT TO SCALE	DWG. NO. 2010–15059	FIGURE 8

C:\Users\burtons\Desktop\SDB\Temp-Projects\2010-15 - Orange County\2010-15064.WetlandTreatmentSys.dwg 1/28/2015 3:30 PM

LEGEND:

——— APPROXIMATE PROPERTY BOUNDARY

--------- APPROXIMATE LIMIT OF LANDFILL GEOMEMBRANE COVER

MAP REFERENCES:

1. PROPERTY BOUNDARY AND LIMIT OF WASTE FROM DRAWINGS ENTITLED "OVERALL PLAN AND RESTRICTED PARCEL," BY THOMAS J. BARRY, DATED FEBRUARY 14, 2013.
2. AERIAL PHOTOGRAPH FROM NYSGIS ORTHOIMAGERY, DATED 2013.

0 1000 2000 4000

1 inch = 2000ft.

STERLING

Sterling Environmental Engineering, P.C.

24 Wade Road • Latham, New York 12110

GROUNDWATER TREATMENT OPTION: MID-HUDSON PSYCHIATRIC CENTER WASTEWATER TREATMENT PLANT

ORANGE CO. DEPT. OF PUBLIC WORKS

ORANGE COUNTY LANDFILL

TOWN OF GOSHEN ORANGE CO., N.Y.

PROJ. No.: 2010-15	DATE: 1/30/15	SCALE: 1" = 1000'	DWG. NO. 2010-15060	FIGURE 9

C:\Users\burtons\Desktop\SDB\Temp-Projects\2010-15 - Orange County\2010-15056\WWTP-Option.dwg 1/28/2015 3:47 PM

APPENDIX A

ORDER ON CONSENT

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
STATE SUPERFUND PROGRAM
ECL §27-1301 *et seq.*

In the Matter a Remedial Program for

ORDER ON CONSENT AND ADMINISTRATIVE SETTLEMENT
Index No: A3-0829-14-05
"Order"

DEC Site Name: Orange County Landfill
DEC Site No.: 336007
Site Address: ROUTE 17M
GOSHEN, NY 10924
Orange County

Hereinafter referred to as "Site"

by:

Orange County
Goshen, NY 10924

Hereinafter referred to as "Respondent"

---

1. A. The New York State Department of Environmental Conservation ("Department") is responsible for inactive hazardous waste disposal site remedial programs pursuant to Article 27, Title 13 of the Environmental Conservation Law ("ECL") and Part 375 of Title 6 of the Official Compilation of Codes, Rules and Regulations ("6 NYCRR") and may issue orders consistent with the authority granted to the Commissioner by such statute.

B. The Department is responsible for carrying out the policy of the State of New York to conserve, improve and protect its natural resources and environment and control water, land, and air pollution consistent with the authority granted to the Department and the Commissioner by Article 1, Title 3 of the ECL.

C. This Order is issued pursuant to the Department's authority under, *inter alia*, ECL Article 27, Title 13 and ECL 3-0301, and resolves Respondent's liability to the State as provided at 6 NYCRR 375-1.5(b)(5).

2. A. The Site was operated as a landfill from 1974 to 1992 and is currently listed in the Registry of Inactive Hazardous Waste Disposal Sites in New York State as Site Number 336007 with a Classification of 2 pursuant to ECL 27-1305.

B. The Department issued a Record of Decision ("ROD") in January 1994 that required construction of a final cover over the Site's 75-acre landfill waste mass. Construction was completed in November 1995. A second ROD addressing the Site as a whole, including any contamination that may have migrated from the waste mass, was issued in March of 1998. It required additional activities including the continued operation and maintenance of the Site's leachate collection system.

C. Respondent had investigated and undertaken remedial actions at the Site pursuant to Order on Consent Index #W3-0603-92-06, dated January 11, 1993 ("1993 Order"). Since additional investigation and remedial actions, including Interim Remedial Measures ("IRMs"), are required in connection with the Site, Respondent is carrying out the additional Site work pursuant to this Order. The work plan submittals pursuant to this Order constitute "Supplemental" work plans as defined in Subsection III.A.6 of Appendix "A" of this Order. The Department does not anticipate a need to issue an additional ROD or RODs in connection with the Site.

D. Respondent submitted a Supplemental Work Plan entitled "Cheechunk Canal / Landfill Seep Evaluation" dated December 18, 2013 ("Long Term Seep Evaluation Work Plan"). The Department approved the Long Term Seep Evaluation Work Plan on December 31, 2013. Respondent submitted a report on April 4, 2014. Respondent is currently undertaking additional investigation related to the Long Term Seep Evaluation Work Plan and will provide additional submittals and undertake additional work as described below.

E. The Department approved Respondent's Site Management Plan, which is dated June 6, 2014 and was submitted in final form on September 4, 2014 ("Site Management Plan").

3. Respondent consents to the issuance of this Order without (i) an admission or finding of liability, fault, wrongdoing, or violation of any law, regulation, permit, order, requirement, or standard of care of any kind whatsoever; (ii) an acknowledgment that there has been a release or threatened release of hazardous waste at or from the Site; and/or (iii) an acknowledgment that a release or threatened release of hazardous waste at or from the Site constitutes a significant threat to the public health or environment.

4. Solely with regard to the matters set forth below, Respondent hereby waives any right to a hearing as may be provided by law, consents to the issuance and entry of this Order, and agrees to be bound by its terms. Respondent consents to and agrees not to contest the authority or jurisdiction of the Department to issue or enforce this Order, and agrees not to contest the validity of this Order or its terms or the validity of data submitted to the Department by Respondent pursuant to this Order.

NOW, having considered this matter and being duly advised, **IT IS ORDERED THAT**:

I. Real Property

The Site subject to this Order has been assigned number 336007, consists of approximately 75.000 acres, and is as follows:

Subject Property Description (Exhibit "A" is a map of the Site)

Tax Map of the Town of Goshen
Tax Map/Parcel No.: Section 16 Subsection 000 Block 1 Lot 1 Sublot 1

21 Training Center Lane
Goshen, NY
Owner: County of Orange

II. Site Management Plan and Initial Work Plans

A. **Site Management Plan:** It is deemed incorporated into and made an enforceable part of this Order and shall be implemented in accordance with the schedule contained therein. It shall be modified and updated, as appropriate, subject to the Department's input and approval.

B. **Long Term Seep Evaluation Report:** On or before December 3, 2014, Respondent shall submit a report that includes all final data generated pursuant to the investigations undertaken pursuant to the Long Term Seep Evaluation Work Plan, a summary of all other relevant data, and, based upon this information, conclusions regarding the nature, scope and extent of contamination.

C. **Expedited IRM Work Plan:** On or before December 3, 2014, Respondent shall submit an IRM Work Plan evaluating the expedited remediation of the current seeps, and soils and sediments in proximity to the seeps. In the event Respondent determines that an Expedited IRM is not feasible, Respondent shall submit an evaluation of the alternatives considered and an explanation of the feasibility evaluation for each.

D. **Long Term Seep Elimination Feasibility Study:** On or before January 30, 2015, Respondent shall submit a Feasibility Study for a Long Term Seep Elimination IRM that includes the rationale for the choice of IRM, and the technical basis for determining that the proposed IRM will eliminate landfill seeps and be protective of public health and the environment.

E. **Supplemental Sediment Investigation Work Plan:** On or before December 18, 2014, Respondent shall submit a Supplemental Sediment Investigation Work Plan, the initial stage of which will include the collection of sediment samples adjacent to and downgradient of the seeps (two samples each seep, at a depth of 0-6") for contaminants of concern for the Site, and the collection of several sediment samples at a location that could not be impacted by the landfill (upgradient). Decisions regarding the need for and scope of additional investigation will be based upon the results of the initial stage.

III. Payment of State Costs

Invoices shall be sent to Respondent at one of the following address(es) if more than one address is listed:

Orange County
Attn: Peter Hammond
Division of Environmental Facilities & Services

2455-2459 Route 17M, P.O. Box 637
Goshen, NY 10924

In addition to the requirement to pay future state costs as set forth in Appendix "A," within forty-five (45) days after the effective date of this Order, Respondent shall pay to the Department the sum set forth on Exhibit "C," which shall represent reimbursement for past State Costs, as defined by 6 NYCRR 375-1.5(b)(3), incurred for the period commencing on January 5, 2012 and ending on July 2, 2014. Respondent acknowledges that all reimbursable past State Costs are not itemized on the Exhibit "C" cost summary and that additional charges may be billed at a later date for State Costs incurred for the period commencing on July 3, 2014 and ending on the effective date of this Consent Order.

IV. Communications

A. All written communications required by this Consent Order shall be transmitted by United States Postal Service, by private courier service, by hand delivery, or by electronic mail.

1. Communication from Respondent shall be sent to:

Brad Shaw (1 hard copy (unbound for work plans) & 1 electronic copy)
New York State Department of Environmental Conservation
Division of Environmental Remediation
625 Broadway, Albany, NY 12233
brad.shaw@dec.ny.gov

Krista Anders (electronic copy only)
New York State Department of Health
Bureau of Environmental Exposure Investigation
Empire State Plaza
Corning Tower Room 1787
Albany, NY 12237
krista.anders@health.ny.gov

Dolores A. Tuohy, Esq.
New York State Department of Environmental Conservation
Office of General Counsel
625 Broadway, Albany, New York 12233-1500
dolores.tuohy@dec.ny.gov

2. Communication from the Department to Respondent shall be sent to:

Orange County
Attn: Peter Hammond
Division of Environmental Facilities & Services

2455-2459 Route 17M, P.O. Box 637
Goshen, NY 10924
phammond@CO.ORANGE.NY.us

B. The Department and Respondent reserve the right to designate additional or different addressees for communication on written notice to the other. Additionally, the Department reserves the right to request that the Respondent provide more than one paper copy of any work plan or report.

C. Each party shall notify the other within ninety (90) days after any change in the addresses listed in this paragraph or in Paragraph I.

V. Citizen Participation

Within twenty (20) days after the effective date of this Order, Respondent shall submit for review and approval a written citizen participation plan prepared in accordance with the requirements of 6 NYCRR 375-2.10. Upon approval, the Citizen Participation Plan shall be deemed to be incorporated into and made a part of this Order.

VI. Part 375 Provisions Regarding Work Plans

The provisions of Part 375 applicable to the development of Work Plans pursuant to this Order are 6 NYCRR 375-1.6(a) and 6 NYCRR 375-6.

VII. Miscellaneous

A. Appendix "A" - "Standard Clauses for All New York State State Superfund Orders" is attached to and hereby made a part of this Order as if set forth fully herein.

B. In the event of a conflict between the terms of this Order (including any and all attachments thereto and amendments thereof) and the terms of Appendix "A," the terms of this Order shall control.

C. The effective date of this Order is the 10th day after it is signed by the Commissioner or the Commissioner's designee.

DATED:

DEC 31 2014

JOE MARTENS
COMMISSIONER
NEW YORK STATE DEPARTMENT OF
ENVIRONMENTAL CONSERVATION

By: _____

Robert W. Schick, P.E., Director
Division of Environmental Remediation

CONSENT BY RESPONDENT

Respondent hereby consents to the issuing and entering of this Consent Order, waives Respondent's right to a hearing herein as provided by law, and agrees to be bound by this Consent Order.

Orange County

By: _____

Title: County Executive

Date: 17 DEC 2014

STATE OF NEW YORK)
) ss:
COUNTY OF Orange)

On the 17TH day of December in the year 2014, before me, the undersigned, personally appeared Stefan "Steven" M. Neuhaus *(full name)* personally known to me or proved to me on the basis of satisfactory evidence to be the individual whose name is subscribed to the within instrument and acknowledged to me that he/she executed the same in his/her capacity, and that by his/her signature on the instrument, the individual, or the person upon behalf of which the individual acted, executed the instrument.

Acknowledgment by a corporation, in New York State:

On the _____ day of _____ in the year 20___, before me, the undersigned, personally appeared _____ *(full name)* personally known to me who, being duly sworn, did depose and say that he/she/they reside at _____ *(full mailing address)* and that he/she/they is (are) the _____ *(president or other officer or director or attorney in fact duly appointed)* of the _____ *(full legal name of corporation)*, the corporation described in and which executed the above instrument; and that he/she/they signed his/her/their name(s) thereto by the authority of the board of directors of said corporation.

Doreen Hamel
Notary Public, State of New York

DOREEN HAMEL
NOTARY PUBLIC-STATE OF NEW YORK
No. 01HA6175975
Qualified in Orange County
My Commission Expires October 22, 2015

EXHIBIT "A"

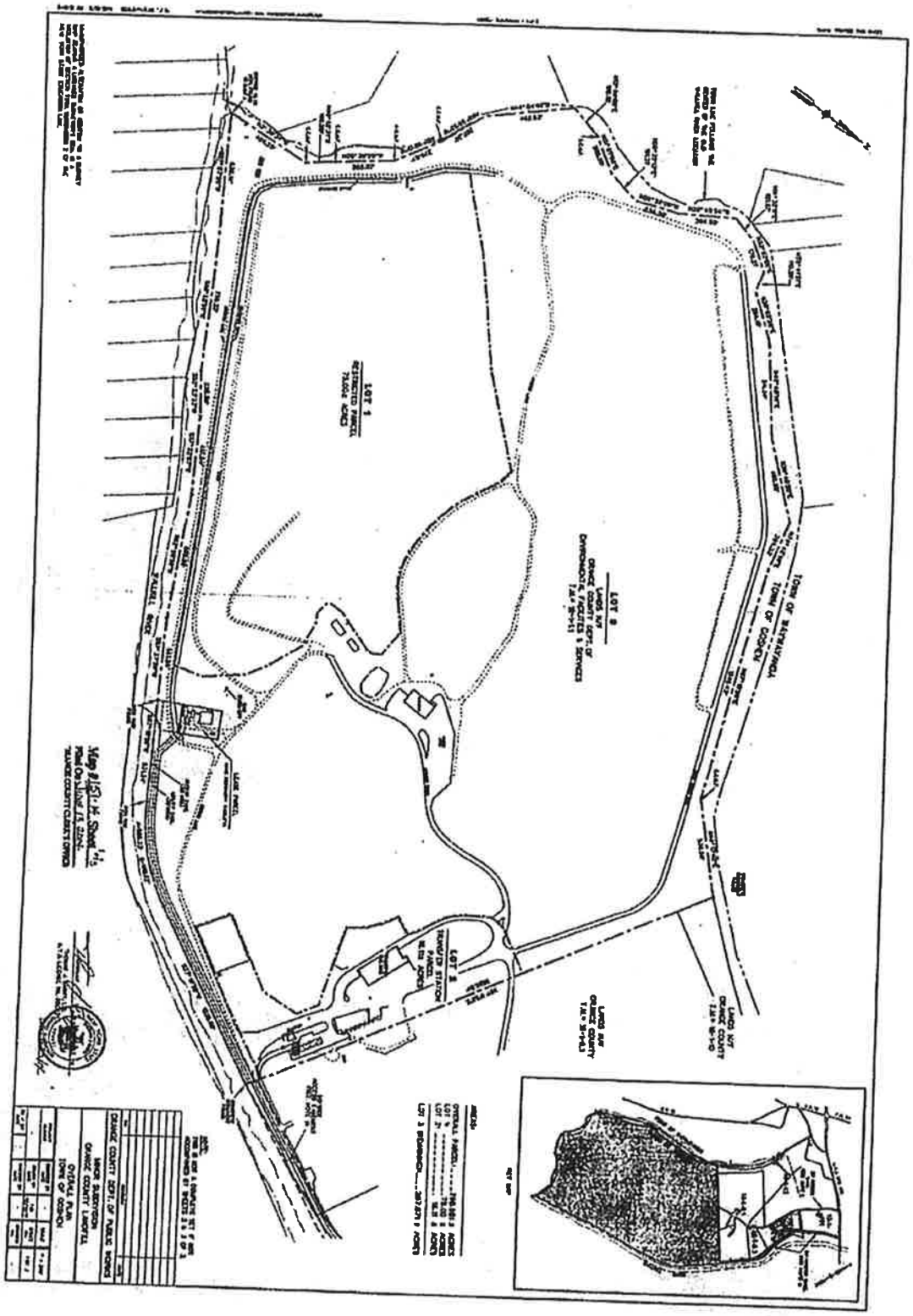


EXHIBIT "B"

RECORDS SEARCH REPORT

1. Detail all environmental data and information within Respondent's or Respondent's agents' or consultants' possession or control regarding environmental conditions at or emanating from the Site.

2. A comprehensive list of all existing relevant reports with titles, authors, and subject matter, as well as a description of the results of all previous investigations of the Site and of areas immediately surrounding the Site which are or might be affected by contamination at the Site, including all available topographic and property surveys, engineering studies, and aerial photographs.

3. A concise summary of information held by Respondent and Respondent's attorneys and consultants with respect to:

(i) a history and description of the Site, including the nature of operations;

(ii) the types, quantities, physical state, locations, methods, and dates of disposal or release of hazardous waste at or emanating from the Site;(iii)a description of current Site security (i.e. fencing, posting, etc.); and

(iii) the names and addresses of all persons responsible for disposal of hazardous waste, including the dates of such disposal and any proof linking each such person responsible with the hazardous wastes identified.

EXHIBIT "C"

New York State Department of Environmental Conservation
Division of Environmental Remediation
Bureau of Program Management, 12th Floor
625 Broadway, Albany, New York 12233-7012
Phone: (518) 402-9764 • **Fax:** (518) 402-9020
Website: www.dec.ny.gov

Joe Martens
Commissioner

Transmitted via E-Mail
MEMORANDUM

TO: Dolores Tuohy, Office of General Counsel

FROM: Susan Bolesky, Bureau of Program Management, DER Susan Bolesky

SUBJECT: Cost Summary – Orange County Landfill, Site #336007

DATE: SEP - 9 2014

This cost recovery summary has been prepared in response to your June 4, 2014 request. The following summarizes costs incurred by the New York State Department of Environmental Conservation (DEC) and the New York State Department of Health (DOH) for the noted time period. There may be additional future costs associated with this site that are not included in this summary. Please contact the project manager to determine if additional future costs are anticipated.

The total unreimbursed costs incurred by the State in association with the Orange County Landfill Site are $42,310.66. This amount includes emergency response costs incurred at the site by a hazardous material spill, if any. Please note that if the site involves a petroleum spill, any costs incurred by the Oil Spill Fund would be recovered separately by the Office of the State Comptroller and are not included in this summary.

DEC and DOH costs for this site have been included from January 5, 2012 through July 2, 2014 (the latest available data). Please note that there are no open contracts for this site for which we have outstanding obligations.

Please contact me at (518) 402-9732, if you have any questions on this summary.

Attachments

ec: B. Shaw
T. Killeen
S. Edwards

EXHIBIT I

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DIVISION OF ENVIRONMENTAL REMEDIATION
BUREAU OF PROGRAM MANAGEMENT

COST SUMMARY

SITE NAME: Orange County Landfill
SITE NO.: 336007
TIME FRAME: DEC & DOH 01/05/12 - 07/02/14

COST CATEGORY	AMOUNTS	EXHIBIT NO.
DIRECT PERSONAL SERVICES	$20,578.37	
FRINGE	$11,203.68	
INDIRECT	$9,012.10	
PERSONAL SERVICES SUBTOTAL	*$40,794.15*	II
CONTRACTUAL	$833.37	III
TRAVEL	$0.00	
OTHER NPS	$0.00	
NON-PERSONAL SERVICES SUBTOTAL	*$833.37*	
DEC TOTAL	$41,627.52	
DOH TOTAL	$683.14	IV
MINUS PREVIOUSLY REIMBURSED AMOUNT (IF APPLICABLE)	N/A	
DEC & DOH TOTAL	*$42,310.66*	
COST CAP (IF APPLICABLE)	N/A	
GRAND TOTAL	$42,310.66	

LATSnet leave & accrual tracking system

PART OF CPA HRnet

Cost Query - Ad Hoc

Criteria: Timecard Begin Date 1/5/2012 And Timecard End Date 7/2/2014 And Task Code A175
Leave Charges: Included
Cost Indicator: Direct
Rate Type: Non-Federal

Download Excel Report
Print

Jump To Employee: *All*

Pay Period	Pay Period Dates	Check Date	Cost Center	Variable	Budget Year	Employee	Title Description	Work Location Code	Work Location Description	Billable Hourly Rate	State Fringe	State Indirect	Hours	Cost
Task: A175 - 336007 ORANGE CTY LF														
2012/2	04/12/2012 - 04/25/2012	05/09/2012	430221	L6	2012	Edwards, Susan	ENVIRNL ENGINEER 3	615127	Central Office - 625 Broadway	64.40	268.26	233.97	8.00	515.20
2012/4	05/10/2012 - 05/23/2012	06/06/2012	430221	L6	2012	Edwards, Susan	ENVIRNL ENGINEER 3	615127	Central Office - 625 Broadway	65.48	160.74	141.25	4.75	311.03
2012/8	07/05/2012 - 07/18/2012	08/01/2012	430221	L6	2012	Edwards, Susan	ENVIRNL ENGINEER 3	615127	Central Office - 625 Broadway	65.48	270.72	237.89	8.00	523.84
2012/10	08/02/2012 - 08/15/2012	08/29/2012	430221	L6	2012	Edwards, Susan	ENVIRNL ENGINEER 3	615127	Central Office - 625 Broadway	61.00	488.63	429.38	15.50	945.50
2012/11	08/16/2012 - 08/29/2012	09/12/2012	430221	L6	2012	Edwards, Susan	ENVIRNL ENGINEER 3	615127	Central Office - 625 Broadway	65.48	101.52	89.21	3.00	196.44
2012/13	09/13/2012 - 09/26/2012	10/10/2012	430221	L6	2012	Edwards, Susan	ENVIRNL ENGINEER 3	615127	Central Office - 625 Broadway	63.98	66.33	58.31	2.00	127.96
2012/14	09/27/2012 - 10/10/2012	10/24/2012	430221	L6	2012	Edwards, Susan	ENVIRNL ENGINEER 3	615127	Central Office - 625 Broadway	65.48	101.52	89.21	3.00	196.44
2012/15	10/11/2012 - 10/24/2012	11/07/2012	430221	L6	2012	Edwards, Susan	ENVIRNL ENGINEER 3	615127	Central Office - 625 Broadway	65.48	67.68	59.47	2.00	130.96
2012/16	10/25/2012 - 11/07/2012	11/21/2012	430221	L6	2012	Edwards, Susan	ENVIRNL ENGINEER 3	615127	Central Office - 625 Broadway	65.48	67.68	59.47	2.00	130.96
2012/17	11/08/2012 - 11/21/2012	12/05/2012	430221	L6	2012	Edwards, Susan	ENVIRNL ENGINEER 3	615127	Central Office - 625 Broadway	64.62	33.40	29.35	1.00	64.62
2012/18	11/22/2012 - 12/05/2012	12/19/2012	430221	L6	2012	Edwards, Susan	ENVIRNL ENGINEER 3	615127	Central Office - 625 Broadway	65.26	31.73	29.64	1.00	65.26
2012/20	12/20/2012 - 01/02/2013	01/16/2013	430221	L6	2013	Edwards, Susan	ENVIRNL ENGINEER 3	615127	Central Office - 625 Broadway	65.48	33.84	29.74	1.00	65.48
2013/1	03/28/2013 - 04/10/2013	04/24/2013	430221	L6	2013	Edwards, Susan	ENVIRNL ENGINEER 3	615127	Central Office - 625 Broadway	65.73	109.40	90.66	3.00	197.19
2013/2	04/11/2013 - 04/24/2013	05/08/2013	430221	L6	2013	Edwards, Susan	ENVIRNL ENGINEER 3	615127	Central Office - 625 Broadway	65.73	145.87	120.88	4.00	262.92
2013/3	04/25/2013 - 05/08/2013	05/22/2013	430221	L6	2013	Edwards, Susan	ENVIRNL ENGINEER 3	615127	Central Office - 625 Broadway	65.30	36.23	30.02	1.00	65.30
2013/5	05/23/2013 - 06/05/2013	06/19/2013	430221	L6	2012	Edwards, Susan	ENVIRNL ENGINEER 3	615127	Central Office - 625 Broadway	65.73	72.93	60.44	2.00	131.46
2013/6	06/06/2013 - 06/19/2013	07/03/2013	430221	L6	2012	Edwards, Susan	ENVIRNL ENGINEER 3	615127	Central Office - 625 Broadway	65.73	109.40	90.66	3.00	197.19
2013/8	07/04/2013 - 07/17/2013	07/31/2013	430221	L6	2012	Edwards, Susan	ENVIRNL ENGINEER 3	615127	Central Office - 625 Broadway	65.73	255.27	211.54	7.00	460.11
2013/13	09/12/2013 - 09/25/2013	10/09/2013	430221	L6	2012	Edwards, Susan	ENVIRNL ENGINEER 3	615127	Central Office - 625 Broadway	65.30	72.46	60.04	2.00	130.60
2013/18	11/21/2013 - 12/04/2013	12/18/2013	430221	L6	2012	Edwards, Susan	ENVIRNL ENGINEER 3	615127	Central Office - 625 Broadway	65.73	72.93	60.44	2.00	131.46
2011/23	02/02/2012 - 02/15/2012	02/29/2012	430221	L6	2011	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	57.95	27.76	22.34	1.00	57.95
2011/26	03/15/2012 - 03/28/2012	04/11/2012	430221	L6	2011	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	57.95	55.53	44.69	2.00	115.90
2012/1	03/29/2012 - 04/11/2012	04/25/2012	430221	L6	2012	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	58.51	90.71	79.71	3.00	175.53
2012/2	04/12/2012 - 04/25/2012	05/09/2012	430221	L6	2012	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	58.51	328.06	285.64	10.75	628.98
2012/3	04/26/2012 - 05/09/2012	05/23/2012	430221	L6	2012	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	58.51	60.48	53.14	2.00	117.02
2012/5	05/24/2012 - 06/06/2012	06/20/2012	430221	L6	2012	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	58.51	30.24	26.57	1.00	58.51
2012/6	06/07/2012 - 06/20/2012	07/03/2012	430221	L6	2012	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	58.51	30.24	26.57	1.00	58.51
2012/7	06/21/2012 - 07/04/2012	07/18/2012	430221	L6	2012	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	58.51	30.24	26.57	1.00	58.51
2012/8	07/05/2012 - 07/18/2012	08/01/2012	430221	L6	2012	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	57.93	29.94	26.31	1.00	57.93
2012/10	08/02/2012 - 08/15/2012	08/29/2012	430221	L6	2012	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	58.51	90.71	79.71	3.00	175.53
2012/11	08/16/2012 - 08/29/2012	09/12/2012	430221	L6	2012	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	58.51	559.40	491.57	18.50	1,082.44

2012/12	08/30/2012 - 09/12/2012	09/26/2012	430221	L6	2012	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	58.51	90.71	79.71	3.00	175.53
2012/13	09/13/2012 - 09/26/2012	10/10/2012	430221	L6	2012	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	52.71	54.48	47.87	2.00	105.42
2012/14	09/27/2012 - 10/10/2012	10/24/2012	430221	L6	2012	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	58.51	151.19	132.86	5.00	292.55
2012/15	10/11/2012 - 10/24/2012	11/07/2012	430221	L6	2012	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	58.51	120.95	106.28	4.00	234.04
2012/16	10/25/2012 - 11/07/2012	11/21/2012	430221	L6	2012	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	58.51	120.95	106.28	4.00	234.04
2012/19	12/06/2012 - 12/19/2012	01/02/2013	430221	L6	2012	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	58.51	60.48	53.14	2.00	117.02
2012/22	01/17/2013 - 01/30/2013	02/13/2013	430221	L6	2012	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	58.51	15.12	13.29	0.50	29.26
2012/24	02/14/2013 - 02/27/2013	03/13/2013	430221	L6	2012	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	58.51	15.12	13.29	0.50	29.26
2012/26	03/14/2013 - 03/27/2013	04/10/2013	430221	L6	2013	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	58.51	30.24	26.57	1.00	58.51
2013/1	03/28/2013 - 04/10/2013	04/24/2013	430221	L6	2013	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	57.54	79.81	66.14	2.50	143.85
2013/5	05/23/2013 - 06/05/2013	06/19/2013	430221	L6	2013	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	57.54	31.92	26.45	1.00	57.54
2013/6	06/06/2013 - 06/19/2013	07/03/2013	430221	L6	2013	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	57.54	31.92	26.45	1.00	57.54
2013/8	07/04/2013 - 07/17/2013	07/31/2013	430221	L6	2013	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	57.54	95.77	79.36	3.00	172.62
2013/9	07/18/2013 - 07/31/2013	08/14/2013	430221	L6	2013	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	57.54	311.25	257.93	9.75	561.02
2013/10	08/01/2013 - 08/14/2013	08/28/2013	430221	L6	2013	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	57.54	31.92	26.45	1.00	57.54
2013/11	08/15/2013 - 08/28/2013	09/11/2013	430221	L6	2013	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	57.54	63.85	52.91	2.00	115.08
2013/12	08/29/2013 - 09/11/2013	09/25/2013	430221	L6	2013	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	57.54	31.92	26.45	1.00	57.54
2013/13	09/12/2013 - 09/25/2013	10/09/2013	430221	L6	2013	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	57.54	79.81	66.14	2.50	143.85
2013/16	10/24/2013 - 11/06/2013	11/20/2013	430221	L6	2013	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	57.54	319.23	264.54	10.00	575.40
2013/17	11/07/2013 - 11/20/2013	12/04/2013	430221	L6	2013	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	57.54	63.85	52.91	2.00	115.08
2013/22	01/16/2014 - 01/29/2014	02/12/2014	430221	L6	2013	Hoffman, Carl	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	57.54	31.92	26.45	1.00	57.54
2013/16	10/24/2013 - 11/06/2013	11/20/2013	237047	MF	2013	Killeen, Thomas	ENVIRNL ENGINEER 3	615127	Central Office - 625 Broadway	64.44	125.13	103.69	3.50	229.54
2013/18	11/21/2013 - 12/04/2013	12/18/2013	237047	MF	2013	Killeen, Thomas	ENVIRNL ENGINEER 3	615127	Central Office - 625 Broadway	65.73	18.24	15.11	0.50	32.87
2013/20	12/19/2013 - 01/01/2014	01/15/2014	237047	MF	2013	Killeen, Thomas	ENVIRNL ENGINEER 3	615127	Central Office - 625 Broadway	65.73	72.93	60.44	2.00	131.46
2013/23	01/30/2014 - 02/12/2014	02/26/2014	237047	MF	2013	Killeen, Thomas	ENVIRNL ENGINEER 3	615127	Central Office - 625 Broadway	65.73	36.47	30.22	1.00	65.73
2013/25	02/27/2014 - 03/12/2014	03/26/2014	237047	MF	2013	Killeen, Thomas	ENVIRNL ENGINEER 3	615127	Central Office - 625 Broadway	65.73	36.47	30.22	1.00	65.73
2013/26	03/13/2014 - 03/26/2014	04/09/2014	237047	MF	2014	Killeen, Thomas	ENVIRNL ENGINEER 3	615127	Central Office - 625 Broadway	65.73	36.47	30.22	1.00	65.73
2014/3	04/24/2014 - 05/07/2014	05/21/2014	237047	MF	2014	Killeen, Thomas	ENVIRNL ENGINEER 3	615127	Central Office - 625 Broadway	65.45	18.61	12.27	0.50	32.73
2014/6	06/05/2014 - 06/18/2014	07/02/2014	237047	MF	2014	Killeen, Thomas	ENVIRNL ENGINEER 3	615127	Central Office - 625 Broadway	67.85	38.58	25.44	1.00	67.85
2013/16	10/24/2013 - 11/06/2013	11/20/2013	231871	GB	2013	Shaw, Bradford	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	57.54	418.00	343.91	13.00	748.02
2013/17	11/07/2013 - 11/20/2013	12/04/2013	231871	GB	2013	Shaw, Bradford	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	57.54	295.29	244.70	9.25	532.25
2013/18	11/21/2013 - 12/04/2013	12/18/2013	231871	GB	2013	Shaw, Bradford	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	57.54	391.06	324.07	12.25	704.87
2013/19	12/05/2013 - 12/18/2013	12/31/2013	231871	GB	2013	Shaw, Bradford	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	57.54	207.50	171.95	6.50	374.01
2013/20	12/19/2013 - 01/01/2014	01/15/2014	231871	GB	2013	Shaw, Bradford	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	57.54	151.64	125.66	4.75	273.33
2013/22	01/16/2014 - 01/29/2014	02/12/2014	231871	GB	2013	Shaw, Bradford	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	57.54	95.77	79.36	3.00	172.62
2013/23	01/30/2014 - 02/12/2014	02/26/2014	231871	GB	2013	Shaw, Bradford	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	57.54	15.96	13.23	0.50	28.77
2013/24	02/13/2014 - 02/26/2014	03/12/2014	231871	GB	2013	Shaw, Bradford	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	57.54	31.92	26.45	1.00	57.54
2013/26	03/13/2014 - 03/26/2014	04/09/2014	231871	GB	2014	Shaw, Bradford	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	57.54	670.39	555.54	21.00	1,208.34
2014/1	03/27/2014 - 04/09/2014	04/23/2014	231871	GB	2014	Shaw, Bradford	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	59.39	337.69	222.65	10.00	593.90
2014/2	04/10/2014 - 04/23/2014	05/07/2014	231871	GB	2014	Shaw, Bradford	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	59.39	261.71	172.95	7.75	460.27
2014/3	04/24/2014 - 05/07/2014	05/21/2014	231871	GB	2014	Shaw, Bradford	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	59.39	472.77	311.71	14.00	831.48
2014/4	05/08/2014 - 05/21/2014	06/04/2014	231871	GB	2014	Shaw, Bradford	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	59.39	25.33	16.70	0.75	44.54
2014/5	05/22/2014 - 06/04/2014	06/18/2014	231871	GB	2014	Shaw, Bradford	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	59.39	16.89	11.14	0.50	29.70

2014/6	06/05/2014 - 06/18/2014	07/02/2014	231871	GB	2014	Shaw, Bradford	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	59.39	354.58	233.79	10.50	623.60
2014/7	06/19/2014 - 07/02/2014	07/16/2014	231871	GB	2014	Shaw, Bradford	ENVIRNL ENGINEER 2	615127	Central Office - 625 Broadway	59.39	227.94	150.28	6.75	400.88
2013/18	11/21/2013 - 12/04/2013	12/18/2013	240448	00	2013	Tuohy, Dolores	ASSOC ATTY	615127	Central Office - 625 Broadway	60.54	85.56	70.90	2.25	154.22
2013/19	12/05/2013 - 12/18/2013	12/31/2013	240448	00	2013	Tuohy, Dolores	ASSOC ATTY	615127	Central Office - 625 Broadway	68.09	9.44	7.82	0.25	17.02
2013/24	02/13/2014 - 02/26/2014	03/12/2014	240448	00	2013	Tuohy, Dolores	ASSOC ATTY	615127	Central Office - 625 Broadway	68.09	9.44	7.82	0.25	17.02
2013/26	03/13/2014 - 03/26/2014	04/09/2014	240448	00	2014	Tuohy, Dolores	ASSOC ATTY	615127	Central Office - 625 Broadway	66.77	111.13	92.09	3.00	200.31
2014/2	04/10/2014 - 04/23/2014	05/07/2014	240448	00	2014	Tuohy, Dolores	ASSOC ATTY	615127	Central Office - 625 Broadway	70.28	9.99	6.59	0.25	17.57
2014/3	04/24/2014 - 05/07/2014	06/21/2014	240448	00	2014	Tuohy, Dolores	ASSOC ATTY	615127	Central Office - 625 Broadway	70.51	120.28	79.30	3.00	211.53
2014/5	05/22/2014 - 06/04/2014	06/18/2014	240448	00	2014	Tuohy, Dolores	ASSOC ATTY	615127	Central Office - 625 Broadway	69.59	484.72	319.59	12.25	852.48
2014/6	06/05/2014 - 06/18/2014	07/02/2014	240448	00	2014	Tuohy, Dolores	ASSOC ATTY	615127	Central Office - 625 Broadway	70.28	269.74	177.85	6.75	474.39
2014/7	06/19/2014 - 07/02/2014	07/16/2014	240448	00	2014	Tuohy, Dolores	ASSOC ATTY	615127	Central Office - 625 Broadway	70.28	19.98	13.17	0.50	35.14
										Report Total:	11,203.68	9,012.10	338.75	20,578.37

[redacted]

EXHIBIT IV
New York State Department of Health
Cost Recovery
ORANGE COUNTY LANDFILL
336007

Fiscal Year	Personal Service	State Fringe	Indirect*
FY 14/15	$0.00	$0.00	$0.00
FY 13/14	$36.33	$20.16	$9.04
FY 12/13	$345.07	$178.33	$94.21

Personal Service, Fringe, and Indirect Costs:	$683.14
Travel Costs:	$0.00
Laboratory Costs:	$0.00
TOTAL COSTS:	**$683.14**

Fringe and Indirect Rates are as follows:

Fiscal Year	State Fringe rate	Indirect rate
FY 14/15	56.86%	12.00%
FY 13/14	55.48%	16.00%
FY 12/13	51.66%	16.00%

* Indirect amount is calculated per DOH policy as follows: (Personal Services +(Personal Services x Fringe rate)) x Indirect rate

New York State Department of Health
CEH Leave and Accrual Tracking Report
Site Cost Recovery Report Ordered by Pay End Date
(336007) ORANGE COUNTY LANDFILL
For the period January 5, 2012 thru July 2, 2014

Fiscal Year	Pay End Date	Hours	Rate	Amount	Employee	Title
2012	10/24/2012	1.00	$47.86	$47.86	Bethoney, Charlotte M	PUBLIC H SP 3 ENVIRMT
2012	11/07/2012	5.00	$49.34	$246.70	Walz, Nathan	PUBLIC H SP 2 ENVIRMT
2012	03/27/2013	1.25	$40.41	$50.51	Walz, Nathan	PUBLIC H SP 2 ENVIRMT
Total Hours and Cost		7.25		$345.07		
2013	04/10/2013	.75	$48.44	$36.33	Walz, Nathan	PUBLIC H SP 2 ENVIRMT
Total Hours and Cost		0.75		$36.33		
Total Entire Period		8.00		$381.40		

Report of Site Specific Payments made under Non-Site Specific Contracts

(Includes Standby Emergency Response, Investigation and Remediation, Response and Containment, Labs (may include Division of Water Standby Lab Payments), Miscellaneous Program or Administrative, or Payments under Contracts with no Contract Type Specified)

EXHIBIT III

Date 9/2/2014

Cost Center	Contract Type / Payment Description	Processed Date	Amount
	680355L603		
	Contract No. C008011 WA# 00 Contractor Name PHOENIX LABORATORIES, Task No. 336007		
	Standby Lab ORANGE COUNTY LF	10/11/2012	$833.37
		Subtotal for Cost Center - Contract - Task No.:	$833.37
		Subtotal for Cost Center - Contract:	$833.37
		Subtotal for Cost Center:	**$833.37**
		Report Grand Total:	**$833.37**

The report includes any of the following criteria.

Payment Description(s): ORANGE COUNTY L
ROUTE 17M
336007

Task No.: 336007

Start Date for Payment Processing: 1/1/2012

End Date for Payment Processing: 1/1/3000

APPENDIX "A"

STANDARD CLAUSES FOR ALL NEW YORK STATE STATE SUPERFUND ORDERS

APPENDIX A

STANDARD CLAUSES FOR ALL NEW YORK STATE SUPERFUND ADMINISTRATIVE ORDERS

The parties to the State Superfund Order (hereinafter "Order") agree to be bound by the following clauses which are hereby made a part of the Order. The word "Respondent" herein refers to any party to the Order, other than the New York State Department of Environmental Conservation (hereinafter "Department").

I. Citizen Participation Plan

Within twenty (20) days after the effective date of this Order, Respondent shall submit for review and approval a written citizen participation plan prepared in accordance with the requirements of ECL §27-1417 and 6 NYCRR sections 375-1.10 and 375-3.10. Upon approval, the Citizen Participation Plan shall be deemed to be incorporated into and made a part of this Order.

II. Initial Submittal

Within thirty (30) days after the effective date of this Order, Respondent shall submit to the Department a Records Search Report prepared in accordance with Exhibit "B" attached to the Order. The Records Search Report can be limited if the Department notifies Respondent that prior submissions satisfy specific items required for the Records Search Report.

III. Development, Performance, and Reporting of Work Plans

A. Work Plan Requirements

All activities at the Site that comprise any element of an Inactive Hazardous Waste Disposal Site Remedial Program shall be conducted pursuant to one or more Department-approved work plans ("Work Plan" or "Work Plans") and this Order and all activities shall be consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300, as required under CERCLA, 42 U.S.C. § 9600 *et seq.* The Work Plan(s) under this Order shall address both on-Site and off-Site conditions and shall be developed and implemented in accordance with 6 NYCRR § 375-1.6(a), 375-3.6, and 375-6. Subject to Subparagraph III.E.3,. all Department-approved Work Plans shall be incorporated into and become enforceable parts of this Order. Upon approval of a Work Plan by the Department, Respondent shall implement such Work Plan in accordance with the schedule contained therein. Nothing in this Subparagraph shall mandate that any particular Work Plan be submitted.

The Work Plans shall be captioned as follows:

1. Site Characterization ("SC") Work Plan: a Work Plan which provides for the identification of the presence of any hazardous waste disposal at the Site;

2. Remedial Investigation/Feasibility Study ("RI/FS") Work Plan: a Work Plan which provides for the investigation of the nature and extent of contamination within the boundaries of the Site and emanating from such Site and a study of remedial alternatives to address such on-site and off-site contamination;

3. Remedial Design/Remedial Action ("RD/RA") Work Plan: a Work Plan which provides for the development and implementation of final plans and specifications for implementing the remedial alternative set forth in the ROD;

4. "IRM Work Plan" if the Work Plan provides for an interim remedial measure;

5. "Site Management Plan" if the Work Plan provides for the identification and implementation of institutional and/or engineering controls as well as any necessary monitoring and/or operation and maintenance of the remedy; or

6. "Supplemental" if additional work plans other than those set forth in II.A.1-5 are required to be prepared and implemented.

B. Submission/Implementation of Work Plans

1. Respondent may opt to propose one or more additional or supplemental Work Plans

(including one or more IRM Work Plans) at any time, which the Department shall review for appropriateness and technical sufficiency.

2. Any proposed Work Plan shall be submitted for the Department's review and approval and shall include, at a minimum, a chronological description of the anticipated activities, a schedule for performance of those activities, and sufficient detail to allow the Department to evaluate that Work Plan.

i. The Department shall notify Respondent in writing if the Department determines that any element of a Department-approved Work Plan needs to be modified in order to achieve the objectives of the Work Plan as set forth in Subparagraph III.A or to ensure that the Remedial Program otherwise protects human health and the environment. Upon receipt of such notification, Respondent shall, subject to dispute resolution pursuant to Paragraph XV, modify the Work Plan.

ii. The Department may request, subject to dispute resolution pursuant to Paragraph XV, that Respondent submit additional or supplemental Work Plans for the Site to complete the current remedial phase within thirty (30) days after the Department's written request.

3. A Site Management Plan, if necessary, shall be submitted in accordance with the schedule set forth in the IRM Work Plan or Remedial Work Plan.

4. During all field activities conducted under a Department-approved Work Plan, Respondent shall have on-Site a representative who is qualified to supervise the activities undertaken in accordance with the provisions of 6 NYCRR 375-1.6(a)(3).

5. A Professional Engineer must stamp and sign all Work Plans other than SC or RI/FS Work Plans.

C. Submission of Final Reports and Periodic Reports

1. In accordance with the schedule contained in a Work Plan, Respondent shall submit a final report as provided at 6 NYCRR 375-1.6(b) and a final engineering report as provided at 6 NYCRR 375-1.6(c).

2. Any final report or final engineering report that includes construction activities shall include "as built" drawings showing any changes made to the remedial design or the IRM.

3. In the event that the final engineering report for the Site requires Site management, Respondent shall submit an initial periodic report by in accordance with the schedule in the Site Management Plan and thereafter in accordance with a schedule determined by the Department. Such periodic report shall be signed by a Professional Engineer or by such other qualified environmental professional as the Department may find acceptable and shall contain a certification as provided at 6 NYCRR 375-1.8(h)(3). Respondent may petition the Department for a determination that the institutional and/or engineering controls may be terminated. Such petition must be supported by a statement by a Professional Engineer that such controls are no longer necessary for the protection of public health and the environment. The Department shall not unreasonably withhold its approval of such petition.

4. Within sixty (60) days of the Department's approval of a Final Report, Respondent shall submit such additional Work Plans as is required by the Department in its approval letter of such Final Report. Failure to submit any additional Work Plans within such period shall be a violation of this Order.

D. Review of Submittals

1. The Department shall make a good faith effort to review and respond in writing to each submittal Respondent makes pursuant to this Order within sixty (60) days. The Department's response shall include, in accordance with 6 NYCRR 375-1.6(d), an approval, modification request, or disapproval of the submittal, in whole or in part.

i. Subject to Subparagraph III.E.3 and upon the Department's written approval of a Work Plan, such Department-approved Work Plan shall be deemed to be incorporated into and made a part of this Order and shall be implemented in accordance with the schedule contained therein.

ii. If the Department modifies or requests modifications to a submittal, it shall specify the reasons for such modification(s). Within fifteen (15) days after the date of the Department's written notice that Respondent's submittal has been disapproved, Respondent shall notify the Department of its election in accordance with 6 NYCRR 375-1.6(d)(3). If Respondent elects to modify or accept the Department's modifications to the submittal, Respondent shall make a revised submittal that incorporates all of the Department's modifications to the first submittal in accordance with the time period set forth in 6 NYCRR 375-1.6(d)(3). In the event that Respondent's revised submittal is disapproved, the Department shall set forth its reasons for such disapproval in writing and Respondent shall be in violation of this Order unless it invokes dispute resolution pursuant to Paragraph XV and its position prevails. Failure to make an election or failure to comply with the election is a violation of this Order.

iii. If the Department disapproves a submittal, it shall specify the reasons for its disapproval. Within fifteen (15) days after the date of the Department's written notice that Respondent's submittal has been disapproved, Respondent shall notify the Department of its election in accordance with 6 NYCRR 375-1.6(d)(4). If Respondent elects to modify the submittal, Respondent shall make a revised submittal that addresses all of the Department's stated reasons for disapproving the first submittal in accordance with the time period set forth in 6 NYCRR 375-1.6(d)(4). In the event that Respondent's revised submittal is disapproved, the Department shall set forth its reasons for such disapproval in writing and Respondent shall be in violation of this Order unless it invokes dispute resolution pursuant to Paragraph XV and its position prevails. Failure to make an election or failure to comply with the election is a violation of this Order.

2. Within thirty (30) days after the Department's approval of a final report, Respondent shall submit such final report, as well as all data gathered and drawings and submittals made pursuant to such Work Plan, in an electronic format acceptable to the Department. If any document cannot be converted into electronic format, Respondent shall submit such document in an alternative format acceptable to the Department.

E. Department's Issuance of a ROD

1. Respondent shall cooperate with the Department and provide reasonable assistance, consistent with the Citizen Participation Plan, in soliciting public comment on the proposed remedial action plan ("PRAP"), if any. After the close of the public comment period, the Department shall select a final remedial alternative for the Site in a ROD. Nothing in this Order shall be construed to abridge any rights of Respondent, as provided by law, to judicially challenge the Department's ROD.

2. Respondent shall have 60 days from the date of the Department's issuance of the ROD to notify the Department in writing whether it will implement the remedial activities required by such ROD. If the Respondent elects not to implement the required remedial activities, then this order shall terminate in accordance with Paragraph XIV.A. Failure to make an election or failure to comply with the election is a violation of this Order.

3. Nothing in this Order, in any submittal, or in any work plan(s) submitted pursuant to this Order shall modify, expand, reduce, or otherwise change the remedial activities (including site management) required by a ROD issued by the Department.

F. Institutional/Engineering Control Certification

In the event that the remedy for the Site, if any, or any Work Plan for the Site, requires institutional or engineering controls, Respondent shall submit a written certification in accordance with 6 NYCRR 375-1.8(h)(3) and 375-3.8(h)(2).

IV. Penalties

A. 1. Respondent's failure to comply with any term of this Order constitutes a violation of this Order, the ECL, and 6 NYCRR 375-2.11(a)(4). Nothing herein abridges Respondent's right to contest any allegation that it has failed to comply with this Order.

2. Payment of any penalties shall not in any way alter Respondent's obligations under this Order.

B. 1. Respondent shall not suffer any penalty or be subject to any proceeding or action in the event it cannot comply with any requirement of this Order

as a result of any Force Majeure Event as provided at 6 NYCRR 375-1.5(b)(4). Respondent must use best efforts to anticipate the potential Force Majeure Event, best efforts to address any such event as it is occurring, and best efforts following the Force Majeure Event to minimize delay to the greatest extent possible. "Force Majeure" does not include Respondent's economic inability to comply with any obligation, the failure of Respondent to make complete and timely application for any required approval or permit, and non-attainment of the goals, standards, and requirements of this Order.

2. Respondent shall notify the Department in writing within five (5) days of the onset of any Force Majeure Event. Failure to give such notice within such five (5) Day period constitutes a waiver of any claim that a delay is not subject to penalties. Respondent shall be deemed to know of any circumstance which it, any entity controlled by it, or its contractors knew or should have known.

3. Respondent shall have the burden of proving by a preponderance of the evidence that (i) the delay or anticipated delay has been or will be caused by a Force Majeure Event; (ii) the duration of the delay or the extension sought is warranted under the circumstances; (iii) best efforts were exercised to avoid and mitigate the effects of the delay; and (iv) Respondent complied with the requirements of Subparagraph IV.B.2 regarding timely notification.

4. If the Department agrees that the delay or anticipated delay is attributable to a Force Majeure Event, the time for performance of the obligations that are affected by the Force Majeure Event shall be extended for a period of time equivalent to the time lost because of the Force majeure event, in accordance with 375-1.5(4).

5. If the Department rejects Respondent's assertion that an event provides a defense to non-compliance with this Order pursuant to Subparagraph IV.B, Respondent shall be in violation of this Order unless it invokes dispute resolution pursuant to Paragraph XV and Respondent's position prevails.

V. Entry upon Site

A. Respondent hereby consents, upon reasonable notice under the circumstances presented, to entry upon the Site (or areas in the vicinity of the Site which may be under the control of Respondent) by any duly designated officer or employee of the Department or any State agency having jurisdiction with respect to matters addressed pursuant to this Order, and by any agent, consultant, contractor, or other person so authorized by the Commissioner, all of whom shall abide by the health and safety rules in effect for the Site, for inspecting, sampling, copying records related to the contamination at the Site, testing, and any other activities necessary to ensure Respondent's compliance with this Order. Upon request, Respondent shall (i) provide the Department with suitable work space at the Site, including access to a telephone, to the extent available, and (ii) permit the Department full access to all non-privileged records relating to matters addressed by this Order. Raw data is not considered privileged and that portion of any privileged document containing raw data must be provided to the Department. In the event Respondent is unable to obtain any authorization from third-party property owners necessary to perform its obligations under this Order, the Department may, consistent with its legal authority, assist in obtaining such authorizations.

B. The Department shall have the right to take its own samples and scientific measurements and the Department and Respondent shall each have the right to obtain split samples, duplicate samples, or both, of all substances and materials sampled. The Department shall make the results of any such sampling and scientific measurements available to Respondent.

VI. Payment of State Costs

A. Within forty-five (45) days after receipt of an itemized invoice from the Department, Respondent shall pay to the Department a sum of money which shall represent reimbursement for State Costs as provided by 6 NYCRR 375-1.5 (b)(3)(i). Failure to timely pay any invoice will be subject to late payment charge and interest at a rate of 9% from the date the payment is due until the date the payment is made.

B. Costs shall be documented as provided by 6 NYCRR 375-1.5(b)(3). The Department shall not be required to provide any other documentation of costs, provided however, that the Department's records shall be available consistent with, and in accordance with, Article 6 of the Public Officers Law.

C. Each such payment shall be made payable to the New York State Department of Environmental Conservation and shall be sent to:

Director, Bureau of Program Management
Division of Environmental Remediation
New York State Department of Environmental Conservation
625 Broadway
Albany, New York 12233-7012

D. The Department shall provide written notification to the Respondent of any change in the foregoing addresses.

E. If Respondent objects to any invoiced costs under this Order, the provisions of 6 NYCRR 375-1.5 (b)(3)(v) and (vi) shall apply. Objections shall be sent to the Department as provided under subparagraph VI.C above.

F. In the event of non-payment of any invoice within the 45 days provided herein, the Department may seek enforcement of this provision pursuant to Paragraph IV or the Department may commence an enforcement action for non-compliance with ECL '27-1423 and ECL 71-4003.

VII. Release and Covenant Not to Sue

Upon the Department's issuance of a Certificate of Completion as provided at 6 NYCRR 375-1.9 and 375-2.9, Respondent shall obtain the benefits conferred by such provisions, subject to the terms and conditions described therein.

VIII. Reservation of Rights

A. Except as provided at 6 NYCRR 375-1.9 and 375-2.9, nothing contained in this Order shall be construed as barring, diminishing, adjudicating, or in any way affecting any of the Department's rights or authorities, including, but not limited to, the right to require performance of further investigations and/or response action(s), to recover natural resource damages, and/or to exercise any summary abatement powers with respect to any person, including Respondent.

B. Except as otherwise provided in this Order, Respondent specifically reserves all rights and defenses under applicable law respecting any Departmental assertion of remedial liability and/or natural resource damages against Respondent, and further reserves all rights respecting the enforcement of this Order, including the rights to notice, to be heard, to appeal, and to any other due process. The existence of this Order or Respondent's compliance with it shall not be construed as an admission of liability, fault, wrongdoing, or breach of standard of care by Respondent, and shall not give rise to any presumption of law or finding of fact, or create any rights, or grant any cause of action, which shall inure to the benefit of any third party. Further, Respondent reserves such rights as it may have to seek and obtain contribution, indemnification, and/or any other form of recovery from its insurers and from other potentially responsible parties or their insurers for past or future response and/or cleanup costs or such other costs or damages arising from the contamination at the Site as may be provided by law, including but not limited to rights of contribution under section 113(f)(3)(B) of CERCLA, 42 U.S.C. § 9613(f)(3)(B).

IX. Indemnification

Respondent shall indemnify and hold the Department, the State of New York, the Trustee of the State's natural resources, and their representatives and employees harmless as provided by 6 NYCRR 375-2.5(a)(3)(i).

X. Public Notice

A. Within thirty (30) days after the effective date of this Order, Respondent shall provide notice as required by 6 NYCRR 375-1.5(a). Within sixty (60) days of such filing, Respondent shall provide the Department with a copy of such instrument certified by the recording officer to be a true and faithful copy.

B. If Respondent proposes to transfer by sale or lease the whole or any part of Respondent's interest in the Site, or becomes aware of such transfer, Respondent shall, not fewer than forty-five (45) days before the date of transfer, or within forty-five (45) days after becoming aware of such conveyance, notify the Department in writing of the identity of the transferee and of the nature and proposed or actual date of the conveyance, and shall notify the transferee in writing, with a copy to the Department, of the applicability of this Order. However, such obligation shall not extend to a conveyance by means of a corporate reorganization or merger or the granting of any rights under any mortgage, deed, trust,

assignment, judgment, lien, pledge, security agreement, lease, or any other right accruing to a person not affiliated with Respondent to secure the repayment of money or the performance of a duty or obligation.

XI. Change of Use

Applicant shall notify the Department at least sixty (60) days in advance of any change of use, as defined in 6 NYCRR 375-2.2(a), which is proposed for the Site, in accordance with the provisions of 6 NYCRR 375-1.11(d). In the event the Department determines that the proposed change of use is prohibited, the Department shall notify Applicant of such determination within forty-five (45) days of receipt of such notice.

XII. Environmental Easement

A. If a Record of Decision for the Site relies upon one or more institutional and/or engineering controls, Respondent (or the owner of the Site) shall submit to the Department for approval an Environmental Easement to run with the land in favor of the State which complies with the requirements of ECL Article 71, Title 36, and 6 NYCRR 375-1.8(h)(2). Upon acceptance of the Environmental Easement by the State, Respondent shall comply with the requirements of 6 NYCRR 375-1.8(h)(2).

B. If the ROD provides for no action other than implementation of one or more institutional controls, Respondent shall cause an environmental easement to be recorded under the provisions of Subparagraph XII.A.

C. If Respondent does not cause such environmental easement to be recorded in accordance with 6 NYCRR 375-1.8(h)(2), Respondent will not be entitled to the benefits conferred by 6 NYCRR 375-1.9 and 375-2.9 and the Department may file an Environmental Notice on the site.

XIII. Progress Reports

Respondent shall submit a written progress report of its actions under this Order to the parties identified in Subparagraph IV.A.1 of the Order by the 10th day of each month commencing with the month subsequent to the approval of the first Work Plan and ending with the Termination date as set forth in Paragraph XIV, unless a different frequency is set forth in a Work Plan. Such reports shall, at a minimum, include: all actions relative to the Site during the previous reporting period and those anticipated for the next reporting period; all approved activity modifications (changes of work scope and/or schedule); all results of sampling and tests and all other data received or generated by or on behalf of Respondent in connection with this Site, whether under this Order or otherwise, in the previous reporting period, including quality assurance/quality control information; information regarding percentage of completion; unresolved delays encountered or anticipated that may affect the future schedule and efforts made to mitigate such delays; and information regarding activities undertaken in support of the Citizen Participation Plan during the previous reporting period and those anticipated for the next reporting period.

XIV. Termination of Order

A. This Order will terminate upon the earlier of the following events:

1. Respondent's election in accordance with Paragraph III.E.2 not to implement the remedial activities required pursuant to the ROD. In the event of termination in accordance with this Subparagraph, this Order shall terminate effective the 5th Day after the Department's receipt of the written notification, provided, however, that if there are one or more Work Plan(s) for which a final report has not been approved at the time of Respondent's notification of its election not to implement the remedial activities in accordance with the ROD, Respondent shall complete the activities required by such previously approved Work Plan(s) consistent with the schedules contained therein. Thereafter, this Order shall terminate effective the 5th Day after the Department's approval of the final report for all previously approved Work Plans; or

2. The Department's written determination that Respondent has completed all phases of the Remedial Program (including Site Management), in which event the termination shall be effective on the 5th Day after the date of the Department's letter stating that all phases of the remedial program have been completed.

B. Notwithstanding the foregoing, the provisions contained in Paragraphs VI and IX shall survive the termination of this Order and any

violation of such surviving Paragraphs shall be a violation of this Order, the ECL, and 6 NYCRR 375-2.11(a)(4), subjecting Respondent to penalties as provided under Paragraph IV so long as such obligations accrued on or prior to the Termination Date.

C. If the Order is terminated pursuant to Subparagraph XIV.A.1, neither this Order nor its termination shall affect any liability of Respondent for remediation of the Site and/or for payment of State Costs, including implementation of removal and remedial actions, interest, enforcement, and any and all other response costs as defined under CERCLA, nor shall it affect any defenses to such liability that may be asserted by Respondent. Respondent shall also ensure that it does not leave the Site in a condition, from the perspective of human health and environmental protection, worse than that which existed before any activities under this Order were commenced. Further, the Department's efforts in obtaining and overseeing compliance with this Order shall constitute reasonable efforts under law to obtain a voluntary commitment from Respondent for any further activities to be undertaken as part of a Remedial Program for the Site.

XV. Dispute Resolution

A. In the event disputes arise under this Order, Respondent may, within fifteen (15) days after Respondent knew or should have known of the facts which are the basis of the dispute, initiate dispute resolution in accordance with the provisions of 6 NYCRR 375-1.5(b)(2).

B. All cost incurred by the Department associated with dispute resolution are State costs subject to reimbursement pursuant to this Order.

C. Nothing contained in this Order shall be construed to authorize Respondent to invoke dispute resolution with respect to the remedy selected by the Department in the ROD or any element of such remedy, nor to impair any right of Respondent to seek judicial review of the Department's selection of any remedy.

XVI .Miscellaneous

A. Respondent agrees to comply with and be bound by the provisions of 6 NYCRR Subparts 375-1 and 375-2; the provisions of such Subparts that are referenced herein are referenced for clarity and convenience only and the failure of this Order to specifically reference any particular regulatory provision is not intended to imply that such provision is not applicable to activities performed under this Order.

B. The Department may exempt Respondent from the requirement to obtain any state or local permit or other authorization for any activity conducted pursuant to this Order in accordance with 6 NYCRR 375-1.12(b), (c), and (d).

C. 1. Respondent shall use best efforts to obtain all Site access, permits, easements, approvals, institutional controls, and/or authorizations necessary to perform Respondent's obligations under this Order, including all Department-approved Work Plans and the schedules contained therein. If, despite Respondent's best efforts, any access, permits, easements, approvals, institutional controls, or authorizations cannot be obtained, Respondent shall promptly notify the Department and include a summary of the steps taken. The Department may, as it deems appropriate and within its authority, assist Respondent in obtaining same.

2. If an interest in property is needed to implement an institutional control required by a Work Plan and such interest cannot be obtained, the Department may require Respondent to modify the Work Plan pursuant to 6 NYCRR 375-1.6(d)(3) to reflect changes necessitated by Respondent's inability to obtain such interest.

D. The paragraph headings set forth in this Order are included for convenience of reference only and shall be disregarded in the construction and interpretation of any provisions of this Order.

E. 1. The terms of this Order shall constitute the complete and entire agreement between the Department and Respondent concerning the implementation of the activities required by this Order. No term, condition, understanding, or agreement purporting to modify or vary any term of this Order shall be binding unless made in writing and subscribed by the party to be bound. No informal advice, guidance, suggestion, or comment by the Department shall be construed as relieving Respondent of Respondent's obligation to obtain such formal approvals as may be required by this Order. In the event of a conflict between the terms of

this Order and any Work Plan submitted pursuant to this Order, the terms of this Order shall control over the terms of the Work Plan(s). Respondent consents to and agrees not to contest the authority and jurisdiction of the Department to enter into or enforce this Order.

2. i. Except as set forth herein, if Respondent desires that any provision of this Order be changed, Respondent shall make timely written application to the Commissioner with copies to the parties listed in Subparagraph IV.A.1.

ii. If Respondent seeks to modify an approved Work Plan, a written request shall be made to the Department's project manager, with copies to the parties listed in Subparagraph IV.A.1.

iii. Requests for a change to a time frame set forth in this Order shall be made in writing to the Department's project attorney and project manager; such requests shall not be unreasonably denied and a written response to such requests shall be sent to Respondent promptly.

F. 1. If there are multiple parties signing this Order, the term "Respondent" shall be read in the plural, the obligations of each such party under this Order are joint and several, and the insolvency of or failure by any Respondent to implement any obligations under this Order shall not affect the obligations of the remaining Respondent(s) under this Order.

2. If Respondent is a partnership, the obligations of all general partners (including limited partners who act as general partners) under this Order are joint and several and the insolvency or failure of any general partner to implement any obligations under this Order shall not affect the obligations of the remaining partner(s) under this Order.

3. Notwithstanding the foregoing Subparagraphs XVI.F.1 and 2, if multiple parties sign this Order as Respondents but not all of the signing parties elect to implement a Work Plan, all Respondents are jointly and severally liable for each and every obligation under this Order through the completion of activities in such Work Plan that all such parties consented to; thereafter, only those Respondents electing to perform additional work shall be jointly and severally liable under this Order for the obligations and activities under such additional Work Plan(s). The parties electing not to implement the additional Work Plan(s) shall have no obligations under this Order relative to the activities set forth in such Work Plan(s). Further, only those Respondents electing to implement such additional Work Plan(s) shall be eligible to receive the release and covenant not to sue referenced in Paragraph VII.

G. Respondent shall be entitled to receive contribution protection and/or to seek contribution to the extent authorized by ECL 27-1421(6) and 6 NYCRR 375-1.5(b)(5).

H. Any time limitations set forth in Section 113(g)(1) of CERCLA, as amended, 42 U.S.C. § 9613(g)(1), Section 1012(h)(2) of the Oil Pollution Act, as amended, 33 U.S.C. § 2712(h)(2), the Federal Water Pollution Control Act, the New York Navigation Law, the New York Environmental Conservation Law, or any other federal or state statute or regulation with respect to potential claims for natural resource damages against Respondent or any other time limitations for the filing of potential natural resource damages claims against Respondent under any other applicable state or federal law are tolled in their entirety from the effective date of this Order until termination of this Order.

I. Unless otherwise expressly provided herein, terms used in this Order which are defined in ECL Article 27 or in regulations promulgated thereunder shall have the meaning assigned to them under said statute or regulations.

J. Respondent's obligations under this Order represent payment for or reimbursement of response costs, and shall not be deemed to constitute any type of fine or penalty.

K. Respondent and Respondent's successors and assigns shall be bound by this Order. Any change in ownership or corporate status of Respondent shall in no way alter Respondent's responsibilities under this Order.

L. This Order may be executed for the convenience of the parties hereto, individually or in combination, in one or more counterparts, each of which shall be deemed to have the status of an executed original and all of which shall together constitute one and the same.