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

LONG TERM SEEP EVALUATION REPORT

Prepared for:

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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 Evaluation Report 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. 12/3/14 Date

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1.0 INTRODUCTION

The Orange County Landfill (Landfill), located in the Town of Goshen, Orange County, New York (the County) is registered as a Class 2 Inactive Hazardous Waste Disposal Site, Registry No. 336007, by the New York State Department of Environmental Conservation (NYSDEC). The Landfill was previously remediated subject to the NYSDEC's oversight and approval. A Site Location Map is provided as Figure 1.

The monitoring and maintenance program for the Landfill is described in the NYSDEC approved Site Management Plan (SMP), dated June 6, 2014. The County is entering into a Consent Order with the NYSDEC to mitigate landfill impacted seeps observed offsite along the banks of the Cheechunk Canal downgradient from the Landfill. As required by Paragraph II.B of the draft Consent Order, this Long Term Seep Evaluation Report serves to summarize information developed to date and to provide the foundation for subsequent submittals required by the Consent Order.

1.1 Background Information

The Landfill footprint totals approximately 75-acres within a 300-acre parcel approximately three (3) miles west of the Village of Goshen, south of NYS Route 17M. The property is bounded by the Cheechunk Canal to the southeast and by the old channel of the Wallkill River to the northwest and southwest. The New Hampton Transfer Station is located on the northeast portion of the 300-acre parcel. Property features are present on the aerial photograph presented as Figure 2.

The Orange County Department of Public Works 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 Remedial Investigation and Feasibility Study 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 from the results of the Remedial Investigation/Feasibility Study in 1996 and called for 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.

1.2 Cheechunk Canal and Wallkill River

The Cheechunk Canal starts upstream of the Landfill and totals approximately eight (8) miles in length. The initial phase of Canal construction started in the 1820s to mitigate flooding in the Black Dirt Region of Orange County.

The Cheechunk Canal is prone to significant seasonal flooding. The Orange County Soil and Water Conservation District is undertaking a study entitled "Wallkill River Flood Mitigation Implementation Plan Black Dirt Region Orange County, NY". The study area includes the Cheechunk Canal proximate to the Orange County Landfill. The August 16, 2013 "Summary of Further Investigations Regarding Flood

Mitigation Study Areas" (provided in Appendix A) includes important observations regarding the Landfill and its relationship to the canal. The study is also evaluating the merits of future dredging of the canal to aid in flood mitigation.

Flooding at the Landfill site often extends above the tree line at the toe of the mowed slope to the south and east of the wastemass. The flooding condition shown below occurred in September 2011 followed heavy precipitation due to Hurricane Irene.

The summary further notes that with respect to the relationship of the Landfill to the canal, there is "no evidence or data that would support the theory that the current configuration impedes flow". Based upon As-Built construction documentation, the Landfill limit of waste and the limit of the final cover system are no closer than 125 feet from the normal waterline of the canal.

The Wallkill River headwaters are in northern New Jersey. The Wallkill River, 88 miles in total length, serves a watershed of approximately 800 square miles and discharges to the Hudson River south of Kingston, New York. The drainage area of the Wallkill River watershed upstream of the Landfill is approximately 322 square miles. The Wallkill River receives urban runoff, agricultural runoff, non-point source discharges and point source discharges comprised of municipal storm sewer systems and public and private sewer system.

The water quality and sediments of the Wallkill River and the characteristics of the watershed have been extensively studied. Reports were compiled and reviewed in support of this Long Term Seep Evaluation Report (see Appendix J).

The findings documented by these reports provide the context for evaluating the discharges of impacted groundwater at the seeps.

1.3 Landfill Conceptual Model

The physical characterization, nature and extent of contamination, and contaminant fate and transport have been extensively studied at the unlined landfill since the early 1980's. The distribution and character of geologic materials, occurrence of groundwater, and overall water quality has been well documented since 1987. The conceptual model is as follows:

- Six (6) discrete overburden units exist in the vicinity of the landfill and consist of recent alluvial deposits, highly permeable glaciofluvial deposits, moderate to lowly permeable glaciolacustrine units, moderately permeable glaciolacustrine fine sand deposits, and low to moderately permeable glacial till (Wehran, 1984).

- The Wappinger Group dolostone and Martinsburg Formation shale underlie the glacial deposits at the site (Wehran, 1984).

- Groundwater at the site exhibits unconfined and/or confined conditions, depending on location.

- Three hydrostratigraphic units have been identified: glaciolacustrine silt and clay, glaciofluvial sand and gravel or glaciolacustrine fine sand, and bedrock. The refuse mass lies over the low permeability glaciolacustrine silt and clay deposits at the site. In areas where the glaciolacustrine silt and clay is significantly thick, it acts as a confining layer for the underlying glaciofluvial sand and gravel aquifer. Where this glacial unit is thin or non-existent, the sand and gravel aquifer is under unconfined conditions. The bedrock hydrogeologic unit is considered a confined aquifer system.

- The shallow overburden groundwater moves generally in a west-to-east flow direction.

- Groundwater analytical results, collected from post-closure monitoring over two (2) decades have consistently documented that the groundwater near the landfill is characterized by elevated concentrations of Total Dissolved Solids (TDS), iron and manganese and occasional exceedances of drinking water standards for magnesium, ammonia, chloride, phenolics, arsenic, chromium, lead, selenium, and sodium.

- Historical surface water quality data has documented that local surface waters are not significantly influenced by the Orange County Landfill.

- Leachate, collected by the perimeter leachate collection system, has reported detectable to elevated concentrations of typical landfill leachate constituents including Total Organic Carbon (TOC), alkalinity, ammonia, Biochemical Oxygen Demand (BOD), chloride, chemical oxygen demand (COD), nitrate, hardness, Total Kjeldahl Nitrogen (TKN), TDS, phenolics, sulfate, arsenic, barium, boron, calcium, chromium, copper, iron, magnesium, manganese, nickel, potassium, sodium, and zinc.

- Monthly post-closure landfill site inspections have documented that the integrity of the landfill cap, drainage structures, leachate collection system, gas venting system and monitoring well network is in good condition.

1.4 Groundwater Seeps

Offsite groundwater seeps have been observed at various locations along the northern and southern banks of the Cheechunk Canal. Seeps are formed when the groundwater table intersects the ground surface. The Cheechunk Canal was reportedly originally constructed in 1824 to drain the upstream portion of the Wallkill River, because valley farmers wanted to create a landscape more suitable for agriculture from the unproductive, swampy area known as the "drowned lands" and to address frequent flooding of the Wallkill River. During the 1900s, the Cheechunk Canal was dredged by the United States Army Corps of Engineers (USACE). Dredge spoils have been sidecast onto the canal banks resulting in poorly graded areas with inadequate drainage. Some portions of the canal bank were previously armored with rip-rap to control erosion of the silty material placed on the banks. Other areas lack any protection from erosion and flooding. In some areas that lack armoring, seeps are evident. Many of the seeps on both sides of the Canal are red stained due to the oxidation of naturally occurring iron. In fact, the prevalent soils of Orange County are derived from glacial till or glaciolacustrine deposits, which are known to contain iron, and red stained groundwater seeps are commonplace in such soils.

In 2012, NYSDEC received citizen complaints that seeps were observed on the Canal banks downhill of the Landfill. It should be noted that the canal is reportedly owned by New York State. 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 follows:

- July 16, 2012 - NYSDEC notifies County of the seeps and requires that the County prepare a work plan for the sampling, analysis, and assessment of the seeps.

- August 16, 2012 - Orange County met with the NYSDEC at the Landfill to inspect the seeps and select sampling locations.

- August 22, 2012 - Orange County met with the NYSDEC at the Landfill to inspect the seeps. The inspection included canoeing the stretch of the canal along the entire length of the canal adjacent to the Landfill. Samples of seeps were collected for laboratory analysis. Notes, photographs, and data generated by this inspection were submitted to the NYSDEC on September 20, 2012 (Appendix B). A NYSDEC Solid Waste Management Facility Site Visit Report, dated August 24, 2012 is provided in Appendix C.

- October 19, 2012 - Orange County provides a Work Plan for investigation of the perimeter leachate collection system (Appendix D).

- April 11, 2013 and August 19, 2013 - Orange County proceeded with investigation of the leachate collection system (LCS) including cleaning and internal video inspection by Closed Circuit Television (CCTV). Mr. Carl Hoffman of the NYSDEC observed the field investigation on April 11, 2013. The findings are described in Section 3.2 below.

- August 21, 2013 - Samples of seeps were collected for laboratory analysis. Laboratory analytical results are provided in Appendix E.

- December 13, 2013 - Orange County submits a Draft Site Management Plan to NYSDEC.

- December 18, 2013 –Orange County provides a Work Plan to install piezometers between the Landfill and Canal to understand the subsurface conditions and piezometry immediately upgradient of the seeps exhibiting elevated ammonia. A copy of the Work Plan is provided as Appendix F. The Work Plan was approved by the NYSDEC on December 31, 2013.

- February 19 and 20, 2014 - Following NYSDEC approval of the Work Plan, six (6) overburden piezometers were installed. A comprehensive letter report summarizing the findings of the piezometer installations is provided as Appendix G.

- June 12, 2014 - Orange County collected samples of the seeps and surface water for laboratory analysis (see Appendix H)

- October 6 and 8, 2014 - Orange County conducted sampling of the overburden groundwater, seeps in accordance with the approved Work Plan. The purpose of monitoring was to understand seasonal fluctuations in groundwater elevation and water quality as the foundation to developing a seep mitigation plan (see Appendix I).

- October 31, 2014 - Based upon agreements reached at the September 22, 2014 meeting with NYSDEC, Orange County proceeded with steps to immediately address the seeps and a Seep Mitigation Plan and Engineering Report was submitted to the NYSDEC.

1.5 Prevailing Land Use

The Landfill site is situated within a prime agricultural area of Orange County. Lands adjacent to the Landfill to the north consist of an apple orchard. Lands to the south are regularly cultivated for various crops. Various studies of the Landfill and the Wallkill River Basin have focused on agricultural runoff, urban runoff, non-point sources discharges and point source discharges. These reports describe the quality of the water and sediments in the Wallkill River. A listing of available studies is included in the List of References.

1.6 Site Management Plan (SMP)

The approved Site Management Plan (SMP) provides the recommended scope of work to continuously monitor the major components of the selected remedy for the Landfill as provided in the NYSDEC Division of Remediation RODs dated January 28, 1994 for Operable Unit No. 2 and March 26, 1998 for Operable Unit 01 as outlined below:

- Landfill cap;
- Groundwater monitoring wells;
- Leachate collection system;
- Surface water drainage channels;
- Air quality;
- Property deed restrictions;
- Post-closure monitoring and maintenance; and
- Contingency plans to protect nearby residents.

The SMP sets forth contingency measures for potential problems associated with groundwater and surface water contamination. If conditions indicative of leachate outbreaks, such as wet spots, dead vegetation, surface sloughing or discoloration are observed during the inspection, the SMP requires further investigation to evaluate the condition and determine the appropriate corrective action.

The condition must be reported to the NYSDEC and an investigation plan must be developed to determine the cause and extent of the observed condition. The investigation plan may include, but is not necessarily limited to, test pit excavations or other appropriate subsurface investigation methods. A remedial action plan must then be developed to address the condition.

If significant offsite migration of surface or groundwater contamination is determined to be occurring, then the potential threat to human health or the environment must be assessed. Factors contributing to this assessment include, but are not limited to:

- Proximity of downgradient groundwater users.
- Distance to environmentally sensitive surface waters or wetlands.
- Evidence of environmental damage, including stressed vegetation, abnormal algal growth, and abnormally high number of fish deaths.
- Deterioration of surface or groundwater quality.

This Long Term Seep Evaluation Report is a contingency response, as set forth by the SMP.

2.0 LANDFILL ENVIRONMENTAL MONITORING PROGRAM

The Landfill and surroundings have been extensively investigated. There are a total of thirty three (33) monitoring wells, which have been monitored regularly since 1990 based on the Long Term Post-Closure Monitoring Program. The NYSDEC approved Closure Plan as modified by the December 23, 2003 post-closure monitoring variance request established the monitoring well network (twenty one (21) monitoring wells and three (3) piezometers), four (4) surface water monitoring locations, and two (2) leachate manhole collections for the Landfill. This Variance Request, approved by the NYSDEC in December 2002, reduced the frequency of monitoring at the landfill to every fifth quarter for 6 NYCRR Part 360 Baseline Parameters.

The data collected from these wells and other monitoring points provide the foundation for the conceptual model and understanding of the Landfill's relationship to the underlying groundwater systems and adjacent surface water bodies. Environmental monitoring data generated over the last two (2) decades provide a clear understanding of the Landfill's impact upon groundwater quality. The data shows that Landfill related chemistry, such as ammonia, TDS, phenolics, arsenic, iron, etc., are stable with little fluctuation in reported parameter concentrations. Further, the reported horizontal and vertical distribution of the Landfill constituents in groundwater have remained consistent over time.

Based on this understanding, Orange County recommended a modification to the long term monitoring program on December 13, 2013 as considerable data had been generated for decades and the environmental conditions at the site are well understood. In recognition of this, the modified long term monitoring program was approved by the NYSDEC in 2014.

As set forth in the approved SMP, dated June 6, 2014, the approved post-closure environmental monitoring program at the Landfill consists of the collection and analysis of groundwater, surface water and leachate samples and the performance of explosive gas monitoring. Post-closure monitoring has been conducted since 1998. In addition, the monitoring program includes inspections of the Landfill to observe general conditions, oversee and inspect operation and maintenance activities, and to handle non-routine site issues, such as damage to the Landfill cover system.

Groundwater, surface water and leachate monitoring currently consists of annual sampling of seven (7) groundwater monitoring wells, three (3) surface water locations, and two (2) leachate manholes for 6 NYCRR Part 360-2.11 (effective date December 31, 1988) Baseline Parameters. The monitoring wells consist of an upgradient well pair (two hydrogeologic units: overburden sand and gravel and upper bedrock) and five downgradient monitoring wells located south of the Landfill and north of the Cheechunk Canal. Three (3) surface water sample locations are collected from the Cheechunk Canal south of the Landfill. Leachate samples are collected from two (2) manholes along the perimeter of the Landfill. In addition, groundwater elevations from twenty-eight (28) monitoring wells are recorded during each monitoring event. Figure 3 shows the post-closure monitoring locations.

In addition, the Institutional and Engineering Control (IC/EC) Plan also outlines steps necessary to manage and implement the controls for the Landfill property and to evaluate such controls for annual certification consistent with the requirements of the ROD, dated March 1998, and NYSDEC DER-10.

The ECs for the Landfill to control the source of contamination and the generation of contaminated leachate include:

- Maintenance of the Landfill cover system that includes layers of fill material, gas venting system and an impermeable membrane.

- Maintenance of groundwater monitoring wells. The groundwater monitoring wells are regularly sampled to observe groundwater quality at the Landfill. The groundwater monitoring wells are located upgradient, downgradient, and cross-gradient of the Landfill. The monitoring wells range between 10 and 88 feet deep and are installed in sand and gravel or bedrock (see Figure 3 for locations).

- Operation and maintenance of ongoing leachate collection of leachate for offsite treatment. Leachate collected by the perimeter trench system flows by gravity to sumps. From these manhole sumps, leachate is pumped into aboveground storage tanks (ASTs) for subsequent removal and transportation to an offsite permitted wastewater treatment plant.

- Maintenance of surface water drainage swales and erosion control features to collect and divert surface water runoff downgradient of sections of the impermeable membrane installed on the Landfill slopes. Terraces and downchutes have been established on both the Landfill footprint and the immediate land surrounding the Landfill for the prevention of standing water on the Landfill footprint and any damage to the Landfill cover system. These surface water features divert excess surface waters away from the Landfill wastemass.

- Site inspections of the final cover system, including inspections for leachate outbreaks, settlement, erosion and insufficient vegetation continue to be completed monthly by Orange County personnel.

2.1 General Landfill Seep Characteristics

The phenomena of groundwater seeps at old, unlined municipal waste landfills have been studied and much has been learned regarding the fate and transport of principal landfill parameters of concern, namely iron, manganese, arsenic and ammonia. Research by the NYSDEC staff is at the forefront of the understanding of unlined landfills and their impact on the environment.

It is important to appreciate that red-stained groundwater seeps are commonplace in Orange County. Dissolved iron in groundwater rapidly forms an iron oxide precipitate when groundwater daylights. Iron seeps are common at landfill sites throughout New York due to the release of iron from waste decomposition and the reducing environment of the groundwater impacted by landfill releases. Further, the reducing environment present at most landfills can cause naturally occurring iron and other metals, such as arsenic, to be dissolved from the soils underlying old landfills.

Readers of this landfill Seep Mitigation Plan are strongly encouraged to review the various studies and research into how unlined landfills behave and the typical makeup of groundwater influenced by unlined landfills.[1,2]

One published study of environmental monitoring data from 42 unlined landfills in New York provides a statistical analysis of groundwater impacts by typical landfill indicator constituents.[3]

At the most affected seep adjacent to the Orange County Landfill, the concentrations of key indicator parameters are as follows:

Parameter of Interest	Reported Range
Ammonia	6.3 - 40 mg/L
Arsenic	0.048 - 0.12 mg/L
Iron	3.2 - 13 mg/L
Manganese	0.28 - 1.8 mg/L

For these same parameters, the evaluation of 42 unlined landfills in New York State indicates the following:

Parameter of Interest	Reported Range
Ammonia	ND - 200 mg/L
Arsenic	ND – 15.5 mg/L
Iron	ND - 1,330 mg/L
Manganese	ND - 81 mg/L

Clearly, in comparison with the 42 unlined landfills subject to the study, the Orange County Landfill seeps show an impact within the range typically encountered and well below the maximum range experienced within the State.

Further, the seep data shows no presence of volatile organic compounds (VOCs), petroleum constituents or heavy metals that can be present in landfill leachates. The exceedances experienced at the seep represent minor exceedances of the NYSDEC promulgated drinking water standards.

[1] "An Assessment of Groundwater Quality Monitoring Data Collected at Unlined Municipal Solid Waste Landfills." Presented by Steven Parisio of NYSDEC Region 3, Bolton Landing, NY. May 8, 2007.

[2] "Historic Fill & Old Landfills: Tools for Delineation.", Presented by Steven Parisio of NYSDEC Region 3, May 20, 2014.

[3] "Ambient and Landfill-impacted Groundwater Quality In The Hudson Valley of Southeastern New York State" Presented by Steven Parisio of the NYSDEC Region 3 and et al, The Berkeley Electron Press, 2009.

3.0 SEEP INVESTIGATION AND RESPONSE

3.1 Initial Response

A joint inspection of the Canal was conducted on August 22, 2012 with NYSDEC, Orange County, and STERLING. The inspection included canoeing the entire stretch of Canal along the Landfill site. The on water inspection included Mr. Steven Parisio and Mr. Carl Hoffman representing the NYSDEC. Based on observed conditions several seeps were selected for sampling. It was noted that discolored seeps were also present on the opposite side of the Canal from the Landfill, at locations on both sides of the Canal and locations removed from the Landfill. The entire stretch of the Canal along Orange County's property has been extensively disturbed in the past by dredging of the Canal. Excavated material has been sidecast and has not been graded. As a result, the canal banks are poorly drained and in some areas precipitation runoff is trapped upslope contributing to the existence of the observed seeps.

Results from the August 22, 2012 and August 21, 2013 inspections and sampling are provided in Appendices B and E.

3.2 Leachate Collection System Investigation

On April 11, 2013 and August 19, 2013, attempts were made to inspect the perimeter leachate collection system immediately upgradient from the groundwater seeps. Self-propelled robotic camera units were unable to fully access the leachate collection pipe at the connection to the manhole.

Subsequently, push-style video cameras were manually advanced into the leachate collection pipe as far as possible (approximately 140 feet in April 2013, and approximately 175 feet in August 2013). Overall, the perforated leachate collection pipe that was able to be inspected appeared to be in good condition, with no apparent blockages. In August 2013, a jet-vac hose (with no camera) was successfully advanced approximately 190 feet.

Based upon the information obtained and the design of the collection system, the perimeter leachate collection system was determined to be functioning as the installed leachate collection pipe is surrounded by permeable stone. Accordingly, leachate and groundwater is collected and conveyed through the system to the leachate manhole even if the perforated pipe were damaged or blocked. As a result, further efforts to conduct internal video inspection were suspended.

3.3 Overburden Piezometers

On February 19 and 20, 2014, six (6) temporary shallow overburden piezometers (PZ-14-1 through PZ-14-6) were installed in accordance with a Work Plan approved by the NYSDEC between the Landfill's perimeter access road and the Cheechunk Canal bank to better understand the subsurface hydrology between the limit of waste and the seeps (Figure 2). The Cheechunk Canal/Seep Evaluation Letter Report was submitted to the NYSDEC on April 4, 2014 (Appendix G).

Following installation, synoptic rounds of groundwater elevation measurements were collected between February 20 and October 6, 2014 to gain a complete understanding of the local hydrostratigraphy, define groundwater flow direction and gradients, and build a conceptual profile between the Landfill and the Cheechunk Canal.

In addition, field hydraulic conductivity testing was performed on two (2) of the temporary overburden piezometers (PZ-14-3 and PZ-14-5) to characterize the horizontal hydraulic conductivity of the aquifer, and a short-term two (2) hour constant rate pumping test was performed at temporary piezometer PZ-14-3 to further define aquifer characteristics, such as yield and transmissivity (Appendix G).

Groundwater in each temporary piezometer between the Landfill and the seeps were also sampled for 6 NYCRR Part 360 field parameters (specific conductivity, temperature, pH, and Eh) in October 2014. Due to weather conditions, the subject seep area could not be evaluated as the Canal water level was higher than the seep elevation.

3.3.1 Installation

The temporary overburden piezometers were installed using a track-mounted Geoprobe® to a depth sufficient to encounter the upper overburden aquifer (glaciolacustrine fine sand), which underlies the Cheechunk Canal (Figures 2 and 5A). At each location, soil samples were collected on a continuous basis from ground surface to termination depth using the Macro-core® MC5 soil sampler. Each borehole was logged to define the local model of the critical site stratigraphy as it relates to the Landfill and the Cheechunk Canal (Appendix G).

Upon completion of sampling, each borehole was either converted into a 1¼-inch (PZ-14-1, PZ-14-2, PZ-14-4, and PZ-14-6) or a 2-inch inside diameter (I.D.) temporary piezometer (PZ-14-3 and PZ-14-5) with a five (5) foot long section of 0.01-inch (10 slot) machine slotted PVC well screen. As detailed in Table 1, the total depths ranged from 28.91 feet below ground surface (bgs) at PZ-14-4 to 39.5 feet bgs at PZ-14-1. The screened intervals were set in the uppermost portion of the overburden hydrogeologic unit (glaciolacustrine fine sand) to obtain basic aquifer data (groundwater flow direction, gradients, horizontal hydraulic conductivity, aquifer transmissivity, and aquifer yield) and define the hydrogeologic relationship between the Landfill and the seeps identified on the northern bank of the Cheechunk Canal.

The elevation for the top of the piezometer casings (measuring points) were measured with an engineer's level from the measuring point of nearby monitoring well MW-3B to allow for direct comparison of groundwater level measurements routinely collected at the Landfill. The apparent elevations of the Canal bank seeps downgradient from the piezometers, as well as the water level of the Canal, were also determined in the same manner. It should be noted that the slope in this portion of the site ranged from 24% to 28%.

3.3.2 Site Stratigraphy

The field investigation, performed between February and March 2014, was used to define the local geologic conditions, hydrogeologic setting, and environmental parameters as well as serve as the core of understanding to remediate the subject seeps. The critical site stratigraphy between the Landfill and the canal has been defined as follows:

Glaciolacustrine Silt and Clay: Moist grayish brown clayey silt to silty clay; stiff to moderately stiff; occasionally to frequently varved; lowly permeable; and, moderately plastic. As presented in Table 1, this unit was encountered at surface to depths ranging from 24.4 to 34.1 feet bgs, which is consistent with historical data collected near this portion of the Landfill and the Cheechunk Canal. Stearns & Wheler reported that this silt and clay layer thins toward the northeast from approximately 60 feet to 20 feet. The base of the glaciolacustrine silt and clay unit is approximately three (3) to five (5) feet above the subject seep(s).

Glaciolacustrine Sand: Wet fine sand; medium dense; moderately permeable; and, laminated. The top of this water-bearing unit is between 355.52 (PZ-14-1) and 357.43 (PZ-14-3) and feet in elevation and slightly tilts to the north away from the Cheechunk Canal (Table 1 and Figure 4). Again, this field data is consistent with historic geoenvironmental data collected from historical investigations/remedial investigation which reports this unit as being 25 to 35 feet in thickness. The base of the glaciolacustrine sand unit was not encountered during the course of this investigation.

Glacial Till: Basal lodgement till is a dense, unstratified diamict of poorly sorted sediment emplaced on bedrock by the base of the glacier during ice advance. It often has large erratics oriented in the direction of the ice movement. The glacial till unit, which was not encountered during this investigation, is lowly permeable and is not considered a water bearing zone.

3.3.3 Aquifer Characterization

The local hydrogeology was interpreted using historic well logs, slug tests, groundwater elevation data, geologic cross sections, and publications. The hydrogeologic setting was further refined from information obtained from the recent drilling, surveying, overburden groundwater measurements, hydraulic conductivity testing, and the short-term pumping test.

Complex vertical and horizontal stratigraphic relationships exist between the glacial deposits on the site. As shown in Figure 4, the Cheechunk Canal dissects the glacially-derived overburden often cutting down through the glaciolacustrine silt and clay deposits, creating a hydraulic connection between the overburden groundwater unit (glaciolacustrine fine sand) and the Cheechunk Canal (Wallkill River). In general, the low hydraulic conductivity of the glaciolacustrine silt and clay, which underlies a large portion of the Landfill, limits recharge to underlying hydrogeologic units such as the glaciolacustrine fine sand (encountered). The glaciolacustrine silt and clay unit is not a water-bearing zone.

Hydraulic conductivity estimates in the overburden hydrogeologic unit (glaciolacustrine fine sand) were determined using slug tests. The data obtained were analyzed using the Bouwer and Rice method (1989). This method consists of quickly lowering or raising water levels in a well and measuring its rate of recovery. Although originally designed for use in unconfined aquifers, the authors (Bouwer and Rice) determined that most of the head difference "y" between the static water table and water level in the piezometer is dissipated in the vicinity of the piezometer around the screen and slotted section, the method is also applicable to confined or semi-confined conditions. Hydraulic conductivity of the overburden hydrogeologic unit ranged from 9.29×10^{-6} feet/min (4.72×10^{-6} cm/sec) to 2.35×10^{-5} feet/min (1.19×10^{-5} cm/sec).

Groundwater flow in the overburden hydrogeologic unit was determined using depth to groundwater measurements collected from the temporary overburden piezometers between February 20, 2014 and October 6, 2014 (Table 2 and Figures 5A, 5B, and 5C). This data, in conjunction with historical well log data and plots of changes in groundwater elevation over time, suggest that the glaciolacustrine fine sand unit is currently in semi-confined to confined conditions. Therefore, the directions of groundwater flow are based on the potentiometric surface of the glaciolacustrine fine sand, not strictly elevations of the water table surface.

Groundwater flow in the overburden west or north of the Canal is to the east-southeast (Figures 5A, 5B, and 5C), discharging to the Canal that acts as a discharge zone and a groundwater flow boundary separating flow regimes on either side of the Canal. Overburden piezometers PZ-14-2, PZ-14-3, and PZ-14-4 are located immediately upgradient of the subject seep(s); the water level at the subject seep is variable but is approximately nine (9) to eleven (11) feet below the potentiometric surface observed at the lowermost piezometers (PZ-14-2, PZ-14-3 and PZ-14-4). The actual location of the piezometer array was successful at locating the groundwater that is likely causing the subject seeps (Figure 6). There is little potential for contamination to flow between the Canal and to areas east or south of the Canal based on previous investigations conducted at the Landfill. The direction of groundwater movement can be understood in the fact that groundwater always flows in the direction of decreasing head. The rate of movement, on the other hand, is dependent on the hydraulic gradient, which is the change in head per unit distance. The change in head measurement is ideally in the direction where the maximum difference of head decrease occurs. The hydraulic gradient (the change in head divided by the change in distance) on the Orange County property is seasonally variable and ranged from 0.0077 ft./ft. to 0.0133 ft./ft. based on data collected in late winter (March 18, 2014, Figure 5A) and was significantly greater in early September 2014, ranging from 0.0398 ft./ft. to 0.0557 ft./ft. when the subject seep(s) were evident (September 9, 2014, Figure 5B). The moderately steep-sloped lands between the Orange County property line and the Cheechunk Canal exhibits a consistently steeper hydraulic gradient and is less seasonally variable and is best represented by the data collected in early October 2014, ranging from 0.1216 ft./ft. to 0.0.1538 ft./ft. (October 6, 2014, Figure 5C).

An aquifer overlain by a bed of material that has a significantly lower hydraulic conductivity is termed as confined. As was observed during the field investigation, the potentiometric surface of the confined aquifer was 3.5 to 8.5 feet above the base of the overlying confining layer (Tables 1 and 2 and Figure 4). The least seasonal variability was observed in the three (3) uppermost overburden piezometers (PZ-14-1, PZ-14-5, and PZ-14-6). Water levels in confined aquifers are typically slow to respond to storm events or droughts and therefore typically exhibit minor fluctuations. A semi-confined or "leaky" confined aquifer is characterized by a low permeability layer (i.e., glaciolacustrine silt and clay) that permits water to slowly flow through it. Groundwater in these aquifers respond more quickly to changes in precipitation.

Review of site groundwater measurement data, collected between February and October 2014, indicates that the upper portion of the site is in confined conditions while the lowermost plateau, where seeps have been reported, is likely under unconfined conditions (Figures 4 and 6). The similarity between the potentiometric surface elevation and the subject seep(s) elevation suggests that there is seasonal hydraulic connection between the Cheechunk Canal and site groundwater. If groundwater was totally confined, no hydraulic connection would exist between the Canal and local overburden groundwater. The semi-confinement can be the result of leakage through the saturated overlying low permeability layer (glaciolacustrine silt and clay) or through fractures/varved planes in the silt and clay.

Seepage velocities were also calculated in this overburden hydrogeologic unit using the following equation:

$$V = \frac{KI}{n}$$

Where "V" is the seepage velocity in distance per unit time; "K" is the hydraulic conductivity at the borehole (in distance per unit time); "I" is the hydraulic gradient (dimensionless); and, "n" is the estimated effective porosity. The lowest possible values for "n" were used to estimate highest seepage velocities. Seepage velocities for the overburden hydrogeologic unit (glaciolacustrine fine sand) in the vicinity of the seeps range from 2.57×10^{-4} feet/day (0.094 feet/year) to 1.2×10^{-3} feet/day (0.438 feet/year). In comparison, seepage velocities calculated for the glaciofluvial deposit found elsewhere at the site range from 3.40×10^{-4} feet/day (0.12 feet/year) to 1.45×10^{-1} feet/day (52.93 feet/year) (Stearns & Wheler, 1995 RI). The seepage velocity for the majority of the sand wells was on the lower end of the range reported in the RI. For example, well PZ-4 (located approximately 1,000 feet to the west-southwest of the seep area) exhibited a seepage velocity of 0.0522 feet/day (19.05 feet/year) and is likely more representative of seepage velocity in the vicinity of the seeps.

On March 18, 2014, a two (2) hour constant flow rate pumping test was conducted on PZ-14-3 (Figure 6). Initial pumping at 2 gallons per minute (gpm) resulted in complete drawdown at piezometer PZ-14-3; the pumping rate was reduced to provide further evaluation of the overburden aquifer characteristics. Pump flow rate (0.38 to 0.4 gpm) and overburden piezometer water levels were monitored every 15 minutes throughout the two (2) hour test. A drawdown of 7.8 feet was observed during the pumping period, dropping 7.33 feet in the first five (5) minutes and steadily dropped 0.46 foot over the remainder of the pumping test period (Appendix G). Based on this information, the specific capacity was calculated as being 0.05 gpm/ft with a transmissivity of 75 ft^2/day. The adjacent piezometers were lowered by 0.19 foot (PZ-14-6) to 0.29 foot (PZ-14-2), demonstrating good connection to the localized low rate pumping activity (Appendix G).

3.3.4 Sampling

Results from the August 22, 2012 and August 21, 2013 inspections and sampling are provided in Appendices B and E, respectively.

Following the inspection, the County provided a Work Plan to conduct a subsurface investigation downgradient of the Landfill and immediately upslope of the observed seep closest to the Landfill. The Work Plan was approved by NYSDEC on December 31, 2013. The investigation proceeded on February 19 and 20, 2014 consisted of installing six (6) piezometers to define the groundwater elevations and to allow for sample collection. Results of the NYSDEC approved investigation were provided to the NYSDEC by letter dated April 4, 2014.

Synoptic rounds of water levels from overburden piezometers and Cheechunk Canal have been collected since February 20, 2014 (Table 2). Recent inspections conducted by STERLING on August 21, 2014, September 4, 2014, September 9, 2014, and October 6, 2014 identified five (5) seeps; no flowing seeps were observed.

Additional seep and surface water sampling was performed on June 12, 2014 and October 6 - 8, 2014 (Figure 7). The June 12, 2014 sampling event consisted of the collection of five (5) seep samples (Upstream: GW-B and GW-1; at seep area (GW-2); and, Downstream: (GW-3)) and two surface water samples (Upstream: SW-01 and Downstream: SW-02). These samples were analyzed for NYSDEC Baseline parameters and results are provided on Appendix I, Figures 6 and 8, and Tables 5 and 6. The October 6, 2014 sampling event consisted of the collection of two overburden groundwater samples, collected from PZ-14-3 and PZ-14-5, one seep sample (Seep Monitoring Point) in the vicinity of the most persistent seep, and three (3) surface water samples (Upstream: SW-5; slightly downstream of the seep area (SW-Seep-DS; and, Downstream: (SW-8)). These samples were analyzed for NYSDEC Baseline parameters and results are provided in Appendix I, Figures 6 and 8, and Tables 4, 5, and 6. Sampling results for field parameters, overburden groundwater, seeps, and surface water are summarized below.

Field Parameters

On March 27, 2014 and October 6, 2014, overburden groundwater in each temporary overburden piezometer, between the Landfill and the seeps, were sampled for 6 NYCRR Part 360 field parameters, including specific conductivity, temperature, pH, and Eh (Table 3). Due to weather conditions, the subject seep area could not be evaluated in February and March 2014 as it was covered with ice or submerged during this period.

As detailed in Appendix G, the specific conductance from overburden groundwater ranged from 0.607 millisiemens per centimeter (mS/cm) at PZ-14-4 to 1.230 mS/cm at PZ-14-5. The specific conductance of the water sample is the measure of its ability to carry an electrical current under specific conditions and is typically an indication of the concentration of TDS in the groundwater. A specific conductance value that is markedly different from those obtained in nearby piezometers may indicate a different source of the groundwater or leakage from a formation that contains water of a different quality. Specific conductance values from 2012 and 2014 seep sampling ranged from 0.695 mS/cm at Seep GW-03 on August 22, 2012 to 1.339 mS/cm at GW-D on August 21, 2013 (Tables 4, 5, and 6).

As detailed in Table 3 of Appendix G, the redox potential in the overburden aquifer is sensitive to organic matter associated with landfill leachate and of concentrations of redox-active components such as the mineralization of the groundwater. Oxidizing-reducing reactions result in a change of the charge of an ion as it gains or loses an electron. These reactions are almost always facilitated by bacteria that are able to gain energy from the reactions. The most common cause of reducing reactions is organic matter, either in solid form or as dissolved organic carbon. Water in contact with air will have an Eh in the range of 350 milliVolts (mV) to 500mV. Microbially mediated redox processes may decrease the redox potential to values as low as -300mV. The redox potential from overburden groundwater ranged from -90.2 mV at PZ-14-1 to 214.8 mV at PZ-14-5. Oxidation-Reduction Potential (ORP) values from 2012 and 2014 seep sampling ranged from -90.6 mV at Seep GW-01 on August 22, 2012 to 31 mV at GW-3 on June 12, 2014 (Table 5). The redox potential at PZ-14-5 is considered the most irregular.

At any given temperature, there is a specific concentration of a dissolved mineral's constituents in the groundwater that is in contact with that mineral. Even minor changes in groundwater temperature can cause detectable changes in TDS. It should be noted that the temperature of the upper piezometers (PZ-14-1, PZ-14-5, and PZ-14-6) were consistently higher than the lower piezometers (PZ-14-2, PZ-14-3, and PZ-14-4). The temperature at PZ-14-5 is notably higher than others collected on March 27, 2014 and October 6, 2014.

The pH is actually a measure of the hydrogen ion (H+) availability (activity). The hydrogen ion is very small and is able to enter and disrupt mineral structures so that they can contribute dissolved constituents to groundwater. Consequently, the greater the hydrogen ion availability the lower the pH and the higher the TDS in groundwater. The pH readings collected from overburden groundwater ranged from 7.00 standard units (s.u.) at PZ-14-1 to 7.75 s.u. at PZ-14-2. In comparison, 2012 and 2014 seep sampling reported pH readings that ranged from 6.77 s.u. (Seep GW-3) on June 12, 2014 to 7.15 s.u. (GW-D) on August 21, 2013. No direct conclusions can be made based on comparison of pH readings obtained from the piezometers.

Two (2) one (1) liter samples were collected for comparison of water quality field parameters at the start and end of the short-term pumping test, which was performed at PZ-14-3. No significant changes or fluctuations were observed in the field parameters.

Field parameter and leachate indicator analytical results for 2013 from nearby environmental monitoring points (four (4) overburden groundwater monitoring wells (MW-3B, PZ-4, MW-220, MW-222), two (2) surface water locations (SW-5 and SW-8), and one (1) leachate location (MH-7)) were reviewed to further evaluate the potential presence of leachate impacted groundwater. Only total dissolved solids (TDS) exceeded the class GA standard (500 mg/L) at these select monitoring wells, ranging from 730 mg/L (MW-3B) to 860 mg/L (MW-222). Ammonia was only detected above the NYSDEC GA standard (2 mg/L) at monitoring wells MW-3B (4.4 mg/L) and MW-222 (12 mg/L). In comparison, 2013 results for TDS and ammonia from nearby leachate (MH-7) was 3,900 mg/L and 560 mg/L, respectively.

Overburden Groundwater

As shown in Figure 8 and Table 4, groundwater from overburden piezometers PZ-14-3 and PZ-14-5 showed no presence of volatile organic compounds (VOCs) and exceedances of select leachate indicator parameters such as ammonia (ranging from 5.3 to 9.1 mg/L), total cyanide (0.23 mg/L) and phenolics (0.026 mg/L) at PZ-14-5, TDS (680 to 780 mg/L), and turbidity (240 to 450 mg/L). The higher levels of ammonia and TDS at PZ-14-5 correlate to the analysis of field parameter results summarized above.

Inorganic analytes that slightly exceeded NYSDEC groundwater standards include arsenic (0.057 - 0.094 mg/L), iron (4.8 - 18 mg/L), magnesium (54 - 56 mg/L), manganese (1.0 - 2.0 mg/L), and sodium (60 - 87 mg/L).

Seeps

Review of historical and recent seep analytical results (water quality parameters) for upstream seep sample locations (GW-B and GW-01 or GW-1), seep samples in the vicinity of the piezometer array (GW-03, GW-D, GW-2 and Seep Monitoring Point (10/6/2014), and downstream seep samples (GW-3 and GW-A) are provided in Figure 8 and Table 5. Results showed no presence of VOCs, petroleum constituents or heavy metals frequently observed in landfill leachates. Further, as the seeps ultimately discharge into the Cheechunk Canal, a Class C surface water, the promulgated surface water standards are exceeded for ammonia, TDS, iron, occasionally dissolved oxygen. Several slight exceedance of phenols have also been observed.

Surface Water

Review of historical surface water analytical results (water quality parameters) for upstream surface water sample locations (SW-13, SW-5, and SW-01), nearby surface water samples (SW-Seep DS), and downstream surface water samples (SW-02 and SW-8) revealed no exceedances of T.O.G.S. 1.1.1 Ambient Water Quality Standards for Class C Surface Water Quality standards, except for iron (ranging from 0.22 mg/L to 9.17 mg/L (Figure 8 and Table 6), three isolated historical field pH exceedances (ranging from 9.02 to 9.33 s.u. upstream of the site (SW-05) and 8.81 s.u. at the downstreammost location (SW-8)), and one phenol exceedance (0.0072 mg/L) at SW-5 in 2000 and at SW-8 (0.0115 mg/L) in September 2002 (Figure 8 and Table 6).

3.4 Investigation Findings and Results

The piezometer installations confirm a lowly permeable glaciolacustrine silt and clay unit exists at surface to depths ranging from 24.4 to 34.1 feet bgs. The base of this geologic unit tilts to the north away from the Cheechunk Canal. Underlying the silt and clay unit is moderately permeable glaciolacustrine fine sand, which is typically 25 to 35 feet in thickness.

The overlying glaciolacustrine silt and clay unit is not a water-bearing zone and limits recharge to underlying hydrogeologic units while the overburden hydrogeologic unit discharges into and is hydraulically connected to the Cheechunk Canal. Groundwater in the glaciolacustrine fine sand unit reveals semi-confined conditions with groundwater flow being to the east-southeast with a moderate hydraulic gradient between the Landfill and the canal. Two (2) hours of constant rate pumping (0.38 to 0.4 gpm) at PZ-14-3 revealed the following: 1). A drawdown of 7.8 feet at the wellhead; 2). Lowering of the potentiometric surface between 0.19 foot (PZ-14-6) to 0.29 foot (PZ-14-2) within the piezometer array, demonstrating a good connection within the overburden hydrogeologic unit and the Cheechunk Canal (at low pumping rates); 3). The specific capacity and transmissivity values are low for the overburden hydrogeologic unit between the Landfill and the Canal; and, 4). The actual location of the piezometer array was successful at locating the groundwater that is connected to the subject seep(s).

Results from leachate, upgradient monitoring wells (MW-230S and MW-230D), downgradient monitoring wells (PZ-4, MW-3B, MW-220, MW-245S and MW-245D), seeps (2012 through 2014), and the downstream surface water sampling location (SW-8) indicate a completely different geochemical profile compared to the leachate results, as depicted below:

Parameter	Leachate	Upgradient GW	Downgradient GW	Seep	Downstream SW
Ammonia	31 to 560	0.079 to **3.9***	non-detect to 9.0	6.3 to 40	non-detect to 0.221
TDS	800 to 4,000	162 to **1,500***	590 to 820	660 to 830	190 to 428
Phenolics	non-detect to 0.024	non-detect	non-detect to 0.0087	non-detect to 0.0054 J	non-detect to 0.0115
Arsenic	0.0094 to 0.26	non-detect to 0.0093	non-detect to **0.15*****	0.029 to 0.12	non-detect to 0.014
Iron	13 to 1,100	0.5 to **1.7****	1.0 to 6.3	3.2 to 13	0.34 to 3.13
Manganese	0.52 to 6.9	0.13 to **0.58****	0.34**** to 1.9	0.28 to 1.8	0.052 to 0.28

Source: Cornerstone, 2013 and Sterling, 2012/2013/2014.

All results are expressed in mg/L.
***Bolded** results exceed applicable standard.*
**Upper end value collected from upgradient bedrock groundwater sample MW-231D (October 2014) as it was sampled in replacement of MW-230D, which was inaccessible during the October 2014 event. Ammonia reported in the blank and the sample (MW-231D).*
*** Upper end value collected from upgradient overburden groundwater sample MW-230S (October 2014). Iron reported in the blank and the sample (MW-230S).*
****Upper end value collected from downgradient overburden groundwater sample MW-245S (October 2014).*
*****Lower end value collected from downgradient bedrock groundwater sample MW-245D (October 2014). Manganese reported in the blank and the sample (MW-245D).*

Groundwater movement is from the Landfill site toward the Cheechunk Canal. Based on the hydrogeologic characteristics of the water bearing units in the vicinity of the seep, the flow rate of groundwater was calculated. Changing head caused by fluctuations in the surface water level in the Canal can affect the rate of groundwater flow to the Canal on a short term basis; however, an average net flux of groundwater to the Canal can be calculated, assuming the level of the Canal most often is at a base flow rate. As described in Section 3.3.3, the seepage velocity of groundwater in the vicinity of the seeps ranges from 2.57×10^{-4} feet/day (0.094 feet/year) to 1.2×10^{-3} feet/day (0.438 feet/year). The calculated average net flux (i.e. discharge) of groundwater to the Canal ranges from 153 to 717 gallons per day, using these velocity values and a cross sectional area of 80,000 square feet. The range of the average daily mass loading of ammonia to the Canal is calculated as 23 to 108 grams per day, based on a maximum concentration of 40 mg/l (ppm) measured in seep sample GW-01, and using the calculated mass flux values above. This loading is considered a conservatively high value and actual mass loading likely is less.

Ammonia is extremely water soluble and rapidly breaks down in the environment in a matter of several days. Research of the water quality and sediment sampling of the Wallkill River inclusive of the Cheechunk Canal do not report the presence of ammonia at concentrations in excess of any applicable standards.

4.0 CONCLUSION

Seeps downgradient of the Landfill on the northwestern banks of the Cheechunk Canal show concentrations of iron and ammonia at levels above the background concentration. These seeps are discharge points for groundwater impacted with Landfill derived constituents. The mass of ammonia reaching the Canal from the Landfill is very small. To the extent ammonia does reach the Canal, it readily dissipates under the natural conditions. Ammonia has a reported half-life of several days depending upon the temperature and pH of the water. The solubility of iron is significantly reduced in the presence of oxygen. Iron discharges from visible iron precipitate (or iron floc).

Water quality monitoring of the Canal do not indicate any exceedance of iron or ammonia. However, the seeps represent no threat to human health or the environment as the concentrations of both iron and ammonia in the Canal are below standard. The seeps represent an uncontrolled, unpermitted release to the environment.

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TABLES

Table 1

Summary of Site Stratigraphy
Orange County Landfill, Goshen, New York

Piezometer I.D.	Measuring Point (MP) Elevation (Site Datum)	Piezometer Stickup (feet)	Ground Surface Elevation (Site Datum)	Glaciolacustrine Silt and Clay/Glaciolacustrine Fine Sand Interface (feet BGS)/[Geologic Contact Elevation]	Screened Interval (feet BGS) / [Screened Elevation]	Total Depth (Feet BGS) / [Bottom Elevation]
PZ-14-1	390.27	0.65	389.62	34.1 / [355.52]	34.5-39.5 / [355.12 - 350.12]	39.50 / [350.12]
PZ-14-2	381.94	0.80	381.14	24.6 / [356.54]	24.5-29.5 / [356.64 - 351.64]	30.26 / [350.88]
PZ-14-3	381.83	0.35	381.48	24.4 / [357.43]	24.92 -29.92 / [356.56 - 351.56]	29.92 / [351.56]
PZ-14-4	381.77	1.35	380.42	23.9 / [356.52]	23.91-28.91 / [356.51 - 351.51]	28.91 / [351.51]
PZ-14-5	392.22	2.17	390.05	33.5/ [356.55]	32.9-37.9 / [357.15 - 352.15]	37.86 / [352.19]
PZ-14-6	391.11	0.88	390.23	33.85 / [356.38]	34.2-39.2 / [356.03 - 351.03]	39.20 / [351.03]

Table 2

Summary of Surveyed Elevations and Select Water Level Measurements
Orange County Landfill, Goshen, New York

Piezometer I.D.	Northing	Easting	Ground Surface Elevation (Site Datum)	Measuring Point (MP) Elevation (Site Datum)	February 20, 2014 Depth to Groundwater (feet BMP {Top of PVC}) / [Groundwater Elevation]	March 18, 2014 Depth to Groundwater (feet BMP {Top of PVC}) / [Groundwater Elevation]	September 9, 2014 Depth to Groundwater (feet BMP {Top of PVC}) / [Groundwater Elevation]	October 6, 2014 Depth to Groundwater (feet BMP {Top of PVC}) / [Groundwater Elevation]
PZ-14-1	N 41° 23' 19.50"	W 74° 24' 4.85"	389.62	390.27	27.69 / [362.58]	26.29 / [363.98]	28.67 / [361.60]	29.06 / [361.21]
PZ-14-2	N 41° 23' 19.21"	W 74° 24' 4.60"	381.14	381.94	20.21 / [361.73]	18.24 / [363.70]	21.24 / [360.70]	21.53 / [360.41]
PZ-14-3	N 41° 23' 19.39"	W 74° 24' 4.22"	381.48	381.83	20.10 / [361.73]	18.30 / [363.53]	21.09 / [360.74]	21.39 / [360.44]
PZ-14-4	N 41° 23' 19.54"	W 74° 24' 3.79"	380.42	381.77	19.88 / [361.89]	18.23 / [363.54]	20.92 / [360.85]	21.23 / [360.54]
PZ-14-5	N 41° 23' 19.70"	W 74° 24' 4.45"	390.05	392.22	29.58 / [362.64]	28.32 / [363.90]	29.53 / [362.69]	30.94 / [361.28]
PZ-14-6	N 41° 23' 19.88"	W 74° 24' 4.06"	390.23	391.11	28.61 / [362.50]	27.27 / [363.41]	29.32 / [361.79]	29.74 / [361.37]
SG-1	N 41° 23' 18.66"	W 74° 24' 4.11"	---	357.49				
SG-2	N 41° 23' 18.54"	W 74° 24' 4.04"	---	354.99			4.28 / [350.71]	4.72 / [350.27]

Notes:
Northing and Easting coordinates are in New York State Plane.

TABLE 3

Summary of Field Parameter Measurements (October 6, 2014)
Orange County Landfill, Goshen, New York

Parameter	Title 6 Part 703.5 Standards	Units	Groundwater Locations						Seep Location	Surface Water Locations				Leachate
			PZ-14-1[3]	PZ-14-2[3]	PZ-14-3	PZ-14-4[3]	PZ-14-5	PZ-14-6[3]	Seep Monitoring Point	SW-13 (Upstream)	SW-5 (Upstream)	SW-Seep DS	SW-8 (Dwonstream)	MH-5
Static Water Level [1]	---	feet	29.06	21.53	21.39	21.23	31.93	29.74	---	---	---	---	---	---
Specific Conductance	---	mS/cm^c	1.094 (1.113)	1.022 (0.698)	1.041 (0.859)	1.014 (0.607)	1.223 (1.230)	1.006 (1.001)	1.246	0.790	0.806	0.787	0.788	1.775
Temperature	---	°C	16.02 (13.56)	15.15 (12.68)	18.00 (12.96)	15.27 (12.36)	19.80 (14.15)	16.07 (13.66)	16.09	15.79	16.00	15.39	15.47	17.11
Turbidity		NTU	899	235	77.6	291	75.0	165	---	---	---	---	---	---
pH	6.5<pH< 8.5	S.U.	7.22 (7.00)	7.31 (7.41)	7.65 (7.03)	7.10 (7.21)	7.75 (7.03)	7.14 (7.12)	6.95	7.46	7.36	7.56	7.61	7.50
ORP	---	mV	-82.7 (-90.2)	-84.5 (3.10)	-40.4 (38.2)	-55.7 (47.5)	17.8 (214.8)	-64.9 (-15.9)	-58.8	516.9	-138.6	490.1	495.8	204.4
Dissolved Oxygen	> 3.0 [2]	mg/L	1.50 (1.76)	1.89 (2.77)	1.69 (1.19)	1.40 (1.44)	0.69 (1.29)	1.80 (1.72)	2.85	5.71	4.51	3.74	4.83	0.79

NOTES :
[1] Measured from the top of the PVC casing to water surface.
[2] Standard only applies to surface water samples.
[3] Only field measurements were taken at these locations, no sample.
Values in parentheses reflect field parameter measurements collected on March 18, 2014.
Values in **BOLD** indicate an exceedance of applicable water quality standard or guidance value.
--- No standard or not measured.

Table 4

Summary of Analytical Results (October 2014)
Orange County Landfill, Goshen, New York

Analyte and Method	Units	Groundwater Standard and Guidance Values[(A)]	Groundwater Samples		Surface Water Standard and Guidance Values[(B)]	Seep Sample Location		Surface Water Sample Locations				Leachate
			PZ-14-3	PZ-14-5		Seep Monitoring Point	DUP-1	SW-13 (Upstream)	SW-5 (Upstream)	SW-Seep DS	SW-8 (Downstream)	MH-5
Volatile Organic Compounds												
1,1,1-Trichloroethane	µg/L	5.0	0.39 U	0.39 U	---	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	0.39 U	3.9 U
1,1,2,2-Tetrachloroethane	µg/L	5.0	0.26 U	0.26 U	---	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	0.26 U	2.6 U
1,1,2-Trichloroethane	µg/L	1.0	0.48 U	0.48 U	---	0.48 U	0.48 U	0.48 U	0.48 U	0.48 U	0.48 U	4.8 U
1,1-Dichloroethane	µg/L	5.0	0.59 U	0.59 U	---	0.59 U	0.59 U	0.59 U	0.59 U	0.59 U	0.59 U	5.9 U
1,1-Dichloroethene	µg/L	5.0	0.85 U	0.85 U	---	0.85 U	0.85 U	0.85 U	0.85 U	0.85 U	0.85 U	8.5 U
1,2-Dichlorobenzene	µg/L	3.0	0.44 U	0.44 U	5 [(2)]	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	4.4 U
1,2-Dichloroethane	µg/L	0.6[(1)]	0.60 U	0.60 U	---	0.60 U	0.60 U	0.60 U	0.60 U	0.60 U	0.60 U	6.0 U
1,2-Dichloropropane	µg/L	1.0	0.61 U	0.61 U	---	0.61 U	0.61 U	0.61 U	0.61 U	0.61 U	0.61 U	6.1 U
1,3-Dichlorobenzene	µg/L	3.0	0.54 U	0.54 U	5 [(2)]	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	5.4 U
1,4-Dichlorobenzene	µg/L	3.0	0.51 U	0.51 U	5 [(2)]	0.51 U	0.51 U	0.51 U	0.51 U	0.51 U	0.51 U	5.1 U
2-Chloroethyl vinyl ether	µg/L	---	1.9 U	1.9 U	---	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	1.9 U	19 U
Benzene	µg/L	1.0	0.60 U	0.60 U	10	0.60 U	0.60 U	0.60 U	0.60 U	0.60 U	0.60 U	6.0 U
Bromodichloromethane	µg/L	50	0.54 U	0.54 U	---	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	5.4 U
Bromoform	µg/L	50	0.47 U	0.47 U	---	0.47 U	0.47 U	0.47 U	0.47 U	0.47 U	0.47 U	4.7 U
Bromomethane	µg/L	5.0	1.2 U	1.2 U	---	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	12 U
Carbon tetrachloride	µg/L	5.0	0.51 U	0.51 U	---	0.51 U	0.51 U	0.51 U	0.51 U	0.51 U	0.51 U	5.1 U
Chlorobenzene	µg/L	5.0	0.48 U	0.48 U	5	0.48 U	0.48 U	0.48 U	0.48 U	0.48 U	0.48 U	4.8 U
Chloroethane	µg/L	5.0	0.87 U	0.87 U	---	0.87 U	0.87 U	0.87 U	0.87 U	0.87 U	0.87 U	20 J j
Chloroform	µg/L	7.0	0.54 U	0.54 U	---	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	0.54 U	5.4 U
Chloromethane	µg/L	5.0	0.64 U	0.64 U	---	0.64 U	0.64 U	0.64 U	0.64 U	0.64 U	0.64 U	6.4 U
cis-1,2-Dichloroethene	µg/L	5.0	0.57 U	0.57 U	---	0.57 U	0.57 U	0.57 U	0.57 U	0.57 U	0.57 U	5.7 U
cis-1,3-Dichloropropene	µg/L	0.4	0.33 U	0.33 U	---	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	0.33 U	3.3 U
Dibromochloromethane	µg/L	50	0.41 U	0.41 U	---	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	0.41 U	4.1 U
Dichlorodifluoromethane	µg/L	5.0	0.28 U	0.28 U	---	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	0.28 U	2.8 U
Ethylbenzene	µg/L	5.0	0.46 U	0.46 U	17	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U	0.46 U	4.6 U
Methylene Chloride	µg/L	5.0	0.81 U	0.81 U	200	0.81 U	0.81 U	0.81 U	0.81 U	0.81 U	0.81 U	8.1 U
m-Xylene & p-Xylene	µg/L	5.0 [(2)]	1.1 U	1.1 U	65 [(2)]	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	11 U
o-Xylene	µg/L	5.0	0.43 U	0.43 U	65 [(2)]	0.43 U	0.43 U	0.43 U	0.43 U	0.43 U	0.43 U	4.3 U
Tetrachloroethene	µg/L	5.0	0.34 U	0.34 U	1.0	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	0.34 U	3.4 U
Toluene	µg/L	5.0	0.45 U	0.45 U	6,000	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U	4.5 U
trans-1,2-Dichloroethene	µg/L	5.0	0.59 U	0.59 U	---	0.59 U	0.59 U	0.59 U	0.59 U	0.59 U	0.59 U	5.9 U
trans-1,3-Dichloropropene	µg/L	0.4[(1)(2)]	0.44 U	0.44 U	---	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	0.44 U	4.4 U
Trichloroethene	µg/L	5.0	0.60 U	0.60 U	40	0.60 U	0.60 U	0.60 U	0.60 U	0.60 U	0.60 U	6.0 U
Trichlorofluoromethane	µg/L	5.0	0.45 U	0.45 U	---	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U	0.45 U	4.5 U
Vinyl chloride	µg/L	2.0	0.75 U	0.75 U	---	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	0.75 U	7.5 U
Xylenes, Total	µg/L	5.0	1.1 U	1.1 U	65	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U	11 U

Table 4

Summary of Analytical Results (October 2014)
Orange County Landfill, Goshen, New York

Analyte and Method	Units	Groundwater Standard and Guidance Values[(A)]	Groundwater Samples		Surface Water Standard and Guidance Values[(B)]	Seep Sample Location		Surface Water Sample Locations				Leachate
			PZ-14-3	PZ-14-5		Seep Monitoring Point	DUP-1	SW-13 (Upstream)	SW-5 (Upstream)	SW-Seep DS	SW-8 (Downstream)	MH-5
Leachate Indicator Parameters												
Alkalinity, Total	mg/L	---	570 B	600 B	---	590	620	210 B	230	230 B	220 B	1300 B
Ammonia	mg/L	2.0	**5.3**	**9.1 B**	[(3)]	**6.9**	**7.0**	0.009 U	0.009 U	0.058 B	0.014 JB	130 B
Biochemical Oxygen Demand	mg/L	---	2.0 U	7.1 b j	---	6.1	5.2	2.0 H j	2.0 U j	2.0 H b j	2.0 U j	16 b j
Chemical Oxygen Demand	mg/L	---	23 B	32 B	---	21 j	15 j	6.4 JB^	21 B	23 B	21 B	250 B
Chloride	mg/L	250	61	79	---	81 j	84 j	100 j	100 j	100 j	100 j	520
Color	Color Units	15	5.0 U	5.0 U	---	**60**	**50**	25	25	25	25	40
Cyanide, Total	mg/L	0.2	0.005 U	**0.23**	0.0052	0.01 U	0.12	0.005 ^	0.005 ^	0.005 U	0.005 ^	0.0083 J j
Hardness	mg/L	---	610	580	---	490	500	240	230	240	240	760
Nitrate as N	mg/L	10	0.69	0.090	---	0.02 U	0.02 U	2.1	2.1	2.1	2.1	0.24
Phenolics, Total Recoverable	mg/L	0.001[(1)]	0.005 U	**0.026**	0.001[(1)]	0.01 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.0075 J
Sulfate	mg/L	250	34	30	---	4.7 j	5.9 j	33	33	34	34	4.6
Total Dissolved Solids	mg/L	500	**680** j	**780** j	---	**720** j	**740** j	390 j	420 j	410 j	400 j	1000 j
Total Kjeldahl Nitrogen	mg/L	---	5.9	9.2	---	8.5 B j	8.2 B j	0.94 j	0.75 j	0.8 j	0.41 j	140
Total Organic Carbon	mg/L	---	3.2	8.9	---	4.4	4.4	4.1	4.1	4.1	4.1	57
Turbidity	NTU	5.0	**450**	**240**	---	**76**	**73**	28	29	23	22	440
Total Metals												
Aluminum, Total Recoverable	mg/L	---	6.3 j	0.73 j	---	0.19 J	0.06 U	0.54	0.4	0.16 J	0.47	0.16 J
Antimony, Total Recoverable	mg/L	0.003[(1)]	0.0068 U	0.0068 U	---	0.0068 U	0.0064 U	0.0068 U	0.0068 U	0.0068 U	0.0068 U	0.0068 U
Arsenic, Total Recoverable	mg/L	0.025	**0.094**	**0.057**	0.15[(5)]	0.11	0.12	0.0056 U	0.0056 U	0.0062 J	0.0098 J	0.031
Barium, Total Recoverable	mg/L	1.0	0.63	0.51	---	0.86	0.93	0.041	0.04	0.043	0.041	1.9
Beryllium, Total Recoverable	mg/L	0.003[(1)]	0.00047 J	0.0003 U	[(4)]	0.0003 U	0.0003 U	0.0003 U	0.0003 U	0.0003 U	0.0003 U	0.0003 U
Boron, Total Recoverable	mg/L	1.0	0.18	0.21	10	0.24	0.24	0.046	0.045	0.048	0.045	1.0
Cadmium, Total Recoverable	mg/L	0.005	0.0005 U	0.0005 U	[(4)]	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U
Calcium, Total Recoverable	mg/L	---	180	140	---	130	130	59	58	61	61	180
Chromium, Total Recoverable	mg/L	0.05	0.028 j	0.0076 j	[(4)]	0.0018 J	0.0017 J	0.0015 J	0.001 U	0.0015 J	0.001 J	0.0054
Chromium, hexavalent	mg/L	0.05	0.005 U	0.005 U	0.011[(5)]	0.005 U	0.005 H	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Copper, Total Recoverable	mg/L	0.2	0.091	0.0072 J j	[(4)]	0.0026 J	0.0018 J	0.0054 J	0.0051 J	0.0052 J	0.005 J	0.0038 J
Iron, Total Recoverable	mg/L	0.3	**18 B j**	**4.8 B j**	0.3	**8.6**	**9.1**	**0.54 B**	**0.4 B**	0.22 B	**0.46 B**	47 B
Lead, Total Recoverable	mg/L	0.025	0.017	0.003 U	[(4)]	0.0032 J	0.003 U	0.003 U	0.003 U	0.003 U	0.0031 J	0.003 U
Magnesium, Total Recoverable	mg/L	35[(1)]	**56**	**54**	---	**63**	**63**	23	23	23	23	53
Manganese, Total Recoverable	mg/L	0.3	**2.0**	**1.0**	---	**0.76 B**	**0.76 B**	0.13	0.13	0.13	0.12	2.2
Mercury, Total Recoverable	mg/L	0.0007	0.00012 U	0.00012 U	0.7	0.00012 U	0.0001 U	0.0001 U	0.0001 U	0.00012 U	0.00012 U	0.00012 U
Nickel, Total Recoverable	mg/L	0.1	0.025 j	0.028 j	[(4)]	0.0094 J	0.0099 J	0.0016 J	0.0018 J	0.0018 J	0.002 J	0.028
Potassium, Total Recoverable	mg/L	---	9.3	9.8	---	16	16	3.8	3.7	3.7	3.8	67
Selenium, Total Recoverable	mg/L	0.01	0.0087 U	0.0087 U	---	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U
Silver, Total Recoverable	mg/L	0.05	0.0017 U	0.0017 U	---	0.0017 U	0.0017 U	0.0017 U	0.0017 U	0.0017 U	0.0017 U	0.0017 U
Sodium, Total Recoverable	mg/L	20	**60**	**87**	---	**64**	**66**	52	52	52	52	370
Thallium, Total Recoverable	mg/L	0.0005[(1)]	0.01 U	0.01 U	0.008[(1)]	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Zinc, Total Recoverable	mg/L	2.0[(1)]	0.087 B	0.026 B j	[(4)]	0.0094 JB	0.0071 JB	0.0071 JB	0.023 B	0.041 B	0.012 B	0.014 B

Table 4

Summary of Analytical Results (October 2014)
Orange County Landfill, Goshen, New York

Analyte and Method	Units	Groundwater Standard and Guidance Values[A]	Groundwater Samples		Surface Water Standard and Guidance Values[B]	Seep Sample Location		Surface Water Sample Locations				Leachate
			PZ-14-3	PZ-14-5		Seep Monitoring Point	DUP-1	SW-13 (Upstream)	SW-5 (Upstream)	SW-Seep DS	SW-8 (Downstream)	MH-5
Dissolved Metals												
Aluminum, Dissolved	mg/L	---	8.7 j	2.7 j	---	---	---	---	---	---	---	---
Antimony, Dissolved	mg/L	---	0.0068 U	0.0068 U	---	---	---	---	---	---	---	---
Arsenic, Dissolved	mg/L	---	0.092	0.055	---	---	---	---	---	---	---	---
Barium, Dissolved	mg/L	---	0.59	0.47	---	---	---	---	---	---	---	---
Beryllium, Dissolved	mg/L	---	0.00048 J	0.0003 U	---	---	---	---	---	---	---	---
Boron, Dissolved	mg/L	---	0.17 B	0.20 B	---	---	---	---	---	---	---	---
Cadmium, Dissolved	mg/L	---	0.0005 U	0.0005 U	---	---	---	---	---	---	---	---
Calcium, Dissolved	mg/L	---	150	130	---	---	---	---	---	---	---	---
Chromium, Dissolved	mg/L	---	0.032 j	0.016 j	---	---	---	---	---	---	---	---
Copper, Dissolved	mg/L	---	0.083 B	0.011 B j	---	---	---	---	---	---	---	---
Iron, Dissolved	mg/L	---	22 j	7.7 j	---	---	---	---	---	---	---	---
Lead, Dissolved	mg/L	---	0.015	0.0051 J	---	---	---	---	---	---	---	---
Magnesium, Dissolved	mg/L	---	54	52	---	---	---	---	---	---	---	---
Manganese, Dissolved	mg/L	---	1.7	1.1	---	---	---	---	---	---	---	---
Mercury, Dissolved	mg/L	---	0.00012 U	0.00012 U	---	---	---	---	---	---	---	---
Nickel, Dissolved	mg/L	---	0.030 j	0.032 j	---	---	---	---	---	---	---	---
Potassium, Dissolved	mg/L	---	9.1	9.7	---	---	---	---	---	---	---	---
Selenium, Dissolved	mg/L	---	0.0087 U	0.0087 U	---	---	---	---	---	---	---	---
Silver, Dissolved	mg/L	---	0.0017 U	0.0017 U	---	---	---	---	---	---	---	---
Sodium, Dissolved	mg/L	---	58	85	---	---	---	---	---	---	---	---
Thallium, Dissolved	mg/L	---	0.010 U	0.01 U	---	---	---	---	---	---	---	---
Zinc, Dissolved	mg/L	---	0.087 B	0.036 B j	---	---	---	---	---	---	---	---

Values in **BOLD** indicate exceedance of applicable groundwater and surface water quality standard.

--- = Not analyzed or no applicable standard.

(A) = T.O.G.S. 1.1.1 Ambient Water Quality Standards for Class GA Groundwater

(B) = T.O.G.S. 1.1.1 Ambient Water Quality Standards for Class C Surface Water

(1) = Laboratory Method Detection Limit is greater than or equal to the applicable water quality standard.

(2) = Applies to the sum of 1,2-1,3-1,4-Dichlorobenzene, or Applies to each individual isomer, or applies to the sum of m-, o-, and p-xylenes, or applies to the sum of cis-trans 1,3-Dichloropropene.

(3) = Surface water standard for ammonia (mg/L) is interpolated using the temperatures and pH of the individual samples. SW-13 = 2.18; SW-5 = 2.19; SW SEEP DS = 2.14; and SW-8 = 2.10

(4) = Surface Water Standard for Berylium, Cadmium, Chromium, Copper, Lead, Nickel, and Zinc are based on the individual sample's hardness.

Berylium (mg/L): SW-13 = 1.1; SW-5 = 1.1; SW SEEP DS = 1.1; and SW-8 = 1.1
Cadmium (mg/L): SW-13 = 0.01; SW-5 = 0.01; SW SEEP DS = 0.01; and SW-8 = 0.01
Chromium: (mg/L): SW-13 = 1.17; SW-5 = 1.13; SW SEEP DS = 1.17; and SW-8 = 1.7
Copper (mg/L): SW-13 = 0.03; SW-5 = 0.03; SW SEEP DS = 0.03; and SW-8 = 0.03
Lead (mg/L): SW-13 = 0.25; SW-5 = 0.24; SW SEEP DS = 0.25; and SW-8 = 0.25
Nickel (mg/L): SW-13 = 0.98; SW-5 = 0.95; SW SEEP DS = 0.98; and SW-8 = 0.98
Zinc (mg/L): SW-13 = 0.25; SW-5 = 0.24; SW SEEP DS = 0.25; and SW-8 = 0.25

(5) = Standard applies to the dissolved form, not total recoverable.

U = Compound is not detected at or above laboratory method detection limit.
J = Result is less than the laboratory reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.
j = Analyte is present. Reported value may be associated with a higher level of uncertainty than is normally expected with the analytical method.
B = Compound was found in the blank and the sample.
b = Result detected in the unseeded control blank (USB).
H = Sample was prepped or analyzed beyond specified holding time.
^ = Instrument related QC exceeds the control limits.
DUP-1 was collected at the Seep Monitoring Point location.

Table 5

Summary of Historical Analytical Results - Seeps (2012 - 2014)
Orange County Landfill, Goshen, New York

Analyte	Units	Surface Water Standard and Guidance Values(A)	GW-B (South Side of Canal)		GW-01/GW-1 (North Side of Canal)		Seep Monitoring Point (North Side of Canal)				GW-3 (North Side of Canal)	GW-A (South Side of Canal)	
			8/21/2013	6/12/2014	8/22/2012	6/12/2014	8/22/2012 (GW-03)	8/21/2013 (GW-D)	6/12/2014 (GW-2)	10/6/2014	6/12/2014	8/21/2013	6/12/2014
Field Measurements													
Temperature	°C	---	21.75	16.83	20.77	13.81	23.88	19.01	14.47	16.09	15.66	20.57	15.12
Dissolved Oxygen	mg/L	< 4	---	8.1	9.3	**1.98**	8.17	6.54	**2.39**	**2.85**	9.18	5.68	9.08
Oxidation Reduction Potential	mV	---	-7.0	232	-90.6	-15.0	-77	-55	14.1	-58.8	31	9.6	252.3
pH	S.U.	6.5-8.5	7.46	7.7	7.03	6.85	---	7.15	6.83	6.95	6.77	7.48	6.92
Specific Conductivity	mS/cm^c	---	0.426	0.438	0.7772	1.265	0.695	1.339	1.162	1.246	1.247	0.420	0.426
Water Quality Parameters													
Alkalinity	mg/L	---	130 B	260	640	560	850	640	610	590	630	170 B	130
Ammonia	mg/L	(2)	0.075	0.14	**40**	**18**	**13**	**8.0**	**8.8**	**6.9**	**6.3**	0.018 J	0.016 J
Biochemical Oxygen Demand	mg/L	---	2.0 b	2.2 b	2.0 U	2.0 U	5.8 b	13	2.0 U	6.1	14 b	2.0 U	<2.0
Bromide	mg/L	---	0.073 U^	---	0.65	---	0.75	1.0 ^	---	---	---	0.073	---
Chemical Oxygen Demand	mg/L	---	210	110	21	31	22	18 B	5.0 U	21 j	21	18	24
Chloride	mg/L	---	3.0	0.82	82	73	63	73	58	81 j	54	23	44
Color	Color Units	---	400	140	150	25	35	100	15	60	5.0	50	60
Cyanide	mg/L	0.0052	0.012 B	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	**0.0053 J**	0.01 U	0.005 U	0.005 U	0.005 U
Nitrate	mg/L	---	0.28	0.31	0.011 U	0.076	0.26	0.075 U	0.57	0.02 U	0.02 U	0.33	0.45
Phenols	mg/L	0.001(1)	**0.0069 J**	0.005 U	**0.0054 J**	0.005 U	0.005 U	**0.005 JH**	0.005 U	0.01 U	0.005 U	0.005 U	0.005 U
Sulfate	mg/L	---	86	23	19	4.7	7.7	10	11	4.7 j	67	27	17
Total Dissolved Solids	mg/L	500	430	420	**680**	**690**	**780**	**830**	**660**	**720 j**	**780**	250	280
Total Hardness	mg/L	---	240	250	530	490	540	760	500	490	600	180	160
Total Kjeldahl Nitrogen	mg/L	---	4.1 B	2.7	38	16	12	8.2	8.6	8.5 j B	6.8	0.50	0.41
Total Organic Carbon	mg/L	---	67	46	6.1	6.0	6.0	5.5 b	5.9	4.4	5.5	5.6	6.9
Turbidity	NTU	---	7.6	160	66	320	1.0 U	7100	120	76	150	7.6	12
Metal Parameters													
Aluminum	mg/L	---	0.67	6.3	0.22	0.60	0.80	4.4	1.4	0.19 J	0.21	0.23	0.37
Antimony	mg/L	---	0.0068 U	0.0068 U	0.0068 U	0.0068 U	0.0068 U	0.0068 U	0.0068 U	0.0068 U	0.0068 U	0.0068 U	0.0068 U
Arsenic	mg/L	0.15(3)	0.0056 U	0.0058 J	0.094	0.12	0.048	0.11	0.086	0.11	0.029	0.0056 U	0.0056 U
Barium	mg/L	---	0.032	0.074	0.44	1.2	0.33	0.90	0.38	0.86	0.49	0.022	0.021
Berylium	mg/L	1.1	0.0003 U	0.00045 J	0.0003 U	0.0003 U	0.0003 U	0.0003 U	0.0003 U	0.0003 U	0.0003 U	0.0003 U	0.0003
Boron	mg/L	10	0.080	0.027 B	0.37 B	0.27 B	0.23 B	0.25	0.17 B	0.24	0.17 B	0.092	0.023 B
Cadmium	mg/L	*	0.0005 U	0.0005 U	0.0005 U	0.00094 J	0.0005 U	0.0014	0.00062 J	0.0005 U	0.0005 U	0.0005 U	0.0005
Calcium	mg/L	---	72	76	100	92	130	140	120	130	150	56	49
Chromium	mg/L	*	0.0018 J	0.0078	0.001 U	0.0010 U	0.0011 J	0.0058	0.0020 J	0.0018 J	0.0010	0.001 U	0.001 U
Chromium, Hexavalent	mg/L	0.011	0.005 UH	0.005 U	0.005 U	0.005 U	0.005 U	0.0079 JH	0.005 U	0.005 U	0.005 U	0.0087 JH	0.005 U
Cobalt	mg/L	0.005	**0.0065**	0.0014 J	0.00063 U	0.00063 J	0.0034 J	**0.0051**	0.0019 J	---	0.0024 J	0.00063 U	0.00063 U
Copper	mg/L	*	**0.04**	0.012	0.0016 U	0.0016 U	0.0038 J	0.013	0.0027 J	0.0026 J	0.0016 U	0.0044 J	0.0016 U
Iron	mg/L	0.3	**1.5**	**8.0**	**6.5**	**11**	**3.2**	**12**	**5.3**	**8.6**	**13**	**0.34**	**0.53**
Lead	mg/L	*	0.003 U	0.007 J	0.003 U	0.003 U	0.003 U	0.0075	0.0042 J	0.0032 J	0.0030 U	0.003	0.003 U
Magnesium	mg/L	---	12	16	41	57	51	57	44	63	48	9.3	8.8
Manganese	mg/L	---	0.93	1.0	0.54	0.28	1.7	1.1	1.8	0.76 B	1.4	0.047	0.063
Mercury	mg/L	0.0007	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U
Nickel	mg/L	*	0.027	0.018	0.0093 J	0.013	0.009 J	0.015	0.0091 J	0.0094 J	0.0073	0.0013 U	0.0013 U
Potassium	mg/L	---	3.3 B	4.4	23	19	15	13 B	12	16	8.0	2.2 B	1.8
Selenium	mg/L	0.0046(1)	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U
Silver	mg/L	0.0001	0.0017 U	0.0017 U	0.0017 U	0.0017 U	0.0017 U	0.0017 U	0.0017 U	0.0017 U	0.0017 U	0.0017 U	0.0017 U
Sodium	mg/L	---	2.0	3.2	81	65	59	64	45	64	45	16	24
Thallium	mg/L	0.008	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Vanadium	mg/L	0.014	0.0015 U	0.0015 U	0.0017 J	0.0015 U	0.0074	0.0067	0.0015 U	---	0.0015 U	0.0015 U	0.0015 U
Zinc	mg/L	*	0.011	0.028	0.0096 JB	0.012	0.010 B	0.033	0.020	0.0094 JB	0.0054 J	0.0017 J	0.0029 J

Values in **BOLD** indicate exceedance of applicable groundwater and surface water quality standard.
--- = Not analyzed or no applicable standard.
(A) = T.O.G.S. 1.1.1 Ambient Water Quality Standards for Class C Surface Water. Part 703.3 for pH, D.O., TDS, Color, and Trubidity.
(1) = Laboratory Method Detection Limit is greater than or equal to the applicable water quality standard.
(2) Surface Water Standard for ammonia, in mg/L, is interpolated from the samples pH and temperature. GW-B (8/21/2013) = 1.5, GW-B (6/12/2014) = 2.04, GW-1/GW-01 (8/22/2012) = 1.5, GW-1/GW-01 (6/12/2014) = 2.2,
(3) = Standard applies to the dissolved form, not total recoverable.
Seep Monitoring Point (8/22/2012) = No pH value, can't interpolate standard; Seep Monitoring Point (8/21/2013) = 1.5; Seep Monitoring Point (6/12/2014) = 2.2; Seep Monitoring Point (10/6/2014) = 2.2; GW-3 (6/12/2014) = 2.2; GW-A (8/21/2013) = 1.5; and, GW-A (6/12/2014) = 2.2
* = Surface water standards for Cadmium, Chromium, Copper, Lead, Nickel, and Zinc are based on the samples hardness for Class C streams.
Cadmium (mg/L): GW-B(8/21/2013) = 0.01, GW-B(6/12/2014) = 0.01, GW-1/GW-01(8/22/2012) = 0.03, GW-1/GW-01(6/12/2014) = 0.02, Seep Monitoring Point(8/22/2012) = 0.03, Seep Monitoring Point(8/21/2013) = 0.04, Seep Monitoring Point(6/12/2014) = 0.02, Seep Monitoring Point(10/6/2014) = 0.02, GW-3(6/12/2014) = 0.03, GW-A(8/21/2013) = 0.01, GW-A(6/12/2014) = 0.01
Chromium: (mg/L): GW-B(8/21/2013) = 1.17, GW-B(6/12/2014) = 1.12, GW-1/GW-01(8/22/2012) = 2.23, GW-1/GW-01(6/12/2014) = 2.09, Seep Monitoring Point(8/22/2012) = 2.27, Seep Monitoring Point(8/21/2013) = 3.00, Seep Monitoring Point(6/12/2014) = 2.13, Seep Monitoring Point(10/6/2014) = 2.09, GW-3(6/12/2014) = 2.47, GW-A(8/21/2013) = 0.92, GW-A(6/12/2014) = 0.84
Copper (mg/L): GW-B(8/21/2013) = 0.03, GW-B(6/12/2014) = 0.03, GW-1/GW-01(8/22/2012) = 0.06, GW-1/GW-01(6/12/2014) = 0.06, Seep Monitoring Point(8/22/2012) = 0.07, Seep Monitoring Point(8/21/2013) = 0.09, Seep Monitoring Point(6/12/2014) = 0.06, Seep Monitoring Point(10/6/2014) = 0.06, GW-3(6/12/2014) = 2.47, GW-A(8/21/2013) = 0.07, GW-A(6/12/2014) = 0.02
Lead (mg/L): GW-B(8/21/2013) = 0.25, GW-B(6/12/2014) = 0.26, GW-1/GW-01(8/22/2012) = 0.56, GW-1/GW-01(6/12/2014) = 0.52, Seep Monitoring Point(8/22/2012) = 0.57, Seep Monitoring Point(8/21/2013) = 0.80, Seep Monitoring Point(6/12/2014) = 0.53, Seep Monitoring Point(10/6/2014) = 0.52, GW-3(6/12/2014) = 0.64, GW-A(8/21/2013) = 0.18, GW-A(6/12/2014) = 0.16
Nickel (mg/L): GW-B(8/21/2013) = 0.98, GW-B(6/12/2014) = 1.02, GW-1/GW-01(8/22/2012) = 1.92, GW-1/GW-01(6/12/2014) = 1.80, Seep Monitoring Point(8/22/2012) = 1.95, Seep Monitoring Point(8/21/2013) = 2.60, Seep Monitoring Point(6/12/2014) = 1.83, Seep Monitoring Point(10/6/2014) = 1.80, GW-3(6/12/2014) = 2.13, GW-A(8/21/2013) = 0.77, GW-A(6/12/2014) = 0.70
Zinc (mg/L): GW-B(8/21/2013) = 0.25, GW-B(6/12/2014) = 0.25, GW-1/GW-01(8/22/2012) = 0.48, GW-1/GW-01(6/12/2014) = 0.45, Seep Monitoring Point(8/22/2012) = 0.49, Seep Monitoring Point(8/21/2013) = 0.65, Seep Monitoring Point(6/12/2014) = 0.46, Seep Monitoring Point(10/6/2014) = 0.45, GW-3(6/12/2014) = 0.53, GW-A(8/21/2013) = 0.19, GW-A(6/12/2014) = 0.17
U = Compound is not detected at or above laboratory method detection limit.
J = Result is less than the laboratory reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.
j = Analyte is present. Reported value may be associated with a higher level of uncertainty than is normally expected with the anlytical method.
B = Compound was found in the blank and the sample.
b = Result detected in the unseeded control blank (USB).
H = Sample was prepped or analyzed beyond specified holding time.
^ = Instrument related QC exceeds the control limits.

TABLE 6

Summary of Historical Analytical Results - Surface Water (2012 - 2014)
Orange County Landfill, Goshen, New York

Analyte	Units	Surface Water Standard and Guidance Values[A]	SW-13 (Upstream)		SW-5 (Upstream)		SW-01 (Upstream)		SW-Seep DS (Downstream)	SW-02** (Downstream)		SW-8 (Downstream)	
			10/6/2014	Historical Range	10/6/2014	Historical Range	8/22/2012	6/12/2014	10/6/2014	8/22/2012	6/12/2014	10/6/2014	Historical Range
Field Measurements													
Temperature	°C	---	15.79	0.3-25.3	16	0.1-25.4	22.17	18.63	15.39	23.25	18.67	15.47	0.2-25.91
Dissolved Oxygen	mg/L	< 4	5.71	6.79-12.68	4.51	5.2-10.8	6.78	8.13	3.74	6.68	8.04	4.83	6-11.28
Oxidation Reduction Potential	mV	---	516.9	-137-380	-138.6	-162-370	43.9	235.3	490.1	-20.6	235.1	495.8	-186-395
pH	S.U.	6.5-8.5	7.46	7.18-**9.02**	7.36	7.01-**9.33**	7.78	7.85	7.56	7.80	7.72	7.61	7.0-**8.81**
Specific Conductivity	mS/cm[c]	---	0.79	285-576	0.806	290-684	0.479	0.492	0.787	0.488	0.492	0.788	300-4940
Water Quality Parameters													
Alkalinity	mg/L	---	210 B	44-187	230	62.9-160	130 B	130	230 B	140 B	140	220 B	65.2-189
Ammonia	mg/L	[2]	0.009 U	0.03-0.51 U	0.009 U	0.03-0.155 U	0.049	0.053	0.058 B	0.21	0.053	0.014 JB	0.03 U-0.221
Biochemical Oxygen Demand	mg/L	---	2.0 H j	2.0-7.0 U	2.0 U j	2.0 U-8.0	3.3 b	2.0 U	2.0 H b j	2.0 U	2.0 U	2.0 U j	2.0 U-14
Bromide	mg/L	---	---	0.1 U-1.0 U	---	0.1 U-1.0 U	0.1 U	---	---	0.1 U	---	---	0.1 U-1.0 U
Chemical Oxygen Demand	mg/L	--	6.4 JB^	10 U-50	21	10 U-105	14	10	23 B	14	9.0 J	21 B	6.0-34
Chloride	mg/L	---	100 j	23-82	100 j	28.9-79	46	61	100 j	47	61	100 j	30-80
Chromium, Hexavalent	mg/L	0.011	0.005 U	0.004 U-0.01 U	0.005 U	0.004 U-0.01 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	<0.005	0.004 U-0.01
Color	Color Units	---	25	5.0 U-750	25	5.0 U-750	40	35	25	50	40	25	5.0 U-500
Cyanide	mg/L	0.0052	0.005^	0.005 U-0.01 U	0.005^	0.005 U-0.01 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.005^	0.005 U-0.01 U
Hardness	mg/L	---	240	96.7-260	230	99.8-242	18 J	180	240	180	180	240	102-238
Nitrate	mg/L	---	2.1	0.4-1.82	2.1	0.1 U-1.72	0.77	0.91	2.1	0.83	0.93	2.1	0.1 U-3.3
Phenols	mg/L	0.005	0.005 U	0.002 U-0.0045 U	0.005 U	0.002 U-**0.0072**	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	<0.005	0.002 U-**0.0115**
Sulfate	mg/L	---	33	11-91	33	7.5-100	19	14	34	19	14	34	8.5-100
Total Dissolved Solids	mg/L	500	390 j	172-404	420 j	156-446	300	310	410 j	300	310	400 j	190-428
Total Kjeldahl Nitrogen	mg/L	---	0.94 j	0.58-1.45	0.75 j	0.5-7.52	2.4	0.41	0.8 j	0.97	0.44	0.41 j	0.58-1.76
Total Organic Carbon	mg/L	---	4.1	4.5-18	4.1	4.2-11	5.8	4.4	4.1	5.5	4.4	4.1	4.4-18
Turbidity	NTU	---	28	5.6-130	29	8.7-95	37	16	23	29	17	22	5.8-112
Metal Parameters													
Aluminum	mg/L	---	0.54	0.08-0.991	0.4	0.13-0.941	1.5	0.57	0.16 J	1.6	0.55	0.47	0.12-1
Antimony	mg/L	---	0.0068 U	0.0068 U-0.06 U	0.0068 U	0.0044 U-0.0068 U	0.0068 U	0.0068 U	0.0068 U	0.0068 U	0.0068 U	0.0068 U	0.05 U-0.12
Arsenic	mg/L	0.15[3]	0.0056 U	0.002 U-0.02 U	0.0056 U	0.001-0.014	0.0056 U	0.0056 U	0.0062 J	0.0056 U	0.0056 U	0.0098 J	0.002 U-0.014
Barium	mg/L	---	0.041	0.017-0.2 U	0.04	0.016-0.2	0.033	0.024	0.043	0.039	0.024	0.041	0.2 U-0.037
Beryllium	mg/L	*	0.0003 U	0.0003 U-0.02 U	0.0003 U	0.0003 U-0.02 U	0.0003 U	0.0003 U	0.0003 U	0.0003 U	0.0003 U	0.0003 U	0.0003 U-0.02 U
Boron	mg/L	10	0.046	0.026-0.5 U	0.045	0.048 U-0.066	0.035 B	0.022 B	0.048	0.036 B	0.023 B	0.045	0.025 U-0.053
Cadmium	mg/L	*	0.0005 U	0.0005 U-0.02 U	0.0005 U	0.0005 U-0.02 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U-0.02 U
Calcium	mg/L	---	59	28.1-67	58	27.5-61.4	45	43	61	46	44	61	26.8-60.6
Chromium	mg/L	*	0.0015 J	0.001 U-0.02 U	0.001 U	0.0009 U-0.02 U	0.0016 J	0.001 U	0.0015 U	0.0022 J	0.001 U	0.001 J	0.001 U-0.02 U
Cobalt	mg/L	0.005	---	0.0019 U-0.05 U	---	0.0019 U-0.05 U	0.00067 J	0.00063 U	---	0.0019 U	0.00063 U	---	0.0019 U-0.05 U
Copper	mg/L	*	0.0054 J	0.0053-0.017 U	0.0051	0.003 U-0.025 U	**0.0034 J**	0.0016 U	0.0052 J	0.0031 J	0.0017 J	0.005 J	0.0021-0.025 U
Iron	mg/L	0.3	**0.54 B**	**0.36-8.2**	**0.4**	0.285-**9.17**	**1.4**	**0.81**	0.22 B	**1.4**	**0.77**	**0.46**	**0.34-3.13**
Lead	mg/L	*	0.003 U	0.001 U-0.014	0.003 U	0.0019 U-0.013	0.003 U	0.003 U	0.003 U	0.003 U	0.003 U	0.0031 J	0.001 U-0.02 U
Magnesium	mg/L	---	23	6.44-22.7	23	7.55-22.2	15	15	23	16	15	23	7.57-21.2
Manganese	mg/L	---	0.13	0.048-1.0	0.13	0.055-0.22	0.14	0.11	0.13	0.15	0.11	0.12	0.052-0.28
Mercury	mg/L	0.0007	0.00012 U	0.00012 U-0.001 U	0.00012 U	0.00012 U-0.001 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U	0.00012 U-0.001 U
Nickel	mg/L	*	0.0016	0.0013 U-0.04 U	0.0018	0.0013 U-0.02 U	0.0015 J	0.0015 J	0.0018 J	0.0016 J	0.0013 U	0.002 J	0.0013 U-0.04 U
Potassium	mg/L	---	3.8	1.4-5.22	3.7	1.6-4.98	3.2	1.8	3.7	3.3	1.8	3.8	1.2-4.92
Selenium	mg/L	0.00046	0.0087 U	0.001 U-0.059	0.0087 U	0.001 U-0.077 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.0087 U	0.001 U-0.079
Silver	mg/L	0.0001[1]	0.0017 U	0.0012-0.01 U	0.0017 U	0.0017 U-0.01	0.0017 U	0.0017 U	0.0017 U	0.0017 U	0.0017 U	0.0017 U	0.0015-0.01 U
Sodium	mg/L	---	52	14.9-41	52	15-38.6	29	32	52	30	32	52	15-40
Thallium	mg/L	0.008[1]	0.01 U	0.001 U-0.022	0.01 U	0.001 U-0.023	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.001 U-0.02 U
Vanadium	mg/L	0.014	---	0.002 U-0.274	---	0.002 U-0.01 U	0.0043 J	0.0015 U	---	0.0033 J	0.0015 U	---	0.002 U-0.02 U
Zinc	mg/L	*	0.0071 JB	0.0043-0.149	0.023 B	0.028 U-0.0023	0.0069 JB	0.006 J	0.041 B	0.0095 JB	0.0055 J	0.012 B	0.004-0.0345

Values in **BOLD** indicate exceedance of applicable groundwater and surface water quality standard.

--- = Not analyzed or no applicable standard.

[A] = T.O.G.S. 1.1.1 Ambient Water Quality Standards for Class C Surface Water

[1] = Laboratory Method Detection Limit is greater than or equal to the applicable water quality standard.

[2] = Surface water standard for ammonia (mg/L) is interpolated using the temperatures and pH of the individual samples. SW-13 = 2.18; SW-01(8/22/2012) = 1.34; SW-01(6/12/2014) = 1.21; SW-5 = 2.19; SW SEEP DS = 2.14; SW-02(8/22/2012) = 1.31; SW-02(6/12/2014) = 1.41; and SW-8 = 2.10.

[3] = Standard applies to the dissolved form.

* = Surface Water Standard for Berylium, Cadmium, Chromium, Copper, Lead, Nickel, and Zinc are based on the individual sample's hardness.

Beryllium (mg/L): SW-13 = 1.1; SW-01(8/22/2012) = 0.011; SW-01(6/12/2014) = 1.1; SW-5 = 1.1; SW SEEP DS = 1.1; SW-02(8/22/2012) = 1.1; SW-02(6/12/2014) = 1.1; and SW-8 = 1.1

Cadmium (mg/L): SW-13 = 0.01; SW-01(8/22/2012) = 0.0006; SW-01(6/12/2014) = 0.007; SW-5 = 0.01; SW SEEP DS = 0.01; SW-02(8/22/2012) = 0.007; SW-02(6/12/2014) = 0.007; and SW-8 = 0.01

Chromium: (mg/L): SW-13 = 0.03; SW-01(8/22/2012) = 0.14; SW-01(6/12/2014) = 0.92; SW-5 = 1.13; SW SEEP DS = 1.17; SW-02(8/22/2012) = 0.92; SW-02(6/12/2014) = 0.92; and SW-8 = 0.03

Copper (mg/L): SW-13 = 0.03; SW-01(8/22/2012) = 0.003; SW-01(6/12/2014) = 0.02; SW-5 = 0.03; SW SEEP DS = 0.03; SW-02(8/22/2012) = 0.02; SW-02(6/12/2014) = 0.02; and SW-8 = 0.03

Lead (mg/L): SW-13 = 0.25; SW-01(8/22/2012) = 0.01; SW-01(6/12/2014) = 0.18; SW-5 = 0.24; SW SEEP DS = 0.25; SW-02(8/22/2012) = 0.18; SW-02(6/12/2014) = 0.18; and SW-8 = 0.25

Nickel (mg/L): SW-13 = 0.25; SW-01(8/22/2012) = 0.11; SW-01(6/12/2014) = 0.77; SW-5 = 0.95; SW SEEP DS = 0.98; SW-02(8/22/2012) = 0.77; SW-02(6/12/2014) = 0.77; and SW-8 = 0.98

Zinc (mg/L): SW-13 = 0.25; SW-01(8/22/2012) = 0.03; SW-01(6/12/2014) = 0.19; SW-5 = 0.24; SW SEEP DS = 0.25; SW-02(8/22/2012) = 0.19; SW-02(6/12/2014) = 0.19; and SW-8 = 0.25

** = Sampling Location SW-02 at distinct locations (see Figure 4).

U = Compound is not detected at or above laboratory method detection limit.

J = Result is less than the laboratory reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.

j = Analyte is present. Reported value may be associated with a higher level of uncertainty than is normally expected with the anlytical method.

B = Compound was found in the blank and the sample.

b = Result detected in the unseeded control blank (USB).

H = Sample was prepped or analyzed beyond specified holding time.

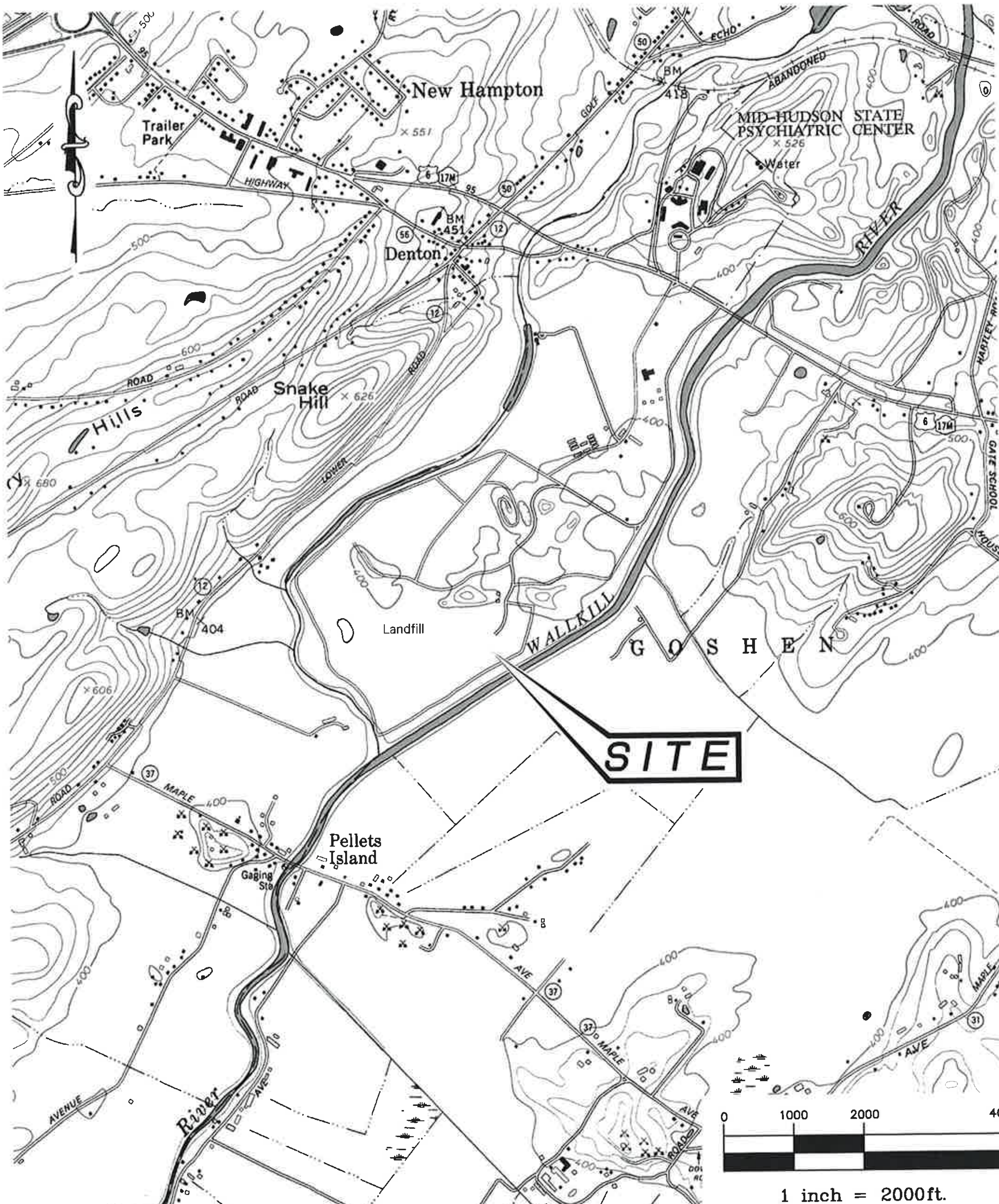
^ = Instrument related QC exceeds the control limits.

Table 7

Evaluation of Mitigation Alternatives
Orange County Landfill, Goshen, New York

Response Action	Technology	Implementability	Effectiveness and Permanence	Cost Remarks
Containment	Geotextile filter fabric or Geomembrane w/ Riprap	Moderately difficult to install and maintain due to location and slope.	Effectively controls seep from reaching canal, no associated treatment of seep, potential negative ecological impacts, and will likely require maintenance.	Likely maintenance costs.
Containment	Slurry Wall	Moderately difficult to install and maintain due to location and slope.	Effectively prevents seep from reaching canal. Will likely require maintenance. Effectiveness could be reduced due to movement of Canal bank.	Likely maintenance costs. Recurring operational costs.
Groundwater Collection	Focused Groundwater Collection Treatment	Readily implementable.	Effectively prevents seep from reaching canal and treats groundwater contamination. Continuous operation of pump required.	Recurring operational costs.
Seep Source Collection	Seep Source Point Collection	Moderately difficult to maintain due to fluctuations of the canal stage.	Effectively prevents seep from reaching canal and treats present contamination. Continuous operation of pump required. Potentially ineffective operation due to frequent flooding of the canal stage.	Recurring operational costs.
In-situ Treatment	Chemical Injection	Readily implementable.	Effectiveness of technology currently unknown. Continuous operation of pump required.	Bench / pilot scale testing costs. Recurring operational costs.
In-situ Treatment	Reactive Trench	Moderately difficult to install and maintain due to location, slope, and is prone to site flooding.	Effectively prevents seep from reaching canal. Will likely require maintenance.	Likely maintenance costs.

FIGURES



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

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SITE LOCATION MAP

ORANGE CO. DEPT. OF PUBLIC WORKS

ORANGE COUNTY LANDFILL

TOWN OF GOSHEN — ORANGE CO., N.Y.

PROJ. No.: 2013-29	DATE: 12/3/14	SCALE: 1" = 2000'	DWG. NO. 2010-15045	FIGURE 1

LEGEND:

APPROXIMATE PROPERTY BOUNDARY

APPROXIMATE LIMIT OF WASTE

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 GOOGLE EARTH IMAGERY, DATED 2013.

0 1000 2000 4000

1 inch = 2000ft.

S:\Drawings\2010-15 - Orange County\2010-15046 SiteVicinity.dwg12/2/2014 9:18 AM

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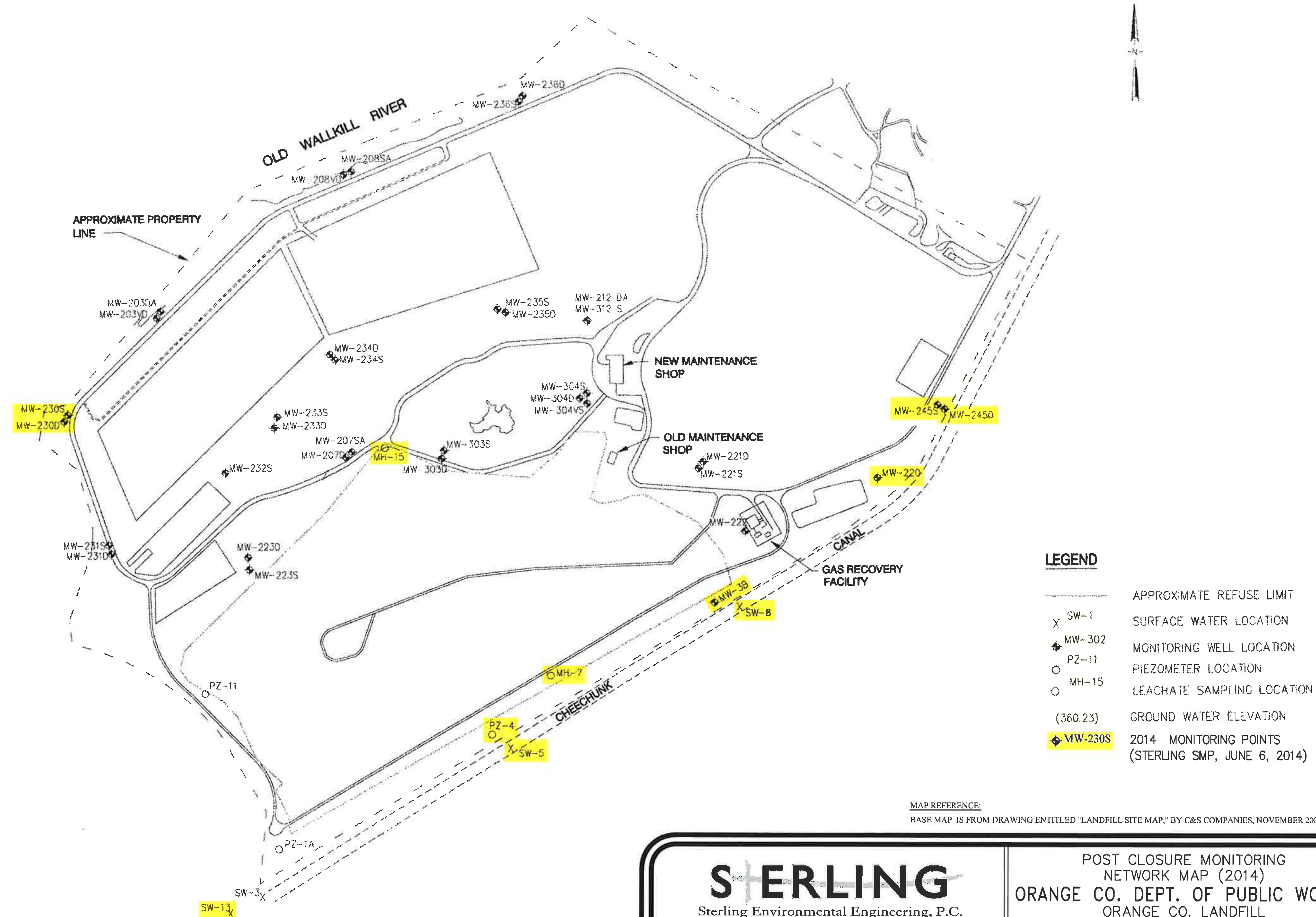
SITE VICINITY MAP
ORANGE CO. DEPT. OF PUBLIC WORKS
ORANGE COUNTY LANDFILL

TOWN OF GOSHEN ORANGE CO., N.Y.

PROJ. No.: 2010-15	DATE: 12/3/14	SCALE: 1" = 1000'	DWG. NO. 2010-15046	FIGURE 2



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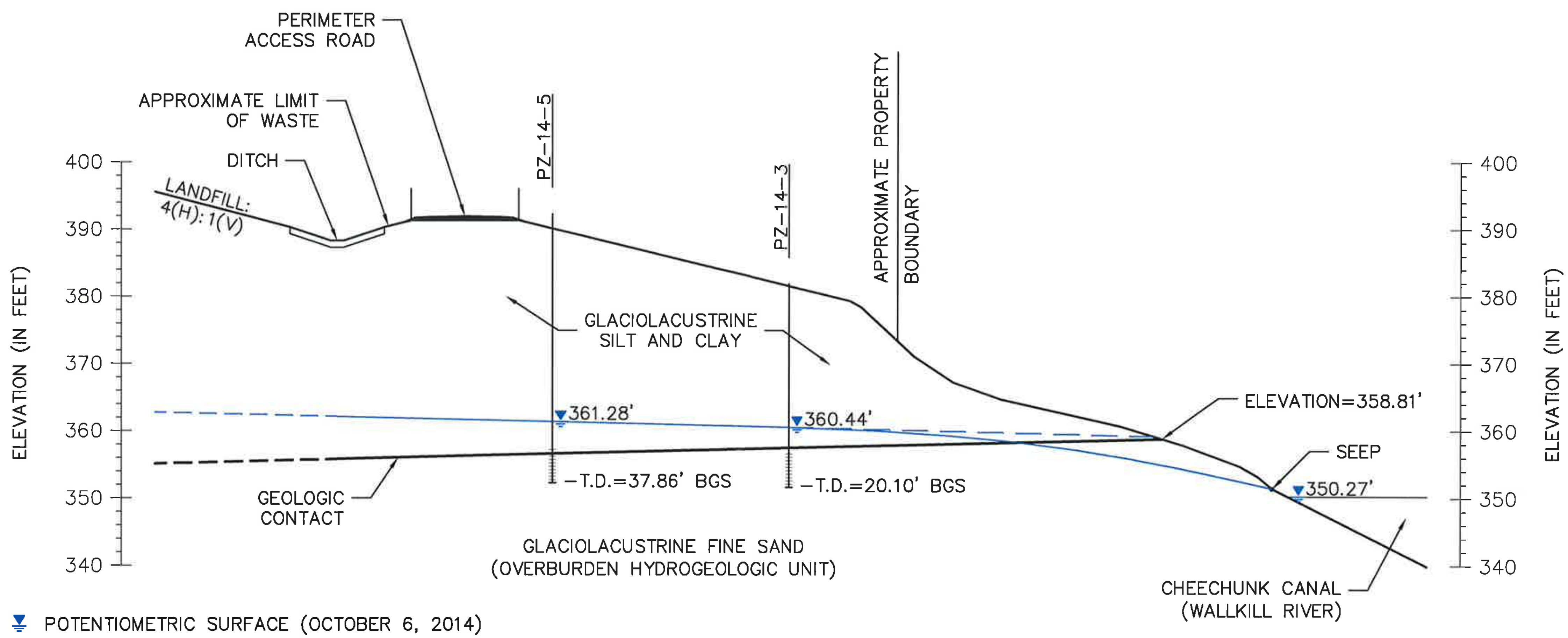
POST CLOSURE MONITORING NETWORK MAP (2014)
ORANGE CO. DEPT. OF PUBLIC WORKS
ORANGE CO. LANDFILL
TOWN OF GOSHEN ORANGE CO., N.Y.

PROJ. No.: 2010-15	DATE: 12/3/14	SCALE: 1" = 500'	DWG. NO. 2010-15047	FIGURE 3

S:\Drawings\2010-15 - Orange County\2010-15047 PostClosureMonitoringMap.dwg 12/2/2014 9:21 AM

GEOLOGIC CROSS SECTION A-A'

HORIZONTAL SCALE: 1"=20'
VERTICAL SCALE: 1"=20'



LINE OF SECTION A-A'

SCALE: 1" =100'

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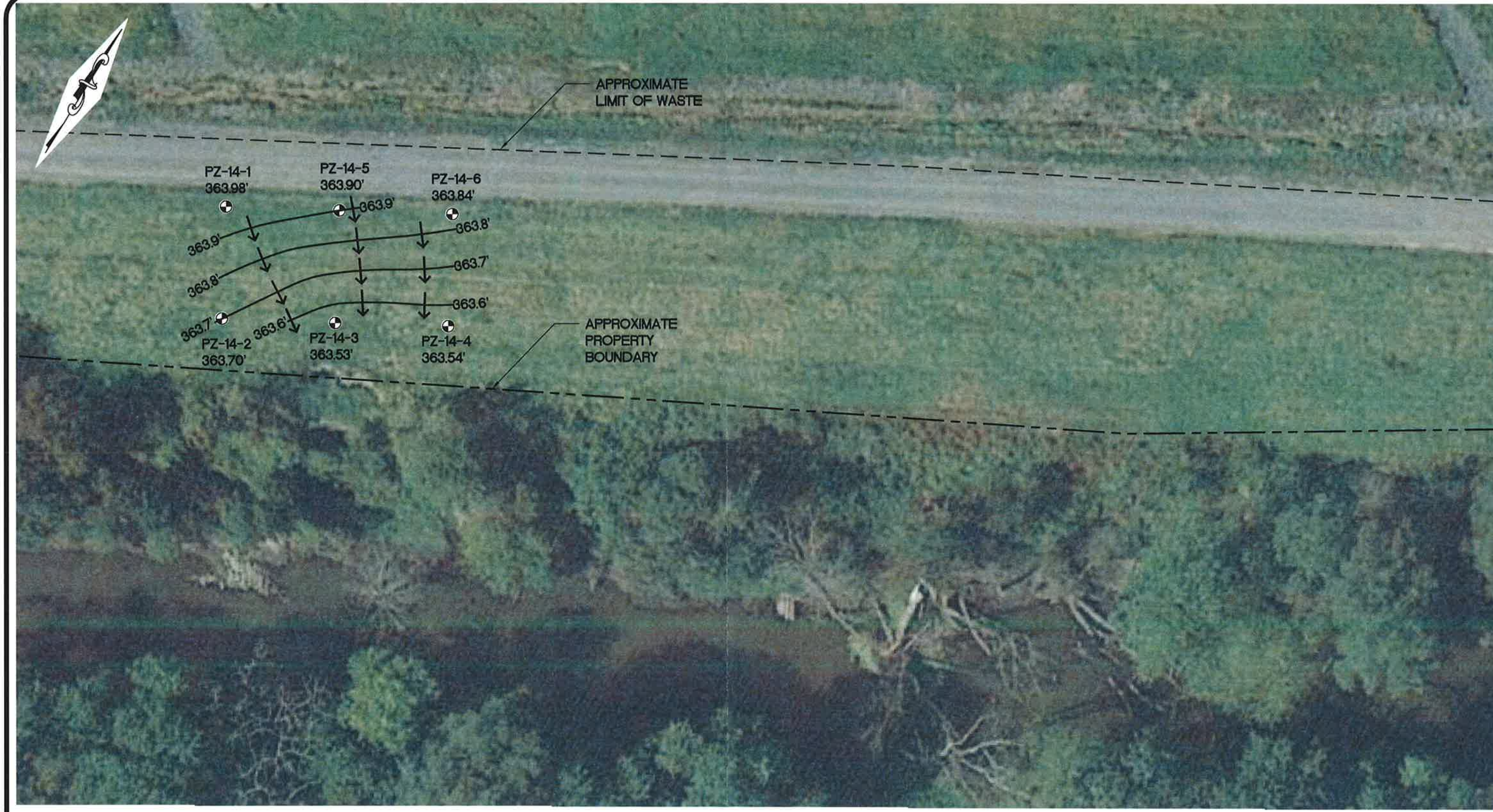
GEOLOGIC CROSS SECTION A–A'
ORANGE CO. DEPT. OF PUBLIC WORKS
ORANGE COUNTY LANDFILL
TOWN OF GOSHEN ORANGE CO., N.Y.

PROJ. No.: 2010–15	DATE: 12/3/14	SCALE: AS NOTED	DWG. NO. 2010–15048	FIGURE 4

S:\Drawings\2010-15 - Orange County\2010-15048 GeologicCrossSect.dwg 12/2/2014 9:21 AM



LEGEND:

PZ-14-1 361.21'	PIEZOMETER LOCATION WITH GROUNDWATER ELEVATION
352'	GROUNDWATER ELEVATION CONTOURS
→	GROUNDWATER FLOW DIRECTION
— — — —	LIMIT OF WASTE
—— – – ——	PROPERTY BOUNDARY

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.
2. AERIAL PHOTOGRAPH FROM GOOGLE EARTH IMAGERY, DATED 2013.

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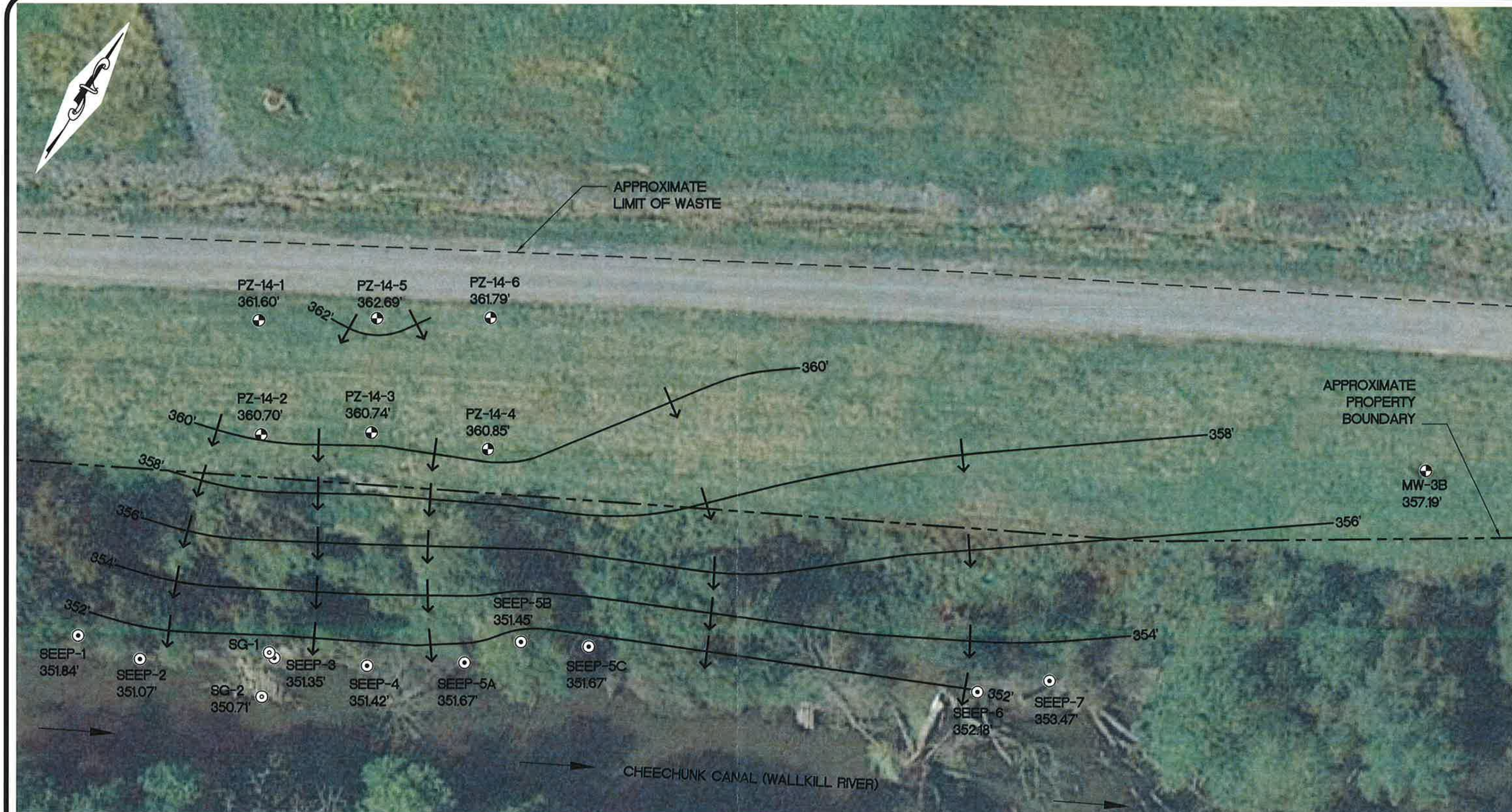
OVERBURDEN GROUNDWATER CONTOUR MAP
(MARCH 18, 2014)
ORANGE CO. DEPT. OF PUBLIC WORKS
ORANGE COUNTY LANDFILL
TOWN OF GOSHEN ORANGE CO., N.Y.

PROJ. No.: 2010-15	DATE: 12/3/14	SCALE: 1" = 30'	DWG. NO. 2010-15049A	FIGURE 5A

S:\Drawings\2010-15 - Orange County\2010-15049A GWContoursMap3-18-14.dwg 12/2/2014 9:22 AM



LEGEND:

PZ-14-1 361.21'	PIEZOMETER LOCATION WITH GROUNDWATER ELEVATION
⊙	SEEP MONITORING POINT
SG-2 350.27'	STAFF GAUGE ELEVATION
——— 352'	GROUNDWATER ELEVATION CONTOURS
→ →	GROUNDWATER FLOW DIRECTION
— — — —	LIMIT OF WASTE
—— — — ——	PROPERTY BOUNDARY

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.
2. AERIAL PHOTOGRAPH FROM GOOGLE EARTH IMAGERY, DATED 2013.

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OVERBURDEN GROUNDWATER CONTOUR MAP
(SEPTEMBER 9, 2014)
ORANGE CO. DEPT. OF PUBLIC WORKS
ORANGE COUNTY LANDFILL
TOWN OF GOSHEN ORANGE CO., N.Y.

PROJ. No.: 2010-15	DATE: 12/3/14	SCALE: 1" = 30'	DWG. NO. 2010-15049B	FIGURE 5B

S:\Drawings\2010-15 - Orange County\2010-15049B GWContours_9-9-14.dwg12/2/2014 9:42 AM

LEGEND:

PZ-14-1 361.21'	PIEZOMETER LOCATION WITH GROUNDWATER ELEVATION
⊙	SEEP MONITORING POINT
SG-2 350.27'	STAFF GAUGE ELEVATION
——— 352'	GROUNDWATER ELEVATION CONTOURS
→ →	GROUNDWATER FLOW DIRECTION
— — — —	LIMIT OF WASTE
—— - - ——	PROPERTY BOUNDARY

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.
2. AERIAL PHOTOGRAPH FROM GOOGLE EARTH IMAGERY, DATED 2013.

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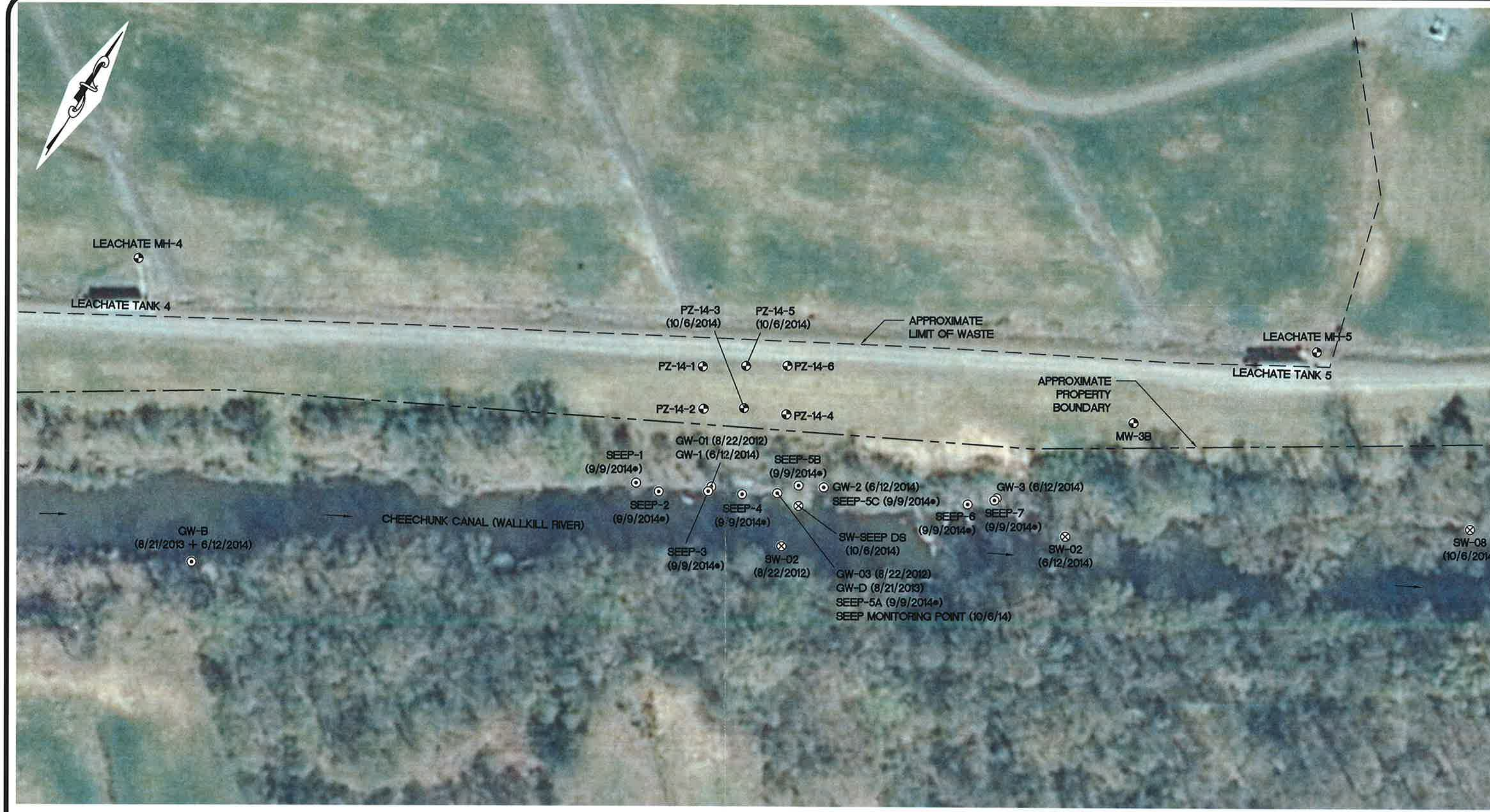
OVERBURDEN GROUNDWATER CONTOUR MAP
(OCTOBER 6, 2014)
ORANGE CO. DEPT. OF PUBLIC WORKS
ORANGE COUNTY LANDFILL
TOWN OF GOSHEN ORANGE CO., N.Y.

PROJ. No.: 2010-15	DATE: 12/3/14	SCALE: 1" = 30'	DWG. NO. 2010-15049C	FIGURE 5C

S:\Drawings\2010-15 - Orange County\2010-15049C-GWContourMap_10-6-14.dwg 12/2/2014 9:34 AM



LEGEND:

PZ-14-1 (6/12/14)	PIEZOMETER/MONITORING WELL LOCATION (DATE SAMPLE WAS TAKEN)
GW-01 (8/22/12) SEEP-1 (9/9/14●)	SEEP LOCATION (DATE SAMPLE WAS TAKEN) SEEP LOCATION (DATE OBSERVED)
SW-02 (8/22/12)	SURFACE WATER LOCATION (DATE SAMPLE WAS TAKEN)
— — — — —	LIMIT OF WASTE
——— — — ———	PROPERTY BOUNDARY

0 40 80 160

(IN FEET)
1 inch = 80 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.
2. AERIAL PHOTOGRAPHY FROM NEW YORK STATWIDE DIGITAL ORTHOIMAGERY PROGRAM, PHOTOGRAPHY CIRCA 2013.

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SAMPLE & SEEP LOCATION MAP
ORANGE CO. DEPT. OF PUBLIC WORKS
ORANGE COUNTY LANDFILL
TOWN OF GOSHEN ORANGE CO., N.Y.

PROJ. No.: 2010-15 | DATE: 12/3/14 | SCALE: 1" = 80' | DWG. NO. 2010-15050 | FIGURE 6

S:\Drawings\2010-15 - Orange County\2010-15050 SampleLocMap.dwg 12/2/2014 9:36 AM

LEGEND:

MW-3B	GROUNDWATER AND LEACHATE SAMPLE LOCATIONS
⊙	SEEP MONITORING POINT
⊗ SW-5	SURFACE WATER SAMPLE LOCATION
— — — — —	LIMIT OF WASTE
——— – – ———	PROPERTY BOUNDARY

0 150 300 600

(IN FEET)
1 inch = 300 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.
2. AERIAL PHOTOGRAPHY FROM NEW YORK STATWIDE DIGITAL ORTHOIMAGERY PROGRAM, PHOTOGRAPHY CIRCA 2013.

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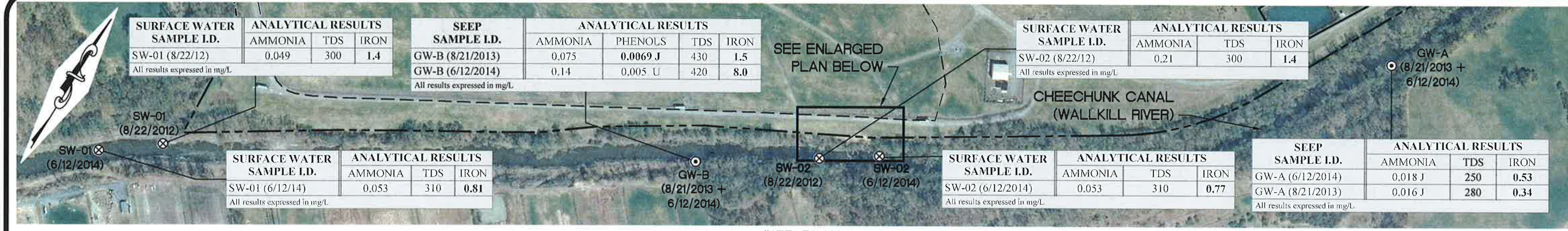
OCTOBER 2014 SAMPLE LOCATION MAP
ORANGE CO. DEPT. OF PUBLIC WORKS
ORANGE COUNTY LANDFILL
TOWN OF GOSHEN ORANGE CO., N.Y.

PROJ. No.: 2010-15	DATE: 12/3/14	SCALE: 1"=300'	DWG. NO. 2010-15051	FIGURE 7



SURFACE WATER SAMPLE I.D.	ANALYTICAL RESULTS		
	AMMONIA	TDS	IRON
SW-01 (8/22/12)	0.049	300	**1.4**

All results expressed in mg/L

SEEP SAMPLE I.D.	ANALYTICAL RESULTS			
	AMMONIA	PHENOLS	TDS	IRON
GW-B (8/21/2013)	0.075	**0.0069 J**	430	**1.5**
GW-B (6/12/2014)	0.14	0.005 U	420	**8.0**

All results expressed in mg/L

SURFACE WATER SAMPLE I.D.	ANALYTICAL RESULTS		
	AMMONIA	TDS	IRON
SW-02 (8/22/12)	0.21	300	**1.4**

All results expressed in mg/L

SURFACE WATER SAMPLE I.D.	ANALYTICAL RESULTS		
	AMMONIA	TDS	IRON
SW-01 (6/12/14)	0.053	310	**0.81**

All results expressed in mg/L

SURFACE WATER SAMPLE I.D.	ANALYTICAL RESULTS		
	AMMONIA	TDS	IRON
SW-02 (6/12/2014)	0.053	310	**0.77**

All results expressed in mg/L

SEEP SAMPLE I.D.	ANALYTICAL RESULTS		
	AMMONIA	TDS	IRON
GW-A (6/12/2014)	0.018 J	**250**	**0.53**
GW-A (8/21/2013)	0.016 J	**280**	**0.34**

All results expressed in mg/L

SITE PLAN
SCALE: 1" = 400'

GROUNDWATER SAMPLE I.D.	ANALYTICAL RESULTS				
	AMMONIA	PHENOLS	ARSENIC	TDS	IRON
PZ-14-5 (10/6/2014)	**9.1 B**	0.005 U	**0.057**	780	**4.8 B**

All results expressed in mg/L

GROUNDWATER SAMPLE I.D.	ANALYTICAL RESULTS				
	AMMONIA	PHENOLS	ARSENIC	TDS	IRON
PZ-14-3 (10/6/2014)	**5.3**	**0.026**	**0.094**	680	**18 B**

All results expressed in mg/L

SEEP SAMPLE I.D.	ANALYTICAL RESULTS			
	AMMONIA	PHENOLS	TDS	IRON
GW-3 (6/12/2014)	**6.3**	0.005 U	**780**	**13**

All results expressed in mg/L

SEEP SAMPLE I.D.	ANALYTICAL RESULTS			
	AMMONIA	PHENOLS	TDS	IRON
GW-2 (6/12/2014)	**8.8**	0.005 U	**660**	**5.3**

All results expressed in mg/L

SEEP SAMPLE I.D.	ANALYTICAL RESULTS			
	AMMONIA	PHENOLS	TDS	IRON
GW-01 (8/22/2012)	**40**	**0.0054 J**	**680**	**6.5**
GW-1 (6/12/2014)	**18**	0.005 U	**690**	**11**

All results expressed in mg/L

SEEP SAMPLE I.D.	ANALYTICAL RESULTS			
	AMMONIA	PHENOLS	TDS	IRON
GW-03 (8/22/2012)	**13**	0.005 U	**780**	**3.2**
GW-D (8/21/2013)	**8**	**0.005 J H**	**830**	**12**
SEEP MONITORING POINT (10/6/2014)	**6.9**	0.01 U	**720**	**8.6**

All results expressed in mg/L

NOTE:
U = Not detected at or above laboratory method detection limit

ENLARGED SITE PLAN
SCALE: 1" = 40'

0 20 40 80
(IN FEET)
1 inch = 40 ft.

LEGEND:

PZ-14-1 (6/12/14)	PIEZOMETER/MONITORING WELL LOCATION (DATE SAMPLE WAS TAKEN)
GW-01 (8/22/12)	SEEP LOCATION (DATE SAMPLE WAS TAKEN)
SW-01 (8/22/12)	SURFACE WATER LOCATION (DATE SAMPLE WAS TAKEN)
— — — — —	LIMIT OF WASTE
——— — — ———	PROPERTY BOUNDARY

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 PHOTOGRAPHY FROM NEW YORK STATEWIDE DIGITAL ORTHOIMAGERY PROGRAM, PHOTOGRAPHY CIRCA 2013.

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2012, 2013, & 2014 GROUNDWATER / SEEP / SURFACE WATER EXCEEDANCES MAP
ORANGE CO. DEPT. OF PUBLIC WORKS
ORANGE COUNTY LANDFILL
TOWN OF GOSHEN ORANGE CO., N.Y.

PROJ. No.: 2010-15	DATE: 12/3/14	SCALE: AS NOTED	DWG. NO. 2010-15052	FIGURE 8

APPENDIX A

WALLKILL RIVER FLOOD MITIGATION PLAN
BLACK DIRT REGION, ORANGE COUNTY, NY
DATED AUGUST 16, 2013

Wallkill River Flood Mitigation Implementation Plan
Black Dirt Region, Orange County, NY

Summary of Further Investigations Regarding Flood Mitigation Study Areas
August 16, 2013

Introduction

Based on our July 10, 2013 meeting in Pine Island and on-going discussions with the Soil and Water Conservation District (SWCD) regarding the flood mitigation plan for the Black Dirt Region, we have explored several alternatives in further detail. The same modeling approach was used as previously discussed. We evaluated each alternative for the 2 year and 10 year storm events. For each alternative, we have summarized the advantages and disadvantages to allow the SWCD to make an informed decision on which alternatives to pursue with the current funding as well as potential future funding opportunities. The alternatives considered include:

- Cheechunk Canal Extension (1930's geometry)
- Cheechunk Canal Extension (Floodplain geometry)
- Dredging the Existing Cheechunk Canal to remove sediment
- Remove portion of Celery Ave Rock Ledge
- Remove portion of Pochuck Rock Ledge
- Remove portion of Wallkill Rock Ledge
- Impacts of Orange County Landfill

Cheechunk Canal Extension (1930's geometry)

This alternative looks at extending the Cheechunk Canal south from the end of the existing canal towards Oil City Road. The extension was modeled with the geometry laid out in the 1930's Army Corps of Engineers Project. This alternative would cost approximately $1,800-$2,000 per foot or $10 million per mile to construct.

Advantages/Benefits

- 3" decrease in 2-year storm upstream of the junction with Pochuck Creek
- 2" decrease in 10-year storm upstream of the junction with Pochuck Creek

Disadvantages/Considerations

- ½" increase in water elevations through the existing Cheechunk Canal for the 2-year storm
- minimal increase in peak flows for the 2-year and 10-year storm at the Orange County Landfill
- Minimal increase in water elevation through the existing Cheechunk Canal for the 10-year storm
- Impact to agricultural land, loss of land due to construction of the canal
- Regulatory (NYS DEC, US ACOE, FEMA, U.S. Fish Wildlife, NYSHPO)

Cheechunk Canal Extension (90' Floodplain Geometry)

This alternative extends the Cheechunk Canal south from the end of the existing canal towards Oil City Road, but in lieu of excavating a new channel, this alternative investigates adding capacity by creating a lower floodplain along the banks of the existing river. The floodplain was modeled as a 90 foot floodplain on either side of the main channel. As part of this alternative, the Mayjack Bridge was removed to accommodate the wider floodplain. The lower floodplain associated with this alternative provides storm storage. The cumulative benefit of this storage area is realized as the floodplain is progressed upstream. The lower water surface elevations at Oil City Road are a result of this increased storage area. This alternative would cost approximately $1800-$2,000 per foot or $10 million per mile to construct.

Advantages/Benefits

- 1"decrease in 2-year storm upstream of the junction with Pochuck Creek and increasing to 9" at Oil City Road
- 1" decrease in 10-year storm upstream of the junction with Pochuck Creek and increasing to 10" at Oil City Road
- minimal decrease in peak flows for the 2-year storm at the Orange County Landfill
- Suitable with various avenues of future funding
- Environmental Benefits may ease regulatory hurdles
- Costs may be considerably offset by incorporating value of soil in removal or relocation options.
- Relocation of usable soil could be used to offset adjacent agricultural subsidence.

Disadvantages/Considerations

- minimal increase in peak flows for the 10-year storm at the Orange County Landfill
- Impact to agricultural land, loss of land due to construction of the canal
- Regulatory (NYS DEC, FEMA, US ACOE) although potential benefits over canal extension alone.

Cheechunk Canal Extension (200' Floodplain Geometry)

This alternative is similar to the alternative above, except the floodplain was expanded to 200 feet either side of the channel. This results in an increased benefit, but also increases the extent of the impact. The water surface changes from the model are summarized below and the remaining advantages/disadvantages are similar to those listed above.

- 3"decrease in 2-year storm upstream of the junction with Pochuck Creek and increasing to 14" at Oil City Road
- 2" decrease in 10-year storm upstream of the junction with Pochuck Creek and increasing to 18" at Oil City Road

Comparison of Cheechunk Canal Extension - 1930's vs Floodplain Configuration

Impact	1930's Geometry	90' Floodplain Geometry	200' Floodplain Geometry
Cost	$10M/mile	$10M/mile	$12M/mile
2-year drop in Water Surface Near Pochuck Creek Near Oil City Road	 3" 3"	 1" 9"	 3" 14"
10-year drop in Water Surface Near Pochuck Creek Near Oil City Road	 2" 2"	 1" 10"	 2" 18"
Active agricultural land impacted by construction	55-60 acres (approx.)	40-45 acres (approx.)	45-50 acres (approx.)
Regulatory hurdles	High	Moderate	Moderate
Funding Opportunities	Few	Several	Several

Dredging the Existing Cheechunk Canal to remove sediment

This alternative evaluates removing the sediment from the bottom of the Cheechunk Canal to increase conveyance of the Canal. This alternative assumed approximately 2' of sediment build up that would be removed through the length of the canal. The excavation of sediment would be transitioned at either end to match the streambed elevation of the Wallkill River upstream and downstream of the canal. The modeling results of this alternative are similar to adding a floodplain bench to the canal which was previously investigated. This alternative also presents a few negative factors that must be considered. The cost to dredge the entire length of the canal would be $4,000,000-$5,000,000. This cost could increase if the dredged material is found to include contaminated material. This cost does not include the future maintenance cost associated with repeating this operation in the future as the canal will accumulate silt in the future.

Advantages/Benefits

- 6"decrease in 2-year storm immediately through the canal, transitioning to less than an inch at Oil City Road.
- 5" decrease in 10-year storm immediately through the canal, transitioning to less than ½ inch at Oil City Road.

Disadvantages/Considerations

- Minimal increase in peak flows for the 2-year and 10-year storms at the Orange County Landfill
- Sediment has potential for containing hazardous waste.
- Lowering invert of the canal would further entrench the river and result in streambank erosion. This option would require transitioning the invert elevation to upstream and downstream and

may require grade control in these areas to prevent incision and streambank erosion from traveling upstream.

- Lowering the invert may cause undermining issues at bridge crossings
- Lowering the invert would lower the groundwater table in the adjacent areas.
- Regulatory (NYS DEC, US ACOE, FEMA, NYSHPO)
- Although deliberated, it has not been confirmed that deposition has occurred in the canal since the original construction. Prior to progressing with this alternative, the extent and rate of deposition should be verified by field measurements to validate that the proposed modeled alternative agrees with the actual field conditions.
- Sediment removal may provide some temporary relief, as shown by the alternative modeled, but the returns will diminish as sediment will likely redeposit over time, requiring future repetitive maintenance.

Remove Portion of the Celery Avenue Rock Ledge

This alternative evaluates lowering the elevation of the rock ledge to increase conveyance. The removal would consist of a 40 foot wide by 4 foot deep notch in the ledge. The streambed immediately upstream of the ledge would be regraded to transition the lower rock ledge to the existing streambed elevation In addition streambed stabilization methods would be employed above the rock cut to prevent future erosion of the stream. This alternative would cost approximately $220,000 to construct.

Advantages/Benefits

- 3-4"decrease in 2-year storm immediately upstream of the rock ledge, transitioning to no benefits upstream of the confluence with Quaker/Black Walnut Creek
- ½" decrease in 10-year storm immediately upstream of the rock ledge, no benefits through the rest of the model.
- Minimal decrease in peak flows for the 2-year storm at the Orange County Landfill

Disadvantages/Considerations

- Minimal increase in peak flows for the 10-year storm at the Orange County Landfill
- Requires soil boring(s) to evaluate effect on ground water levels
- Regulatory (NYS DEC, US ACOE, FEMA)
- Lowering the channel elevation may further entrench the river and result in streambank erosion. May require grade control and/or streambank stabilization
- Must maintain bankfull channel dimensions to maintain sediment conveyance
- Removal of rock ledges impacts smaller storms more than large events. During the larger storm events the rock ledge is submerged, therefore removing a portion of the ledge has decreased benefit.

Remove Portion of the Pochuck Rock Ledge

This alternative evaluates lowering the elevation of the rock ledge to increase conveyance. The removal would consist of a 40 foot wide by 3 foot deep notch in the ledge. The streambed immediately upstream of the ledge would be regraded to transition the lower rock ledge to the existing streambed elevation. In addition streambed stabilization methods would be employed above the rock cut to prevent future erosion of the stream. This alternative would cost approximately $200,000 to construct.

Advantages/Benefits

- 4"decrease in 2-year storm immediately upstream of the rock ledge, transitioning to a 2" decrease at Glenwood Road
- 8"decrease in 10-year storm immediately upstream of the rock ledge, transitioning to a 2" decrease at Glenwood Road

Disadvantages/Considerations

- Minimal increase in peak flows for the 2-year and 10-year storms at the Orange County Landfill
- Lowering the channel elevation may further entrench the river and result in streambank erosion. May require grade control and/or streambank stabilization.
- Regulatory (NYS DEC, US ACOE, FEMA, NYSHPO)

Remove Portion of the Wallkill Rock Ledges

This alternative evaluates the lowering of the rock ledges on the Wallkill River downstream of Oil City Road. There was not sufficient geometry to accurately model this alternative. Based on approximations in the model, we expect small 1-2" benefits upstream of the rock ledges only. In addition streambed stabilization methods would be employed above the rock cut to prevent future erosion of the stream. This alternative would cost approximately $200,000 to construct.

Advantages/Benefits

- Minor decrease in water elevations upstream of the rock ledge

Disadvantages/Considerations

- Only impacts areas upstream of the ledge
- Potential impacts to Federal Wetlands/Duck Ponds upstream
- Lowering the channel elevation may further entrench the river and result in streambank erosion. May require grade control and/or streambank stabilization.
- Regulatory (NYS DEC, US ACOE, FEMA, NYSHPO)
- Removal of rock ledges impacts smaller storms more than large events. During larger storm events the rock ledge is submerged, therefore removing a portion of the ledge has decreased benefit.

Impacts of Orange County Landfill

While it is understood that the construction of the Landfill may have resulted in some alteration of the river channel in the vicinity of the landfill, there appears to be no evidence or data that would support the theory that the current configuration impedes flows. Reviews of the County's records from the Landfill's slope failure indicate that it was at an isolated location and the damage was predominately rectified. Again, there is no evidence or data that supports the supposition that the minor change in landfill shape and size due to the failure impacts the capacity of the Wallkill River to convey water through the Black Dirt Region.

APPENDIX B

STERLING, AUGUST 17, 2012, ORANGE COUNTY LANDFILL - CHEECHUNK CANAL SEEP SAMPLING WORK PLAN
&
STERLING, SEPTEMBER 20, 2012, ORANGE COUNTY LANDFILL - CHEECHUNK CANAL SEEP SAMPLING RESULTS

STERLING
Sterling Environmental Engineering, P.C.

August 17, 2012

Ms. Susan Edwards, P.E.
Chief, Remedial Section D
NYS Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau E, 12th Floor
625 Broadway
Albany, New York 12233-7017

Subject: Orange County Landfill
NYS Inactive Hazardous Waste Site No. 336007
Cheechunk Canal Seep Sampling Work Plan
STERLING File #2010-15

Dear Ms. Edwards,

In response to your letter dated July 16, 2012, the following Work Plan is provided outlining the sampling methodology and procedures for the sampling of seeps along the Cheechunk Canal adjacent to the Orange County Landfill to determine whether the seeps contain leachate constituents and to determine if the Landfill is impacting the canal.

A meeting was conducted August 16, 2012 at the Landfill with Steven Parisio and Carl Hoffman of the NYSDEC and Sterling Environmental Engineering, P.C. (STERLING). Due to heavy vegetation and limited access, the selection of sampling locations could not be finalized. We will return with a boat during the field sampling event to access the seep locations.

Field Sampling:

Sampling will be conducted by STERLING on August 22, 2012 at the following locations:

- Aqueous and floc samples will be obtained at up to three (3) seep locations adjacent to the canal near the closed landfill.
- An aqueous and floc sample will be obtained at one (1) seep location adjacent to canal upstream of and away from the potential influence of the closed landfill.
- One (1) aqueous grab sample will be obtained from the leachate manhole. A floc sample cannot be obtained at this location.
- Two (2) aqueous grab samples will be obtained from the canal; one (1) adjacent to the largest observed seep and one (1) upstream of the landfill site.

This results in a total of seven (7) aqueous samples and four (4) floc samples. A boat will be furnished by STERLING.

The grab samples will be obtained at the water surface using a wide mouth glass jar. The aqueous samples will be obtained by use of a peristaltic pump and dedicated tubing.

Field parameters will be measured as follows.

Water Depth, pH, Specific Conductivity, Temperature, and Oxidation Reduction Potential (ORP) measurements will be recorded in the field on data sheets, and provided in the report for sampled locations.

Aqueous samples will be analyzed for NYSDEC 6 NYCRR 360 "Baseline Parameters".

In accordance with NYSDEC's request, floc samples will be analyzed for TOC, Iron, Aluminum, Si, Mn, and Arsenic.

Additionally, an explosive gas survey of the landfill perimeter will be conducted.

Reporting:

A final letter report and original laboratory data sheets will be prepared with appropriate observations and conclusions.

Please contact me should you have any questions.

Very truly yours,

STERLING ENVIRONMENTAL ENGINEERING, P.C.

Mark P. Millspaugh, P.E.
President
mark@sterlingenvironmental.com

MPM/bc
Email/First Class Mail

cc: Peter Hammond, Orange County Department of Public Works
Steven Parisio, PG, NYSDEC Region 3
Carl Hoffman, P.E., NYSDEC Central Office

STERLING
Sterling Environmental Engineering, P.C.

September 20, 2012

Ms. Susan Edwards, P.E.
Chief, Remedial Section D
NYS Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau E, 12th Floor
625 Broadway
Albany, New York 12233-7017

Subject: Orange County Landfill
NYS Inactive Hazardous Waste Site No. 336007
Cheechunk Canal Seep Sampling
STERLING File #2010-15 (Task 310)

Dear Ms. Edwards,

In accordance with the August 17, 2012 Work Plan approved by the NYSDEC, Sterling Environmental Engineering, P.C. (STERLING) met with the NYSDEC at the Orange County Landfill on August 16, 2012 for the purpose of selecting sampling locations. Due to the limited accessibility of the shoreline of the Cheechunk Canal, the NYSDEC deferred the decision on sampling locations until the August 22, 2012 sampling event.

On August 22, 2012, STERLING provided a canoe so that NYSDEC personnel could inspect the entire riverbank along the Landfill in order to identify seep locations and to select suitable, representative sampling locations. Based upon the inspection, samples were obtained as follows:

- Aqueous and floc samples were obtained at two (2) seep locations adjacent to the canal near the closed Landfill. These locations are shown as Seep 1 and Seep 3 on Figure 1.

- One (1) background floc sample was obtained at the seep location indicated as Seep 2 on Figure 1 containing precipitate similar in appearance to the aforementioned floc samples adjacent to canal, at a location not adjacent to the footprint of the closed Landfill.

- One (1) aqueous grab sample was obtained from the leachate manhole shown as LMH1 in Figure 1. A floc sample was not obtained at this location as there was no visible precipitate.

- Two (2) aqueous grab samples were obtained from the canal; one (1) adjacent to the largest observed seep shown as SW02 and one (1) upstream of the Landfill site shown as SW01 (see Figure 1).

This results in a total of five (5) aqueous samples and three (3) floc samples.

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Samples were submitted to TestAmerica, Inc. located in Amherst, NY. The analytical results are summarized by Tables 1 through 3 attached. The full laboratory analytical reports are also provided with this letter.

FINDINGS:

Floc sample results are summarized by Table 1 along with a comparison to Soil Cleanup Objectives (SCOs) stated in CP-51 and 6 NYCRR 375-6. Comparisons are also made to the reported natural range for soils in New York State.

The floc results are consistent with natural occurring levels and are not indicative of a release from the Landfill. In fact, the results for Seep 2, which is not situated in an area which would be influenced by the Landfill, are comparable to the locations near the Landfill. Further, seeps and surficial red staining are also evident on the south side of the canal which cannot be caused by any Landfill influence.

Regarding the analysis of water samples collected at the identified seep and surface water locations, field parameters and sample analytical results are presented in Tables 2 and 3. This data was compared to the surface and groundwater post-closure monitoring data reported in the July 2012 report by Cornerstone Environmental summarizing the 2012 post-closure monitoring event. The two seep locations sampled are nearest to existing groundwater wells PZ-4, MW-3B and MW-222. No appreciable differences were noted in comparing the seep sample results to the reported site groundwater condition.

Ammonia was detected in all seep and surface water locations in excess of the surface water standards ranging from 0.049 mg/l to 40.0 mg/l. Ammonia levels reported for the groundwater at wells PZ-4, MW-3B and MW-222 indicate a range of 0.13 to 5.2 mg/l. While Ammonia levels reported for Seep 1 and Seep 3 are elevated relative to the surface water sample locations in the canal, we also note Ammonia is present in the upgradient groundwater monitoring wells.

Iron was detected in all seep and surface water locations in excess of the surface water standards ranging from 1.4 to 6.5 mg/l. A review of Iron levels reported for groundwater wells PZ-4, MW-3B and MW-222 indicate a range of 2.05 to 126 mg/l. Elevated Iron is also noted in groundwater wells upgradient of the Landfill. The observed Iron concentrations at Seeps 1 and 3 are much lower than the concentration observed in nearby groundwater.

The analysis of the leachate sample from LMH1 was reviewed and compared to the water sample results at the seep locations. Typical leachate parameters (Ammonia, Iron, Manganese, Phenol, etc.) present in the leachate are also present in the seeps at much lower concentrations and except for Ammonia and Iron all parameters are within the applicable surface water standards at the seep locations.

There were no reported exceedances of volatile or semi-volatile parameters at the seep locations.

CONCLUSION:

The analyses of seep, surface water and flocculent samples are consistent with previously reported groundwater quality at the site. The data does not indicate a release from the Landfill has or is currently occurring. The water quality reported for the seeps is within the naturally occurring range. In fact, other seeps and reddish stained areas exist along both sides of the Cheechunk Canal including areas removed from the Landfill.

Accordingly, no further response is recommended regarding these seeps.

Please contact me should you have any questions.

Very truly yours,

STERLING ENVIRONMENTAL ENGINEERING, P.C.

Mark P. Millspaugh, P.E.
President
mark@sterlingenvironmental.com

MPM/bc
Email/First Class Mail
Attachments

cc: Peter Hammond, Orange County Department of Public Works
Steven Parisio, PG, NYSDEC Region 3
Carl Hoffman, P.E., NYSDEC Central Office

2010-15/Correspondence/NYSDEC_Cheechunk Canal Seep Sampling Results_ltr.doc

GIS FIGURE 1

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

2012 CHEECHUNK CANAL SURFACE WATER, SEEP & LANDFILL LEACHATE SAMPLING AND ORANGE COUNTY LANDFILL EXPLOSIVE GAS SURVEY

ORANGE COUNTY

ORANGE COUNTY LANDFILL

TOWN OF GOSHEN — ORANGE CO., N.Y.

PROJ. No.: 2010-15	DATE: 8-28-2012	SCALE: AS SHOWN	DWG. NO. 2010-15003GIS	FIGURE 1

TABLE 1
Orange County Landfill
2012 Floc Sample Results

Lab Name: TestAmerica Buffalo
Customer: Sterling Environmental Engineering PC
Job No: 480-24283-1
Date :09/04/2012

Date Sampled **08/22/12**

METALS BY 6010B (SOLID) MG/KG

Analyte	CP-51 Standard or Guidance Value (PPM)	6 NYCRR Part 375-6* (PPM)	Reported New York Soil Natural Range(1) (PPM)	Floc 1		Floc 2		Floc 3	
Aluminum	10,000	NA	11,000 - 22,000	11,000		11,000		15,000	
Arsenic	NA	13 a	2.2 - 28	44		15		25	
Iron	2,000	NA	0 - 30,000	27,000	B	25,000	B	33,000	B
Manganese	NA	1,600 a	146 - 2,285	470		1,100		750	
Selenium	NA	3.9 a	0.4 - 5.1	0.79	U	0.92	U	0.77	U

GENERAL CHEMISTRY BY 9060 (SOLID) MG/KG

Total Organic Carbon	NA	NA	NA	120	B	2800	B	23	B

Notes:

NA - No standard or guidance value is available for these substances.

B - Compound was found in the blank and sample.

U - Indicates the analyte was analyzed for but not detected.

* - Unrestricted Use Soil Cleanup Objectives Table 375-6.8(a)

(1) = New York State Brownfield Cleanup Program Development of Soil Cleanup Objectives Techinical Support Document, Appendix D - Concentration of Selected Analytes in Rural New York State Surface Soils: A Summary Report on the Statewide Rural Surface Soil Survey, dated August 2005.

a - For constituents where the calculated SCO was lower than the rural soil background concentration, as determined by the NYSDEC and Department of Health rural soil survey, the rural soil background concentration is used as the Track 1 SCO value for this use of the site.

TABLE 2
Orange County Landfill
2012 Seep Sampling - Water Quality Monitoring
Field Parameters Measurements Obtained 8/22/2012

Parameter	Title 6 Part 703.5 Standards	Units	Seep 01 (Adjacent to Landfill)	Seep 03 (Adjacent to Landfill)	SW01 (Canal Upstream of Landfill)	SW02 (Canal Adjacent to Seep 03)	LMH1 (Leachate Manhole)
Specific Conductance	--	mS/cm^c	0.772	0.695	0.479	0.488	3.129
Temperature	--	degrees C	20.77	23.88	22.17	23.25	24.16
pH	6.5<pH< 8.5	pH Units	7.03	---	7.78	7.80	---
ORP	--	mV	-90.6	-77.0	43.9	-20.6	-46.1
Dissolved Oxygen	--	mg/L	9.3	8.17	6.78	6.68	8.05

Values in **BOLD** indicate an exceedance of applicable water quality standard or guidance value.

--- = No standard or not measured.

TABLE 3
Orange County Landfill
2012 Seep Sampling - Water Quality Results
August 22, 2012

Analyte	CAS Number	Units	Specific Method		Reports To	Reg 1	SW01 Canal Upstream of Landfill 08/22/12	SW02 Canal Adjacent to Seep 03 08/22/12	Seep 01 Adjacent to Landfill 08/22/12	Seep 03 Adjacent to Landfill 08/22/12	LMH1 Leachate Manhole 08/22/12
1,1,1-Trichloroethane	71-55-6	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
1,1,2,2-Tetrachloroethane	79-34-5	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
1,1,2-Trichloroethane	79-00-5	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
1,1-Dichloroethane	75-34-3	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
1,1-Dichloroethene	75-35-4	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
1,2,3-Trichloropropane	96-18-4	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
1,2-Dibromo-3-Chloropropane	96-12-8	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
1,2-Dibromoethane	106-93-4	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
1,2-Dichlorobenzene	95-50-1	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	5(1)	ND	ND	ND	ND	ND
1,2-Dichloroethane	107-06-2	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
1,2-Dichloropropane	78-87-5	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
1,3-Dichlorobenzene	541-73-1	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	5(1)	ND	ND	ND	ND	ND
1,4-Dichlorobenzene	106-46-7	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	5(1)	ND	ND	ND	ND	ND
2-Butanone (MEK)	78-93-3	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
2-Chloroethyl vinyl ether	110-75-8	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
4-Methyl-2-pentanone (MIBK)	108-10-1	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
Acetone	67-64-1	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	3.9 J	47 J
Acrylonitrile	107-13-1	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
Alkalinity, Total	N/A	mg/L	Alkalinity	310.2	MRL	---	130 B	140 B	640	850	1500
Aluminum	7429-90-5	mg/L	Metals (ICP)	6010B	MRL	---	1.5	1.6	0.22	0.8	ND
Ammonia	7664-41-7	mg/L	Nitrogen, Ammonia	350.1	MRL	0.044	**0.049**	**0.21**	**40**	**13**	190
Antimony	7440-36-0	mg/L	Metals (ICP)	6010B	MDL	---	ND	ND	ND	ND	ND
Arsenic	7440-38-2	mg/L	Metals (ICP)	6010B	MRL	0.15	ND	ND	0.094	0.048	0.016
Barium	7440-39-3	mg/L	Metals (ICP)	6010B	MRL	---	0.033	0.039	0.44	0.33	0.15
Benzene	71-43-2	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	0.01	ND	ND	ND	ND	ND
Beryllium	7440-41-7	mg/L	Metals (ICP)	6010B	MDL	---	ND*	ND*	ND*	ND*	ND
Biochemical Oxygen Demand	N/A	mg/L	BOD, 5-Day	5210B	MDL	---	3.3 b	ND	ND	5.8 b	13 b
Boron	7440-42-8	mg/L	Metals (ICP)	6010B	MRL	10	0.035 B	0.036 B	0.37 B	0.23 B	1.7 B
Bromide	24959-67-9	mg/L	Anions, Ion Chromatography	300.0_28D	MRL	---	ND	ND	0.65	0.75	10
Bromodichloromethane	75-27-4	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
Bromoform	75-25-2	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
Bromomethane	74-83-9	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
Cadmium	7440-43-9	mg/L	Metals (ICP)	6010B	MDL	0.8	ND	ND	ND	ND	ND
Calcium	7440-70-2	mg/L	Metals (ICP)	6010B	MRL	---	45	46	100	130	140
Carbon disulfide	75-15-0	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
Carbon tetrachloride	56-23-5	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
Chemical Oxygen Demand	N/A	mg/L	COD	410.4	MRL	---	14	15	21	22	380
Chloride	16887-00-6	mg/L	Anions, Ion Chromatography	300.0_28D	MRL	---	46	47	82	63	870
Chlorobenzene	108-90-7	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	5	ND	ND	ND	ND	ND
Chloroethane	75-00-3	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
Chloroform	67-66-3	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
Chloromethane	74-87-3	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
Chromium	7440-47-3	mg/L	Metals (ICP)	6010B	MDL	0.47	0.0016 J	0.0022 J	ND	0.0011 J	0.0030 J
Chromium, hexavalent	18540-29-9	mg/L	Chromium, Hexavalent	7196A	MDL	0.011	ND	ND	ND	ND	ND
cis-1,2-Dichloroethene	156-59-2	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
cis-1,3-Dichloropropene	10061-01-5	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
Cobalt	7440-48-4	mg/L	Metals (ICP)	6010B	MDL	0.005	0.00067 J	ND	ND	0.0034 J	0.014
Color	N/A	Color Units	Color, Colorimetric	2120B	MRL	---	40	50	150	35	250
Copper	7440-50-8	mg/L	Metals (ICP)	6010B	MDL	0.89	0.0034 J	0.0031 J	ND	0.0038 J	0.0054 J
Cyanide, Total	57-12-5	mg/L	Cyanide, Total and/or Amenable	9012A	MDL	0.0052	ND	ND	ND	ND	0.0054 J
Dibromochloromethane	124-48-1	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
Dichlorodifluoromethane	75-71-8	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
Ethylbenzene	100-41-4	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	0.017 GV	ND	ND	ND	ND	ND
Hardness	N/A	mg/L	Hardness, Total	2340C	MRL	---	18 J	180	530	540	860
Iron	7439-89-6	mg/L	Metals (ICP)	6010B	MRL	0.3	**1.4**	**1.4**	**6.5**	**3.2**	5.6
Lead	7439-92-1	mg/L	Metals (ICP)	6010B	MDL	0.45	ND	ND	ND	ND	ND
Magnesium	7439-95-4	mg/L	Metals (ICP)	6010B	MRL	---	15	16	41	51	65
Manganese	7439-96-5	mg/L	Metals (ICP)	6010B	MRL	---	0.14	0.15	0.54	1.7	0.45
Mercury	7439-97-6	mg/L	Mercury (CVAA)	7470A	MDL	0.0007	ND	ND	ND	ND	ND
Methylene Chloride	75-09-2	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
m-Xylene & p-Xylene	179601-23-1	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	65(2)	ND	ND	ND	ND	ND
Nickel	7440-02-0	mg/L	Metals (ICP)	6010B	MRL	0.99	0.0015 J	0.0016 J	0.0093 J	0.0090 J	0.06
Nitrate as N	14797-55-8	mg/L	Nitrogen, Nitrate-Nitrite	NITRATE_CALC	MDL	---	0.77	0.83	ND	0.26	ND
o-Xylene	95-47-6	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	65(2)	ND	ND	ND	ND	ND
Phenolics, Total Recoverable	N/A	mg/L	Phenolics, Total Recoverable	9066	MRL	---	ND	ND	0.0054 J	ND	0.011
Potassium	7440-09-7	mg/L	Metals (ICP)	6010B	MRL	---	3.2	3.3	23	15	150
Selenium	7782-49-2	mg/L	Metals (ICP)	6010B	MDL	0.0046	ND	ND	ND	ND	ND
Silver	7440-22-4	mg/L	Metals (ICP)	6010B	MDL	0.0001	ND	ND	ND	ND	ND
Sodium	7440-23-5	mg/L	Metals (ICP)	6010B	MRL	---	29	30	81	59	590
Styrene	100-42-5	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
Sulfate	14808-79-8	mg/L	Anions, Ion Chromatography	300.0_28D	MRL	---	19	19	19	7.7	160
Tetrachloroethene	127-18-4	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	1 GV	ND	ND	ND	ND	ND
Thallium	7440-28-0	mg/L	Metals (ICP)	6010B	MDL	0.008	ND	ND	ND	ND	ND
Toluene	108-88-3	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	0.1	ND	ND	ND	ND	ND
Total Dissolved Solids	N/A	mg/L	Solids, Total Dissolved (TDS)	2540C_CALCD	MRL	---	300	300	680	780	2700
Total Kjeldahl Nitrogen	N/A	mg/L	Nitrogen, Total Kjeldahl	351.2	MRL	---	2.4	0.97	38	12	140
Total Organic Carbon	7440-44-0	mg/L	Organic Carbon, Total (TOC)	9060	MRL	---	5.8	5.5	6.1	6	78
trans-1,2-Dichloroethene	156-60-5	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
trans-1,3-Dichloropropene	10061-02-6	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
trans-1,4-Dichloro-2-butene	110-57-6	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
Trichloroethene	79-01-6	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	40	ND	ND	ND	ND	ND
Trichlorofluoromethane	75-69-4	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
Turbidity	N/A	NTU	Turbidity, Nephelometric	180.1	MRL	---	37	29	66	ND	33
Vanadium	7440-62-2	mg/L	Metals (ICP)	6010B	MRL	0.014	0.0043 J	0.0033 J	0.0017 J	0.0074	0.0057
Vinyl acetate	108-05-4	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
Vinyl chloride	75-01-4	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	---	ND	ND	ND	ND	ND
Xylenes, Total	1330-20-7	ug/L	Volatile Organic Compounds (GC/MS)	624_5ML	MDL	65(2)	ND	ND	ND	ND	ND
Zinc	7440-66-6	mg/L	Metals (ICP)	6010B	MRL	2.96	0.0069 J B	0.0095 J B	0.0096 J B	0.010 B	0.0045 J B

Reg 1 T.O.G.S. 1.1.1 Surface Water Standards C Streams.

Bold = Value indicates reported concentration exceeds applicable water quality standard.
B = Compound was found in the blank and sample.
GV = Guidance Value
J = Result is less than the reporting limit but greater than or equal to the method detection limit and the concentration is an approximate value.
(1) = Applies to the sum of 1,2-, 1,3- and 1,4-Dichlorobenzene.
(2) = Applies to the sum of m-, o- and p-Xylene.
* = 11 ug/L, when hardness is less than or equal to 75 ppm; 1,100 ug/L when hardness is greater than 75 ppm
MDL = Method Detection Limit
MRL = Method Reporting Limit
ND = Not Detected
--- = No Existing Standard
b = Result Detected in the USB

APPENDIX C

NYSDEC, AUGUST 24, 2012, REGION 3/SOLID WASTE PROGRAM, SOLID WASTE MANAGEMENT FACILITY SITE VISIT REPORT (AUGUST 22, 2012) - ORANGE COUNTY LANDFILL, TOWN OF GOSHEN, ORANGE COUNTY

Region 3/Solid Waste Program
Solid Waste Management Facility Site Visit Report

Facility Name/Location:	Orange County Landfill, T-Goshen, Orange County
Date of Site Visit:	August 22, 2012
DEC Staff Present:	Steven Parisio, Carl Hoffman
Others Present:	Mark Millspaugh, Nathan Shafer Sterling Environmental Engineering P.C.
Background Information:	Concerns have been expressed by the public regarding “orange goo” seeping from the bank of the Cheechunk Canal (Wallkill River) downslope of the landfill. The County has agreed to collect and analyze environmental samples to determine whether these discharges are impacting water quality or otherwise pose a threat to the environment. After consultation with Department staff, a sampling plan was submitted on August 17, 2012 by Sterling Environmental Engineering P.C on behalf of the County. The plan includes sampling of groundwater (from seeps), surface water and leachate for Part 360 baseline parameters and sampling of iron flocs for iron, TOC, arsenic and other selected metals.
Purpose of Site Visit:	To observe and assist with sampling and to collect split samples for analysis by the Department’s contact lab.
New Issues and Follow-up Required:	Department staff collected 3 water samples and 2 iron floc samples which were splits of samples collected by Sterling. Table 1 provides a summary of the samples collected and Figure 1 shows the sampling locations.
Report prepared by:	Steven Parisio
Report Date:	August 24, 2012

Figure 1. Orange County Landfill and vicinity, August 22, 2012 sampling locations.

Table 1. Samples Collected at Orange Co. Landfill on August 22, 2012 by Sterling Environmental Engineering, P.C. & NYSDEC					
Sterling Sample ID	DEC Split Sample ID	Sample Time	Latitude	Longitude	Sample Description/Comments
FLOC 02	NA	11:00	N41.39458	W74.39368	Background sample of grey silt w/iron floc coatings; No DEC split due to insufficient sample volume
SW 01	121115-OCLF-01	12:11	N41.38489	W74.40900	Surface water from Cheechunk Canal upstream of landfill
LMH	121115-OCLF-02	13:00	N41.38882	W74.40141	Leachate from manhole upslope of seeps
FLOC 01	121115-OCLF-04	13:15	N41.38846	W74.40131	Gray silt with iron floc coating on river bank downslope of leachate manhole; Upstream and smaller of two adjacent seeps
FLOC 03	121115-OCLF-05	13:40	N41.38846	W74.40128	Gray silt with iron floc coating on river bank downslope of leachate manhole; Downstream and larger of two adjacent seeps
GW 03	121115-OCLF-03	14:00	N41.38846	W74.40128	Groundwater discharging from seep in area of sample FLOC 03 (DEC Split 121115-OCLF-05)
SW 02	NA	14:00	N41.38846	W74.40128	Surface water where seeps with iron flocs enter the Cheechunk Canal
GW 01	NA	15:00	N41.38846	W74.40131	Groundwater discharging from seep in area of sample FLOC 01 (DEC Split 121115-OCLF-04)

A thorough reconnaissance of the Cheechunk Canal was carried out using a canoe provided by Sterling. Both banks were examined along a stretch extending from the upstream end of the landfill to a point well beyond the downstream end of the landfill (see figure 1). Several flowing seeps with iron flocs were observed in the area immediately downslope of the leachate manhole. Dried iron floc residues without active seepage were observed at two locations considered to be outside of the influence of landfill-derived groundwater contamination.

Iron floc residues were observed adhering to exposed plant roots in an erosional gully in the bank of the canal opposite the landfill.. No moisture was present on the day of our sampling event. This is the location where seepage and iron flocs had been observed by Department staff during a site visit on April 18, 2012. A sample was collected from this location but was not submitted for analysis because a more suitable background sample was observed further downstream.

Sterling collected a floc sample (FLOC 02) from the northwest bank (landfill side) of the canal at a location far enough downstream to be outside of the immediate influence of landfill-derived groundwater contamination. The sample consisted of gray silt with a coating of iron floc. A DEC split sample was not collected due to inadequate sample volume. No groundwater sample was collected here because the rate and volume of the seep was inadequate to allow collection of a liquid sample.

An upstream surface water sample (SW 01) was collected by Sterling in the Cheechunk Canal. A split sample (121115-OCLF-01) was collected by DEC staff.

An iron floc sample (Sterling FLOC 01, DEC split 121115-OCLF-04) and a groundwater seep sample (Sterling GW 01) was collected from this location which is downslope of the leachate manhole. Iron floc was present as only a thin film on the surface of the gray silt and a pure iron floc sample could not be collected. The iron floc sample consisted of gray silt with a thin coating of iron floc.

Slightly downstream of the FLOC 02 sampling location, a larger area of seepage and iron floc was observed. Iron floc sample FLOC3 (Sterling ID) and 121115-OCLF-05 (DEC split) were collected here. Iron floc was present as only a thin film on the surface of the gray silt and a pure iron floc sample could not be collected. The iron floc sample consisted of gray silt with a thin coating of iron floc.

Groundwater seeping out of the area of iron floc deposition at sample location FLOC 03 was collected using a peristaltic pump. A small depression was excavated in the seepage channel downstream of the iron floc deposits and just upstream of where the seep enters the canal. By letting the silt settle out and by keeping the end of the pump tubing just below the water surface, a turbidity-free sample of the seep discharge was collected. This was sample GW 03 (Sterling) and 121115-OCLF-05 (DEC split sample).

APPENDIX D

STERLING, OCTOBER 19, 2012, ORANGE COUNTY LANDFILL - WORK PLAN TO EVALUATE LEACHATE COLLECTION SYSTEM

STERLING

Sterling Environmental Engineering, P.C.

October 19, 2012

Ms. Susan Edwards, P.E.
Chief, Remedial Section D
NYS Department of Environmental Conservation
Division of Environmental Remediation
Remedial Bureau E, 12th Floor
625 Broadway
Albany, New York 12233-7017

Subject: Orange County Landfill
Work Plan to Evaluate Leachate Collection System
STERLING File #2010-15 (Task 310)

Dear Ms. Edwards,

On Monday, October 15, 2012, I met with Mr. Peter Hammond and Mr. Brian Ritzinger at the Orange County Landfill to determine an appropriate course of action to assess the integrity of the existing leachate collection system upslope of the recently sampled seeps and leachate manhole. Results of the sampling were provided to the New York State Department of Environmental Conservation (NYSDEC) by letter dated September 20, 2012 and were also the subject of a conference call with the NYSDEC on October 10, 2012.

Following the meeting at the Landfill, Brian Ritzinger and I inspected leachate Tanks 4 and 5 along with the adjacent pump chambers. We also inspected the manhole between leachate Tanks 4 and 5 which was previously observed to contain a pump and riser pipe. It is this manhole and pump system that Mr. Carl Hoffman specifically mentioned during the October 10, 2012 conference call.

Brian Ritzinger and I determined that the leachate collection trenches convey collected leachate by gravity to the sumps adjacent to the leachate tanks. Manhole MH-9, upon further evaluation, is no longer in use and the electrical service is not connected. Operational records indicate the manhole is regularly pumped out when the leachate tanks are emptied.

Insomuch as the pump and forcemain from MH-9 are not in use, there is no need to conduct an integrity test of the forcemain. Rather, Orange County will proceed to obtain price quotes from qualified contractors capable of performing internal video inspections of the leachate collection trench pipes between leachate Tanks 4 and 5.

The County has determined it cannot use the inspection equipment maintained by the Sewer Department due to access limitations and observed explosive atmosphere. This inspection will require the services of a trained, qualified contractor.

The County has determined that competitive quotes should be obtained and Sterling Environmental Engineering, P.C. is proceeding to develop the Request for Proposals.

"Serving our clients and the environment since 1993"

24 Wade Road ✦ Latham, New York 12110 ✦ Tel: 518-456-4900 ✦ Fax: 518-456-3532
E-mail: sterling@sterlingenvironmental.com ✦ Website: www.sterlingenvironmental.com

Please contact me should you have any questions.

Very truly yours,

STERLING ENVIRONMENTAL ENGINEERING, P.C.

Mark P. Millspaugh

Mark P. Millspaugh, P.E.
President
mark@sterlingenvironmental.com

MPM/bc
Email/First Class Mail

cc: Peter Hammond, Orange County Department of Public Works
Steven Parisio, PG, NYSDEC Region 3
Carl Hoffman, P.E., NYSDEC Central Office

2010-15/Correspondence/NYSDEC_Work Plan To Evaluate Leachate Collection System_ltr.doc

APPENDIX E

AUGUST 21, 2013
CHEECHUNK CANAL SEEP SAMPLING
ANALYTICAL RESULTS

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Buffalo
10 Hazelwood Drive
Amherst, NY 14228-2298
Tel: (716)691-2600

TestAmerica Job ID: 480-44452-1
Client Project/Site: Orange County Landfill

For:
Sterling Environmental Engineering PC
24 Wade Road
Latham, New York 12110

Attn: Nathan J Shaffer

Authorized for release by:
9/4/2013 3:48:31 PM

Lisa Shaffer, Project Manager I
lisa.shaffer@testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Qualifiers

Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
B	Compound was found in the blank and sample.

General Chemistry

Qualifier	Qualifier Description
H	Sample was prepped or analyzed beyond the specified holding time
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
*	LCS or LCSD exceeds the control limits
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA, DLCK or MRL standard: Instrument related QC exceeds the control limits.
B	Compound was found in the blank and sample.
b	Result Detected in the Unseeded Control blank (USB).

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

1 2 3 4 5 6 7 8 9 10 11 12 13 14

Job ID: 480-44452-1

Laboratory: TestAmerica Buffalo

Narrative

Job Narrative
480-44452-1

Comments
No additional comments.

Receipt
The samples were received on 8/23/2013 2:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperature of the cooler at receipt was 2.7º C.

HPLC
Method(s) 300.0: The continuing calibration verification (CCV) for Bromide associated with batch 135669 recovered above the upper control limit. The samples associated with this CCV were non-detects for the affected analytes; therefore, the data have been reported.

No other analytical or quality issues were noted.

Metals
Method(s) 6010B: The Method Blank for batch 480-135533 contained total potassium above the method detection limit. This target analyte concentration was less than the reporting limit (RL); therefore, re-extraction and/or re-analysis of samples GW-A (480-44452-1), GW-B (480-44452-2), GW-D (480-44452-3) was not performed.

Method(s) 6010B: The Method Blank for batch 480-136979 contained dissolved aluminum, barium, calcium, manganese, and zinc above the method detection limits. These target analyte concentrations were less than the reporting limits (RLs); therefore, re-extraction and/or re-analysis of sample GW-D (480-44452-3) was not performed.

No other analytical or quality issues were noted.

General Chemistry
Method(s) SM 2540C: Due to the matrix, the initial volume(s) used for the following sample(s) deviated from the standard procedure: GW-D (480-44452-3). The reporting limits (RLs) have been adjusted proportionately.

Method(s) 310.2: The method blank for batch 136002 contained Alkalinity above the method detection limit. This target analyte concentration was less than the reporting limit (RL); therefore, re-extraction and/or re-analysis of samples was not performed.GW-A (480-44452-1), GW-B (480-44452-2), GW-D (480-44452-3)

Method(s) 351.2: The method blank for batch 135990 contained TKN above the method detection limit. This target analyte concentration was less than the reporting limit (RL); therefore, re-extraction and/or re-analysis of samples was not performed.GW-B (480-44452-2), GW-D (480-44452-3)

Method(s) SM 5210B: For batch # 135640, the USB dilution water D.O. depletion was greater than 0.2 mg/L but less than the reporting limit of 2.0 mg/L. The associated sample results are reported. (USB 480-135640/1)

Method(s) 7196A: The following samples were received outside of holding time: GW-A (480-44452-1), GW-B (480-44452-2), GW-D (480-44452-3).

Method(s) 335.4, 9012A: The method blank for batch 135893 contained Cyanide above the method detection limit. This target analyte concentration was less than the reporting limit (RL); therefore, re-extraction and/or re-analysis of samples was not performed. GW-B (480-44452-2)

No other analytical or quality issues were noted.

1 2 3 4 5 6 7 8 9 10 11 12 13 14

Client Sample ID: GW-A — Lab Sample ID: 480-44452-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	0.23		0.20	0.060	mg/L	1		6010B	Total/NA
Barium	0.022		0.0020	0.00070	mg/L	1		6010B	Total/NA
Boron	0.092		0.020	0.0040	mg/L	1		6010B	Total/NA
Calcium	56		0.50	0.10	mg/L	1		6010B	Total/NA
Copper	0.0044	J	0.010	0.0016	mg/L	1		6010B	Total/NA
Iron	0.34		0.050	0.019	mg/L	1		6010B	Total/NA
Magnesium	9.3		0.20	0.043	mg/L	1		6010B	Total/NA
Manganese	0.047		0.0030	0.00040	mg/L	1		6010B	Total/NA
Potassium	2.2	B	0.50	0.10	mg/L	1		6010B	Total/NA
Sodium	16		1.0	0.32	mg/L	1		6010B	Total/NA
Zinc	0.0017	J	0.010	0.0015	mg/L	1		6010B	Total/NA
Chloride	23		0.50	0.28	mg/L	1		300.0	Total/NA
Sulfate	27		2.0	0.35	mg/L	1		300.0	Total/NA
Alkalinity, Total	170	B	50	20	mg/L	5		310.2	Total/NA
Ammonia	0.018	J	0.020	0.0090	mg/L	1		350.1	Total/NA
Total Kjeldahl Nitrogen	0.50		0.20	0.15	mg/L	1		351.2	Total/NA
Nitrate as N	0.33		0.050	0.020	mg/L	1		353.2	Total/NA
Chemical Oxygen Demand	18		10	5.0	mg/L	1		410.4	Total/NA
Chromium, hexavalent	0.0087	J H	0.010	0.0050	mg/L	1		7196A	Total/NA
Total Organic Carbon	5.6		1.0	0.43	mg/L	1		9060	Total/NA
Hardness	180		4.0	1.1	mg/L	1		SM 2340C	Total/NA
Total Dissolved Solids	250		10	4.0	mg/L	1		SM 2540C	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Turbidity	7.6		1.0	1.0	NTU	1		180.1	Total/NA
Color	50		5.0	5.0	Color Units	1		SM 2120B	Total/NA

Client Sample ID: GW-B — Lab Sample ID: 480-44452-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	0.67		0.20	0.060	mg/L	1		6010B	Total/NA
Barium	0.032		0.0020	0.00070	mg/L	1		6010B	Total/NA
Boron	0.080		0.020	0.0040	mg/L	1		6010B	Total/NA
Calcium	72		0.50	0.10	mg/L	1		6010B	Total/NA
Chromium	0.0018	J	0.0040	0.0010	mg/L	1		6010B	Total/NA
Cobalt	0.0065		0.0040	0.00063	mg/L	1		6010B	Total/NA
Copper	0.040		0.010	0.0016	mg/L	1		6010B	Total/NA
Iron	1.5		0.050	0.019	mg/L	1		6010B	Total/NA
Magnesium	12		0.20	0.043	mg/L	1		6010B	Total/NA
Manganese	0.93		0.0030	0.00040	mg/L	1		6010B	Total/NA
Nickel	0.027		0.010	0.0013	mg/L	1		6010B	Total/NA
Potassium	3.3	B	0.50	0.10	mg/L	1		6010B	Total/NA
Sodium	2.0		1.0	0.32	mg/L	1		6010B	Total/NA
Zinc	0.011		0.010	0.0015	mg/L	1		6010B	Total/NA
Chloride	3.0		0.50	0.28	mg/L	1		300.0	Total/NA
Sulfate	86		2.0	0.35	mg/L	1		300.0	Total/NA
Alkalinity, Total	130	B	50	20	mg/L	5		310.2	Total/NA
Ammonia	0.075		0.020	0.0090	mg/L	1		350.1	Total/NA
Total Kjeldahl Nitrogen	4.1	B	0.40	0.30	mg/L	2		351.2	Total/NA
Nitrate as N	0.28		0.050	0.020	mg/L	1		353.2	Total/NA
Chemical Oxygen Demand	210		10	5.0	mg/L	1		410.4	Total/NA

This Detection Summary does not include radiochemical test results.

1 2 3 4 5 6 7 8 9 10 11 12 13 14

Client Sample ID: GW-B (Continued) — Lab Sample ID: 480-44452-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Cyanide, Total	0.012	B	0.010	0.0050	mg/L	1		9012A	Total/NA
Total Organic Carbon	67		1.0	0.43	mg/L	1		9060	Total/NA
Phenolics, Total Recoverable	0.0069	J	0.010	0.0050	mg/L	1		9066	Total/NA
Hardness	240		4.0	1.1	mg/L	1		SM 2340C	Total/NA
Total Dissolved Solids	430		10	4.0	mg/L	1		SM 2540C	Total/NA
Biochemical Oxygen Demand	2.0	b	2.0	2.0	mg/L	1		SM 5210B	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Turbidity	19		1.0	1.0	NTU	1		180.1	Total/NA
Color	400		50	50	Color Units	10		SM 2120B	Total/NA

Client Sample ID: GW-D — Lab Sample ID: 480-44452-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	4.4		0.20	0.060	mg/L	1		6010B	Total/NA
Arsenic	0.11		0.010	0.0056	mg/L	1		6010B	Total/NA
Barium	0.90		0.0020	0.00070	mg/L	1		6010B	Total/NA
Boron	0.25		0.020	0.0040	mg/L	1		6010B	Total/NA
Cadmium	0.0014		0.0010	0.00050	mg/L	1		6010B	Total/NA
Calcium	140		0.50	0.10	mg/L	1		6010B	Total/NA
Chromium	0.0058		0.0040	0.0010	mg/L	1		6010B	Total/NA
Cobalt	0.0051		0.0040	0.00063	mg/L	1		6010B	Total/NA
Copper	0.013		0.010	0.0016	mg/L	1		6010B	Total/NA
Iron	12		0.050	0.019	mg/L	1		6010B	Total/NA
Lead	0.0075		0.0050	0.0030	mg/L	1		6010B	Total/NA
Magnesium	57		0.20	0.043	mg/L	1		6010B	Total/NA
Manganese	1.1		0.0030	0.00040	mg/L	1		6010B	Total/NA
Nickel	0.015		0.010	0.0013	mg/L	1		6010B	Total/NA
Potassium	13	B	0.50	0.10	mg/L	1		6010B	Total/NA
Sodium	64		1.0	0.32	mg/L	1		6010B	Total/NA
Vanadium	0.0067		0.0050	0.0015	mg/L	1		6010B	Total/NA
Zinc	0.033		0.010	0.0015	mg/L	1		6010B	Total/NA
Aluminum	0.15	J B	0.20	0.060	mg/L	1		6010B	Dissolved
Barium	0.66	B	0.0020	0.00070	mg/L	1		6010B	Dissolved
Boron	0.20		0.020	0.0040	mg/L	1		6010B	Dissolved
Cadmium	0.00054	J	0.0010	0.00050	mg/L	1		6010B	Dissolved
Calcium	130	B	0.50	0.10	mg/L	1		6010B	Dissolved
Copper	0.0045	J	0.010	0.0016	mg/L	1		6010B	Dissolved
Lead	0.0040	J	0.0050	0.0030	mg/L	1		6010B	Dissolved
Magnesium	52		0.20	0.043	mg/L	1		6010B	Dissolved
Manganese	0.12	B	0.0030	0.00040	mg/L	1		6010B	Dissolved
Nickel	0.0084	J	0.010	0.0013	mg/L	1		6010B	Dissolved
Potassium	11		0.50	0.10	mg/L	1		6010B	Dissolved
Sodium	62		1.0	0.32	mg/L	1		6010B	Dissolved
Zinc	0.0066	J B	0.010	0.0015	mg/L	1		6010B	Dissolved
Bromide	1.0	^ *	0.20	0.073	mg/L	1		300.0	Total/NA
Chloride	73		0.50	0.28	mg/L	1		300.0	Total/NA
Sulfate	10		2.0	0.35	mg/L	1		300.0	Total/NA
Alkalinity, Total	640	B	100	40	mg/L	10		310.2	Total/NA
Ammonia	8.0		0.10	0.045	mg/L	5		350.1	Total/NA
Total Kjeldahl Nitrogen	8.2	B	1.0	0.75	mg/L	5		351.2	Total/NA

This Detection Summary does not include radiochemical test results.

1 2 3 4 5 6 7 8 9 10 11 12 13 14

Client Sample ID: GW-D (Continued)

Lab Sample ID: 480-44452-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Nitrate as N	0.075		0.050	0.020	mg/L	1		353.2	Total/NA
Chemical Oxygen Demand	18		10	5.0	mg/L	1		410.4	Total/NA
Chromium, hexavalent	0.0079	J H	0.010	0.0050	mg/L	1		7196A	Total/NA
Total Organic Carbon	5.5		1.0	0.43	mg/L	1		9060	Total/NA
Hardness	760		10	2.6	mg/L	1		SM 2340C	Total/NA
Total Dissolved Solids	830		40	16	mg/L	1		SM 2540C	Total/NA
Biochemical Oxygen Demand	13	b	2.0	2.0	mg/L	1		SM 5210B	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Turbidity	7100		25	25	NTU	25		180.1	Total/NA
Color	100		50	50	Color Units	10		SM 2120B	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: GW-A
Lab Sample ID: 480-44452-1
Date Collected: 08/21/13 16:40
Matrix: Water
Date Received: 08/23/13 02:00

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**0.23**		0.20	0.060	mg/L		08/23/13 08:20	08/23/13 19:17	1
Antimony	ND		0.020	0.0068	mg/L		08/23/13 08:20	08/23/13 19:17	1
Arsenic	ND		0.010	0.0056	mg/L		08/23/13 08:20	08/23/13 19:17	1
Barium	**0.022**		0.0020	0.00070	mg/L		08/23/13 08:20	08/23/13 19:17	1
Beryllium	ND		0.0020	0.00030	mg/L		08/23/13 08:20	08/23/13 19:17	1
Boron	**0.092**		0.020	0.0040	mg/L		08/23/13 08:20	08/23/13 19:17	1
Cadmium	ND		0.0010	0.00050	mg/L		08/23/13 08:20	08/23/13 19:17	1
Calcium	**56**		0.50	0.10	mg/L		08/23/13 08:20	08/23/13 19:17	1
Chromium	ND		0.0040	0.0010	mg/L		08/23/13 08:20	08/23/13 19:17	1
Cobalt	ND		0.0040	0.00063	mg/L		08/23/13 08:20	08/23/13 19:17	1
Copper	**0.0044**	**J**	0.010	0.0016	mg/L		08/23/13 08:20	08/23/13 19:17	1
Iron	**0.34**		0.050	0.019	mg/L		08/23/13 08:20	08/23/13 19:17	1
Lead	ND		0.0050	0.0030	mg/L		08/23/13 08:20	08/23/13 19:17	1
Magnesium	**9.3**		0.20	0.043	mg/L		08/23/13 08:20	08/23/13 19:17	1
Manganese	**0.047**		0.0030	0.00040	mg/L		08/23/13 08:20	08/23/13 19:17	1
Nickel	ND		0.010	0.0013	mg/L		08/23/13 08:20	08/23/13 19:17	1
Potassium	**2.2**	**B**	0.50	0.10	mg/L		08/23/13 08:20	08/23/13 19:17	1
Selenium	ND		0.015	0.0087	mg/L		08/23/13 08:20	08/23/13 19:17	1
Silver	ND		0.0030	0.0017	mg/L		08/23/13 08:20	08/23/13 19:17	1
Sodium	**16**		1.0	0.32	mg/L		08/23/13 08:20	08/23/13 19:17	1
Thallium	ND		0.020	0.010	mg/L		08/23/13 08:20	08/23/13 19:17	1
Vanadium	ND		0.0050	0.0015	mg/L		08/23/13 08:20	08/23/13 19:17	1
Zinc	**0.0017**	**J**	0.010	0.0015	mg/L		08/23/13 08:20	08/23/13 19:17	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		08/23/13 08:35	08/23/13 13:35	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	ND	^ *	0.20	0.073	mg/L			08/24/13 02:26	1
Chloride	**23**		0.50	0.28	mg/L			08/24/13 02:26	1
Sulfate	**27**		2.0	0.35	mg/L			08/26/13 18:06	1
Alkalinity, Total	**170**	**B**	50	20	mg/L			08/26/13 21:27	5
Ammonia	**0.018**	**J**	0.020	0.0090	mg/L			08/23/13 16:01	1
Total Kjeldahl Nitrogen	**0.50**		0.20	0.15	mg/L		08/26/13 07:41	08/26/13 18:41	1
Nitrate as N	**0.33**		0.050	0.020	mg/L			08/23/13 10:30	1
Chemical Oxygen Demand	**18**		10	5.0	mg/L			08/27/13 16:49	1
Chromium, hexavalent	**0.0087**	**J H**	0.010	0.0050	mg/L			08/23/13 07:45	1
Cyanide, Total	ND		0.010	0.0050	mg/L		08/23/13 11:26	08/26/13 09:20	1
Total Organic Carbon	**5.6**		1.0	0.43	mg/L			08/23/13 16:46	1
Phenolics, Total Recoverable	ND		0.010	0.0050	mg/L		08/26/13 08:00	08/27/13 17:35	1
Hardness	**180**		4.0	1.1	mg/L			08/27/13 12:49	1
Total Dissolved Solids	**250**		10	4.0	mg/L			08/26/13 15:11	1
Biochemical Oxygen Demand	ND		2.0	2.0	mg/L			08/23/13 10:08	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	**7.6**		1.0	1.0	NTU			08/23/13 06:00	1
Color	**50**		5.0	5.0	Color Units			08/23/13 11:30	1

Client Sample ID: GW-B — Lab Sample ID: 480-44452-2

Date Collected: 08/21/13 16:25 — **Matrix: Water**
Date Received: 08/23/13 02:00

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**0.67**		0.20	0.060	mg/L		08/23/13 08:20	08/23/13 19:19	1
Antimony	ND		0.020	0.0068	mg/L		08/23/13 08:20	08/23/13 19:19	1
Arsenic	ND		0.010	0.0056	mg/L		08/23/13 08:20	08/23/13 19:19	1
Barium	**0.032**		0.0020	0.00070	mg/L		08/23/13 08:20	08/23/13 19:19	1
Beryllium	ND		0.0020	0.00030	mg/L		08/23/13 08:20	08/23/13 19:19	1
Boron	**0.080**		0.020	0.0040	mg/L		08/23/13 08:20	08/23/13 19:19	1
Cadmium	ND		0.0010	0.00050	mg/L		08/23/13 08:20	08/23/13 19:19	1
Calcium	**72**		0.50	0.10	mg/L		08/23/13 08:20	08/23/13 19:19	1
Chromium	**0.0018**	**J**	0.0040	0.0010	mg/L		08/23/13 08:20	08/23/13 19:19	1
Cobalt	**0.0065**		0.0040	0.00063	mg/L		08/23/13 08:20	08/23/13 19:19	1
Copper	**0.040**		0.010	0.0016	mg/L		08/23/13 08:20	08/23/13 19:19	1
Iron	**1.5**		0.050	0.019	mg/L		08/23/13 08:20	08/23/13 19:19	1
Lead	ND		0.0050	0.0030	mg/L		08/23/13 08:20	08/23/13 19:19	1
Magnesium	**12**		0.20	0.043	mg/L		08/23/13 08:20	08/23/13 19:19	1
Manganese	**0.93**		0.0030	0.00040	mg/L		08/23/13 08:20	08/23/13 19:19	1
Nickel	**0.027**		0.010	0.0013	mg/L		08/23/13 08:20	08/23/13 19:19	1
Potassium	**3.3**	**B**	0.50	0.10	mg/L		08/23/13 08:20	08/23/13 19:19	1
Selenium	ND		0.015	0.0087	mg/L		08/23/13 08:20	08/23/13 19:19	1
Silver	ND		0.0030	0.0017	mg/L		08/23/13 08:20	08/23/13 19:19	1
Sodium	**2.0**		1.0	0.32	mg/L		08/23/13 08:20	08/23/13 19:19	1
Thallium	ND		0.020	0.010	mg/L		08/23/13 08:20	08/23/13 19:19	1
Vanadium	ND		0.0050	0.0015	mg/L		08/23/13 08:20	08/23/13 19:19	1
Zinc	**0.011**		0.010	0.0015	mg/L		08/23/13 08:20	08/23/13 19:19	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		08/23/13 08:35	08/23/13 13:37	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	ND	^ *	0.20	0.073	mg/L			08/24/13 02:36	1
Chloride	**3.0**		0.50	0.28	mg/L			08/24/13 02:36	1
Sulfate	**86**		2.0	0.35	mg/L			08/26/13 18:17	1
Alkalinity, Total	**130**	**B**	50	20	mg/L			08/26/13 21:27	5
Ammonia	**0.075**		0.020	0.0090	mg/L			08/23/13 16:02	1
Total Kjeldahl Nitrogen	**4.1**	**B**	0.40	0.30	mg/L		08/26/13 07:50	08/26/13 20:17	2
Nitrate as N	**0.28**		0.050	0.020	mg/L			08/23/13 10:31	1
Chemical Oxygen Demand	**210**		10	5.0	mg/L			08/30/13 23:30	1
Chromium, hexavalent	ND	H	0.010	0.0050	mg/L			08/23/13 07:45	1
Cyanide, Total	**0.012**	**B**	0.010	0.0050	mg/L		08/23/13 11:26	08/26/13 09:21	1
Total Organic Carbon	**67**		1.0	0.43	mg/L			08/23/13 17:14	1
Phenolics, Total Recoverable	**0.0069**	**J**	0.010	0.0050	mg/L		08/26/13 08:00	08/27/13 17:44	1
Hardness	**240**		4.0	1.1	mg/L			08/27/13 12:49	1
Total Dissolved Solids	**430**		10	4.0	mg/L			08/26/13 15:12	1
Biochemical Oxygen Demand	**2.0**	**b**	2.0	2.0	mg/L			08/23/13 10:08	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	**19**		1.0	1.0	NTU			08/23/13 06:00	1
Color	**400**		50	50	Color Units			08/23/13 11:30	10

Client Sample ID: GW-D

Lab Sample ID: 480-44452-3

Date Collected: 08/21/13 16:00
Date Received: 08/23/13 02:00
Matrix: Water

Method: 6010B - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	4.4		0.20	0.060	mg/L		08/23/13 08:20	08/23/13 19:21	1
Antimony	ND		0.020	0.0068	mg/L		08/23/13 08:20	08/23/13 19:21	1
Arsenic	0.11		0.010	0.0056	mg/L		08/23/13 08:20	08/23/13 19:21	1
Barium	0.90		0.0020	0.00070	mg/L		08/23/13 08:20	08/23/13 19:21	1
Beryllium	ND		0.0020	0.00030	mg/L		08/23/13 08:20	08/23/13 19:21	1
Boron	0.25		0.020	0.0040	mg/L		08/23/13 08:20	08/23/13 19:21	1
Cadmium	0.0014		0.0010	0.00050	mg/L		08/23/13 08:20	08/23/13 19:21	1
Calcium	140		0.50	0.10	mg/L		08/23/13 08:20	08/23/13 19:21	1
Chromium	0.0058		0.0040	0.0010	mg/L		08/23/13 08:20	08/23/13 19:21	1
Cobalt	0.0051		0.0040	0.00063	mg/L		08/23/13 08:20	08/23/13 19:21	1
Copper	0.013		0.010	0.0016	mg/L		08/23/13 08:20	08/23/13 19:21	1
Iron	12		0.050	0.019	mg/L		08/23/13 08:20	08/23/13 19:21	1
Lead	0.0075		0.0050	0.0030	mg/L		08/23/13 08:20	08/23/13 19:21	1
Magnesium	57		0.20	0.043	mg/L		08/23/13 08:20	08/23/13 19:21	1
Manganese	1.1		0.0030	0.00040	mg/L		08/23/13 08:20	08/23/13 19:21	1
Nickel	0.015		0.010	0.0013	mg/L		08/23/13 08:20	08/23/13 19:21	1
Potassium	13	B	0.50	0.10	mg/L		08/23/13 08:20	08/23/13 19:21	1
Selenium	ND		0.015	0.0087	mg/L		08/23/13 08:20	08/23/13 19:21	1
Silver	ND		0.0030	0.0017	mg/L		08/23/13 08:20	08/23/13 19:21	1
Sodium	64		1.0	0.32	mg/L		08/23/13 08:20	08/23/13 19:21	1
Thallium	ND		0.020	0.010	mg/L		08/23/13 08:20	08/23/13 19:21	1
Vanadium	0.0067		0.0050	0.0015	mg/L		08/23/13 08:20	08/23/13 19:21	1
Zinc	0.033		0.010	0.0015	mg/L		08/23/13 08:20	08/23/13 19:21	1

Method: 6010B - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	0.15	J B	0.20	0.060	mg/L		09/03/13 09:40	09/03/13 16:06	1
Antimony	ND		0.020	0.0068	mg/L		09/03/13 09:40	09/03/13 16:06	1
Arsenic	ND		0.010	0.0056	mg/L		09/03/13 09:40	09/03/13 16:06	1
Barium	0.66	B	0.0020	0.00070	mg/L		09/03/13 09:40	09/03/13 16:06	1
Beryllium	ND		0.0020	0.00030	mg/L		09/03/13 09:40	09/03/13 16:06	1
Boron	0.20		0.020	0.0040	mg/L		08/27/13 08:20	08/28/13 17:10	1
Cadmium	0.00054	J	0.0010	0.00050	mg/L		09/03/13 09:40	09/03/13 16:06	1
Calcium	130	B	0.50	0.10	mg/L		09/03/13 09:40	09/03/13 16:06	1
Chromium	ND		0.0040	0.0010	mg/L		09/03/13 09:40	09/03/13 16:06	1
Cobalt	ND		0.0040	0.00063	mg/L		09/03/13 09:40	09/03/13 16:06	1
Copper	0.0045	J	0.010	0.0016	mg/L		09/03/13 09:40	09/03/13 18:17	1
Iron	ND		0.050	0.019	mg/L		09/03/13 09:40	09/03/13 16:06	1
Lead	0.0040	J	0.0050	0.0030	mg/L		09/03/13 09:40	09/03/13 16:06	1
Magnesium	52		0.20	0.043	mg/L		09/03/13 09:40	09/03/13 16:06	1
Manganese	0.12	B	0.0030	0.00040	mg/L		09/03/13 09:40	09/03/13 16:06	1
Nickel	0.0084	J	0.010	0.0013	mg/L		09/03/13 09:40	09/03/13 16:06	1
Potassium	11		0.50	0.10	mg/L		09/03/13 09:40	09/03/13 16:06	1
Selenium	ND		0.015	0.0087	mg/L		09/03/13 09:40	09/03/13 16:06	1
Silver	ND		0.0030	0.0017	mg/L		09/03/13 09:40	09/03/13 16:06	1
Sodium	62		1.0	0.32	mg/L		09/03/13 09:40	09/03/13 16:06	1
Thallium	ND		0.020	0.010	mg/L		09/03/13 09:40	09/03/13 16:06	1
Vanadium	ND		0.0050	0.0015	mg/L		09/03/13 09:40	09/03/13 16:06	1
Zinc	0.0066	J B	0.010	0.0015	mg/L		09/03/13 09:40	09/03/13 16:06	1

Client Sample ID: GW-D | **Lab Sample ID: 480-44452-3**
Date Collected: 08/21/13 16:00 | **Matrix: Water**
Date Received: 08/23/13 02:00

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		08/23/13 08:35	08/23/13 13:39	1

Method: 7470A - Mercury (CVAA) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		08/27/13 08:30	08/27/13 13:07	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	**1.0**	**^ ***	0.20	0.073	mg/L			08/24/13 02:46	1
Chloride	**73**		0.50	0.28	mg/L			08/24/13 02:46	1
Sulfate	**10**		2.0	0.35	mg/L			08/26/13 18:27	1
Alkalinity, Total	**640**	**B**	100	40	mg/L			08/26/13 22:04	10
Ammonia	**8.0**		0.10	0.045	mg/L			08/23/13 17:00	5
Total Kjeldahl Nitrogen	**8.2**	**B**	1.0	0.75	mg/L		08/26/13 07:50	08/26/13 20:53	5
Nitrate as N	**0.075**		0.050	0.020	mg/L			08/23/13 10:32	1
Chemical Oxygen Demand	**18**		10	5.0	mg/L			08/27/13 16:49	1
Chromium, hexavalent	**0.0079**	**J H**	0.010	0.0050	mg/L			08/23/13 07:45	1
Cyanide, Total	ND		0.010	0.0050	mg/L		08/23/13 11:26	08/26/13 09:22	1
Total Organic Carbon	**5.5**		1.0	0.43	mg/L			08/23/13 17:41	1
Phenolics, Total Recoverable	ND		0.010	0.0050	mg/L		08/26/13 08:00	08/27/13 17:44	1
Hardness	**760**		10	2.6	mg/L			08/27/13 12:49	1
Total Dissolved Solids	**830**		40	16	mg/L			08/26/13 15:13	1
Biochemical Oxygen Demand	**13**	**b**	2.0	2.0	mg/L			08/23/13 10:08	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	**7100**		25	25	NTU			08/23/13 06:00	25
Color	**100**		50	50	Color Units			08/23/13 11:30	10

QC Sample Results

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-44452-1

Method: 6010B - Metals (ICP)

Lab Sample ID: MB 480-135533/1-A
Matrix: Water
Analysis Batch: 135857

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 135533

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		0.20	0.060	mg/L		08/23/13 08:20	08/23/13 18:18	1
Antimony	ND		0.020	0.0068	mg/L		08/23/13 08:20	08/23/13 18:18	1
Arsenic	ND		0.010	0.0056	mg/L		08/23/13 08:20	08/23/13 18:18	1
Barium	ND		0.0020	0.00070	mg/L		08/23/13 08:20	08/23/13 18:18	1
Beryllium	ND		0.0020	0.00030	mg/L		08/23/13 08:20	08/23/13 18:18	1
Boron	ND		0.020	0.0040	mg/L		08/23/13 08:20	08/23/13 18:18	1
Cadmium	ND		0.0010	0.00050	mg/L		08/23/13 08:20	08/23/13 18:18	1
Calcium	ND		0.50	0.10	mg/L		08/23/13 08:20	08/23/13 18:18	1
Chromium	ND		0.0040	0.0010	mg/L		08/23/13 08:20	08/23/13 18:18	1
Cobalt	ND		0.0040	0.00063	mg/L		08/23/13 08:20	08/23/13 18:18	1
Copper	ND		0.010	0.0016	mg/L		08/23/13 08:20	08/23/13 18:18	1
Iron	ND		0.050	0.019	mg/L		08/23/13 08:20	08/23/13 18:18	1
Lead	ND		0.0050	0.0030	mg/L		08/23/13 08:20	08/23/13 18:18	1
Magnesium	ND		0.20	0.043	mg/L		08/23/13 08:20	08/23/13 18:18	1
Manganese	ND		0.0030	0.00040	mg/L		08/23/13 08:20	08/23/13 18:18	1
Nickel	ND		0.010	0.0013	mg/L		08/23/13 08:20	08/23/13 18:18	1
Potassium	0.225	J	0.50	0.10	mg/L		08/23/13 08:20	08/23/13 18:18	1
Selenium	ND		0.015	0.0087	mg/L		08/23/13 08:20	08/23/13 18:18	1
Silver	ND		0.0030	0.0017	mg/L		08/23/13 08:20	08/23/13 18:18	1
Sodium	ND		1.0	0.32	mg/L		08/23/13 08:20	08/23/13 18:18	1
Thallium	ND		0.020	0.010	mg/L		08/23/13 08:20	08/23/13 18:18	1
Vanadium	ND		0.0050	0.0015	mg/L		08/23/13 08:20	08/23/13 18:18	1
Zinc	ND		0.010	0.0015	mg/L		08/23/13 08:20	08/23/13 18:18	1

Lab Sample ID: LCS 480-135533/2-A
Matrix: Water
Analysis Batch: 135857

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 135533

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	10.0	10.3		mg/L		103	80 - 120
Antimony	0.200	0.202		mg/L		101	80 - 120
Arsenic	0.200	0.202		mg/L		101	80 - 120
Barium	0.200	0.207		mg/L		103	80 - 120
Beryllium	0.200	0.204		mg/L		102	80 - 120
Boron	0.200	0.204		mg/L		102	80 - 120
Cadmium	0.200	0.203		mg/L		102	80 - 120
Calcium	10.0	10.0		mg/L		100	80 - 120
Chromium	0.200	0.208		mg/L		104	80 - 120
Cobalt	0.200	0.200		mg/L		100	80 - 120
Copper	0.200	0.206		mg/L		103	80 - 120
Iron	10.0	9.99		mg/L		100	80 - 120
Lead	0.200	0.197		mg/L		98	80 - 120
Magnesium	10.0	10.3		mg/L		103	80 - 120
Manganese	0.200	0.202		mg/L		101	80 - 120
Nickel	0.200	0.197		mg/L		99	80 - 120
Potassium	10.0	10.2		mg/L		102	80 - 120
Selenium	0.200	0.199		mg/L		99	80 - 120
Silver	0.0500	0.0521		mg/L		104	80 - 120

Method: 6010B - Metals (ICP) (Continued)

Lab Sample ID: LCS 480-135533/2-A
Matrix: Water
Analysis Batch: 135857

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 135533

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sodium	10.0	9.94		mg/L		99	80 - 120
Thallium	0.200	0.199		mg/L		99	80 - 120
Vanadium	0.200	0.204		mg/L		102	80 - 120
Zinc	0.200	0.196		mg/L		98	80 - 120

Lab Sample ID: MB 480-135891/1-B
Matrix: Water
Analysis Batch: 136502

Client Sample ID: Method Blank
Prep Type: Dissolved
Prep Batch: 136029

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	ND		0.020	0.0040	mg/L		08/27/13 08:20	08/28/13 16:22	1

Lab Sample ID: LCS 480-135891/2-B
Matrix: Water
Analysis Batch: 136502

Client Sample ID: Lab Control Sample
Prep Type: Dissolved
Prep Batch: 136029

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Boron	0.200	0.206		mg/L		103	80 - 120

Lab Sample ID: LCSD 480-135891/15-B
Matrix: Water
Analysis Batch: 136502

Client Sample ID: Lab Control Sample Dup
Prep Type: Dissolved
Prep Batch: 136029

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Boron	0.200	0.208		mg/L		104	80 - 120	1	20

Lab Sample ID: MB 480-136834/1-B
Matrix: Water
Analysis Batch: 137111

Client Sample ID: Method Blank
Prep Type: Dissolved
Prep Batch: 136979

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	0.124	J	0.20	0.060	mg/L		09/03/13 09:40	09/03/13 15:18	1
Antimony	ND		0.020	0.0068	mg/L		09/03/13 09:40	09/03/13 15:18	1
Arsenic	ND		0.010	0.0056	mg/L		09/03/13 09:40	09/03/13 15:18	1
Barium	0.000960	J	0.0020	0.00070	mg/L		09/03/13 09:40	09/03/13 15:18	1
Beryllium	ND		0.0020	0.00030	mg/L		09/03/13 09:40	09/03/13 15:18	1
Cadmium	ND		0.0010	0.00050	mg/L		09/03/13 09:40	09/03/13 15:18	1
Calcium	0.388	J	0.50	0.10	mg/L		09/03/13 09:40	09/03/13 15:18	1
Chromium	0.00198	J	0.0040	0.0010	mg/L		09/03/13 09:40	09/03/13 15:18	1
Cobalt	ND		0.0040	0.00063	mg/L		09/03/13 09:40	09/03/13 15:18	1
Copper	ND		0.010	0.0016	mg/L		09/03/13 09:40	09/03/13 15:18	1
Iron	0.0279	J	0.050	0.019	mg/L		09/03/13 09:40	09/03/13 15:18	1
Lead	ND		0.0050	0.0030	mg/L		09/03/13 09:40	09/03/13 15:18	1
Magnesium	ND		0.20	0.043	mg/L		09/03/13 09:40	09/03/13 15:18	1
Manganese	0.000680	J	0.0030	0.00040	mg/L		09/03/13 09:40	09/03/13 15:18	1
Nickel	ND		0.010	0.0013	mg/L		09/03/13 09:40	09/03/13 15:18	1
Potassium	ND		0.50	0.10	mg/L		09/03/13 09:40	09/03/13 15:18	1
Selenium	ND		0.015	0.0087	mg/L		09/03/13 09:40	09/03/13 15:18	1
Silver	ND		0.0030	0.0017	mg/L		09/03/13 09:40	09/03/13 15:18	1

Method: 6010B - Metals (ICP) (Continued)

Lab Sample ID: MB 480-136834/1-B
Matrix: Water
Analysis Batch: 137111

Client Sample ID: Method Blank
Prep Type: Dissolved
Prep Batch: 136979

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Sodium	ND		1.0	0.32	mg/L		09/03/13 09:40	09/03/13 15:18	1
Thallium	ND		0.020	0.010	mg/L		09/03/13 09:40	09/03/13 15:18	1
Vanadium	ND		0.0050	0.0015	mg/L		09/03/13 09:40	09/03/13 15:18	1
Zinc	0.00416	J	0.010	0.0015	mg/L		09/03/13 09:40	09/03/13 15:18	1

Lab Sample ID: LCS 480-136834/2-B
Matrix: Water
Analysis Batch: 137111

Client Sample ID: Lab Control Sample
Prep Type: Dissolved
Prep Batch: 136979

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	10.0	10.4		mg/L		104	80 - 120
Antimony	0.200	0.203		mg/L		101	80 - 120
Arsenic	0.200	0.206		mg/L		103	80 - 120
Barium	0.200	0.208		mg/L		104	80 - 120
Beryllium	0.200	0.205		mg/L		103	80 - 120
Cadmium	0.200	0.204		mg/L		102	80 - 120
Calcium	10.0	10.6		mg/L		106	80 - 120
Chromium	0.200	0.206		mg/L		103	80 - 120
Cobalt	0.200	0.201		mg/L		100	80 - 120
Copper	0.200	0.213		mg/L		106	80 - 120
Iron	10.0	10.1		mg/L		101	80 - 120
Lead	0.200	0.199		mg/L		100	80 - 120
Magnesium	10.0	10.1		mg/L		101	80 - 120
Manganese	0.200	0.202		mg/L		101	80 - 120
Nickel	0.200	0.198		mg/L		99	80 - 120
Potassium	10.0	9.96		mg/L		99	80 - 120
Selenium	0.200	0.205		mg/L		102	80 - 120
Silver	0.0500	0.0520		mg/L		104	80 - 120
Sodium	10.0	9.97		mg/L		100	80 - 120
Thallium	0.200	0.203		mg/L		102	80 - 120
Vanadium	0.200	0.206		mg/L		103	80 - 120
Zinc	0.200	0.204		mg/L		102	80 - 120

Lab Sample ID: LCSD 480-136834/3-B
Matrix: Water
Analysis Batch: 137111

Client Sample ID: Lab Control Sample Dup
Prep Type: Dissolved
Prep Batch: 136979

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	10.0	10.5		mg/L		105	80 - 120	1	20
Antimony	0.200	0.201		mg/L		101	80 - 120	1	20
Arsenic	0.200	0.204		mg/L		102	80 - 120	1	20
Barium	0.200	0.208		mg/L		104	80 - 120	0	20
Beryllium	0.200	0.206		mg/L		103	80 - 120	0	20
Cadmium	0.200	0.204		mg/L		102	80 - 120	0	20
Calcium	10.0	10.6		mg/L		106	80 - 120	1	20
Chromium	0.200	0.208		mg/L		104	80 - 120	1	20
Cobalt	0.200	0.199		mg/L		100	80 - 120	1	20
Copper	0.200	0.208		mg/L		104	80 - 120	2	20
Iron	10.0	10.1		mg/L		101	80 - 120	0	20

Method: 6010B - Metals (ICP) (Continued)

Lab Sample ID: LCSD 480-136834/3-B
Client Sample ID: Lab Control Sample Dup
Matrix: Water
Prep Type: Dissolved
Analysis Batch: 137111
Prep Batch: 136979

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Lead	0.200	0.198		mg/L		99	80 - 120	1	20
Magnesium	10.0	10.2		mg/L		102	80 - 120	0	20
Manganese	0.200	0.203		mg/L		101	80 - 120	0	20
Nickel	0.200	0.197		mg/L		98	80 - 120	0	20
Potassium	10.0	9.97		mg/L		100	80 - 120	0	20
Selenium	0.200	0.206		mg/L		103	80 - 120	1	20
Silver	0.0500	0.0508		mg/L		102	80 - 120	2	20
Sodium	10.0	9.99		mg/L		100	80 - 120	0	20
Thallium	0.200	0.202		mg/L		101	80 - 120	0	20
Vanadium	0.200	0.206		mg/L		103	80 - 120	0	20
Zinc	0.200	0.205		mg/L		103	80 - 120	1	20

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 480-135544/1-A
Client Sample ID: Method Blank
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 135676
Prep Batch: 135544

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		08/23/13 08:35	08/23/13 12:50	1

Lab Sample ID: LCS 480-135544/2-A
Client Sample ID: Lab Control Sample
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 135676
Prep Batch: 135544

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.00667	0.00683		mg/L		102	80 - 120

Lab Sample ID: MB 480-135891/1-D
Client Sample ID: Method Blank
Matrix: Water
Prep Type: Dissolved
Analysis Batch: 136156
Prep Batch: 136034

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		08/27/13 08:30	08/27/13 13:02	1

Lab Sample ID: LCS 480-135891/2-D
Client Sample ID: Lab Control Sample
Matrix: Water
Prep Type: Dissolved
Analysis Batch: 136156
Prep Batch: 136034

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.00667	0.00653		mg/L		98	80 - 120

Lab Sample ID: LCSD 480-135891/15-D
Client Sample ID: Lab Control Sample Dup
Matrix: Water
Prep Type: Dissolved
Analysis Batch: 136156
Prep Batch: 136034

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	0.00667	0.00643		mg/L		96	80 - 120	2	20

Method: 180.1 - Turbidity, Nephelometric

Lab Sample ID: MB 480-135512/3
Matrix: Water
Analysis Batch: 135512

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	ND		1.0	1.0	NTU			08/23/13 06:00	1

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 480-135669/52
Matrix: Water
Analysis Batch: 135669

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	ND	^	0.20	0.073	mg/L			08/24/13 00:14	1
Chloride	ND		0.50	0.28	mg/L			08/24/13 00:14	1
Sulfate	0.452	J ^	2.0	0.35	mg/L			08/24/13 00:14	1

Lab Sample ID: LCS 480-135669/51
Matrix: Water
Analysis Batch: 135669

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Bromide	2.00	2.34	^ *	mg/L		117	90 - 110
Chloride	20.0	20.4		mg/L		102	90 - 110
Sulfate	20.0	21.9	^	mg/L		109	90 - 110

Lab Sample ID: MB 480-135910/28
Matrix: Water
Analysis Batch: 135910

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Bromide	ND		0.20	0.073	mg/L			08/26/13 17:56	1
Chloride	ND		0.50	0.28	mg/L			08/26/13 17:56	1
Sulfate	ND		2.0	0.35	mg/L			08/26/13 17:56	1

Lab Sample ID: LCS 480-135910/27
Matrix: Water
Analysis Batch: 135910

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Bromide	2.00	2.02		mg/L		101	90 - 110
Chloride	20.0	20.5		mg/L		102	90 - 110
Sulfate	20.0	21.3		mg/L		106	90 - 110

Method: 310.2 - Alkalinity

Lab Sample ID: MB 480-136002/100
Matrix: Water
Analysis Batch: 136002

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total	ND		10	4.0	mg/L			08/26/13 19:40	1

Method: 310.2 - Alkalinity (Continued)

Lab Sample ID: MB 480-136002/126
Matrix: Water
Analysis Batch: 136002

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total	4.05	J	10	4.0	mg/L			08/26/13 20:30	1

Lab Sample ID: MB 480-136002/74
Matrix: Water
Analysis Batch: 136002

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total	ND		10	4.0	mg/L			08/26/13 17:13	1

Lab Sample ID: LCS 480-136002/125
Matrix: Water
Analysis Batch: 136002

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity, Total	50.0	53.4		mg/L		107	90 - 110

Lab Sample ID: LCS 480-136002/73
Matrix: Water
Analysis Batch: 136002

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity, Total	50.0	50.8		mg/L		102	90 - 110

Lab Sample ID: LCS 480-136002/99
Matrix: Water
Analysis Batch: 136002

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity, Total	50.0	52.5		mg/L		105	90 - 110

Method: 350.1 - Nitrogen, Ammonia

Lab Sample ID: MB 480-135721/147
Matrix: Water
Analysis Batch: 135721

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	ND		0.020	0.0090	mg/L			08/23/13 15:59	1

Lab Sample ID: MB 480-135721/195
Matrix: Water
Analysis Batch: 135721

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	ND		0.020	0.0090	mg/L			08/23/13 16:46	1

Method: 350.1 - Nitrogen, Ammonia (Continued)

Lab Sample ID: MB 480-135721/219
Matrix: Water
Analysis Batch: 135721

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	ND		0.020	0.0090	mg/L			08/23/13 17:10	1

Lab Sample ID: MB 480-135721/51
Matrix: Water
Analysis Batch: 135721

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	ND		0.020	0.0090	mg/L			08/23/13 14:25	1

Lab Sample ID: LCS 480-135721/148
Matrix: Water
Analysis Batch: 135721

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Ammonia	1.00	1.01		mg/L		101	90 - 110

Lab Sample ID: LCS 480-135721/196
Matrix: Water
Analysis Batch: 135721

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Ammonia	1.00	0.991		mg/L		99	90 - 110

Lab Sample ID: LCS 480-135721/220
Matrix: Water
Analysis Batch: 135721

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Ammonia	1.00	0.991		mg/L		99	90 - 110

Lab Sample ID: LCS 480-135721/52
Matrix: Water
Analysis Batch: 135721

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Ammonia	1.00	0.990		mg/L		99	90 - 110

Method: 351.2 - Nitrogen, Total Kjeldahl

Lab Sample ID: MB 480-135895/1-A
Matrix: Water
Analysis Batch: 135990

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 135895

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Kjeldahl Nitrogen	ND		0.20	0.15	mg/L		08/26/13 07:41	08/26/13 16:56	1

Method: 351.2 - Nitrogen, Total Kjeldahl (Continued)

Lab Sample ID: LCS 480-135895/2-A
Client Sample ID: Lab Control Sample
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 135990
Prep Batch: 135895

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Kjeldahl Nitrogen	2.50	2.53		mg/L		101	90 - 110

Lab Sample ID: MB 480-135901/1-A
Client Sample ID: Method Blank
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 135990
Prep Batch: 135901

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Kjeldahl Nitrogen	0.167	J	0.20	0.15	mg/L		08/26/13 07:50	08/26/13 16:56	1

Lab Sample ID: LCS 480-135901/2-A
Client Sample ID: Lab Control Sample
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 135990
Prep Batch: 135901

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Kjeldahl Nitrogen	2.50	2.54		mg/L		102	90 - 110

Method: 410.4 - COD

Lab Sample ID: MB 480-136178/27
Client Sample ID: Method Blank
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 136178

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chemical Oxygen Demand	ND		10	5.0	mg/L			08/27/13 16:49	1

Lab Sample ID: MB 480-136178/3
Client Sample ID: Method Blank
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 136178

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chemical Oxygen Demand	ND		10	5.0	mg/L			08/27/13 16:49	1

Lab Sample ID: LCS 480-136178/28
Client Sample ID: Lab Control Sample
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 136178

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chemical Oxygen Demand	25.0	22.5		mg/L		90	90 - 110

Lab Sample ID: LCS 480-136178/4
Client Sample ID: Lab Control Sample
Matrix: Water
Prep Type: Total/NA
Analysis Batch: 136178

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chemical Oxygen Demand	25.0	25.0		mg/L		100	90 - 110

Method: 410.4 - COD (Continued)

Lab Sample ID: MB 480-136903/3
Matrix: Water
Analysis Batch: 136903

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chemical Oxygen Demand	ND		10	5.0	mg/L			08/30/13 23:30	1

Lab Sample ID: LCS 480-136903/4
Matrix: Water
Analysis Batch: 136903

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chemical Oxygen Demand	200	188		mg/L		94	90 - 110

Method: 7196A - Chromium, Hexavalent

Lab Sample ID: MB 480-135649/3
Matrix: Water
Analysis Batch: 135649

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hexavalent	ND		0.010	0.0050	mg/L			08/23/13 07:45	1

Lab Sample ID: LCS 480-135649/4
Matrix: Water
Analysis Batch: 135649

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium, hexavalent	0.0500	0.0470		mg/L		94	85 - 115

Lab Sample ID: 480-44452-1 MS
Matrix: Water
Analysis Batch: 135649

Client Sample ID: GW-A
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium, hexavalent	0.0087	J H	0.0500	0.0592		mg/L		101	85 - 115

Lab Sample ID: 480-44452-2 DU
Matrix: Water
Analysis Batch: 135649

Client Sample ID: GW-B
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Chromium, hexavalent	ND	H	ND		mg/L		NC	15

Method: 9012A - Cyanide, Total and/or Amenable

Lab Sample ID: MB 480-135629/1-A
Matrix: Water
Analysis Batch: 135893

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 135629

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	0.00623	J	0.010	0.0050	mg/L		08/23/13 11:26	08/26/13 09:05	1

Method: 9012A - Cyanide, Total and/or Amenable (Continued)

Lab Sample ID: LCS 480-135629/2-A
Matrix: Water
Analysis Batch: 135893

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 135629

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Cyanide, Total			0.400	0.390		mg/L		98	90 - 110		

Method: 9060 - Organic Carbon, Total (TOC)

Lab Sample ID: MB 480-135841/3
Matrix: Water
Analysis Batch: 135841

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon	ND		1.0	0.43	mg/L			08/23/13 15:24	1

Lab Sample ID: LCS 480-135841/4
Matrix: Water
Analysis Batch: 135841

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Total Organic Carbon			60.0	59.1		mg/L		98	90 - 110		

Method: 9066 - Phenolics, Total Recoverable

Lab Sample ID: MB 480-135940/1-A
Matrix: Water
Analysis Batch: 136188

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 135940

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Phenolics, Total Recoverable	ND		0.010	0.0050	mg/L		08/26/13 08:00	08/27/13 16:28	1

Lab Sample ID: LCS 480-135940/2-A
Matrix: Water
Analysis Batch: 136188

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 135940

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Phenolics, Total Recoverable			0.100	0.0984		mg/L		98	90 - 110		

Lab Sample ID: 480-44452-2 MS
Matrix: Water
Analysis Batch: 136188

Client Sample ID: GW-B
Prep Type: Total/NA
Prep Batch: 135940

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Phenolics, Total Recoverable	0.0069	J	0.100	0.102		mg/L		95	60 - 143		

Lab Sample ID: 480-44452-1 DU
Matrix: Water
Analysis Batch: 136188

Client Sample ID: GW-A
Prep Type: Total/NA
Prep Batch: 135940

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Phenolics, Total Recoverable	ND			0.00518	J	mg/L				NC	20

Method: SM 2120B - Color, Colorimetric

Lab Sample ID: MB 480-135638/3
Matrix: Water
Analysis Batch: 135638

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Color	ND		5.0	5.0	Color Units			08/23/13 11:30	1

Lab Sample ID: LCS 480-135638/4
Matrix: Water
Analysis Batch: 135638

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Color			30.0	30.0		Color Units		100	90 - 110		

Method: SM 2340C - Hardness, Total

Lab Sample ID: MB 480-136133/27
Matrix: Water
Analysis Batch: 136133

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hardness	ND		2.0	0.53	mg/L			08/27/13 12:48	1

Lab Sample ID: LCS 480-136133/28
Matrix: Water
Analysis Batch: 136133

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte			Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits		
Hardness			120	132		mg/L		110	90 - 110		

Lab Sample ID: 480-44452-1 MS
Matrix: Water
Analysis Batch: 136133

Client Sample ID: GW-A
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits		
Hardness	180		200	384		mg/L		100	74 - 130		

Lab Sample ID: 480-44452-2 DU
Matrix: Water
Analysis Batch: 136133

Client Sample ID: GW-B
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier		DU Result	DU Qualifier	Unit	D			RPD	RPD Limit
Hardness	240			256		mg/L				8	15

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 480-135950/1
Matrix: Water
Analysis Batch: 135950

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		10	4.0	mg/L			08/26/13 15:07	1

Method: SM 2540C - Solids, Total Dissolved (TDS) (Continued)

Lab Sample ID: LCS 480-135950/2
Matrix: Water
Analysis Batch: 135950

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	503	465		mg/L		92	85 - 115

Method: SM 5210B - BOD, 5-Day

Lab Sample ID: USB 480-135640/1 USB
Matrix: Water
Analysis Batch: 135640

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	USB Result	USB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Biochemical Oxygen Demand	ND		2.0	2.0	mg/L			08/23/13 10:08	1

Lab Sample ID: LCS 480-135640/2
Matrix: Water
Analysis Batch: 135640

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Biochemical Oxygen Demand	198	213		mg/L		107	85 - 115

1 2 3 4 5 6 7 8 9 10 11 12 13 14

Metals

Prep Batch: 135533

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-1	GW-A	Total/NA	Water	3005A	
480-44452-2	GW-B	Total/NA	Water	3005A	
480-44452-3	GW-D	Total/NA	Water	3005A	
LCS 480-135533/2-A	Lab Control Sample	Total/NA	Water	3005A	
MB 480-135533/1-A	Method Blank	Total/NA	Water	3005A	

Prep Batch: 135544

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-1	GW-A	Total/NA	Water	7470A	
480-44452-2	GW-B	Total/NA	Water	7470A	
480-44452-3	GW-D	Total/NA	Water	7470A	
LCS 480-135544/2-A	Lab Control Sample	Total/NA	Water	7470A	
MB 480-135544/1-A	Method Blank	Total/NA	Water	7470A	

Analysis Batch: 135676

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-1	GW-A	Total/NA	Water	7470A	135544
480-44452-2	GW-B	Total/NA	Water	7470A	135544
480-44452-3	GW-D	Total/NA	Water	7470A	135544
LCS 480-135544/2-A	Lab Control Sample	Total/NA	Water	7470A	135544
MB 480-135544/1-A	Method Blank	Total/NA	Water	7470A	135544

Analysis Batch: 135857

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-1	GW-A	Total/NA	Water	6010B	135533
480-44452-2	GW-B	Total/NA	Water	6010B	135533
480-44452-3	GW-D	Total/NA	Water	6010B	135533
LCS 480-135533/2-A	Lab Control Sample	Total/NA	Water	6010B	135533
MB 480-135533/1-A	Method Blank	Total/NA	Water	6010B	135533

Filtration Batch: 135891

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-3	GW-D	Dissolved	Water	FILTRATION	
LCS 480-135891/2-B	Lab Control Sample	Dissolved	Water	FILTRATION	
LCS 480-135891/2-D	Lab Control Sample	Dissolved	Water	FILTRATION	
LCSD 480-135891/15-B	Lab Control Sample Dup	Dissolved	Water	FILTRATION	
LCSD 480-135891/15-D	Lab Control Sample Dup	Dissolved	Water	FILTRATION	
MB 480-135891/1-B	Method Blank	Dissolved	Water	FILTRATION	
MB 480-135891/1-D	Method Blank	Dissolved	Water	FILTRATION	

Prep Batch: 136029

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-3	GW-D	Dissolved	Water	3005A	135891
LCS 480-135891/2-B	Lab Control Sample	Dissolved	Water	3005A	135891
LCSD 480-135891/15-B	Lab Control Sample Dup	Dissolved	Water	3005A	135891
MB 480-135891/1-B	Method Blank	Dissolved	Water	3005A	135891

Prep Batch: 136034

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-3	GW-D	Dissolved	Water	7470A	135891
LCS 480-135891/2-D	Lab Control Sample	Dissolved	Water	7470A	135891

Metals (Continued)

Prep Batch: 136034 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCSD 480-135891/15-D	Lab Control Sample Dup	Dissolved	Water	7470A	135891
MB 480-135891/1-D	Method Blank	Dissolved	Water	7470A	135891

Analysis Batch: 136156

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-3	GW-D	Dissolved	Water	7470A	136034
LCS 480-135891/2-D	Lab Control Sample	Dissolved	Water	7470A	136034
LCSD 480-135891/15-D	Lab Control Sample Dup	Dissolved	Water	7470A	136034
MB 480-135891/1-D	Method Blank	Dissolved	Water	7470A	136034

Analysis Batch: 136502

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-3	GW-D	Dissolved	Water	6010B	136029
LCS 480-135891/2-B	Lab Control Sample	Dissolved	Water	6010B	136029
LCSD 480-135891/15-B	Lab Control Sample Dup	Dissolved	Water	6010B	136029
MB 480-135891/1-B	Method Blank	Dissolved	Water	6010B	136029

Filtration Batch: 136834

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-3	GW-D	Dissolved	Water	FILTRATION	
LCS 480-136834/2-B	Lab Control Sample	Dissolved	Water	FILTRATION	
LCSD 480-136834/3-B	Lab Control Sample Dup	Dissolved	Water	FILTRATION	
MB 480-136834/1-B	Method Blank	Dissolved	Water	FILTRATION	

Prep Batch: 136979

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-3	GW-D	Dissolved	Water	3005A	136834
LCS 480-136834/2-B	Lab Control Sample	Dissolved	Water	3005A	136834
LCSD 480-136834/3-B	Lab Control Sample Dup	Dissolved	Water	3005A	136834
MB 480-136834/1-B	Method Blank	Dissolved	Water	3005A	136834

Analysis Batch: 137111

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-3	GW-D	Dissolved	Water	6010B	136979
LCS 480-136834/2-B	Lab Control Sample	Dissolved	Water	6010B	136979
LCSD 480-136834/3-B	Lab Control Sample Dup	Dissolved	Water	6010B	136979
MB 480-136834/1-B	Method Blank	Dissolved	Water	6010B	136979

Analysis Batch: 137177

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-3	GW-D	Dissolved	Water	6010B	136979

General Chemistry

Analysis Batch: 135512

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-1	GW-A	Total/NA	Water	180.1	
480-44452-2	GW-B	Total/NA	Water	180.1	
480-44452-3	GW-D	Total/NA	Water	180.1	
LCS 480-135512/4	Lab Control Sample	Total/NA	Water	180.1	

General Chemistry (Continued)

Analysis Batch: 135512 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 480-135512/3	Method Blank	Total/NA	Water	180.1	

Prep Batch: 135629

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-1	GW-A	Total/NA	Water	9012A	
480-44452-2	GW-B	Total/NA	Water	9012A	
480-44452-3	GW-D	Total/NA	Water	9012A	
LCS 480-135629/2-A	Lab Control Sample	Total/NA	Water	9012A	
MB 480-135629/1-A	Method Blank	Total/NA	Water	9012A	

Analysis Batch: 135638

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-1	GW-A	Total/NA	Water	SM 2120B	
480-44452-2	GW-B	Total/NA	Water	SM 2120B	
480-44452-3	GW-D	Total/NA	Water	SM 2120B	
LCS 480-135638/4	Lab Control Sample	Total/NA	Water	SM 2120B	
MB 480-135638/3	Method Blank	Total/NA	Water	SM 2120B	

Analysis Batch: 135640

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-1	GW-A	Total/NA	Water	SM 5210B	
480-44452-2	GW-B	Total/NA	Water	SM 5210B	
480-44452-3	GW-D	Total/NA	Water	SM 5210B	
LCS 480-135640/2	Lab Control Sample	Total/NA	Water	SM 5210B	
USB 480-135640/1 USB	Method Blank	Total/NA	Water	SM 5210B	

Analysis Batch: 135649

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-1	GW-A	Total/NA	Water	7196A	
480-44452-1 MS	GW-A	Total/NA	Water	7196A	
480-44452-2	GW-B	Total/NA	Water	7196A	
480-44452-2 DU	GW-B	Total/NA	Water	7196A	
480-44452-3	GW-D	Total/NA	Water	7196A	
LCS 480-135649/4	Lab Control Sample	Total/NA	Water	7196A	
MB 480-135649/3	Method Blank	Total/NA	Water	7196A	

Analysis Batch: 135661

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-1	GW-A	Total/NA	Water	353.2	
480-44452-2	GW-B	Total/NA	Water	353.2	
480-44452-3	GW-D	Total/NA	Water	353.2	

Analysis Batch: 135669

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-1	GW-A	Total/NA	Water	300.0	
480-44452-2	GW-B	Total/NA	Water	300.0	
480-44452-3	GW-D	Total/NA	Water	300.0	
LCS 480-135669/51	Lab Control Sample	Total/NA	Water	300.0	
MB 480-135669/52	Method Blank	Total/NA	Water	300.0	

General Chemistry (Continued)

Analysis Batch: 135721

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-1	GW-A	Total/NA	Water	350.1	
480-44452-2	GW-B	Total/NA	Water	350.1	
480-44452-3	GW-D	Total/NA	Water	350.1	
LCS 480-135721/148	Lab Control Sample	Total/NA	Water	350.1	
LCS 480-135721/196	Lab Control Sample	Total/NA	Water	350.1	
LCS 480-135721/220	Lab Control Sample	Total/NA	Water	350.1	
LCS 480-135721/52	Lab Control Sample	Total/NA	Water	350.1	
MB 480-135721/147	Method Blank	Total/NA	Water	350.1	
MB 480-135721/195	Method Blank	Total/NA	Water	350.1	
MB 480-135721/219	Method Blank	Total/NA	Water	350.1	
MB 480-135721/51	Method Blank	Total/NA	Water	350.1	

Analysis Batch: 135841

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-1	GW-A	Total/NA	Water	9060	
480-44452-2	GW-B	Total/NA	Water	9060	
480-44452-3	GW-D	Total/NA	Water	9060	
LCS 480-135841/4	Lab Control Sample	Total/NA	Water	9060	
MB 480-135841/3	Method Blank	Total/NA	Water	9060	

Analysis Batch: 135893

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-1	GW-A	Total/NA	Water	9012A	135629
480-44452-2	GW-B	Total/NA	Water	9012A	135629
480-44452-3	GW-D	Total/NA	Water	9012A	135629
LCS 480-135629/2-A	Lab Control Sample	Total/NA	Water	9012A	135629
MB 480-135629/1-A	Method Blank	Total/NA	Water	9012A	135629

Prep Batch: 135895

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-1	GW-A	Total/NA	Water	351.2	
LCS 480-135895/2-A	Lab Control Sample	Total/NA	Water	351.2	
MB 480-135895/1-A	Method Blank	Total/NA	Water	351.2	

Prep Batch: 135901

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-2	GW-B	Total/NA	Water	351.2	
480-44452-3	GW-D	Total/NA	Water	351.2	
LCS 480-135901/2-A	Lab Control Sample	Total/NA	Water	351.2	
MB 480-135901/1-A	Method Blank	Total/NA	Water	351.2	

Analysis Batch: 135910

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-1	GW-A	Total/NA	Water	300.0	
480-44452-2	GW-B	Total/NA	Water	300.0	
480-44452-3	GW-D	Total/NA	Water	300.0	
LCS 480-135910/27	Lab Control Sample	Total/NA	Water	300.0	
MB 480-135910/28	Method Blank	Total/NA	Water	300.0	

General Chemistry (Continued)

Prep Batch: 135940

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-1	GW-A	Total/NA	Water	Distill/Phenol	
480-44452-1 DU	GW-A	Total/NA	Water	Distill/Phenol	
480-44452-2	GW-B	Total/NA	Water	Distill/Phenol	
480-44452-2 MS	GW-B	Total/NA	Water	Distill/Phenol	
480-44452-3	GW-D	Total/NA	Water	Distill/Phenol	
LCS 480-135940/2-A	Lab Control Sample	Total/NA	Water	Distill/Phenol	
MB 480-135940/1-A	Method Blank	Total/NA	Water	Distill/Phenol	

Analysis Batch: 135950

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-1	GW-A	Total/NA	Water	SM 2540C	
480-44452-2	GW-B	Total/NA	Water	SM 2540C	
480-44452-3	GW-D	Total/NA	Water	SM 2540C	
LCS 480-135950/2	Lab Control Sample	Total/NA	Water	SM 2540C	
MB 480-135950/1	Method Blank	Total/NA	Water	SM 2540C	

Analysis Batch: 135990

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-1	GW-A	Total/NA	Water	351.2	135895
480-44452-2	GW-B	Total/NA	Water	351.2	135901
480-44452-3	GW-D	Total/NA	Water	351.2	135901
LCS 480-135895/2-A	Lab Control Sample	Total/NA	Water	351.2	135895
LCS 480-135901/2-A	Lab Control Sample	Total/NA	Water	351.2	135901
MB 480-135895/1-A	Method Blank	Total/NA	Water	351.2	135895
MB 480-135901/1-A	Method Blank	Total/NA	Water	351.2	135901

Analysis Batch: 136002

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-1	GW-A	Total/NA	Water	310.2	
480-44452-2	GW-B	Total/NA	Water	310.2	
480-44452-3	GW-D	Total/NA	Water	310.2	
LCS 480-136002/125	Lab Control Sample	Total/NA	Water	310.2	
LCS 480-136002/73	Lab Control Sample	Total/NA	Water	310.2	
LCS 480-136002/99	Lab Control Sample	Total/NA	Water	310.2	
MB 480-136002/100	Method Blank	Total/NA	Water	310.2	
MB 480-136002/126	Method Blank	Total/NA	Water	310.2	
MB 480-136002/74	Method Blank	Total/NA	Water	310.2	

Analysis Batch: 136133

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-1	GW-A	Total/NA	Water	SM 2340C	
480-44452-1 MS	GW-A	Total/NA	Water	SM 2340C	
480-44452-2	GW-B	Total/NA	Water	SM 2340C	
480-44452-2 DU	GW-B	Total/NA	Water	SM 2340C	
480-44452-3	GW-D	Total/NA	Water	SM 2340C	
LCS 480-136133/28	Lab Control Sample	Total/NA	Water	SM 2340C	
MB 480-136133/27	Method Blank	Total/NA	Water	SM 2340C	

Analysis Batch: 136178

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-1	GW-A	Total/NA	Water	410.4	

General Chemistry (Continued)

Analysis Batch: 136178 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-3	GW-D	Total/NA	Water	410.4	
LCS 480-136178/28	Lab Control Sample	Total/NA	Water	410.4	
LCS 480-136178/4	Lab Control Sample	Total/NA	Water	410.4	
MB 480-136178/27	Method Blank	Total/NA	Water	410.4	
MB 480-136178/3	Method Blank	Total/NA	Water	410.4	

Analysis Batch: 136188

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-1	GW-A	Total/NA	Water	9066	135940
480-44452-1 DU	GW-A	Total/NA	Water	9066	135940
480-44452-2	GW-B	Total/NA	Water	9066	135940
480-44452-2 MS	GW-B	Total/NA	Water	9066	135940
480-44452-3	GW-D	Total/NA	Water	9066	135940
LCS 480-135940/2-A	Lab Control Sample	Total/NA	Water	9066	135940
MB 480-135940/1-A	Method Blank	Total/NA	Water	9066	135940

Analysis Batch: 136903

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-44452-2	GW-B	Total/NA	Water	410.4	
LCS 480-136903/4	Lab Control Sample	Total/NA	Water	410.4	
MB 480-136903/3	Method Blank	Total/NA	Water	410.4	

Client Sample ID: GW-A

Lab Sample ID: 480-44452-1

Date Collected: 08/21/13 16:40

Matrix: Water

Date Received: 08/23/13 02:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	7470A			135544	08/23/13 08:35	JRK	TAL BUF
Total/NA	Analysis	7470A		1	135676	08/23/13 13:35	JRK	TAL BUF
Total/NA	Prep	3005A			135533	08/23/13 08:20	NMD2	TAL BUF
Total/NA	Analysis	6010B		1	135857	08/23/13 19:17	LMH	TAL BUF
Total/NA	Analysis	180.1		1	135512	08/23/13 06:00	LMK	TAL BUF
Total/NA	Analysis	SM 2120B		1	135638	08/23/13 11:30	LAW	TAL BUF
Total/NA	Analysis	SM 5210B		1	135640	08/23/13 10:08	MDL	TAL BUF
Total/NA	Analysis	7196A		1	135649	08/23/13 07:45	MDL	TAL BUF
Total/NA	Analysis	353.2		1	135661	08/23/13 10:30	RMB	TAL BUF
Total/NA	Analysis	300.0		1	135669	08/24/13 02:26	KRC	TAL BUF
Total/NA	Analysis	350.1		1	135721	08/23/13 16:01	KMF	TAL BUF
Total/NA	Analysis	9060		1	135841	08/23/13 16:46	KRC	TAL BUF
Total/NA	Prep	9012A			135629	08/23/13 11:26	KWJ	TAL BUF
Total/NA	Analysis	9012A		1	135893	08/26/13 09:20	KWJ	TAL BUF
Total/NA	Analysis	300.0		1	135910	08/26/13 18:06	KRC	TAL BUF
Total/NA	Analysis	SM 2540C		1	135950	08/26/13 15:11	KS	TAL BUF
Total/NA	Prep	351.2			135895	08/26/13 07:41	LAW	TAL BUF
Total/NA	Analysis	351.2		1	135990	08/26/13 18:41	NCH	TAL BUF
Total/NA	Analysis	310.2		5	136002	08/26/13 21:27	JME	TAL BUF
Total/NA	Analysis	SM 2340C		1	136133	08/27/13 12:49	KWJ	TAL BUF
Total/NA	Analysis	410.4		1	136178	08/27/13 16:49	JMB	TAL BUF
Total/NA	Prep	Distill/Phenol			135940	08/26/13 08:00	CLT	TAL BUF
Total/NA	Analysis	9066		1	136188	08/27/13 17:35	NCH	TAL BUF

Client Sample ID: GW-B

Lab Sample ID: 480-44452-2

Date Collected: 08/21/13 16:25

Matrix: Water

Date Received: 08/23/13 02:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	7470A			135544	08/23/13 08:35	JRK	TAL BUF
Total/NA	Analysis	7470A		1	135676	08/23/13 13:37	JRK	TAL BUF
Total/NA	Prep	3005A			135533	08/23/13 08:20	NMD2	TAL BUF
Total/NA	Analysis	6010B		1	135857	08/23/13 19:19	LMH	TAL BUF
Total/NA	Analysis	180.1		1	135512	08/23/13 06:00	LMK	TAL BUF
Total/NA	Analysis	SM 2120B		10	135638	08/23/13 11:30	LAW	TAL BUF
Total/NA	Analysis	SM 5210B		1	135640	08/23/13 10:08	MDL	TAL BUF
Total/NA	Analysis	7196A		1	135649	08/23/13 07:45	MDL	TAL BUF
Total/NA	Analysis	353.2		1	135661	08/23/13 10:31	RMB	TAL BUF
Total/NA	Analysis	300.0		1	135669	08/24/13 02:36	KRC	TAL BUF
Total/NA	Analysis	350.1		1	135721	08/23/13 16:02	KMF	TAL BUF
Total/NA	Analysis	9060		1	135841	08/23/13 17:14	KRC	TAL BUF

Client Sample ID: GW-B
Date Collected: 08/21/13 16:25
Date Received: 08/23/13 02:00

Lab Sample ID: 480-44452-2
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	9012A			135629	08/23/13 11:26	KWJ	TAL BUF
Total/NA	Analysis	9012A		1	135893	08/26/13 09:21	KWJ	TAL BUF
Total/NA	Analysis	300.0		1	135910	08/26/13 18:17	KRC	TAL BUF
Total/NA	Analysis	SM 2540C		1	135950	08/26/13 15:12	KS	TAL BUF
Total/NA	Prep	351.2			135901	08/26/13 07:50	LAW	TAL BUF
Total/NA	Analysis	351.2		2	135990	08/26/13 20:17	NCH	TAL BUF
Total/NA	Analysis	310.2		5	136002	08/26/13 21:27	JME	TAL BUF
Total/NA	Analysis	SM 2340C		1	136133	08/27/13 12:49	KWJ	TAL BUF
Total/NA	Prep	Distill/Phenol			135940	08/26/13 08:00	CLT	TAL BUF
Total/NA	Analysis	9066		1	136188	08/27/13 17:44	NCH	TAL BUF
Total/NA	Analysis	410.4		1	136903	08/30/13 23:30	JMB	TAL BUF

Client Sample ID: GW-D
Date Collected: 08/21/13 16:00
Date Received: 08/23/13 02:00

Lab Sample ID: 480-44452-3
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	7470A			135544	08/23/13 08:35	JRK	TAL BUF
Total/NA	Analysis	7470A		1	135676	08/23/13 13:39	JRK	TAL BUF
Total/NA	Prep	3005A			135533	08/23/13 08:20	NMD2	TAL BUF
Total/NA	Analysis	6010B		1	135857	08/23/13 19:21	LMH	TAL BUF
Dissolved	Filtration	FILTRATION			135891	08/26/13 11:00	NMD2	TAL BUF
Dissolved	Prep	7470A			136034	08/27/13 08:30	JRK	TAL BUF
Dissolved	Analysis	7470A		1	136156	08/27/13 13:07	JRK	TAL BUF
Dissolved	Filtration	FILTRATION			135891	08/26/13 11:00	NMD2	TAL BUF
Dissolved	Prep	3005A			136029	08/27/13 08:20	NMD2	TAL BUF
Dissolved	Analysis	6010B		1	136502	08/28/13 17:10	AMH	TAL BUF
Dissolved	Filtration	FILTRATION			136834	08/30/13 15:52	NMD2	TAL BUF
Dissolved	Prep	3005A			136979	09/03/13 09:40	NMD2	TAL BUF
Dissolved	Analysis	6010B		1	137111	09/03/13 16:06	AMH	TAL BUF
Dissolved	Filtration	FILTRATION			136834	08/30/13 15:52	NMD2	TAL BUF
Dissolved	Prep	3005A			136979	09/03/13 09:40	NMD2	TAL BUF
Dissolved	Analysis	6010B		1	137177	09/03/13 18:17	AMH	TAL BUF
Total/NA	Analysis	180.1		25	135512	08/23/13 06:00	LMK	TAL BUF
Total/NA	Analysis	SM 2120B		10	135638	08/23/13 11:30	LAW	TAL BUF
Total/NA	Analysis	SM 5210B		1	135640	08/23/13 10:08	MDL	TAL BUF
Total/NA	Analysis	7196A		1	135649	08/23/13 07:45	MDL	TAL BUF
Total/NA	Analysis	353.2		1	135661	08/23/13 10:32	RMB	TAL BUF
Total/NA	Analysis	300.0		1	135669	08/24/13 02:46	KRC	TAL BUF
Total/NA	Analysis	350.1		5	135721	08/23/13 17:00	KMF	TAL BUF
Total/NA	Analysis	9060		1	135841	08/23/13 17:41	KRC	TAL BUF
Total/NA	Prep	9012A			135629	08/23/13 11:26	KWJ	TAL BUF
Total/NA	Analysis	9012A		1	135893	08/26/13 09:22	KWJ	TAL BUF

Client Sample ID: GW-D
Lab Sample ID: 480-44452-3

Date Collected: 08/21/13 16:00
Matrix: Water
Date Received: 08/23/13 02:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	300.0		1	135910	08/26/13 18:27	KRC	TAL BUF
Total/NA	Analysis	SM 2540C		1	135950	08/26/13 15:13	KS	TAL BUF
Total/NA	Prep	351.2			135901	08/26/13 07:50	LAW	TAL BUF
Total/NA	Analysis	351.2		5	135990	08/26/13 20:53	NCH	TAL BUF
Total/NA	Analysis	310.2		10	136002	08/26/13 22:04	JME	TAL BUF
Total/NA	Analysis	SM 2340C		1	136133	08/27/13 12:49	KWJ	TAL BUF
Total/NA	Analysis	410.4		1	136178	08/27/13 16:49	JMB	TAL BUF
Total/NA	Prep	Distill/Phenol			135940	08/26/13 08:00	CLT	TAL BUF
Total/NA	Analysis	9066		1	136188	08/27/13 17:44	NCH	TAL BUF

Laboratory References:

TAL BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

Certification Summary

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-44452-1

Laboratory: TestAmerica Buffalo

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Arkansas DEQ	State Program	6	88-0686	10-06-13
California	NELAP	9	1169CA	09-30-13
Connecticut	State Program	1	PH-0568	09-30-14
Florida	NELAP	4	E87672	06-30-14
Georgia	State Program	4	N/A	03-31-09 *
Georgia	State Program	4	N/A	03-31-14
Georgia	State Program	4	956	03-31-09 *
Illinois	NELAP	5	200003	09-30-13
Iowa	State Program	7	374	03-01-09 *
Iowa	State Program	7	374	03-15-15
Kansas	NELAP	7	E-10187	01-31-14
Kentucky	State Program	4	90029	12-31-08 *
Kentucky	State Program	4	90029	12-31-13
Kentucky (UST)	State Program	4	30	04-01-14
Louisiana	NELAP	6	02031	06-30-14
Maine	State Program	1	NY00044	12-04-14
Maryland	State Program	3	294	03-31-14
Massachusetts	State Program	1	M-NY044	06-30-14
Michigan	State Program	5	9937	04-01-09 *
Michigan	State Program	5	9937	04-01-14
Minnesota	NELAP	5	036-999-337	12-31-13
New Hampshire	NELAP	1	2337	11-17-13
New Jersey	NELAP	2	NY455	06-30-14
New York	NELAP	2	10026	04-01-14
North Dakota	State Program	8	R-176	03-31-14
Oklahoma	State Program	6	9421	08-31-14
Oregon	NELAP	10	NY200003	06-09-14
Pennsylvania	NELAP	3	68-00281	07-31-14
Rhode Island	State Program	1	LAO00328	12-31-13
Tennessee	State Program	4	TN02970	04-01-14
Texas	NELAP	6	T104704412-11-2	07-31-14
USDA	Federal		P330-11-00386	11-22-14
Virginia	NELAP	3	460185	09-14-13 *
Washington	State Program	10	C784	02-10-14
West Virginia DEP	State Program	3	252	09-30-13
Wisconsin	State Program	5	998310390	09-30-13

* Expired certification is currently pending renewal and is considered valid.

Method Summary

Method	Method Description	Protocol	Laboratory
6010B	Metals (ICP)	SW846	TAL BUF
7470A	Mercury (CVAA)	SW846	TAL BUF
180.1	Turbidity, Nephelometric	MCAWW	TAL BUF
300.0	Anions, Ion Chromatography	MCAWW	TAL BUF
310.2	Alkalinity	MCAWW	TAL BUF
350.1	Nitrogen, Ammonia	MCAWW	TAL BUF
351.2	Nitrogen, Total Kjeldahl	MCAWW	TAL BUF
353.2	Nitrate	EPA	TAL BUF
410.4	COD	MCAWW	TAL BUF
7196A	Chromium, Hexavalent	SW846	TAL BUF
9012A	Cyanide, Total and/or Amenable	SW846	TAL BUF
9060	Organic Carbon, Total (TOC)	SW846	TAL BUF
9066	Phenolics, Total Recoverable	SW846	TAL BUF
SM 2120B	Color, Colorimetric	SM	TAL BUF
SM 2340C	Hardness, Total	SM	TAL BUF
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL BUF
SM 5210B	BOD, 5-Day	SM	TAL BUF

Protocol References:

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater",

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

Sample Summary

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-44452-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
480-44452-1	GW-A	Water	08/21/13 16:40	08/23/13 02:00
480-44452-2	GW-B	Water	08/21/13 16:25	08/23/13 02:00
480-44452-3	GW-D	Water	08/21/13 16:00	08/23/13 02:00

TestAmerica Albany
25 Kraft Road
Albany, NY 12205

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: [illegible]	Lab PM: Shaffer, Lisa E	Carrier Tracking No(s):	COC No: 480-38789-10237.1
Client Contact: Nathan Shaffer	Phone: 518 456 4900	E-Mail: lisa.shaffer@testamericainc.com		Page: Page 1 of 1
Company: Sterling Environmental Engineering PC				Job #: 2012-15
Address: 24 Wade Road	Due Date Requested:			
City: Latham	TAT Requested (days): Standard 10 Days			
State, Zip: NY, 12110				
Phone: 518 456 4900	PO #: Purchase Order not required			
Email: nathan.shaffer@sterlingenvironmental.com	WO #:			
Project Name: Orange County Landfill	Project #: 48005786			
Site: New York	SSOW#:			

Analysis Requested

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	300.0_28D - (MOD) Chloride, Sulfate, Bromide	350.1, 351.2, 410.4	6010B, 7470A	2340C - Hardness	9066 - Phenolics, Total Recoverable	9060 - Total Organic Carbon	5210B - Biochemical Oxygen Demand	2540C_Calcd - Total Dissolved Solids	9012A - Cyanide, Total	180.1, 2120B, 353.2, 353.2_Nitrite, Nitrate_Calc	7196A - Chromium, hexavalent	310.2 - Alkalinity, Total	★ Filtered Metals (1 L Bottle)	Total Number of containers	Special Instructions/Note:
			Preservation Code:		X	X	N	S	D	D	S	A	N	N	B	N	N	N		X	
GW A	8/21/13	4:40	G	Water								2	1	1	1	2					
GW B	8/21/13	4:25	C	Water			1	1	1	1	1	2	1	1	1	2	1	1			
~~[illegible]~~				~~Water~~																	
GW D	8/21/13	4:00	G	Water			1	1	1	1	1	2	1	1	1	2	1	1	0		★ If insufficient quantity of Fm preserved sample please call Nathan Shaffer @ 518.456.4900 for parameters or analysis to be excluded.
				Water																	

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - pH 4-5, Z - other (specify)
Other:

Possible Hazard Identification
☐ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For ______ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:		Time:		Method of Shipment:	
Relinquished by: [signature]	Date/Time: 8/22/2013 12:30	Company: [illegible]	Received by: [signature]	Date/Time: 8/22/13 12:50	Company: TA
Relinquished by: [signature]	Date/Time: 8/22/13	Company:	Received by: [signature]	Date/Time: 8-23-13 0200	Company: TAL
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:
Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks: 2.7 #1			

Login Sample Receipt Checklist

Client: Sterling Environmental Engineering PC

Job Number: 480-44452-1

Login Number: 44452
List Number: 1
Creator: Wienke, Robert K

List Source: TestAmerica Buffalo

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Sampling Company provided.	True	STERLING
Samples received within 48 hours of sampling.	True	
Samples requiring field filtration have been filtered in the field.	N/A	
Chlorine Residual checked.	N/A	

APPENDIX F

STERLING, DECEMBER 18, 2013, ORANGE COUNTY LANDFILL - CHEECHUNK CANAL / LANDFILL STABILITY AND SEEP EVALUATION

STERLING
Sterling Environmental Engineering, P.C.

December 18, 2013

Mr. Bradford Shaw, P.E.
NYS Department of Environmental Conservation
RCRA Permitting Section
Division of Environmental Remediation
Remedial Bureau E, 12th Floor
625 Broadway
Albany, New York 12233-7017

Subject: Orange County Landfill
Cheechunk Canal/Landfill Seep Evaluation
STERLING File #2010-15 (Task 312)

Dear Mr. Shaw,

In accordance with the schedule provided by Peter Hammond's September 20, 2013 letter, Sterling Environmental Engineering, P.C. (STERLING) provides this work plan to determine if the seeps are impacted by the Landfill and if so, propose mitigation strategies.

In accordance with your letter of November 25, 2013, evaluation of the stability of the slope between the most recent canal slope failure and the closed Orange County Landfill can be deferred.

Seep Evaluation:

STERLING proposes to install approximately nine (9) temporary piezometers (small diameter groundwater observation wells) between the Landfill and the seeps near the canal bank failure in order to understand the subsurface hydrology between the limit of waste and the seeps (see Figure 1, attached).

The piezometers will be installed using a track-mounted geoprobe to a depth sufficient to straddle the groundwater surface at each location (estimated to be less than 20 feet). At each location, soil samples will be collected on a continuous basis from ground surface to termination depth using the geoprobe soil sampler. Upon completion of sampling, each borehole will be converted into a 1-¼ inch diameter standpipe piezometer by installing machine slotted PVC well screen and riser. We expect the piezometer installations can be completed in two (2) days depending on depths and conditions encountered at each borehole.

The elevation of the top of the piezometer casings (measuring points) will be measured with an engineer's level from the measuring point of nearby monitoring well MW-3B to allow for direct comparison of groundwater level measurements routinely collected at the Landfill. The apparent elevations of the canal bank seeps downgradient from the piezometers, as well as the water level of the canal, will be determined in the same manner.

Following installation, groundwater in each observation well between the Landfill and the seeps will be sampled for 6 NYCRR Part 360 field parameters (Conductivity, Temperature, pH and Eh). STERLING may additionally recommend that groundwater samples be obtained from one or more of the piezometers and analyzed for leachate indicator parameters. Static groundwater levels will be periodically measured, with additional readings as directed by STERLING. County personnel can be trained to assist with periodic readings, if necessary.

Borehole logs, sampling results, and periodic measurements of groundwater levels will be evaluated to determine the nature of the seep. STERLING will provide a final report providing an opinion as to the impact of the Landfill on the seep, along with mitigation strategies based upon the findings or recommendations for additional investigatory work if necessary.

The investigative work described above can be performed within six (6) weeks of NYSDEC's approval of the Work Plan, weather permitting. Based upon the results of the investigation, the proposed design of a mitigation system will be provided to the NYSDEC which will likely consist of a recovery well (or wells) or collection trench with a sump. Such can be installed following NYSDEC approval of the design.

Please contact me should you have any questions or require additional clarification.

Very truly yours,

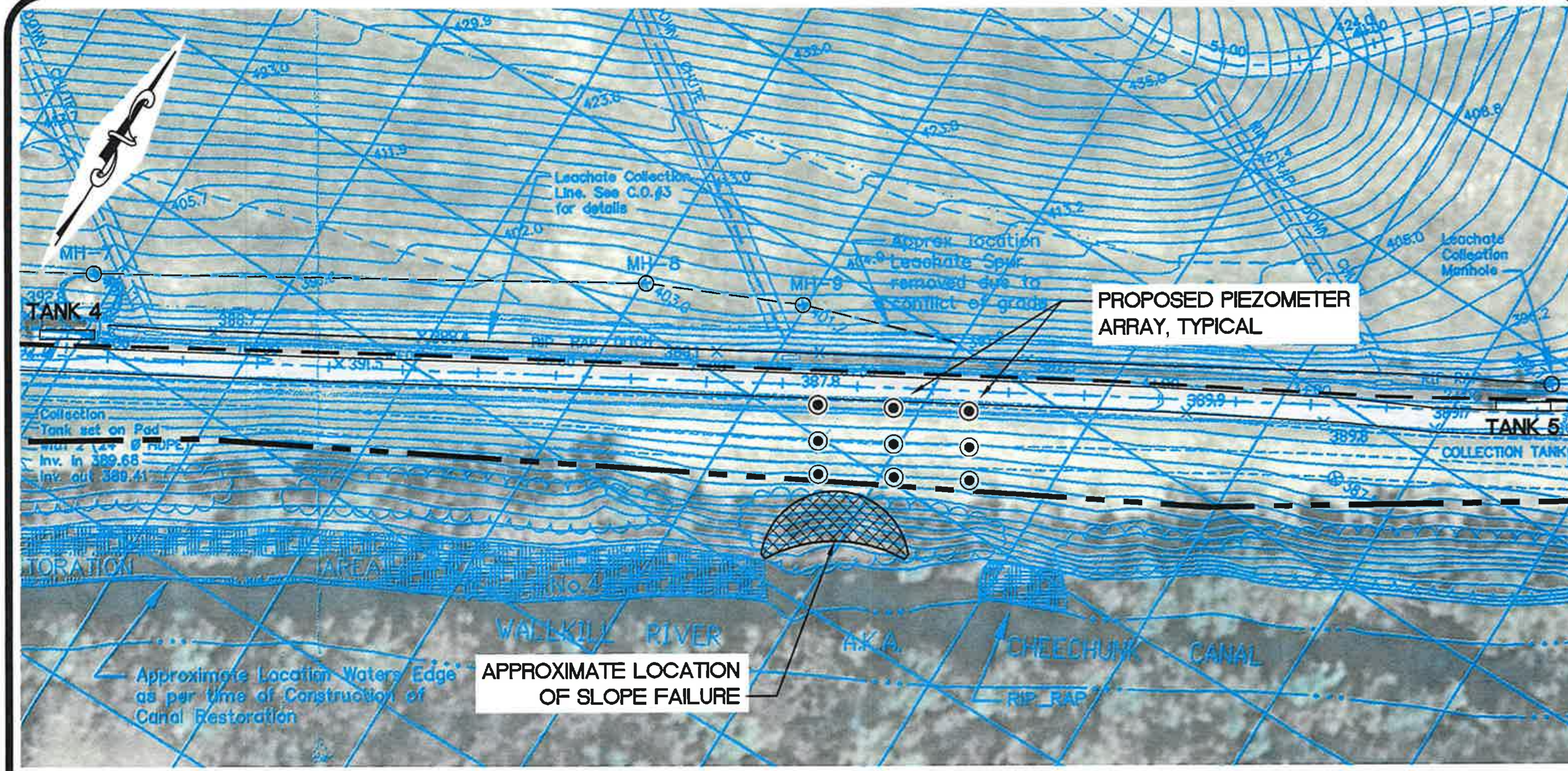
STERLING ENVIRONMENTAL ENGINEERING, P.C.

Mark P. Millspaugh, P.E.
President
mark.millspaugh@sterlingenvironmental.com

MPM/bc
Email/First Class Mail
Attachment (Figure 1)

cc: Peter S. Hammond, Orange County
Joseph F. Mahoney Esq.

2010-15\Correspondence\NYSDEC Geotechnical Evaluation_ltr_121813.doc



LEGEND:

- PROPERTY BOUNDARY
- LIMIT OF WASTE
- PROPOSED PIEZOMETER

0 50 100 200

(IN FEET)
1 inch = 100 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.
2. AERIAL PHOTOGRAPH FROM NEW YORK STATEWIDE DIGITAL ORTHOIMAGERY PROGRAM, PHOTOGRAPHY CIRCA 2010.

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

SITE PLAN
ORANGE CO. DEPT. OF PUBLIC WORKS
ORANGE CO. LANDFILL

TOWN OF GOSHEN ORANGE CO., N.Y.

PROJ. No.:	2010-15	DATE:	10/4/13	SCALE:	1" = 100'	DWG. NO.	2010-15013	FIGURE	1

APPENDIX G

STERLING, APRIL 4, 2014, ORANGE COUNTY LANDFILL - CHEECHUNK CANAL / LANDFILL SEEP EVALUATION RESULTS

STERLING
Sterling Environmental Engineering, P.C.

April 4, 2014

Mr. Bradford Shaw, P.E.
NYS Department of Environmental Conservation
RCRA Permitting Section
Division of Environmental Remediation
Remedial Bureau E, 12th Floor
625 Broadway
Albany, New York 12233-7017

Subject: Orange County Landfill
Cheechunk Canal/Landfill Seep Evaluation
STERLING File #2010-15 (Task 313)

Dear Mr. Shaw,

Sterling Environmental Engineering, P.C. (STERLING) provides this letter report to summarize results from our recent investigation to determine if the seeps are impacted by the Landfill, located in the Town of New Hampton, New York (Figure 1). The following includes a summary of work performed, a characterization of the geologic and hydrogeologic setting, recommendations for additional field investigation, and the proposed design of a mitigation system.

SUMMARY OF WORK PERFORMED:

On February 19 and 20, 2014, six (6) temporary piezometers (PZ-14-1 through PZ-14-6) were installed between the Landfill's perimeter access road and the seeps near the Cheechunk Canal bank (referred to as "Project Area") to better understand the subsurface hydrology between the limit of waste and the seeps (Figure 2).

The temporary piezometers were installed using a track-mounted Geoprobe® to a depth sufficient to encounter the glaciolacustrine sand aquifer, which underlies the Cheechunk Canal (Figure 3). At each location, soil samples were collected on a continuous basis from ground surface to termination depth using the Macro-core® MC5 soil sampler. Each borehole was logged to define the local model of the critical site stratigraphy as it relates to the Landfill and the Cheechunk Canal (Appendix A).

Upon completion of sampling, each borehole was either converted into a 1¼-inch (PZ-14-1, PZ-14-2, PZ-14-4, and PZ-14-6) or a 2-inch inside diameter (I.D.) temporary piezometer (PZ-14-3 and PZ-14-5) with a five (5) foot long section of 0.01-inch (10 slot) machine slotted PVC well. As detailed in Table 1, the total depths ranged from 28.91 feet below ground surface (bgs) at PZ-14-4 to 39.5 feet bgs at PZ-14-1. The screened intervals were set in the uppermost portion of the overburden hydrogeologic unit (glaciolacustrine fine sand) to obtain basic aquifer data (groundwater flow direction, gradients, horizontal hydraulic conductivity, aquifer transmissivity, and aquifer yield) and define the hydrogeologic relationship between the Landfill and the seeps identified on the northern bank of the Cheechunk Canal.

The elevation for the top of the piezometer casings (measuring points) were measured with an engineer's level from the measuring point of nearby monitoring well MW-3B to allow for direct comparison of groundwater level measurements routinely collected at the Landfill. The apparent elevations of the Canal bank seeps downgradient from the piezometers, as well as the water level of the Canal, were also collected in the same manner. It should be noted that the slope in the Project Area ranged from 24% to 28%.

Following installation, three (3) synoptic rounds of groundwater elevation measurements were collected on February 20, March 18, and March 27, 2014 to gain a complete understanding of the local hydrostratigraphy, define groundwater flow direction and gradients, and build a conceptual profile between the Landfill and the Cheechunk Canal.

In addition, field hydraulic conductivity testing was performed on two (2) of the temporary piezometers (PZ-14-3 and PZ-14-5) to characterize the horizontal hydraulic conductivity of the aquifer and a short-term two (2) hour constant rate pumping test was performed at temporary piezometer PZ-14-3 to further define aquifer characteristics, such as yield and transmissivity (Appendix B).

Groundwater in each temporary piezometer between the Landfill and the seeps were also sampled for 6 NYCRR Part 360 field parameters (specific conductivity, temperature, pH, and Eh). Due to weather conditions, the subject seep area could not be evaluated as it was covered with ice or meltwater runoff.

FIELD INVESTIGATION FINDINGS:

The field investigation, performed between February and March 2014, was used to define the local geologic conditions, hydrogeologic setting, and environmental parameters in the Project Area as well as serve as the core of understanding to remediate the subject seep. Findings are detailed below:

- **Geologic Setting**

  The critical site stratigraphy in the vicinity of the Project Area has been defined as follows:

  Glaciolacustrine Silt and Clay: Moist grayish brown clayey silt to silty clay; stiff to moderately stiff; occasionally to frequently varved; lowly permeable; and moderately plastic. As presented in Table 1, this unit was encountered at surface to depths ranging from 24.4 to 34.1 feet bgs, which is consistent with historical data collected near this portion of the Landfill and the Cheechunk Canal. Stearns & Wheler reported that this silt and clay layer thins toward the northeast from approximately 60 feet to 20 feet. The base of the glaciolacustrine silt and clay unit is approximately three (3) to five (5) feet below the subject seep(s).

  Glaciolacustrine Sand: Wet fine sand; medium dense; moderately permeable; and laminated. The top of this water-bearing unit is between 65.25 (PZ-14-1) and 66.81 (PZ-14-3) feet in elevation (site datum) and slightly tilts to the north away from the Cheechunk Canal (Table 1 and Figure 3). Again, this field data is consistent with historic geoenvironmental data collected near the Project Area which reports this unit as being 25 to 35 feet in thickness. The base of the glaciolacustrine sand unit was not encountered during the course of this investigation.

Glacial Till: Basal lodgement till is a dense, unstratified diamict of poorly sorted sediment emplaced on bedrock by the base of the glacier during ice advance. It often has large erratics oriented in the direction of the ice movement. The glacial till unit, which was not encountered during this investigation, is lowly permeable and is not considered a water bearing zone.

- **Hydrogeologic Setting**

The hydrogeologic nature of the Project Area was interpreted using historic well logs, slug tests, groundwater elevation data, geologic cross sections, and publications. The hydrogeologic setting for the Project Area was further refined from information obtained from the recent drilling, surveying, overburden groundwater measurements, hydraulic conductivity testing, and the short-term pumping test.

Complex vertical and horizontal stratigraphic relationships exist between the glacial deposits on the site and Project Area. As shown in Figure 3, the Cheechunk Canal dissects the glacially-derived overburden in the vicinity of the Project Area, often cutting down through the glaciolacustrine silt and clay deposits, creating a hydraulic connection between the overburden groundwater unit (glaciolacustrine sand) and the Cheechunk Canal (Wallkill River). In general, the low hydraulic conductivity of the glaciolacustrine silt and clay, which underlies a large portion of the Landfill, limits recharge to underlying hydrogeologic units such as the glaciolacustrine sand (encountered) and ice contact sand and gravel deposits (not encountered). The glaciolacustrine silt and clay unit is not a water-bearing zone.

Hydraulic conductivity estimates in the overburden hydrogeologic unit (glaciolacustrine sand) were determined using slug tests. The data obtained from the Project Area were analyzed using the Bouwer and Rice method (1989). This method consists of quickly lowering or raising water levels in a well and measuring its rate of recovery (Appendix B). Although originally designed for use in unconfined aquifers, the authors (Bouwer and Rice) determined that most of the head difference "y" between the static water table and water level in the piezometer is dissipated in the vicinity of the piezometer around the screen and slotted section, the method is also applicable to confined or semi-confined conditions, such as in the Project Area. Hydraulic conductivity of the overburden hydrogeologic unit ranged from 9.29×10^{-6} feet/min (4.72×10^{-6} cm/sec) to 2.35×10^{-5} feet/min (1.19×10^{-5} cm/sec).

Groundwater flow in the overburden hydrogeologic unit was determined using depth to groundwater measurements collected from temporary piezometers on February 20, March 18, and March 27, 2014 (Table 2). This data, in conjunction with historical well log data and plots of changes in groundwater elevation over time, suggest that the glaciolacustrine sand unit is currently in semi-confined to confined conditions in the Project Area. Therefore, the directions of groundwater flow are based on the potentiometric surface of the glaciolacustrine sand, not strictly elevations of the water table surface.

Groundwater flow in the overburden west or north of the Canal is to the east-southeast (Figure 4), discharging to the Canal that acts as a discharge zone and a groundwater flow boundary separating flow regimes on either side of the Canal. Overburden piezometer PZ-14-4 is located immediately upgradient of the subject seep(s); although the subject seep could not be directly measured it is likely less than one (1) foot lower than the potentiometric surface observed at PZ-14-4. The actual location of the piezometer array was successful at locating the groundwater that is likely causing the subject seeps. There is little potential for contamination to flow between the Canal and to areas east or south of the Canal based on previous investigations conducted at the Landfill. The direction of groundwater movement can be understood in the fact that groundwater always flows in the direction of decreasing head. The rate of movement, on the other hand, is dependent on the hydraulic gradient, which is the change in head per unit distance. The change in head measurement is ideally in the direction where the maximum difference of head decrease occurs. In the Project Area, the hydraulic gradient (the change in head divided by the change in distance) ranged from 0.00769 ft./ft. to 0.0133 ft./ft. based on data collected from March 18, 2014 (Figure 4).

An aquifer overlain by a bed of material that has a significantly lower hydraulic conductivity is termed as confined. As was observed during the field investigation, the potentiometric surface of the confined aquifer was 6.5 to 8.5 feet above the base of the overlying confining layer (Tables 1 and 2 and Figure 3). Water levels in confined aquifers are typically slow to respond to storm events or droughts and therefore typically exhibit minor fluctuations. A semi-confined or "leaky" confined aquifer is characterized by a low permeability layer (i.e., glaciolacustrine silt and clay) that permits water to slowly flow through it. Groundwater in these aquifers responds more quickly to changes in precipitation. The similarity between the potentiometric surface elevation and the subject seep(s) elevation suggests that there is seasonal hydraulic connection between the Cheechunk Canal and site groundwater. If groundwater was confined, no hydraulic connection would exist between the Canal and site groundwater. The semi-confinement can be the result of leakage through the saturated overlying low permeability layer (glaciolacustrine silt and clay) or through fractures/varved planes in the silt and clay.

Seepage velocities were also calculated in this overburden hydrogeologic unit using the following equation:

$$V = \frac{KI}{n}$$

Where "V" is the seepage velocity in distance per unit time; "K" is the hydraulic conductivity at the borehole (in distance per unit time); "I" is the hydraulic gradient (dimensionless); and, "n" is the estimated effective porosity. The lowest possible values for "n" were used to estimate highest seepage velocities. Seepage velocities at the Project Area indicate a range from $2.57\text{x}10^{-4}$ feet/day (0.094 feet/year) to $1.2\text{x}10^{-3}$ feet/day (0.438 feet/year).

On March 18, 2014, a two (2) hour constant flow rate pumping test was conducted on PZ-14-3 (Figure 2). Initial pumping at 2 gallons per minute (gpm) resulted in complete drawdown at piezometer PZ-14-3; the pumping rate was reduced to provide further evaluation of the overburden aquifer characteristics. Pump flow rate (0.38 to 0.4 gpm) and overburden piezometer water levels were monitored every 15 minutes throughout the two (2) hour test. A drawdown of 7.8 feet was observed during the pumping period, dropping 7.33 feet in the first five (5) minutes and steadily dropped 0.46 foot over the remainder of the pumping test period (Appendix B). Based on this information, the specific capacity was calculated as being 0.05 gpm/ft with a transmissivity of 75 ft^2/day. The adjacent piezometers were lowered by 0.19 foot (PZ-14-6) to

0.29 foot (PZ-14-2), demonstrating good connection to the localized low rate pumping activity (Appendix B).

- **Environmental Setting**

On March 27, 2014 overburden groundwater in each temporary piezometer, between the Landfill and the seeps, were sampled for 6 NYCRR Part 360 field parameters, including specific conductivity, temperature, pH, and Eh (Table 3). Due to weather conditions, the subject seep area could not be evaluated as it was covered with ice or submerged during this period.

As detailed in Table 3, the specific conductance from overburden groundwater ranged from 0.607 millisiemens per centimeter (mS/cm) at PZ-14-4 to 1.230 mS/cm at PZ-14-5. The specific conductance of the water sample is the measure of its ability to carry an electrical current under specific conditions and is typically an indication of the concentration of total dissolved solids (TDS) in the groundwater. A specific conductance value that is markedly different (anomalous) from those obtained in nearby piezometers may indicate a different source of the groundwater or leakage from a formation that contains water of a different quality. Specific conductance values from 2012 and 2013 seep sampling ranged from 0.695 mS/cm at Seep 03 on August 22, 2012 to 1.339 mS/cm at GW-03 on August 21, 2013. The specific conductance at PZ-14-5 is considered the most anomalous from the set of field parameters collected on March 27, 2014.

As detailed in Table 3, the redox potential in the overburden aquifer is sensitive to organic matter associated with landfill leachate and of concentrations of redox-active components such as the mineralization of the groundwater. Oxidizing-reducing reactions result in a change of the charge of an ion as it gains or loses an electron. These reactions are almost always facilitated by bacteria that are able to gain energy from the reactions. The most common cause of reducing reactions is organic matter, either in solid form or as dissolved organic carbon. Water in contact with air will have an Eh in the range of 350 milliVolts (mV) to 500mV. Microbially mediated redox processes may decrease the redox potential to values as low as -300mV. The redox potential from overburden groundwater ranged from -90.2 mV at PZ-14-1 to 214.8 mV at PZ-14-5. Oxidation Reduction Potential (ORP) values from 2012 and 2013 seep sampling ranged from 9.6 mV at Seep GW-A on August 21, 2013 to -90.6 mV at GW-01 on August 22, 2012. The redox potential at PZ-14-5 is considered the most irregular while the reading at PZ-14-1 is consistent with ORP values at one of the historical seeps.

At any given temperature, there is a specific concentration of a dissolved mineral's constituents in the groundwater that is in contact with that mineral. Even minor changes in groundwater temperature can cause detectable changes in TDS. It should be noted that the temperature of the upper piezometers (PZ-14-1, PZ-14-5, and PZ-14-6) were over 2° Fahrenheit warmer than the lower piezometers (PZ-14-2, PZ-14-3, and PZ-14-4). The temperature at PZ-14-5 is decidedly higher than others collected on March 27, 2014.

The pH is actually a measure of the hydrogen ion (H+) availability (activity). The hydrogen ion is very small and is able to enter and disrupt mineral structures so that they can contribute dissolved constituents to groundwater. Consequently, the greater the hydrogen ion availability the lower the pH and the higher the TDS in groundwater. The pH readings collected from overburden groundwater ranged from 7.0 standard units (s.u.) at PZ-14-1 to 7.41 s.u. at PZ-14-2. In comparison, 2012 and 2013 seep sampling reported pH readings that ranged from 7.03 s.u. (Seep GW-01) on August 22, 2012 to 7.48 s.u. (GW-A) on August 21, 2013. No direct conclusions can be made based on comparison of pH readings obtained within the Project Area.

Two (2) one (1) liter samples were collected for comparison of water quality field parameters at the start and end of the short-term pumping test, which was performed at PZ-14-3. No significant changes or fluctuations were observed in the field parameters.

The current New York State Department of Environmental Conservation (NYSDEC) approved Post-Closure Monitoring (PCM) Program provides for an annual monitoring schedule consisting of sampling twenty six (26) monitoring wells, four (4) surface water locations, and two (2) leachate manholes for field parameters. Annual sampling is performed in accordance with the Field Sampling Plan, Sampling QA/QC protocol, 1999 revision of the Orange County Landfill Post Closure Monitoring and Maintenance Operations Manual, and the 2003 Orange County PCM variance request approved by the NYSDEC.

Orange County provided the NYSDEC with a Site Management Plan (SMP) for the closed landfill. The SMP also included a request to modify the annual PCM Program. Under the prior (6 NYCRR Part 360) closure, the County performed PCM and annual reporting. During 2014, the annual sampling event is to be performed in October. At present, the NYSDEC has not approved or commented upon the SMP and proposed modification to the annual monitoring program. In prior negotiation with the NYSDEC regarding the need for a SMP, Orange County and the NYSDEC agreed the existing post-closure monitoring program should be carefully evaluated in light of the substantial body of available information. The data allows assessment of long-term trends by well location. Overall, the Landfill monitoring data indicates that the system is stable with some wells showing gradual improvement with time.

Design of a seep mitigation system solely based on limited field parameter data is questionable and may not reflect leachate impacted groundwater given that many of these field parameters are also within the observed range of naturally occurring waters. 2013 field parameter and leachate indicator analytical results from nearby environmental monitoring points (four (4) overburden groundwater monitoring wells (MW-3B, PZ-4, MW-220, MW-222), two (2) surface water locations (SW-5 and SW-8), and one (1) leachate location (MH-7)) were reviewed to further evaluate the potential presence of leachate impacted groundwater. Only total dissolved solids (TDS) exceeded the class GA standard (500 mg/L) at these select monitoring wells, ranging from 730 mg/L (MW-3B) to 860 mg/L (MW-222). Ammonia was only detected slightly above the NYSDEC GA standard (2 mg/L) at monitoring wells MW-3B (4.4 mg/L) and MW-222 (12 mg/L). In comparison, 2013 results for TDS and ammonia from nearby leachate (MH-7) was 3,900 mg/L and 0.64 mg/L, respectively. This environmental monitoring data does not reveal that leachate-impacted groundwater exists in this portion of the Landfill. Further, other reliable leachate indicators, such as chloride, field pH, nitrate (as N), phenols, sulfate, and Volatile Organic Compounds (VOCs) were either nondetect or below their respective NYSDEC GA standard.

Review of historical surface water analytical results (water quality parameters) for nearby surface water samples SW-5 and SW-8 revealed no exceedances of Class C Surface Water Quality standards, except for one (1) minor exceedance of field pH (9.33 s.u.) and phenols (0.0072 mg/L) at SW-5 in 1999 and 2000, respectively, and field pH (8.81 s.u.) and phenols (0.0115 mg/L) at SW-8 in 1999 and September 2002, respectively.

CONCLUSIONS:

Six (6) shallow borings were completed on a moderate to steep slope (24 to 28%) to define the geologic conditions within the Project Area. A lowly permeable glaciolacustrine silt and clay unit exists at surface to depths ranging from 24.4 to 34.1 feet bgs and is characterized as moist grayish brown clayey silt to silty clay that is stiff to moderately stiff and occasionally to frequently varved. The base of this geologic unit is approximately three (3) to five (5) feet below the subject seep(s), which is located along the north or west bank of the Cheechunk Canal. This geologic contact actually tilts to the north away from the Cheechunk Canal. Underlying the silt and clay unit is moderately permeable glaciolacustrine sand, which is wet fine sand that is medium dense, laminated, and typically 25 to 35 feet in thickness.

Each boring was converted into temporary overburden piezometers, screening the uppermost portion of the overburden hydrogeologic unit (glaciolacustrine fine sand). The overlying glaciolacustrine silt and clay unit is not a water-bearing zone and limits recharge to underlying hydrogeologic units. The overburden hydrogeologic unit discharges into and is hydraulically connected to the Cheechunk Canal. Hydraulic conductivity of the overburden hydrogeologic unit ranged from 9.29×10^{-6} feet/min (4.72×10^{-6} cm/sec) to 2.35×10^{-5} feet/min (1.19×10^{-5} cm/sec) in the Project Area. Groundwater in the glaciolacustrine sand unit reveals semi-confined conditions with groundwater flow being to the east-southeast with a moderate hydraulic gradient in the Project Area. Two (2) hours of constant rate pumping (0.38 to 0.4 gpm) at PZ-14-3 revealed the following: 1). A drawdown of 7.8 feet at the wellhead; 2). Lowering of the potentiometric surface between 0.19 foot (PZ-14-6) to 0.29 foot (PZ-14-2) within the piezometer array (Project Area), demonstrating a good connection within the overburden hydrogeologic unit and the Cheechunk Canal (at low pumping rates); 3). The specific capacity and transmissivity values are low for the overburden hydrogeologic unit in the Project Area; and, 4). The actual location of the piezometer array was successful at locating the groundwater that is connected to the subject seep(s).

At the time of the field investigation the seep area was covered with ice and/or submerged. Review of field parameter data from the recently installed overburden piezometers revealed elevated temperature, specific conductivity, and ORP at PZ-14-5, which is located in the center of the piezometer array. Figure 4 presents likely groundwater flowlines from the piezometers to the vicinity of SEEP-3, indicating a continuity of groundwater, which was observed to be most anomalous at PZ-14-5.

2013 field parameter and leachate indicator analytical results from nearby environmental monitoring points (four (4) overburden groundwater monitoring wells (MW-3B, PZ-4, MW-220, MW-222), two (2) surface water locations (SW-5 and SW-8), and one (1) leachate location (MH-7)) were reviewed to further evaluate the potential presence of leachate impacted groundwater in the vicinity of the seep. Ammonia was only detected slightly above the NYSDEC GA standard (2 mg/L) at monitoring wells MW-3B (4.4 mg/L) and MW-222 (12 mg/L). In comparison, 2013 results for TDS and ammonia from nearby leachate (MH-7) was 3,900 mg/L and 0.64 mg/L, respectively. This environmental monitoring data does not reveal that leachate-impacted groundwater exists in this portion of the Landfill. Other reliable leachate indicators, such as chloride, field pH, nitrate (as N), phenols, sulfate, and Volatile Organic Compounds (VOCs) were either nondetect or below their respective NYSDEC GA standard.

RECOMMENDATIONS:

Prior seep sampling results were from grab samples. Once the Cheechunk Canal recedes, such that the seep(s) are accessible, a well point should be hand driven (or a concrete/brick containment should be installed) to enable collection of seep samples that are an accurate representation of water quality.

A sample from each overburden piezometer, the subject seep, and the Cheechunk Canal should be collected and analyzed for 6 NYCRR Part 360 leachate indicator parameters to supplement available data in order to develop a clearer picture and to finalize selection and design of a mitigation system. This supplemental data will be coordinated with the ongoing environmental monitoring program and results will be compared to the extensive historic environmental monitoring database and data from the ongoing sampling of leachate, surface water, and groundwater monitoring program, as outlined in the Draft SMP, dated December 13, 2013. The Draft SMP provides that contingency measures are in-place if offsite contaminant migration is identified and, through assessment, is considered a potential threat to human health and the environment.

Additionally, we recommend that static groundwater levels should be periodically measured to better understand the seasonal variability and hydrogeologic relationship between the overburden hydrogeologic unit and the seep(s)/Cheechunk Canal. In addition, additional readings should be collected from the seep(s) and a staff gauge on the Cheechunk Canal.

MITIGATION SYSTEM:

The following mitigation measures are under consideration at this time.

- No Action - Continue regular monitoring of the Cheechunk Canal upstream and downstream of the Landfill to assess impacts to surface water.

- Intercept Impacted Water Upslope of Seep - Install a dry well or recovery well upslope of the seep above the flood elevation to be located along the flowpath indicating the greatest potential impact to groundwater. Use controlled pumping to dewater the seep(s) so it is not discharging at surface.

- Alter Redox Potential of Groundwater in Project Area - Reduction/oxidation (redox) processes affect the quality of groundwater in all aquifer systems. Redox processes can alternately mobilize or immobilize potentially toxic metals associated with naturally occurring aquifer materials, contribute to the degradation or preservation of anthropogenic contaminants, and generate undesirable byproducts, such as dissolved manganese (Mn^{2+}), ferrous iron (Fe^{2+}), hydrogen sulfide (H_2S), and methane (CH_4). Changing the redox processes that occur in an aquifer system and documenting the spatial distribution may positively influence the concentrations of natural or anthropogenic contaminants observed in historical seeps along the northern bank of the Cheechunk Canal.

Please contact me should you have any questions or require additional clarification.

Very truly yours,

STERLING ENVIRONMENTAL ENGINEERING, P.C.

Mark P. Millspaugh MAW

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President
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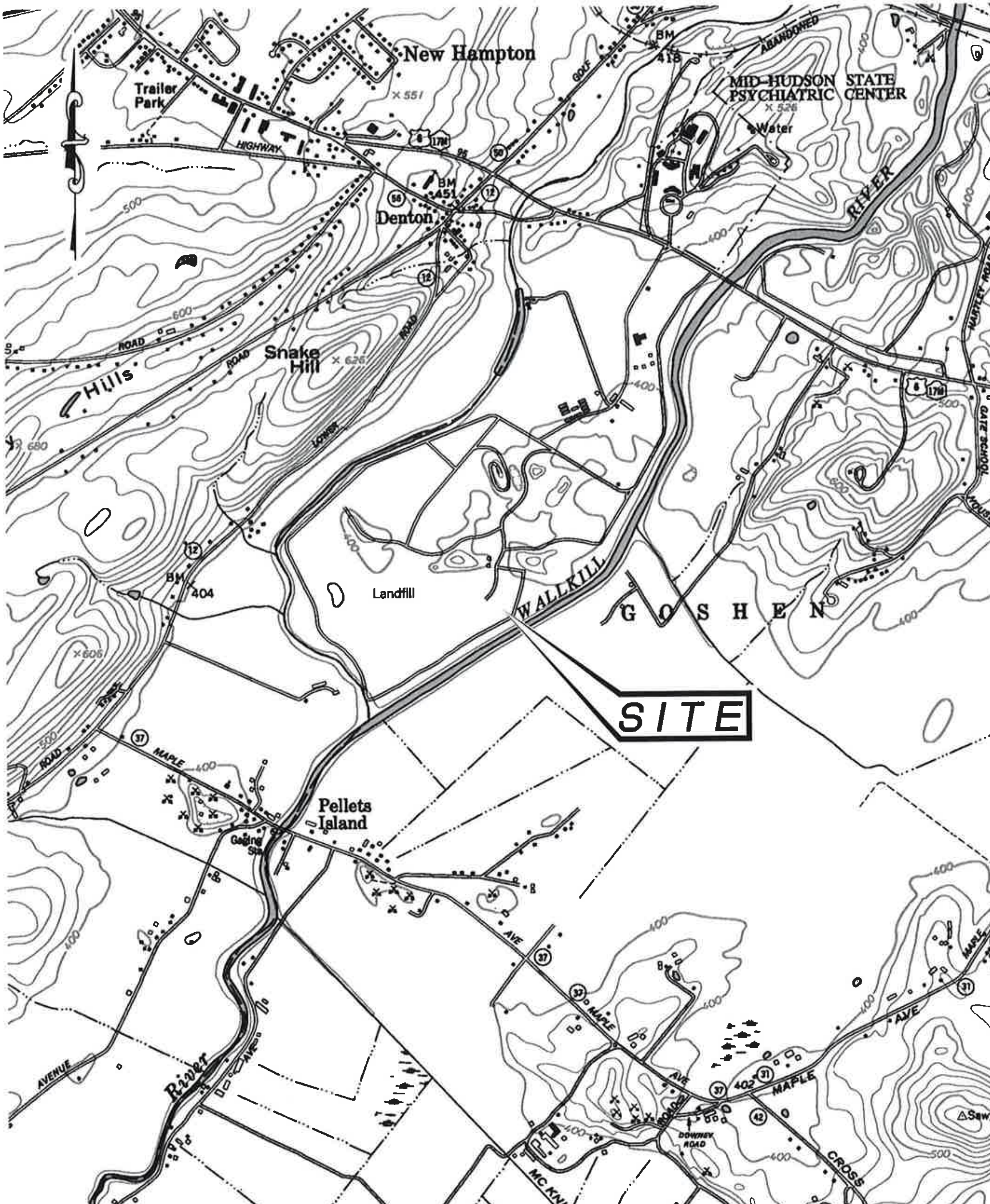
MPM/bc
Email/First Class Mail
Attachments

cc: Peter S. Hammond, Orange County
Joseph F. Mahoney Esq.

S:\Sterling\Projects\2010 Projects\Orange County - 2010-15\Correspondence\NYSDEC_Summary of Seep Evaluation_ltr_04_04_2014.docx

FIGURES



MAP REFERENCE: NYSDOT MIDDLETOWN QUADRANGLE, 1991, GOSHEN QUADRANGLE, 1991.

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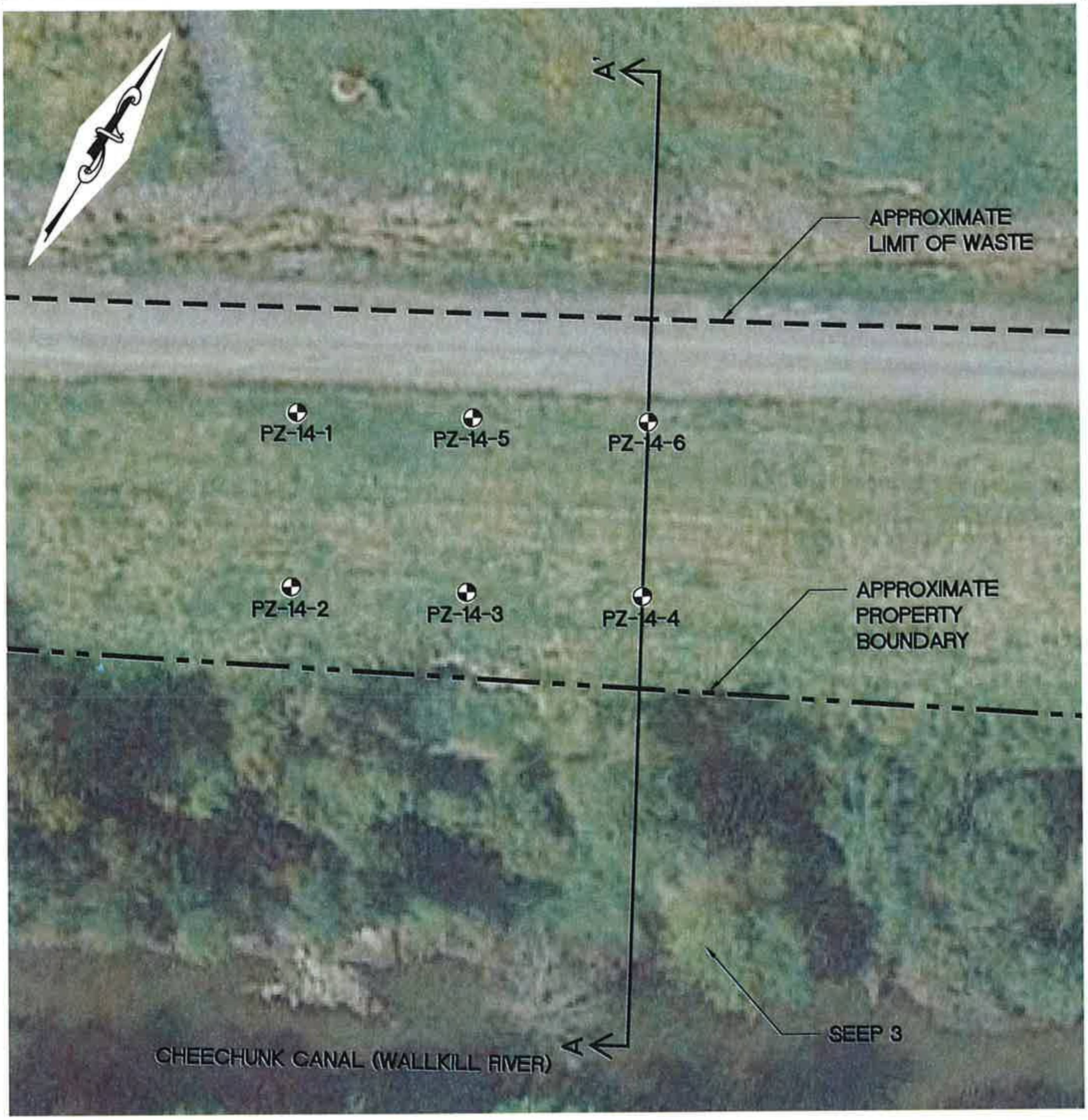
SITE LOCATION MAP
ORANGE COUNTY LANDFILL
21 TRAINING CENTER LANE

TOWN OF NEW HAMPTON — ORANGE CO., N.Y.

PROJ. No.:	2010-15	DATE:	3/28/14	SCALE:	1" = 2000'	DWG. NO. 2010-15014	FIGURE	1



LEGEND:

PROPERTY BOUNDARY

LIMIT OF WASTE

PZ-14-1 APPROXIMATE PIEZOMETER LOCATION

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.
2. AERIAL PHOTOGRAPH FROM GOOGLE EARTH IMAGERY, DATED 2013.

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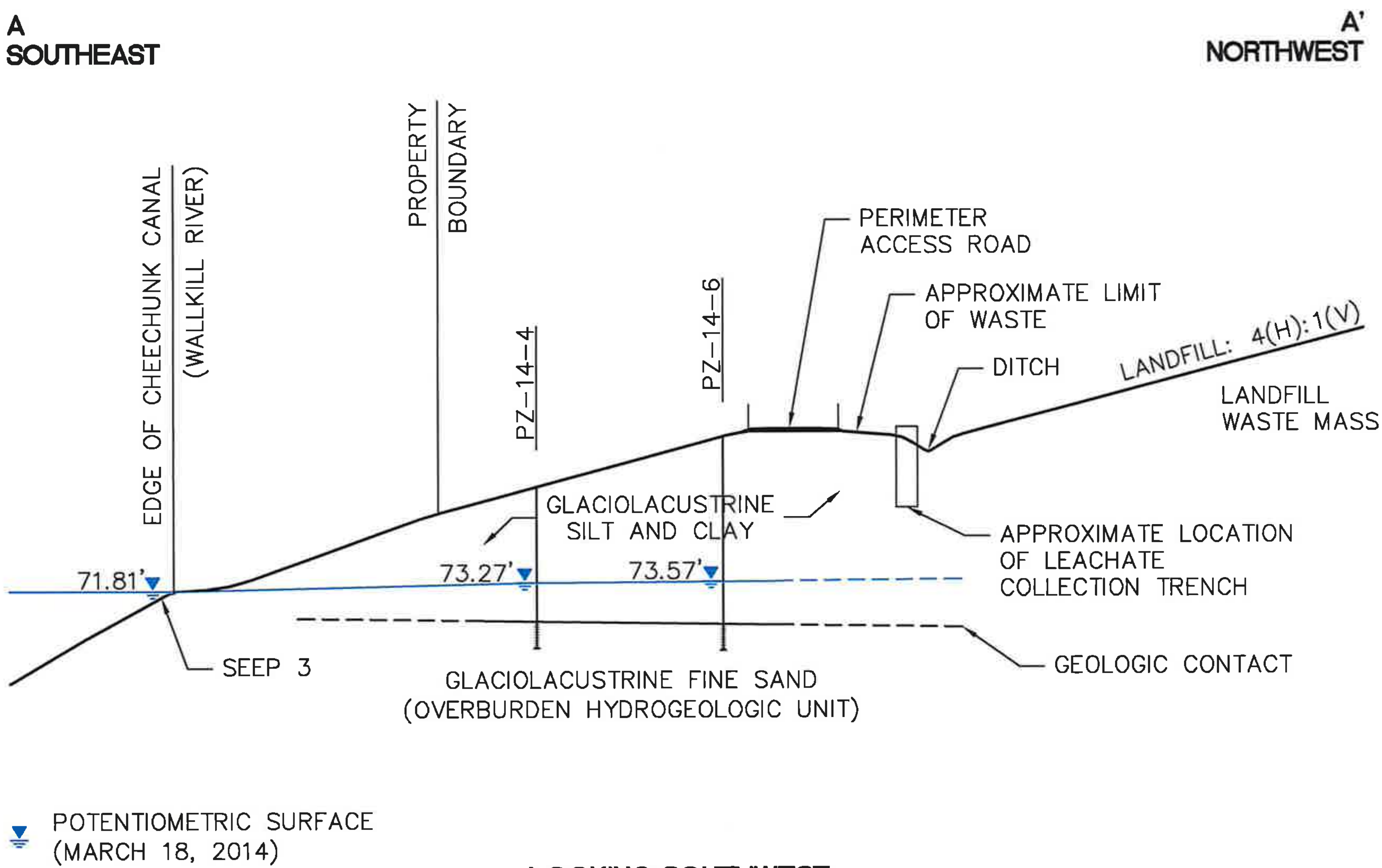
BORING/PIEZOMETER LOCATION MAP
ORANGE CO. DEPT. OF PUBLIC WORKS
ORANGE CO. LANDFILL
TOWN OF NEW HAMPTON ORANGE CO., N.Y.

PROJ. No.: 2010–15	DATE: 3/28/14	SCALE: 1" = 30'	DWG. NO. 2010–15015	FIGURE 2



LOOKING SOUTHWEST

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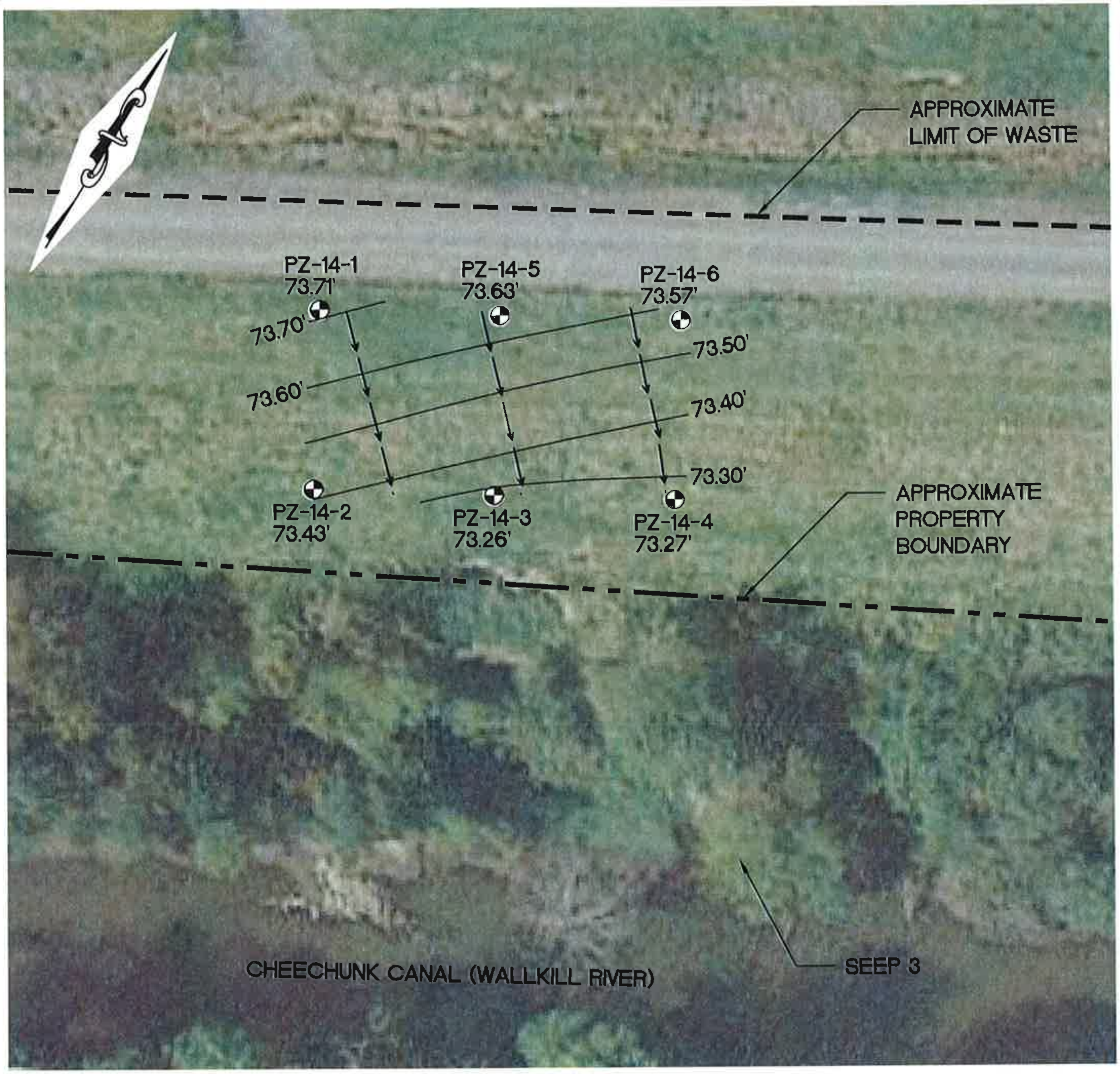
CONCEPTUAL PROFILE
ORANGE CO. DEPT. OF PUBLIC WORKS
ORANGE CO. LANDFILL

TOWN OF NEW HAMPTON | ORANGE CO., N.Y.

PROJ. No.: 2010-15	DATE: 4/1/14	SCALE: NOT TO SCALE	DWG. NO. 2010-15016	FIGURE 3



LEGEND:

— - - —	PROPERTY BOUNDARY
— — — —	LIMIT OF WASTE
PZ-14-1 73.50	PIEZOMETER LOCATION WITH GROUNDWATER ELEVATION (SITE DATUM)
———	GROUNDWATER ELEVATION CONTOURS
→ → → →	INFERRED GROUNDWATER FLOW DIRECTION

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.
2. AERIAL PHOTOGRAPH FROM GOOGLE EARTH IMAGERY, DATED 2013.

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GROUNDWATER CONTOUR MAP
(OVERBURDEN HYDROGEOLOGIC UNIT)–MARCH 18, 2014
ORANGE CO. DEPT. OF PUBLIC WORKS
ORANGE CO. LANDFILL
TOWN OF NEW HAMPTON ORANGE CO., N.Y.

PROJ. No.: 2010–15	DATE: 3/28/14	SCALE: 1" = 30'	DWG. NO. 2010–15017	FIGURE 4

TABLES

Table 1

Summary of Borings/Piezometer Information
Orange County Landfill, New Hampton, New York

Piezometer I.D.	Ground Surface Elevation (Site Datum)	Piezometer Stickup (feet)	Assumed MP Elevation* (Site Datum)	Screened Interval / [Screened Elevation]	Total Depth (Feet BGS) / [Bottom Elevation]	Glaciolacustrine (Silt and Clay)/Glaciolacustrine Sand (Fine Sand) Interface (feet BGS) / [Geologic Contact Elevation]
PZ-14-1	99.35	0.65	100.00	34.5-39.5 / [64.85 - 59.85]	39.5 / [59.85]	34.1 / [65.25]
PZ-14-2	90.87	0.80	91.67	24.5-29.5 / [66.37 - 61.37]	30.26 / [60.61]	24.6 / [66.27]
PZ-14-3	91.21	0.35	91.56	24.92 -29.92 / [66.29 - 61.29]	29.92 / [61.29]	24.4 / [66.81]
PZ-14-4	90.15	1.35	91.50	23.91-28.91 / [66.24 - 61.24]	28.91 / [61.24]	23.9 / [66.25]
PZ-14-5	99.78	2.17	101.95	32.9-37.9 / [66.88 - 61.88]	37.86 / [61.92]	33.5 / [66.28]
PZ-14-6	99.96	0.88	100.84	34.2-39.2 / [65.76 - 60.76]	39.20 / [60.76]	33.85 / [66.11]

* Assume PZ-14-1 MP (Top of PVC) is elevation 100.00 feet.

Table 2

Summary of Groundwater Elevation Data
Orange County Landfill, New Hampton, New York

Piezometer I.D.	February 20, 2014 Depth to Groundwater (feet BMP {Top of PVC}) / [Groundwater Elevation]	March 18, 2014 Depth to Groundwater (feet BMP {Top of PVC}) / [Groundwater Elevation]	March 27, 2014 Depth to Groundwater (feet BMP {Top of PVC}) / [Groundwater Elevation]
PZ-14-1	27.69 / [72.31]	26.29 / [73.71]	26.27 / [73.73]
PZ-14-2	20.21 / [71.46]	18.24 / [73.43]	18.37 / [73.30]
PZ-14-3	20.10 / [71.46]	18.30 / [73.26]	18.31 / [73.25]
PZ-14-4	19.88 / [71.62]	18.23 / [73.27]	18.39 / [73.11]
PZ-14-5	29.58 / [72.37]	28.32 / [73.63]	28.31 / [73.64]
PZ-14-6	28.61 / [72.23]	27.27 / [73.57]	27.15 / [73.69]

Table 3

Summary of Water Quality Information
Orange County Landfill, New Hampton, New York

Sample ID	Temperature (^{0}F)	Conductivity (mS/cm)	Dissolved Oxygen (mg/L)	pH (s.u.)	Oxidation Reduction Potential (mV)	Turbidity (NTU)
PZ-14-1	56.41	1.113	1.76	7.00	-90.2	24.3
PZ-14-2	54.82	0.698	2.77	7.41	3.1	39.0
PZ-14-3	55.33	0.859	1.19	7.03	38.2	102.7
PZ-14-4	54.25	0.607	1.44	7.21	47.5	33.0
PZ-14-5	57.47	1.230	1.29	7.03	214.8	37.8
PZ-14-6	56.59	1.011	1.72	7.12	-15.9	117.0

APPENDIX A

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BORING LOG

Boring No. PZ-14-1

Project Name:	Orange County Landfill – Cheechunk Canal/Seep Evaluation	**Project No.:**	2010-15
Client Name:	Orange County Department of Public Works	**Date:**	February 19, 2014
Location:	Goshen, NY	**Logged By:**	Mark Williams
Weather/Temp.:	12ºF - 40ºF, 1.55" Precip (wintry mix) Winds (1-3mph)	**Checked By:**	Peter Kelleher, P.E.

Drilling Co.:	Zebra Environmental Corp.	**Depth:**	39.5' bgs
Driller:	Jason Frederick	**Equipment:**	Geoprobe® 7720 DT
Date Started:	February 19, 2014	**Surface Elev.:**	99.35' (Site Datum)
Date Completed:	February 19, 2014	**Depth Elev.:**	59.85' (Site Datum)

Depth	Sample No.	Blow Counts	Graphic Log 1"=5'	Unified Soil Classification	DESCRIPTIVE LOG (color, grain size and amount, texture, moisture) DEPOSITIONAL UNIT (outwash, till, lacustrine, muck, fill)	COMMENTS
					BrGr Cy$; occ. mtld; no odor; med. stiff; moist (ML/CL).	
			5		BrGr Cy$l, fS; no odor; med. stiff; moist (ML).	
			10		BrGr C&$; no odor; med. stiff; low to mod. plasticity; moist (ML/CL).	
			15		BrGr $&Cl(-),vfS($); no odor; stiff; occ. to freq. vvd; low to mod. plasticity; moist (ML/CL).	
			20		Gr C&$; no odor; stiff to hard; occ. to freq. vvd (partings 0.4 – 0.1'); mod. plasticity; moist (ML/CL).	
			25		(GLACIOLACUSTRINE SILT AND CLAY)	

Sterling Environmental Engineering, P.C.

BORING LOG

Boring No. PZ-14-1

Project Name:	Orange County Landfill – Cheechunk Canal/Seep Evaluation	**Project No.:**	2010-15
Client Name:	Orange County Department of Public Works	**Date:**	February 19/20, 2014
Location:	Goshen, NY	**Logged By:**	Mark Williams
Weather/Temp.:	See page 1 of 2	**Checked By:**	Peter Kelleher, P.E.

Drilling Co.:	Zebra Environmental Corp.	**Depth:**	39.5'bgs
Driller:	Jason Frederick	**Equipment:**	Geoprobe® 7720 DT
Date Started:	February 19, 2014	**Surface Elev.:**	99.35' (Site Datum)
Date Completed:	February 19, 2014	**Depth/Datum:**	59.85' (Site Datum)

Depth	Sample No.	Blow Counts	Graphic Log 1"=5'	Unified Soil Classification	DESCRIPTIVE LOG (color, grain size and amount, texture, moisture) DEPOSITIONAL UNIT (outwash, till, lacustrine, muck, fill)	COMMENTS
					Gr C&$; no odor; soft to mod. stiff; occ. to freq. vvd; mod. plasticity; moist (ML/CL).	Depth to Groundwater = 26.29' bgs (March 18, 2014)
			30		Gr Cy$; no odor; mod. stiff to soft; freq. vvd; mod. plasticity; moist to wet (ML).	
					(GLACIOLACUSTRINE SILT AND CLAY) 34.1'	
			35		GrfS, sCy$; no odor; med. dense; wet (SM/ML).	1¼"I.D. Schedule 40 PVC overburden piezometer installed on February 20, 2014. 10-slot PVC screen: 34.5 -39.5'bgs.
					GrfS, l(-)Cy$; no odor; med. dense; wet (SM/ML).	
					(GLACIOLACUSTRINE SAND) 39.5'	
			40		Boring terminated at 39.5 feet below ground surface (bgs).	
			45			
			50			

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BORING LOG

Boring No. PZ-14-2

Project Name:	Orange County Landfill – Cheechunk Canal/Seep Evaluation	**Project No.:**	2010-15
Client Name:	Orange County Department of Public Works	**Date:**	February 19, 2014
Location:	Goshen, NY	**Logged By:**	Mark Williams
Weather/Temp.:	12°F - 40°F, 1.55" Precip (wintry mix) Winds (1-3mph)	**Checked By:**	Peter Kelleher, P.E.

Drilling Co.:	Zebra Environmental Corp.	**Depth:**	30' bgs
Driller:	Jason Frederick	**Equipment:**	Geoprobe® 7720 DT
Date Started:	February 19, 2014	**Surface Elev.:**	90.87' (Site Datum)
Date Completed:	February 19, 2014	**Depth Elev.:**	60.61' (Site Datum)

Depth	Sample No.	Blow Counts	Graphic Log 1"=5'	Unified Soil Classification	DESCRIPTIVE LOG (color, grain size and amount, texture, moisture) DEPOSITIONAL UNIT (outwash, till, lacustrine, muck, fill)	COMMENTS
					Gr C&$; no odor; mod. stiff; occ. vvd; mod. plasticity; moist (ML/CL).	
			5		Gr $&C; no odor; mod. stiff; occ. to freq. vvd; mod. (0.01' partings); plasticity; moist (ML/CL).	
			10		Gr $&C; no odor; stiff; freq. vvd (0.04 – 0.07' partings); mod. plasticity; moist (ML/CL).	
			15		Gr C&$; no odor; stiff; occ. - freq. vvd); mod. plasticity; moist to wet (ML/CL).	Depth to Groundwater = 18.24' bgs (March 18, 2014)
			20		Gr $&C; no odor; mod. stiff to stiff; occ. - freq. vvd; mod. plasticity; moist to wet (ML/CL). (GLACIOLACUSTRINE SILT AND CLAY) 24.6'	
			25		GrfS, aCy$; no odor; med. dense; wet (SM/ML) (GLACIOLACUSTRINE SAND)	

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Sterling Environmental Engineering, P.C.

BORING LOG

Boring No. PZ-14-2

Project Name:	Orange County Landfill – Cheechunk Canal/Seep Evaluation	**Project No.:**	2010-15
Client Name:	Orange County Department of Public Works	**Date:**	February 19, 2014
Location:	Goshen, NY	**Logged By:**	Mark Williams
Weather/Temp.:	See page 1 of 2	**Checked By:**	Peter Kelleher, P.E.

Drilling Co.:	Zebra Environmental Corp.	**Depth:**	30'bgs
Driller:	Jason Frederick	**Equipment:**	Geoprobe® 7720 DT
Date Started:	February 19, 2014	**Surface Elev.:**	90.87' (Site Datum)
Date Completed:	February 19, 2014	**Depth/Datum:**	60.61' (Site Datum)

Depth	Sample No.	Blow Counts	Graphic Log 1"=5'	Unified Soil Classification	DESCRIPTIVE LOG (color, grain size and amount, texture, moisture) DEPOSITIONAL UNIT (outwash, till, lacustrine, muck, fill)	COMMENTS
					GrfS, t$; no odor; med. dense; wet; GrmfS @ 27.6 -28.7' bgs (SM). (GLACIOLACUSTRINE SAND) 30.26'	1¼"I.D. Schedule 40 PVC overburden piezometer installed on February 20, 2014. 10-slot PVC screen: 24.5 -29.5'bgs.
			30		Boring terminated at 30.26 feet below ground surface (bgs).	
			35			
			40			
			45			
			50			

Sterling Environmental Engineering, P.C.

BORING LOG

Boring No. PZ-14-3

Project Name:	Orange County Landfill – Cheechunk Canal/Seep Evaluation	**Project No.:**	2010-15
Client Name:	Orange County Department of Public Works	**Date:**	February 19, 2014
Location:	Goshen, NY	**Logged By:**	Mark Williams
Weather/Temp.:	12°F - 40°F, 1.55" Precip (wintry mix) Winds (1-3mph)	**Checked By:**	Peter Kelleher, P.E.

Drilling Co.:	Zebra Environmental Corp.	**Depth:**	30' bgs
Driller:	Jason Frederick	**Equipment:**	Geoprobe® 7720 DT
Date Started:	February 19, 2014	**Surface Elev.:**	91.21' (Site Datum)
Date Completed:	February 19, 2014	**Depth Elev.:**	61.29' (Site Datum)

Depth	Sample No.	Blow Counts	Graphic Log 1"=5'	Unified Soil Classification	DESCRIPTIVE LOG (color, grain size and amount, texture, moisture) DEPOSITIONAL UNIT (outwash, till, lacustrine, muck, fill)	COMMENTS
					Br-GrBr Cy$; no odor; occ. mtld; mod. stiff; occ. vvd; low to mod. plasticity; dry to moist (ML/CL).	
			5		Gr C&$; no odor; mod. stiff; freq. vvd (partings 0.01'); mod. plasticity; moist to wet (ML/CL).	
			10		BrGr Cy$; no odor; mod. stiff; freq. vvd (partings 0.01'); mod. plasticity; moist to wet (ML/CL).	
			15		BrGr Cy$; no odor; mod. stiff to stiff; freq. vvd (partings <0.01'); mod. plasticity; moist (ML/CL).	Depth to Groundwater = 18.30' bgs (March 18, 2014)
			20		BrGr Cy$; no odor; soft to mod. stiff; massive; mod. plasticity; moist (ML/CL). (GLACIOLACUSTRINE SILT AND CLAY) 24.4'	
			25		DkGrfS, l(-)$; med. dense; wet (SM/ML). (GLACIOLACUSTRINE SAND)	

Sterling Environmental Engineering, P.C.

BORING LOG

Boring No. PZ-14-3

Project Name:	Orange County Landfill – Cheechunk Canal/Seep Evaluation	**Project No.:**	2010-15
Client Name:	Orange County Department of Public Works	**Date:**	February 19, 2014
Location:	Goshen, NY	**Logged By:**	Mark Williams
Weather/Temp.:	See page 1 of 2	**Checked By:**	Peter Kelleher, P.E.

Drilling Co.:	Zebra Environmental Corp.	**Depth:**	30'bgs
Driller:	Jason Frederick	**Equipment:**	Geoprobe® 7720 DT
Date Started:	February 19, 2014	**Surface Elev.:**	91.21' (Site Datum)
Date Completed:	February 19, 2014	**Depth/Datum:**	61.29' (Site Datum)

Depth	Sample No.	Blow Counts	Graphic Log 1"=5'	Unified Soil Classification	DESCRIPTIVE LOG (color, grain size and amount, texture, moisture) DEPOSITIONAL UNIT (outwash, till, lacustrine, muck, fill)	COMMENTS
					Grmf(+)S; no odor; med.dense; laminated; wet(SM/ML). (GLACIOLACUSTRINE SAND) 29.92'	2"I.D. Schedule 40 PVC overburden piezometer installed on February 20, 2014. 10-slot PVC screen: 24.92 -29.92'bgs.
			30		Boring terminated at 29.92 feet below ground surface (bgs).	
			35			
			40			
			45			
			50			

Sterling Environmental Engineering, P.C.

BORING LOG

Boring No. PZ-14-4

Project Name:	Orange County Landfill – Cheechunk Canal/Seep Evaluation	**Project No.:**	2010-15
Client Name:	Orange County Department of Public Works	**Date:**	February 20, 2014
Location:	Goshen, NY	**Logged By:**	Mark Williams
Weather/Temp.:	23°F - 50°F, 0" Precip, Winds (1-4mph)	**Checked By:**	Peter Kelleher, P.E.

Drilling Co.:	Zebra Environmental Corp.	**Depth:**	30' bgs
Driller:	Jason Frederick	**Equipment:**	Geoprobe® 7720 DT
Date Started:	February 20, 2014	**Surface Elev.:**	90.15' (Site Datum)
Date Completed:	February 20, 2014	**Depth Elev.:**	61.24' (Site Datum)

Depth	Sample No.	Blow Counts	Graphic Log 1"=5'	Unified Soil Classification	DESCRIPTIVE LOG (color, grain size and amount, texture, moisture) DEPOSITIONAL UNIT (outwash, till, lacustrine, muck, fill)	COMMENTS
					GrBr Cy$; no odor; occ. mtld; mod. stiff to stiff; occ. vvd (partings 0.01'); low to mod. plasticity; dry to moist (ML).	
			5		BrGr $&C to Cy$; no odor; mod. stiff to stiff; freq. vvd (partings 0.01'); low to mod. plasticity; moist (ML/CL).	
			10		BrGr $&C to $yC; no odor; mod. stiff; occ. to freq. vvd (partings 0.01'); mod. plasticity; moist (ML/CL).	
			15		Gr Cy$ to $&C; no odor; mod. stiff; occ. to freq. vvd (partings 0.02 – 0.07'); mod. plasticity; moist to wet (ML/CL).	▼ Depth to Groundwater = 18.23' bgs (March 18, 2014)
			20		GrCy$ to $&C; no odor; mod. stiff; massive; moist to wet (ML/CL). **(GLACIOLACUSTRINE SILT AND CLAY)** **23.9'**	
			25		DkGrmf(+)fS, l(-)Cy$; no odor; med. dense; wet (SM/ML). **(GLACIOLACUSTRINE SAND)**	

Sterling Environmental Engineering, P.C.

BORING LOG

Boring No. PZ-14-4

Project Name:	Orange County Landfill – Cheechunk Canal/Seep Evaluation	**Project No.:**	2010-15
Client Name:	Orange County Department of Public Works	**Date:**	February 20, 2014
Location:	Goshen, NY	**Logged By:**	Mark Williams
Weather/Temp.:	See page 1 of 2	**Checked By:**	Peter Kelleher, P.E.

Drilling Co.:	Zebra Environmental Corp.	**Depth:**	38.91'bgs
Driller:	Jason Frederick	**Equipment:**	Geoprobe® 7720 DT
Date Started:	February 20, 2014	**Surface Elev.:**	90.15' (Site Datum)
Date Completed:	February 20, 2014	**Depth/Datum:**	61.24' (Site Datum)

Depth	Sample No.	Blow Counts	Graphic Log 1"=5'	Unified Soil Classification	DESCRIPTIVE LOG (color, grain size and amount, texture, moisture) DEPOSITIONAL UNIT (outwash, till, lacustrine, muck, fill)	COMMENTS
					Grmf(+)S; no odor; med.dense; laminated; wet(SM/ML). **(GLACIOLACUSTRINE SAND) 28.91'**	2"I.D. Schedule 40 PVC overburden piezometer installed on February 20, 2014. 10-slot PVC screen: 23.91 -28.91'bgs.
			30		Boring terminated at 28.91 feet below ground surface (bgs).	
			35			
			40			
			45			
			50			

STERLING
Sterling Environmental Engineering, P.C.

BORING LOG

Boring No. PZ-14-5

Project Name:	Orange County Landfill – Cheechunk Canal/Seep Evaluation	**Project No.:**	2010-15
Client Name:	Orange County Department of Public Works	**Date:**	February 20, 2014
Location:	Goshen, NY	**Logged By:**	Mark Williams
Weather/Temp.:	23°F - 50°F, 0" Precip, Winds (1-4mph)	**Checked By:**	Peter Kelleher, P.E.

Drilling Co.:	Zebra Environmental Corp.	**Depth:**	38' bgs
Driller:	Jason Frederick	**Equipment:**	Geoprobe® 7720 DT
Date Started:	February 20, 2014	**Surface Elev.:**	99.78' (Site Datum)
Date Completed:	February 20, 2014	**Depth Elev.:**	61.92' (Site Datum)

Depth	Sample No.	Blow Counts	Graphic Log 1"=5'	Unified Soil Classification	DESCRIPTIVE LOG (color, grain size and amount, texture, moisture) DEPOSITIONAL UNIT (outwash, till, lacustrine, muck, fill)	COMMENTS
					BrGr Cy$; no odor; occ. mtld; med. stiff; moist (ML/CL).	
			5		BrGr Cy$; no odor; med. stiff; moist (ML).	
			10		BrGr C&$; no odor; med. stiff; low to mod. plasticity; moist (ML/CL).	
			15		BrGr-Gr $&Ct, vfS($); no odor; mod. stiff; occ.vvd; low to mod. plasticity; moist (ML/CL).	
			20		Gr Cy$ to $&C; no odor; mod. stiff; occ. vvd (partings = 0.04 – 0.07'); low to mod. plasticity; moist (ML/CL).	
			25		(GLACIOLACUSTRINE SILT AND CLAY)	

Sterling Environmental Engineering, P.C.

BORING LOG

Boring No. PZ-14-5

Project Name:	Orange County Landfill – Cheechunk Canal/Seep Evaluation	**Project No.:**	2010-15
Client Name:	Orange County Department of Public Works	**Date:**	February 20, 2014
Location:	Goshen, NY	**Logged By:**	Mark Williams
Weather/Temp.:	See page 1 of 2	**Checked By:**	Peter Kelleher, P.E.

Drilling Co.:	Zebra Environmental Corp.	**Depth:**	38'bgs
Driller:	Jason Frederick	**Equipment:**	Geoprobe® 7720 DT
Date Started:	February 20, 2014	**Surface Elev.:**	99.78' (Site Datum)
Date Completed:	February 20, 2014	**Depth/Datum:**	61.92' (Site Datum)

Depth	Sample No.	Blow Counts	Graphic Log 1"=5'	Unified Soil Classification	DESCRIPTIVE LOG (color, grain size and amount, texture, moisture) DEPOSITIONAL UNIT (outwash, till, lacustrine, muck, fill)	COMMENTS
					Gr Cy$ to $&C; no odor; mod. stiff; occ. to freq. vvd (partings = 0.05'); mod. plasticity; wet to moist (ML/CL). ▼	Depth to Groundwater = 28.32' bgs (March 18, 2014)
			30		Gr Cy$; no odor; soft to mod. stiff; massive; low plasticity; moist to wet (ML). **(GLACIOLACUSTRINE SILT AND CLAY) 33.5'**	2"I.D. Schedule 40 PVC overburden piezometer installed on February 20, 2014. 10-slot PVC screen: 32.9 -34.9'bgs.
			35		DkGrmf(+)S, t$; laminated; med. dense to dense; wet (SM). Gr-DkGrfS; no odor; dense; wet (SM). **(GLACIOLACUSTRINE SAND) 37.86'**	
			40		Boring terminated at 37.86 feet below ground surface (bgs).	
			45			
			50			

Sterling Environmental Engineering, P.C.

BORING LOG

Boring No. PZ-14-6

Project Name:	Orange County Landfill – Cheechunk Canal/Seep Evaluation	**Project No.:**	2010-15
Client Name:	Orange County Department of Public Works	**Date:**	February 20, 2014
Location:	Goshen, NY	**Logged By:**	Mark Williams
Weather/Temp.:	23°F - 50°F, 0" Precip, Winds (1-4mph)	**Checked By:**	Peter Kelleher, P.E.

Drilling Co.:	Zebra Environmental Corp.	**Depth:**	39.2' bgs
Driller:	Jason Frederick	**Equipment:**	Geoprobe® 7720 DT
Date Started:	February 20, 2014	**Surface Elev.:**	99.96' (Site Datum)
Date Completed:	February 20, 2014	**Depth Elev.:**	60.76' (Site Datum)

Depth	Sample No.	Blow Counts	Graphic Log 1"=5'	Unified Soil Classification	DESCRIPTIVE LOG (color, grain size and amount, texture, moisture) DEPOSITIONAL UNIT (outwash, till, lacustrine, muck, fill)	COMMENTS
					BrGr Cy$; no odor; occ. mtld; mod. stiff; moist (ML).	
			5		BrGr Cy$ to $&C; no odor; mod. stiff; moist (ML/CL).	
			10		BrGr C&$; no odor; mod. stiff; low to mod. plasticity; moist (ML/CL).	
			15		BrGr-Gr $&C to Cy$; no odor; mod. stiff; occ.vvd; low to mod. plasticity; moist (ML/CL).	
			20		Gr Cy$; no odor; mod. stiff; occ.vvd; low to mod. plasticity; moist (ML/CL).	
			25		(GLACIOLACUSTRINE SILT AND CLAY)	

Sterling Environmental Engineering, P.C.

BORING LOG

Boring No. PZ-14-6

Project Name:	Orange County Landfill – Cheechunk Canal/Seep Evaluation	**Project No.:**	2010-15
Client Name:	Orange County Department of Public Works	**Date:**	February 20, 2014
Location:	Goshen, NY	**Logged By:**	Mark Williams
Weather/Temp.:	See page 1 of 2	**Checked By:**	Peter Kelleher, P.E.

Drilling Co.:	Zebra Environmental Corp.	**Depth:**	39.2'bgs
Driller:	Jason Frederick	**Equipment:**	Geoprobe® 7720 DT
Date Started:	February 20, 2014	**Surface Elev.:**	99.96' (Site Datum)
Date Completed:	February 20, 2014	**Depth/Datum:**	60.76' (Site Datum)

Depth	Sample No.	Blow Counts	Graphic Log 1"=5'	Unified Soil Classification	DESCRIPTIVE LOG (color, grain size and amount, texture, moisture) DEPOSITIONAL UNIT (outwash, till, lacustrine, muck, fill)	COMMENTS
					Gr Cy$; no odor; soft to mod. stiff; occ. to freq. vvd (partings = 0.03 – 0.05'); mod. plasticity; moist (ML/CL).	Depth to Groundwater = 27.27' bgs (March 18, 2014)
			30		Gr Cy$; no odor; soft to mod. stiff; massive; low plasticity; moist to wet (ML). **(GLACIOLACUSTRINE SILT AND CLAY) 33.85'**	
			35		Gr-DkGrfSl(-), Cy$; no odor; med. dense to dense; wet (SM/ML) **(GLACIOLACUSTRINE SAND) 39.2'**	1¼"I.D. Schedule 40 PVC overburden piezometer installed on February 20, 2014. 10-slot PVC screen: 34.2 -39.2'bgs.
			40		Boring terminated at 39.2 feet below ground surface (bgs).	
			45			
			50			

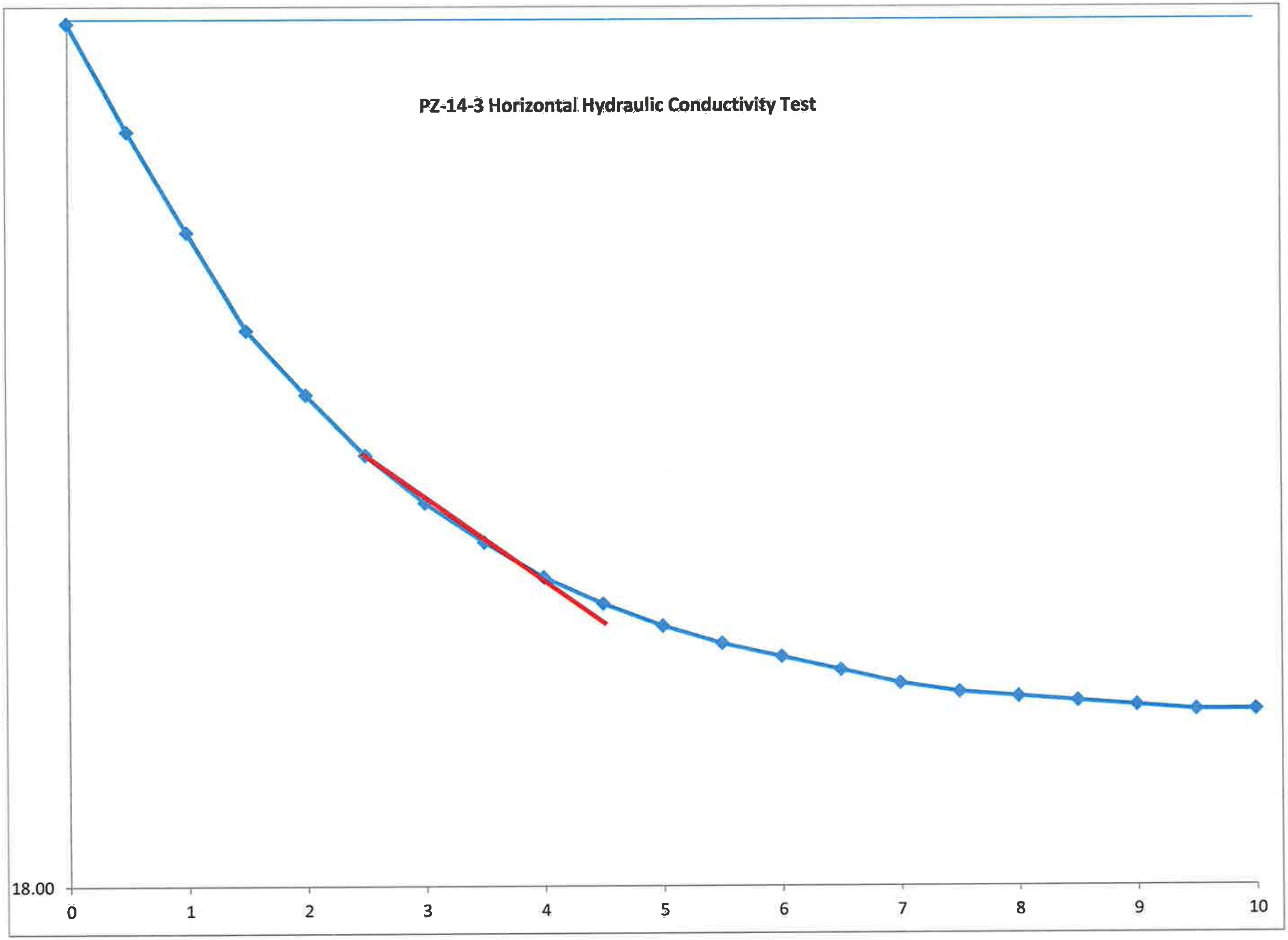
APPENDIX B

Summary of Survey and Project Information - Orange County Landfill Seep Evaluation

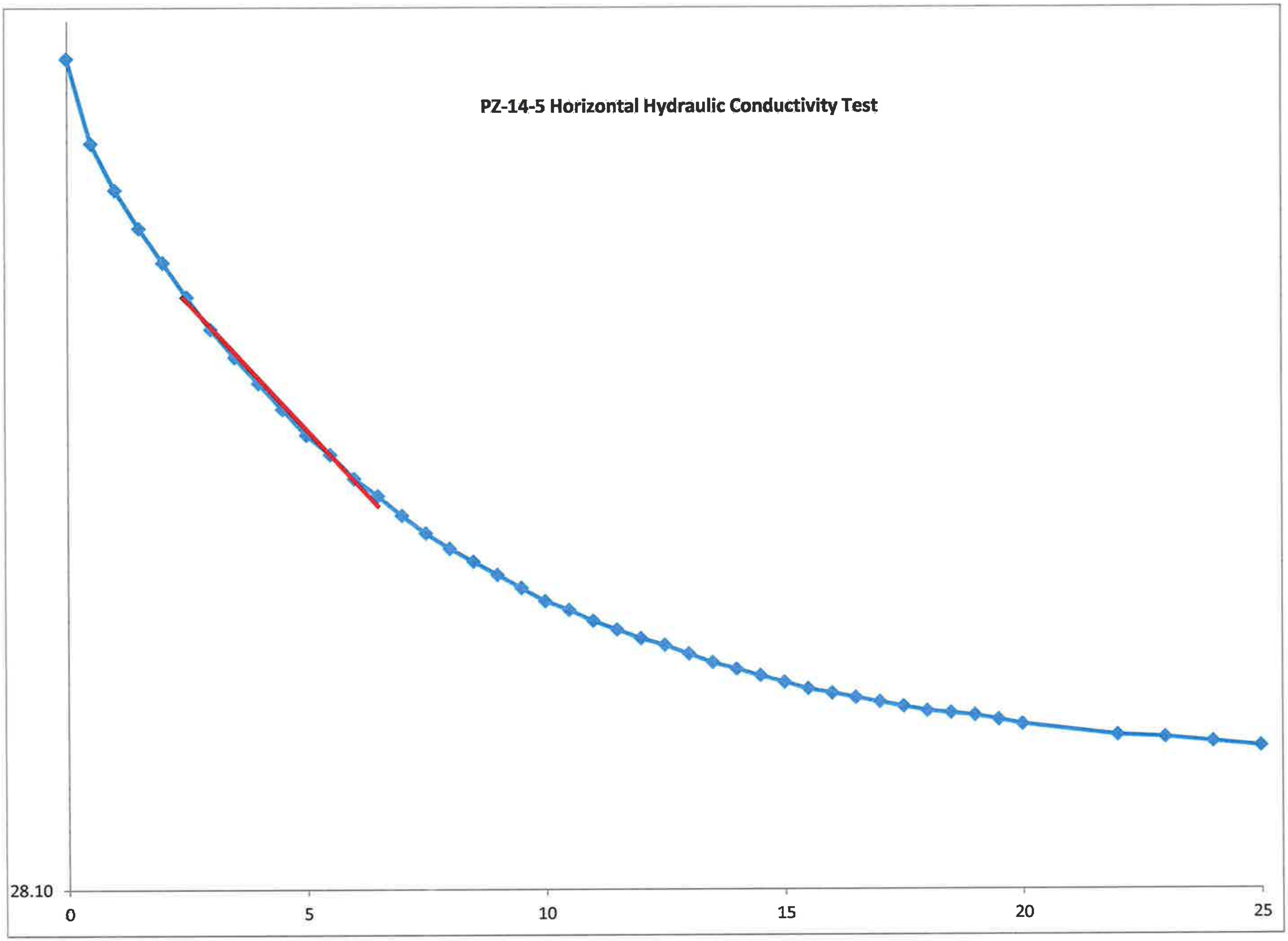
Assign PZ-14-1 MP Elev =	100.00	ft

Piezometer I.D.	Assumed Elevation (Site Datum)	delta Z - 1st Setup	delta Z - 2nd Setup	delta Z - 3rd Setup	Piezometer Stickup (feet)	Ground Surface Elevation (Site Datum)	Glaciolacustrine (Silt and Clay)/Glaciolacustrine (Fine Sand) Interface (feet BGS)/[Geologic Contact Elevation]	Screened Interval / [Screened Elevation]	Total Depth (Feet BGS) / [Bottom Elevation]	February 20, 2014 Depth to Groundwater (feet BMP {Top of PVC}) / [Groundwater Elevation]	March 18, 2014 Depth to Groundwater (feet BMP {Top of PVC}) / [Groundwater Elevation]
	(MP)	(to MP)	(to MP)	(to MP)							
PZ-14-1	100.00	-3.31			0.65	99.35	34.1 / [65.25]	34.5-39.5 / [64.85 - 59.85]	39.5 / [59.85]	27.69 / [72.31]	26.29 / [73.71]
PZ-14-2	91.67	-11.64			0.80	90.87	24.6 / [66.27]	24.5-29.5 / [66.37 - 61.37]	30.26 / [60.61]	20.21 / [71.46]	18.24 / [73.43]
PZ-14-3	91.56	-11.75		0.40	0.35	91.21	24.4 / [66.81]	24.92 -29.92 / [66.29 - 61.29]	29.92 / [61.29]	20.10 / [71.46]	18.30 / [73.26]
PZ-14-4	91.50	-11.81			1.35	90.15	23.9 / [66.25]	23.91-28.91 / [66.24 - 61.24]	28.91 / [61.24]	19.88 / [71.62]	18.23 / [73.27]
PZ-14-5	101.95	-1.36			2.17	99.78	33.5 / [66.28]	32.9-37.9 / [66.88 - 61.88]	37.86 / [61.92]	29.58 / [72.37]	28.32 / [73.63]
PZ-14-6	100.84	-2.47			0.88	99.96	33.85 / [66.11]	34.2-39.2 / [65.76 - 60.76]	39.20 / [60.76]	28.61 / [72.23]	27.27 / [73.57]
MW-3B	96.16	-7.15	-8.19								
MH-5	102.56		-1.80								
Canal	71.81			-19.35							

Time (sec)	PZ-14-3 Water Level (from MP)			
Static	18.33	1.66	1.577	18.41 95% recovery
0	19.99			
0.5	19.73			
1	19.49			
1.5	19.26			
2	19.11			
2.5	18.97			
3	18.86			
3.5	18.77			
4	18.69			
4.5	18.63			
5	18.58			
5.5	18.54			
6	18.51			
6.5	18.48			
7	18.45			
7.5	18.43			
8	18.42			
8.5	18.41			
9	18.40			
9.5	18.39			
10	18.39			


PZ-14-3 Horizontal Hydraulic Conductivity Test
18.00
0
1
2
3
4
5
6
7
8
9
10

Time (min)	PZ-14-5 Water Level (from MP)				
Static	28.35	1.66	1.577	28.43	95% recovery
0	30.01				
0.5	29.81				
1	29.70				
1.5	29.61				
2	29.53				
2.5	29.45				
3	29.375				
3.5	29.31				
4	29.25				
4.5	29.19				
5	29.13				
5.5	29.09				
6	29.03				
6.5	28.99				
7	28.95				
7.5	28.91				
8	28.87				
8.5	28.84				
9	28.81				
9.5	28.78				
10	28.75				
10.5	28.73				
11	28.71				
11.5	28.69				
12	28.67				
12.5	28.65				
13	28.63				
13.5	28.61				
14	28.60				
14.5	28.58				
15	28.57				
15.5	28.55				
16	28.54				
16.5	28.53				
17	28.52				
17.5	28.51				
18	28.50				
18.5	28.50				
19	28.49				
19.5	28.48				
20	28.47				
22	28.445				
23	28.44				
24	28.43				
25	28.42				


PZ-14-5 Horizontal Hydraulic Conductivity Test
28.10
0
5
10
15
20
25

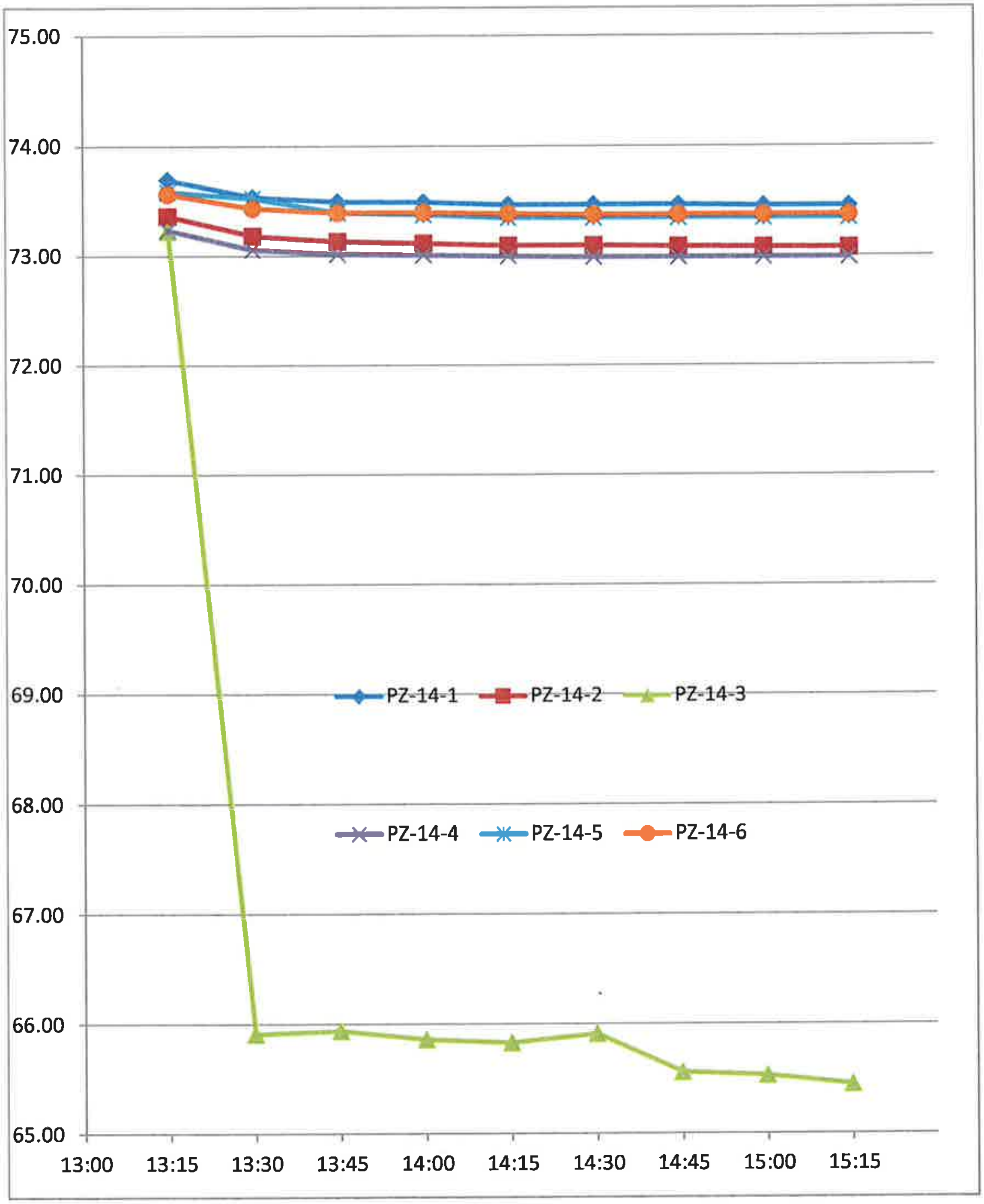
Pumping Test Data (PZ-14-3)

Time	PZ-14-1 (ft)	PZ-14-2 (ft)	PZ-14-3 (ft)	PZ-14-4 (ft)	PZ-14-5 (ft)	PZ-14-6 (ft)	Pump Rate (gpm)
9:30	26.29	18.24	18.30	18.23	28.32	27.27	
11:50	26.30	18.28	18.33	18.25	28.35	27.27	
13:10	26.30	18.30	18.33	18.26	28.36	27.27	
13:15	26.30	18.30	18.33	18.26	28.36	27.27	0.33
13:30	26.46	18.48	25.65	18.44	28.42	27.40	0.40
13:45	26.50	18.53	25.62	18.48	28.55	27.44	0.38
14:00	26.51	18.55	25.70	18.49	28.57	27.44	0.38
14:15	26.53	18.57	25.73	18.50	28.60	27.45	0.38
14:30	26.53	18.57	25.65	18.51	28.60	27.46	0.36
14:45	26.53	18.58	26.00	18.51	28.60	27.46	0.41
15:00	26.54	18.59	26.03	18.51	28.60	27.46	0.38
15:15	26.54	18.59	26.11	18.51	28.60	27.46	0.40
max delta	-0.24	-0.29	-7.78	-0.25	-0.24	-0.19	

Using water levels as elevations (Canal ~71.8'):

13:15	73.70	73.37	73.23	73.24	73.59	73.57
13:30	73.54	73.19	65.91	73.06	73.53	73.44
13:45	73.50	73.14	65.94	73.02	73.40	73.40
14:00	73.50	73.12	65.86	73.01	73.38	73.40
14:15	73.47	73.10	65.83	73.00	73.35	73.39
14:30	73.47	73.10	65.91	72.99	73.35	73.38
14:45	73.47	73.09	65.56	72.99	73.35	73.38
15:00	73.46	73.09	65.53	72.99	73.35	73.38
15:15	73.46	73.08	65.45	72.99	73.35	73.38

Pumping Test Data (PZ-14-3)



Sample ID	Time Collected	Time Analyzed	Temp. C	Cond. mS/cm (S)	Cond. mS/cm	DO %	DO mg/L	pH SU	ORP mV	Turbidity NTU
BEFORE	13:20; 3/18/14	16:50; 3/19/14	13.05	1.189	0.918	12.2	1.28	6.92	-51.0	
AFTER	15:15; 3/18/14	17:10; 3/19/14	13.13	1.176	0.910	20.1	2.1	6.93	-34.2	

APPENDIX H

JUNE 12, 2014 ANALYTICAL RESULTS

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Buffalo
10 Hazelwood Drive
Amherst, NY 14228-2298
Tel: (716)691-2600

TestAmerica Job ID: 480-61861-1
Client Project/Site: Orange County Landfill
Sampling Event: Groundwater Baseline

For:
Sterling Environmental Engineering PC
24 Wade Road
Latham, New York 12110

Attn: Stephen Burton

Authorized for release by:
6/27/2014 2:51:39 PM

Lisa Shaffer, Project Manager II
(716)504-9816
lisa.shaffer@testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Metals

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

General Chemistry

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
b	Result Detected in the Unseeded Control blank (USB).

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Job ID: 480-61861-1

Laboratory: TestAmerica Buffalo

Narrative

Job Narrative
480-61861-1

Comments
No additional comments.

Receipt
The samples were received on 6/13/2014 9:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 3 coolers at receipt time were 3.0° C, 3.2° C and 3.5° C.

GC/MS VOA
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

HPLC
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Metals
Method(s) 6010C: The method blank for batch 480-187751 contained total boron above the method detection limit. This target analyte concentration was less than the reporting limit (RL); therefore, re-extraction and/or re-analysis of samples GW-1 (480-61861-7), GW-2 (480-61861-8), GW-3 (480-61861-6), GW-A (480-61861-2), GW-B (480-61861-3), SW-01 (480-61861-5), SW-02 (480-61861-4) was not performed.

Method(s) 6010C: The method blank for batch 480-187896 contained dissolved zinc above the method detection limit. This target analyte concentration was less than the reporting limit (RL); therefore, re-extraction and/or re-analysis of samples GW-1 (480-61861-7), GW-2 (480-61861-8), GW-3 (480-61861-6), GW-A (480-61861-2), GW-B (480-61861-3), SW-01 (480-61861-5), SW-02 (480-61861-4) was not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry
Method(s) SM 2120B: The sample was filtered prior to analysis, therefore the analytical result must be reported as true color. GW-2 (480-61861-8), GW-3 (480-61861-6), GW-B (480-61861-3)

Method(s) 353.2: The method blank for batch 187689 contained nitrite above the method detection limit. This target analyte concentration was less than the reporting limit (RL); therefore, re-extraction and/or re-analysis of samples was not performed.SW-02 (480-61861-4)

Method(s) SM 5210B: The USB dilution water D.O. depletion was greater than 0.2 mg/L but less than the reporting limit of 2.0 mg/L. The associated sample results in batch 187695 are reported. (USB 480-187695/1)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-61861-1

Client Sample ID: GW-A

Lab Sample ID: 480-61861-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	0.37		0.20	0.060	mg/L	1		6010C	Total/NA
Barium	0.021		0.0020	0.00070	mg/L	1		6010C	Total/NA
Boron	0.023	B	0.020	0.0040	mg/L	1		6010C	Total/NA
Calcium	49		0.50	0.10	mg/L	1		6010C	Total/NA
Iron	0.53		0.050	0.019	mg/L	1		6010C	Total/NA
Magnesium	8.8		0.20	0.043	mg/L	1		6010C	Total/NA
Manganese	0.063		0.0030	0.00040	mg/L	1		6010C	Total/NA
Potassium	1.8		0.50	0.10	mg/L	1		6010C	Total/NA
Sodium	24		1.0	0.32	mg/L	1		6010C	Total/NA
Zinc	0.0029	J	0.010	0.0015	mg/L	1		6010C	Total/NA
Barium	0.14		0.0020	0.00070	mg/L	1		6010C	Dissolved
Boron	0.022		0.020	0.0040	mg/L	1		6010C	Dissolved
Calcium	46		0.50	0.10	mg/L	1		6010C	Dissolved
Chromium	0.0031	J	0.0040	0.0010	mg/L	1		6010C	Dissolved
Copper	0.0017	J	0.010	0.0016	mg/L	1		6010C	Dissolved
Iron	0.099		0.050	0.019	mg/L	1		6010C	Dissolved
Magnesium	8.4		0.20	0.043	mg/L	1		6010C	Dissolved
Manganese	0.038		0.0030	0.00040	mg/L	1		6010C	Dissolved
Nickel	0.0013	J	0.010	0.0013	mg/L	1		6010C	Dissolved
Potassium	1.6		0.50	0.10	mg/L	1		6010C	Dissolved
Sodium	25		1.0	0.32	mg/L	1		6010C	Dissolved
Zinc	0.0042	J B	0.010	0.0015	mg/L	1		6010C	Dissolved
Chloride	44		0.50	0.28	mg/L	1		300.0	Total/NA
Sulfate	17		2.0	0.35	mg/L	1		300.0	Total/NA
Alkalinity, Total	130		50	20	mg/L	5		310.2	Total/NA
Ammonia	0.016	J	0.020	0.0090	mg/L	1		350.1	Total/NA
Total Kjeldahl Nitrogen	0.41		0.20	0.15	mg/L	1		351.2	Total/NA
Nitrate as N	0.45		0.050	0.020	mg/L	1		353.2	Total/NA
Chemical Oxygen Demand	24		10	5.0	mg/L	1		410.4	Total/NA
Total Organic Carbon	6.9		1.0	0.43	mg/L	1		9060A	Total/NA
Hardness	160		4.0	1.1	mg/L	1		SM 2340C	Total/NA
Total Dissolved Solids	280		10	4.0	mg/L	1		SM 2540C	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Turbidity	12		1.0	1.0	NTU	1		180.1	Total/NA
Color	60		5.0	5.0	Color Units	1		SM 2120B	Total/NA

Client Sample ID: GW-B

Lab Sample ID: 480-61861-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	6.3		0.20	0.060	mg/L	1		6010C	Total/NA
Arsenic	0.0058	J	0.015	0.0056	mg/L	1		6010C	Total/NA
Barium	0.074		0.0020	0.00070	mg/L	1		6010C	Total/NA
Beryllium	0.00045	J	0.0020	0.00030	mg/L	1		6010C	Total/NA
Boron	0.027	B	0.020	0.0040	mg/L	1		6010C	Total/NA
Calcium	76		0.50	0.10	mg/L	1		6010C	Total/NA
Chromium	0.0078		0.0040	0.0010	mg/L	1		6010C	Total/NA
Copper	0.012		0.010	0.0016	mg/L	1		6010C	Total/NA
Iron	8.0		0.050	0.019	mg/L	1		6010C	Total/NA
Lead	0.0070	J	0.010	0.0030	mg/L	1		6010C	Total/NA
Magnesium	16		0.20	0.043	mg/L	1		6010C	Total/NA

This Detection Summary does not include radiochemical test results.

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-61861-1

Client Sample ID: GW-B (Continued)

Lab Sample ID: 480-61861-3

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Manganese	1.0		0.0030	0.00040	mg/L	1		6010C	Total/NA
Nickel	0.018		0.010	0.0013	mg/L	1		6010C	Total/NA
Potassium	4.4		0.50	0.10	mg/L	1		6010C	Total/NA
Sodium	3.2		1.0	0.32	mg/L	1		6010C	Total/NA
Zinc	0.028		0.010	0.0015	mg/L	1		6010C	Total/NA
Aluminum	0.14	J	0.20	0.060	mg/L	1		6010C	Dissolved
Barium	0.27		0.0020	0.00070	mg/L	1		6010C	Dissolved
Boron	0.020		0.020	0.0040	mg/L	1		6010C	Dissolved
Calcium	72		0.50	0.10	mg/L	1		6010C	Dissolved
Chromium	0.0038	J	0.0040	0.0010	mg/L	1		6010C	Dissolved
Cobalt	0.0014	J	0.0040	0.00063	mg/L	1		6010C	Dissolved
Copper	0.0054	J	0.010	0.0016	mg/L	1		6010C	Dissolved
Iron	0.22		0.050	0.019	mg/L	1		6010C	Dissolved
Magnesium	15		0.20	0.043	mg/L	1		6010C	Dissolved
Manganese	0.44		0.0030	0.00040	mg/L	1		6010C	Dissolved
Nickel	0.010		0.010	0.0013	mg/L	1		6010C	Dissolved
Potassium	2.2		0.50	0.10	mg/L	1		6010C	Dissolved
Sodium	4.1		1.0	0.32	mg/L	1		6010C	Dissolved
Zinc	0.0055	J B	0.010	0.0015	mg/L	1		6010C	Dissolved
Chloride	0.82		0.50	0.28	mg/L	1		300.0	Total/NA
Sulfate	23		2.0	0.35	mg/L	1		300.0	Total/NA
Alkalinity, Total	260		100	40	mg/L	10		310.2	Total/NA
Ammonia	0.14		0.020	0.0090	mg/L	1		350.1	Total/NA
Total Kjeldahl Nitrogen	2.7		0.20	0.15	mg/L	1		351.2	Total/NA
Nitrate as N	0.31		0.050	0.020	mg/L	1		353.2	Total/NA
Chemical Oxygen Demand	110		10	5.0	mg/L	1		410.4	Total/NA
Total Organic Carbon	46		1.0	0.43	mg/L	1		9060A	Total/NA
Hardness	250		10	2.6	mg/L	1		SM 2340C	Total/NA
Total Dissolved Solids	420		10	4.0	mg/L	1		SM 2540C	Total/NA
Biochemical Oxygen Demand	2.2	b	2.0	2.0	mg/L	1		SM 5210B	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Turbidity	160		1.0	1.0	NTU	1		180.1	Total/NA
Color	140		10	10	Color Units	2		SM 2120B	Total/NA

Client Sample ID: SW-02

Lab Sample ID: 480-61861-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	0.55		0.20	0.060	mg/L	1		6010C	Total/NA
Barium	0.024		0.0020	0.00070	mg/L	1		6010C	Total/NA
Boron	0.023	B	0.020	0.0040	mg/L	1		6010C	Total/NA
Calcium	44		0.50	0.10	mg/L	1		6010C	Total/NA
Copper	0.0017	J	0.010	0.0016	mg/L	1		6010C	Total/NA
Iron	0.77		0.050	0.019	mg/L	1		6010C	Total/NA
Magnesium	15		0.20	0.043	mg/L	1		6010C	Total/NA
Manganese	0.11		0.0030	0.00040	mg/L	1		6010C	Total/NA
Potassium	1.8		0.50	0.10	mg/L	1		6010C	Total/NA
Sodium	32		1.0	0.32	mg/L	1		6010C	Total/NA
Zinc	0.0055	J	0.010	0.0015	mg/L	1		6010C	Total/NA
Barium	0.021		0.0020	0.00070	mg/L	1		6010C	Dissolved
Boron	0.021		0.020	0.0040	mg/L	1		6010C	Dissolved

This Detection Summary does not include radiochemical test results.

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-61861-1

Client Sample ID: SW-02 (Continued)

Lab Sample ID: 480-61861-4

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Calcium	42		0.50	0.10	mg/L	1		6010C	Dissolved
Chromium	0.0019	J	0.0040	0.0010	mg/L	1		6010C	Dissolved
Copper	0.0016	J	0.010	0.0016	mg/L	1		6010C	Dissolved
Iron	0.026	J	0.050	0.019	mg/L	1		6010C	Dissolved
Magnesium	15		0.20	0.043	mg/L	1		6010C	Dissolved
Manganese	0.0062		0.0030	0.00040	mg/L	1		6010C	Dissolved
Potassium	1.5		0.50	0.10	mg/L	1		6010C	Dissolved
Selenium	0.0090	J	0.025	0.0087	mg/L	1		6010C	Dissolved
Sodium	32		1.0	0.32	mg/L	1		6010C	Dissolved
Zinc	0.0028	J B	0.010	0.0015	mg/L	1		6010C	Dissolved
Chloride	61		0.50	0.28	mg/L	1		300.0	Total/NA
Sulfate	14		2.0	0.35	mg/L	1		300.0	Total/NA
Alkalinity, Total	140		50	20	mg/L	5		310.2	Total/NA
Ammonia	0.053		0.020	0.0090	mg/L	1		350.1	Total/NA
Total Kjeldahl Nitrogen	0.44		0.20	0.15	mg/L	1		351.2	Total/NA
Nitrate as N	0.93		0.050	0.020	mg/L	1		353.2	Total/NA
Chemical Oxygen Demand	9.0	J	10	5.0	mg/L	1		410.4	Total/NA
Total Organic Carbon	4.4		1.0	0.43	mg/L	1		9060A	Total/NA
Hardness	180		4.0	1.1	mg/L	1		SM 2340C	Total/NA
Total Dissolved Solids	310		10	4.0	mg/L	1		SM 2540C	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Turbidity	17		1.0	1.0	NTU	1		180.1	Total/NA
Color	40		5.0	5.0	Color Units	1		SM 2120B	Total/NA

Client Sample ID: SW-01

Lab Sample ID: 480-61861-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	0.57		0.20	0.060	mg/L	1		6010C	Total/NA
Barium	0.024		0.0020	0.00070	mg/L	1		6010C	Total/NA
Boron	0.022	B	0.020	0.0040	mg/L	1		6010C	Total/NA
Calcium	43		0.50	0.10	mg/L	1		6010C	Total/NA
Iron	0.81		0.050	0.019	mg/L	1		6010C	Total/NA
Magnesium	15		0.20	0.043	mg/L	1		6010C	Total/NA
Manganese	0.11		0.0030	0.00040	mg/L	1		6010C	Total/NA
Nickel	0.0015	J	0.010	0.0013	mg/L	1		6010C	Total/NA
Potassium	1.8		0.50	0.10	mg/L	1		6010C	Total/NA
Sodium	32		1.0	0.32	mg/L	1		6010C	Total/NA
Zinc	0.0060	J	0.010	0.0015	mg/L	1		6010C	Total/NA
Barium	0.022		0.0020	0.00070	mg/L	1		6010C	Dissolved
Boron	0.022		0.020	0.0040	mg/L	1		6010C	Dissolved
Calcium	42		0.50	0.10	mg/L	1		6010C	Dissolved
Chromium	0.0015	J	0.0040	0.0010	mg/L	1		6010C	Dissolved
Iron	0.095		0.050	0.019	mg/L	1		6010C	Dissolved
Magnesium	16		0.20	0.043	mg/L	1		6010C	Dissolved
Manganese	0.0059		0.0030	0.00040	mg/L	1		6010C	Dissolved
Potassium	1.6		0.50	0.10	mg/L	1		6010C	Dissolved
Sodium	33		1.0	0.32	mg/L	1		6010C	Dissolved
Zinc	0.0047	J B	0.010	0.0015	mg/L	1		6010C	Dissolved
Chloride	61		0.50	0.28	mg/L	1		300.0	Total/NA
Sulfate	14		2.0	0.35	mg/L	1		300.0	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: SW-01 (Continued)

Lab Sample ID: 480-61861-5

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Alkalinity, Total	130		50	20	mg/L	5		310.2	Total/NA
Ammonia	0.053		0.020	0.0090	mg/L	1		350.1	Total/NA
Total Kjeldahl Nitrogen	0.41		0.20	0.15	mg/L	1		351.2	Total/NA
Nitrate as N	0.91		0.050	0.020	mg/L	1		353.2	Total/NA
Chemical Oxygen Demand	10		10	5.0	mg/L	1		410.4	Total/NA
Total Organic Carbon	4.4		1.0	0.43	mg/L	1		9060A	Total/NA
Hardness	180		4.0	1.1	mg/L	1		SM 2340C	Total/NA
Total Dissolved Solids	310		10	4.0	mg/L	1		SM 2540C	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Turbidity	16		1.0	1.0	NTU	1		180.1	Total/NA
Color	35		5.0	5.0	Color Units	1		SM 2120B	Total/NA

Client Sample ID: GW-3

Lab Sample ID: 480-61861-6

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	0.21		0.20	0.060	mg/L	1		6010C	Total/NA
Arsenic	0.029		0.015	0.0056	mg/L	1		6010C	Total/NA
Barium	0.49		0.0020	0.00070	mg/L	1		6010C	Total/NA
Boron	0.17	B	0.020	0.0040	mg/L	1		6010C	Total/NA
Calcium	150		0.50	0.10	mg/L	1		6010C	Total/NA
Iron	13		0.050	0.019	mg/L	1		6010C	Total/NA
Magnesium	48		0.20	0.043	mg/L	1		6010C	Total/NA
Manganese	1.4		0.0030	0.00040	mg/L	1		6010C	Total/NA
Nickel	0.0073	J	0.010	0.0013	mg/L	1		6010C	Total/NA
Potassium	8.0		0.50	0.10	mg/L	1		6010C	Total/NA
Sodium	45		1.0	0.32	mg/L	1		6010C	Total/NA
Zinc	0.0054	J	0.010	0.0015	mg/L	1		6010C	Total/NA
Arsenic	0.010	J	0.015	0.0056	mg/L	1		6010C	Dissolved
Barium	0.43		0.0020	0.00070	mg/L	1		6010C	Dissolved
Boron	0.17		0.020	0.0040	mg/L	1		6010C	Dissolved
Calcium	140		0.50	0.10	mg/L	1		6010C	Dissolved
Chromium	0.0018	J	0.0040	0.0010	mg/L	1		6010C	Dissolved
Cobalt	0.0024	J	0.0040	0.00063	mg/L	1		6010C	Dissolved
Magnesium	48		0.20	0.043	mg/L	1		6010C	Dissolved
Manganese	1.2		0.0030	0.00040	mg/L	1		6010C	Dissolved
Nickel	0.0064	J	0.010	0.0013	mg/L	1		6010C	Dissolved
Potassium	7.9		0.50	0.10	mg/L	1		6010C	Dissolved
Selenium	0.0091	J	0.025	0.0087	mg/L	1		6010C	Dissolved
Sodium	45		1.0	0.32	mg/L	1		6010C	Dissolved
Zinc	0.0041	J B	0.010	0.0015	mg/L	1		6010C	Dissolved
Chloride	54		0.50	0.28	mg/L	1		300.0	Total/NA
Sulfate	67		2.0	0.35	mg/L	1		300.0	Total/NA
Alkalinity, Total	630		100	40	mg/L	10		310.2	Total/NA
Ammonia	6.3		0.10	0.045	mg/L	5		350.1	Total/NA
Total Kjeldahl Nitrogen	6.8		0.40	0.30	mg/L	2		351.2	Total/NA
Chemical Oxygen Demand	21		10	5.0	mg/L	1		410.4	Total/NA
Total Organic Carbon	5.5		1.0	0.43	mg/L	1		9060A	Total/NA
Hardness	600		20	5.3	mg/L	1		SM 2340C	Total/NA
Total Dissolved Solids	780		10	4.0	mg/L	1		SM 2540C	Total/NA
Biochemical Oxygen Demand	14	b	2.0	2.0	mg/L	1		SM 5210B	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: GW-3 (Continued)

Lab Sample ID: 480-61861-6

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Turbidity	150		1.0	1.0	NTU	1		180.1	Total/NA
Color	5.0		5.0	5.0	Color Units	1		SM 2120B	Total/NA

Client Sample ID: GW-1

Lab Sample ID: 480-61861-7

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	0.60		0.20	0.060	mg/L	1		6010C	Total/NA
Arsenic	0.12		0.015	0.0056	mg/L	1		6010C	Total/NA
Barium	1.2		0.0020	0.00070	mg/L	1		6010C	Total/NA
Boron	0.27	B	0.020	0.0040	mg/L	1		6010C	Total/NA
Cadmium	0.00094	J	0.0020	0.00050	mg/L	1		6010C	Total/NA
Calcium	92		0.50	0.10	mg/L	1		6010C	Total/NA
Iron	11		0.050	0.019	mg/L	1		6010C	Total/NA
Magnesium	57		0.20	0.043	mg/L	1		6010C	Total/NA
Manganese	0.28		0.0030	0.00040	mg/L	1		6010C	Total/NA
Nickel	0.013		0.010	0.0013	mg/L	1		6010C	Total/NA
Potassium	19		0.50	0.10	mg/L	1		6010C	Total/NA
Sodium	65		1.0	0.32	mg/L	1		6010C	Total/NA
Zinc	0.012		0.010	0.0015	mg/L	1		6010C	Total/NA
Arsenic	0.037		0.015	0.0056	mg/L	1		6010C	Dissolved
Barium	1.1		0.0020	0.00070	mg/L	1		6010C	Dissolved
Boron	0.28		0.020	0.0040	mg/L	1		6010C	Dissolved
Calcium	89		0.50	0.10	mg/L	1		6010C	Dissolved
Chromium	0.0019	J	0.0040	0.0010	mg/L	1		6010C	Dissolved
Cobalt	0.00063	J	0.0040	0.00063	mg/L	1		6010C	Dissolved
Iron	0.019	J	0.050	0.019	mg/L	1		6010C	Dissolved
Lead	0.0038	J	0.010	0.0030	mg/L	1		6010C	Dissolved
Magnesium	60		0.20	0.043	mg/L	1		6010C	Dissolved
Manganese	0.23		0.0030	0.00040	mg/L	1		6010C	Dissolved
Nickel	0.012		0.010	0.0013	mg/L	1		6010C	Dissolved
Potassium	19		0.50	0.10	mg/L	1		6010C	Dissolved
Sodium	65		1.0	0.32	mg/L	1		6010C	Dissolved
Zinc	0.0057	J B	0.010	0.0015	mg/L	1		6010C	Dissolved
Chloride	73		0.50	0.28	mg/L	1		300.0	Total/NA
Sulfate	4.7		2.0	0.35	mg/L	1		300.0	Total/NA
Alkalinity, Total	560		100	40	mg/L	10		310.2	Total/NA
Ammonia	18		0.20	0.090	mg/L	10		350.1	Total/NA
Total Kjeldahl Nitrogen	16		2.0	1.5	mg/L	10		351.2	Total/NA
Nitrate as N	0.076		0.050	0.020	mg/L	1		353.2	Total/NA
Chemical Oxygen Demand	31		10	5.0	mg/L	1		410.4	Total/NA
Total Organic Carbon	6.0		1.0	0.43	mg/L	1		9060A	Total/NA
Hardness	490		4.0	1.1	mg/L	1		SM 2340C	Total/NA
Total Dissolved Solids	690		10	4.0	mg/L	1		SM 2540C	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Turbidity	320		1.0	1.0	NTU	1		180.1	Total/NA
Color	25		5.0	5.0	Color Units	1		SM 2120B	Total/NA

Client Sample ID: GW-2

Lab Sample ID: 480-61861-8

This Detection Summary does not include radiochemical test results.

Client Sample ID: GW-2 (Continued)

Lab Sample ID: 480-61861-8

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	1.4		0.20	0.060	mg/L	1		6010C	Total/NA
Arsenic	0.086		0.015	0.0056	mg/L	1		6010C	Total/NA
Barium	0.38		0.0020	0.00070	mg/L	1		6010C	Total/NA
Boron	0.17	B	0.020	0.0040	mg/L	1		6010C	Total/NA
Cadmium	0.00062	J	0.0020	0.00050	mg/L	1		6010C	Total/NA
Calcium	120		0.50	0.10	mg/L	1		6010C	Total/NA
Chromium	0.0020	J	0.0040	0.0010	mg/L	1		6010C	Total/NA
Copper	0.0027	J	0.010	0.0016	mg/L	1		6010C	Total/NA
Iron	5.3		0.050	0.019	mg/L	1		6010C	Total/NA
Lead	0.0042	J	0.010	0.0030	mg/L	1		6010C	Total/NA
Magnesium	44		0.20	0.043	mg/L	1		6010C	Total/NA
Manganese	1.8		0.0030	0.00040	mg/L	1		6010C	Total/NA
Nickel	0.0091	J	0.010	0.0013	mg/L	1		6010C	Total/NA
Potassium	12		0.50	0.10	mg/L	1		6010C	Total/NA
Sodium	45		1.0	0.32	mg/L	1		6010C	Total/NA
Zinc	0.020		0.010	0.0015	mg/L	1		6010C	Total/NA
Arsenic	0.049		0.015	0.0056	mg/L	1		6010C	Dissolved
Barium	0.40		0.0020	0.00070	mg/L	1		6010C	Dissolved
Boron	0.18		0.020	0.0040	mg/L	1		6010C	Dissolved
Calcium	120		0.50	0.10	mg/L	1		6010C	Dissolved
Chromium	0.0020	J	0.0040	0.0010	mg/L	1		6010C	Dissolved
Cobalt	0.0019	J	0.0040	0.00063	mg/L	1		6010C	Dissolved
Magnesium	45		0.20	0.043	mg/L	1		6010C	Dissolved
Manganese	1.6		0.0030	0.00040	mg/L	1		6010C	Dissolved
Nickel	0.0071	J	0.010	0.0013	mg/L	1		6010C	Dissolved
Potassium	12		0.50	0.10	mg/L	1		6010C	Dissolved
Sodium	47		1.0	0.32	mg/L	1		6010C	Dissolved
Zinc	0.0088	J B	0.010	0.0015	mg/L	1		6010C	Dissolved
Chloride	58		0.50	0.28	mg/L	1		300.0	Total/NA
Sulfate	11		2.0	0.35	mg/L	1		300.0	Total/NA
Alkalinity, Total	610		100	40	mg/L	10		310.2	Total/NA
Ammonia	8.8		0.10	0.045	mg/L	5		350.1	Total/NA
Total Kjeldahl Nitrogen	8.6		1.0	0.75	mg/L	5		351.2	Total/NA
Nitrate as N	0.57		0.050	0.020	mg/L	1		353.2	Total/NA
Cyanide, Total	0.0053	J	0.010	0.0050	mg/L	1		9012B	Total/NA
Total Organic Carbon	5.9		1.0	0.43	mg/L	1		9060A	Total/NA
Hardness	500		10	2.6	mg/L	1		SM 2340C	Total/NA
Total Dissolved Solids	660		10	4.0	mg/L	1		SM 2540C	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Turbidity	120		1.0	1.0	NTU	1		180.1	Total/NA
Color	15		5.0	5.0	Color Units	1		SM 2120B	Total/NA

Client Sample ID: TRIP BLANK

Lab Sample ID: 480-61861-9

No Detections.

This Detection Summary does not include radiochemical test results.

Client Sample ID: GW-A
Date Collected: 06/12/14 14:00
Date Received: 06/13/14 09:00

Lab Sample ID: 480-61861-2
Matrix: Water

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	ND		5.0	0.39	ug/L			06/18/14 05:07	1
1,1,2,2-Tetrachloroethane	ND		5.0	0.26	ug/L			06/18/14 05:07	1
1,1,2-Trichloroethane	ND		5.0	0.48	ug/L			06/18/14 05:07	1
1,1-Dichloroethane	ND		5.0	0.59	ug/L			06/18/14 05:07	1
1,1-Dichloroethene	ND		5.0	0.85	ug/L			06/18/14 05:07	1
1,2-Dichlorobenzene	ND		5.0	0.44	ug/L			06/18/14 05:07	1
1,2-Dichloroethane	ND		5.0	0.60	ug/L			06/18/14 05:07	1
1,2-Dichloropropane	ND		5.0	0.61	ug/L			06/18/14 05:07	1
1,3-Dichlorobenzene	ND		5.0	0.54	ug/L			06/18/14 05:07	1
1,4-Dichlorobenzene	ND		5.0	0.51	ug/L			06/18/14 05:07	1
2-Chloroethyl vinyl ether	ND		25	1.9	ug/L			06/18/14 05:07	1
Benzene	ND		5.0	0.60	ug/L			06/18/14 05:07	1
Bromodichloromethane	ND		5.0	0.54	ug/L			06/18/14 05:07	1
Bromoform	ND		5.0	0.47	ug/L			06/18/14 05:07	1
Bromomethane	ND		5.0	1.2	ug/L			06/18/14 05:07	1
Carbon tetrachloride	ND		5.0	0.51	ug/L			06/18/14 05:07	1
Chlorobenzene	ND		5.0	0.48	ug/L			06/18/14 05:07	1
Chloroethane	ND		5.0	0.87	ug/L			06/18/14 05:07	1
Chloroform	ND		5.0	0.54	ug/L			06/18/14 05:07	1
Chloromethane	ND		5.0	0.64	ug/L			06/18/14 05:07	1
cis-1,2-Dichloroethene	ND		5.0	0.57	ug/L			06/18/14 05:07	1
cis-1,3-Dichloropropene	ND		5.0	0.33	ug/L			06/18/14 05:07	1
Dibromochloromethane	ND		5.0	0.41	ug/L			06/18/14 05:07	1
Dichlorodifluoromethane	ND		5.0	0.28	ug/L			06/18/14 05:07	1
Ethylbenzene	ND		5.0	0.46	ug/L			06/18/14 05:07	1
Methylene Chloride	ND		5.0	0.81	ug/L			06/18/14 05:07	1
m-Xylene & p-Xylene	ND		10	1.1	ug/L			06/18/14 05:07	1
o-Xylene	ND		5.0	0.43	ug/L			06/18/14 05:07	1
Tetrachloroethene	ND		5.0	0.34	ug/L			06/18/14 05:07	1
Toluene	ND		5.0	0.45	ug/L			06/18/14 05:07	1
trans-1,2-Dichloroethene	ND		5.0	0.59	ug/L			06/18/14 05:07	1
trans-1,3-Dichloropropene	ND		5.0	0.44	ug/L			06/18/14 05:07	1
Trichloroethene	ND		5.0	0.60	ug/L			06/18/14 05:07	1
Trichlorofluoromethane	ND		5.0	0.45	ug/L			06/18/14 05:07	1
Vinyl chloride	ND		5.0	0.75	ug/L			06/18/14 05:07	1
Xylenes, Total	ND		10	1.1	ug/L			06/18/14 05:07	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*100*		*72 - 130*		*06/18/14 05:07*	*1*
4-Bromofluorobenzene (Surr)	*95*		*69 - 121*		*06/18/14 05:07*	*1*
Toluene-d8 (Surr)	*97*		*70 - 123*		*06/18/14 05:07*	*1*

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**0.37**		0.20	0.060	mg/L		06/16/14 08:00	06/18/14 22:05	1
Antimony	ND		0.020	0.0068	mg/L		06/16/14 08:00	06/18/14 22:05	1
Arsenic	ND		0.015	0.0056	mg/L		06/16/14 08:00	06/18/14 22:05	1
Barium	**0.021**		0.0020	0.00070	mg/L		06/16/14 08:00	06/18/14 22:05	1
Beryllium	ND		0.0020	0.00030	mg/L		06/16/14 08:00	06/18/14 22:05	1
Boron	**0.023**	**B**	0.020	0.0040	mg/L		06/16/14 08:00	06/18/14 22:05	1

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-61861-1

Client Sample ID: GW-A

Lab Sample ID: 480-61861-2

Date Collected: 06/12/14 14:00
Matrix: Water
Date Received: 06/13/14 09:00

Method: 6010C - Metals (ICP) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.0020	0.00050	mg/L		06/16/14 08:00	06/18/14 22:05	1
Calcium	**49**		0.50	0.10	mg/L		06/16/14 08:00	06/18/14 22:05	1
Chromium	ND		0.0040	0.0010	mg/L		06/16/14 08:00	06/18/14 22:05	1
Copper	ND		0.010	0.0016	mg/L		06/16/14 08:00	06/18/14 22:05	1
Iron	**0.53**		0.050	0.019	mg/L		06/16/14 08:00	06/18/14 22:05	1
Lead	ND		0.010	0.0030	mg/L		06/16/14 08:00	06/18/14 22:05	1
Magnesium	**8.8**		0.20	0.043	mg/L		06/16/14 08:00	06/18/14 22:05	1
Manganese	**0.063**		0.0030	0.00040	mg/L		06/16/14 08:00	06/18/14 22:05	1
Nickel	ND		0.010	0.0013	mg/L		06/16/14 08:00	06/18/14 22:05	1
Potassium	**1.8**		0.50	0.10	mg/L		06/16/14 08:00	06/18/14 22:05	1
Selenium	ND		0.025	0.0087	mg/L		06/16/14 08:00	06/18/14 22:05	1
Silver	ND		0.0060	0.0017	mg/L		06/16/14 08:00	06/18/14 22:05	1
Sodium	**24**		1.0	0.32	mg/L		06/16/14 08:00	06/18/14 22:05	1
Thallium	ND		0.020	0.010	mg/L		06/16/14 08:00	06/18/14 22:05	1
Zinc	**0.0029**	**J**	0.010	0.0015	mg/L		06/16/14 08:00	06/18/14 22:05	1

Method: 6010C - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		0.20	0.060	mg/L		06/16/14 12:05	06/20/14 14:31	1
Antimony	ND		0.020	0.0068	mg/L		06/16/14 12:05	06/20/14 14:31	1
Arsenic	ND		0.015	0.0056	mg/L		06/16/14 12:05	06/20/14 14:31	1
Barium	**0.14**		0.0020	0.00070	mg/L		06/16/14 12:05	06/20/14 14:31	1
Beryllium	ND		0.0020	0.00030	mg/L		06/16/14 12:05	06/20/14 14:31	1
Boron	**0.022**		0.020	0.0040	mg/L		06/16/14 12:05	06/20/14 14:31	1
Cadmium	ND		0.0020	0.00050	mg/L		06/16/14 12:05	06/20/14 14:31	1
Calcium	**46**		0.50	0.10	mg/L		06/16/14 12:05	06/20/14 14:31	1
Chromium	**0.0031**	**J**	0.0040	0.0010	mg/L		06/16/14 12:05	06/20/14 14:31	1
Cobalt	ND		0.0040	0.00063	mg/L		06/16/14 12:05	06/20/14 14:31	1
Copper	**0.0017**	**J**	0.010	0.0016	mg/L		06/16/14 12:05	06/20/14 14:31	1
Iron	**0.099**		0.050	0.019	mg/L		06/16/14 12:05	06/20/14 14:31	1
Lead	ND		0.010	0.0030	mg/L		06/16/14 12:05	06/20/14 14:31	1
Magnesium	**8.4**		0.20	0.043	mg/L		06/16/14 12:05	06/20/14 14:31	1
Manganese	**0.038**		0.0030	0.00040	mg/L		06/16/14 12:05	06/20/14 14:31	1
Nickel	**0.0013**	**J**	0.010	0.0013	mg/L		06/16/14 12:05	06/20/14 14:31	1
Potassium	**1.6**		0.50	0.10	mg/L		06/16/14 12:05	06/20/14 14:31	1
Selenium	ND		0.025	0.0087	mg/L		06/16/14 12:05	06/20/14 14:31	1
Silver	ND		0.0060	0.0017	mg/L		06/16/14 12:05	06/20/14 14:31	1
Sodium	**25**		1.0	0.32	mg/L		06/16/14 12:05	06/20/14 14:31	1
Thallium	ND		0.020	0.010	mg/L		06/16/14 12:05	06/20/14 14:31	1
Vanadium	ND		0.0050	0.0015	mg/L		06/16/14 12:05	06/20/14 14:31	1
Zinc	**0.0042**	**J B**	0.010	0.0015	mg/L		06/16/14 12:05	06/20/14 14:31	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		06/16/14 14:30	06/17/14 10:03	1

Method: 7470A - Mercury (CVAA) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		06/17/14 10:15	06/17/14 14:02	1

Client Sample Results

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-61861-1

Client Sample ID: GW-A
Date Collected: 06/12/14 14:00
Date Received: 06/13/14 09:00

Lab Sample ID: 480-61861-2
Matrix: Water

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	44		0.50	0.28	mg/L			06/20/14 11:22	1
Sulfate	17		2.0	0.35	mg/L			06/20/14 11:22	1
Alkalinity, Total	130		50	20	mg/L			06/20/14 12:52	5
Ammonia	0.016	J	0.020	0.0090	mg/L			06/17/14 12:47	1
Total Kjeldahl Nitrogen	0.41		0.20	0.15	mg/L		06/18/14 19:32	06/19/14 10:12	1
Nitrate as N	0.45		0.050	0.020	mg/L			06/13/14 16:24	1
Chemical Oxygen Demand	24		10	5.0	mg/L			06/16/14 17:30	1
Chromium, hexavalent	ND		0.010	0.0050	mg/L			06/13/14 09:59	1
Cyanide, Total	ND		0.010	0.0050	mg/L		06/19/14 17:30	06/20/14 10:32	1
Total Organic Carbon	6.9		1.0	0.43	mg/L			06/17/14 13:22	1
Phenolics, Total Recoverable	ND		0.010	0.0050	mg/L		06/23/14 17:30	06/24/14 11:20	1
Hardness	160		4.0	1.1	mg/L			06/24/14 10:32	1
Total Dissolved Solids	280		10	4.0	mg/L			06/16/14 23:16	1
Biochemical Oxygen Demand	ND		2.0	2.0	mg/L			06/13/14 17:39	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	12		1.0	1.0	NTU			06/13/14 08:37	1
Color	60		5.0	5.0	Color Units			06/13/14 11:17	1

Client Sample ID: GW-B

Lab Sample ID: 480-61861-3

Date Collected: 06/12/14 14:45
Matrix: Water
Date Received: 06/13/14 09:00

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	ND		5.0	0.39	ug/L			06/18/14 05:31	1
1,1,2,2-Tetrachloroethane	ND		5.0	0.26	ug/L			06/18/14 05:31	1
1,1,2-Trichloroethane	ND		5.0	0.48	ug/L			06/18/14 05:31	1
1,1-Dichloroethane	ND		5.0	0.59	ug/L			06/18/14 05:31	1
1,1-Dichloroethene	ND		5.0	0.85	ug/L			06/18/14 05:31	1
1,2-Dichlorobenzene	ND		5.0	0.44	ug/L			06/18/14 05:31	1
1,2-Dichloroethane	ND		5.0	0.60	ug/L			06/18/14 05:31	1
1,2-Dichloropropane	ND		5.0	0.61	ug/L			06/18/14 05:31	1
1,3-Dichlorobenzene	ND		5.0	0.54	ug/L			06/18/14 05:31	1
1,4-Dichlorobenzene	ND		5.0	0.51	ug/L			06/18/14 05:31	1
2-Chloroethyl vinyl ether	ND		25	1.9	ug/L			06/18/14 05:31	1
Benzene	ND		5.0	0.60	ug/L			06/18/14 05:31	1
Bromodichloromethane	ND		5.0	0.54	ug/L			06/18/14 05:31	1
Bromoform	ND		5.0	0.47	ug/L			06/18/14 05:31	1
Bromomethane	ND		5.0	1.2	ug/L			06/18/14 05:31	1
Carbon tetrachloride	ND		5.0	0.51	ug/L			06/18/14 05:31	1
Chlorobenzene	ND		5.0	0.48	ug/L			06/18/14 05:31	1
Chloroethane	ND		5.0	0.87	ug/L			06/18/14 05:31	1
Chloroform	ND		5.0	0.54	ug/L			06/18/14 05:31	1
Chloromethane	ND		5.0	0.64	ug/L			06/18/14 05:31	1
cis-1,2-Dichloroethene	ND		5.0	0.57	ug/L			06/18/14 05:31	1
cis-1,3-Dichloropropene	ND		5.0	0.33	ug/L			06/18/14 05:31	1
Dibromochloromethane	ND		5.0	0.41	ug/L			06/18/14 05:31	1
Dichlorodifluoromethane	ND		5.0	0.28	ug/L			06/18/14 05:31	1
Ethylbenzene	ND		5.0	0.46	ug/L			06/18/14 05:31	1
Methylene Chloride	ND		5.0	0.81	ug/L			06/18/14 05:31	1
m-Xylene & p-Xylene	ND		10	1.1	ug/L			06/18/14 05:31	1
o-Xylene	ND		5.0	0.43	ug/L			06/18/14 05:31	1
Tetrachloroethene	ND		5.0	0.34	ug/L			06/18/14 05:31	1
Toluene	ND		5.0	0.45	ug/L			06/18/14 05:31	1
trans-1,2-Dichloroethene	ND		5.0	0.59	ug/L			06/18/14 05:31	1
trans-1,3-Dichloropropene	ND		5.0	0.44	ug/L			06/18/14 05:31	1
Trichloroethene	ND		5.0	0.60	ug/L			06/18/14 05:31	1
Trichlorofluoromethane	ND		5.0	0.45	ug/L			06/18/14 05:31	1
Vinyl chloride	ND		5.0	0.75	ug/L			06/18/14 05:31	1
Xylenes, Total	ND		10	1.1	ug/L			06/18/14 05:31	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*103*		*72 - 130*		*06/18/14 05:31*	*1*
4-Bromofluorobenzene (Surr)	*94*		*69 - 121*		*06/18/14 05:31*	*1*
Toluene-d8 (Surr)	*98*		*70 - 123*		*06/18/14 05:31*	*1*

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**6.3**		0.20	0.060	mg/L		06/16/14 08:00	06/18/14 22:10	1
Antimony	ND		0.020	0.0068	mg/L		06/16/14 08:00	06/18/14 22:10	1
Arsenic	**0.0058**	**J**	0.015	0.0056	mg/L		06/16/14 08:00	06/18/14 22:10	1
Barium	**0.074**		0.0020	0.00070	mg/L		06/16/14 08:00	06/18/14 22:10	1
Beryllium	**0.00045**	**J**	0.0020	0.00030	mg/L		06/16/14 08:00	06/18/14 22:10	1
Boron	**0.027**	**B**	0.020	0.0040	mg/L		06/16/14 08:00	06/18/14 22:10	1

Client Sample ID: GW-B

Date Collected: 06/12/14 14:45
Date Received: 06/13/14 09:00

Lab Sample ID: 480-61861-3
Matrix: Water

Method: 6010C - Metals (ICP) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.0020	0.00050	mg/L		06/16/14 08:00	06/18/14 22:10	1
Calcium	**76**		0.50	0.10	mg/L		06/16/14 08:00	06/18/14 22:10	1
Chromium	**0.0078**		0.0040	0.0010	mg/L		06/16/14 08:00	06/18/14 22:10	1
Copper	**0.012**		0.010	0.0016	mg/L		06/16/14 08:00	06/18/14 22:10	1
Iron	**8.0**		0.050	0.019	mg/L		06/16/14 08:00	06/18/14 22:10	1
Lead	**0.0070**	**J**	0.010	0.0030	mg/L		06/16/14 08:00	06/18/14 22:10	1
Magnesium	**16**		0.20	0.043	mg/L		06/16/14 08:00	06/18/14 22:10	1
Manganese	**1.0**		0.0030	0.00040	mg/L		06/16/14 08:00	06/18/14 22:10	1
Nickel	**0.018**		0.010	0.0013	mg/L		06/16/14 08:00	06/18/14 22:10	1
Potassium	**4.4**		0.50	0.10	mg/L		06/16/14 08:00	06/18/14 22:10	1
Selenium	ND		0.025	0.0087	mg/L		06/16/14 08:00	06/18/14 22:10	1
Silver	ND		0.0060	0.0017	mg/L		06/16/14 08:00	06/18/14 22:10	1
Sodium	**3.2**		1.0	0.32	mg/L		06/16/14 08:00	06/18/14 22:10	1
Thallium	ND		0.020	0.010	mg/L		06/16/14 08:00	06/18/14 22:10	1
Zinc	**0.028**		0.010	0.0015	mg/L		06/16/14 08:00	06/18/14 22:10	1

Method: 6010C - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**0.14**	**J**	0.20	0.060	mg/L		06/16/14 12:05	06/20/14 14:34	1
Antimony	ND		0.020	0.0068	mg/L		06/16/14 12:05	06/20/14 14:34	1
Arsenic	ND		0.015	0.0056	mg/L		06/16/14 12:05	06/20/14 14:34	1
Barium	**0.27**		0.0020	0.00070	mg/L		06/16/14 12:05	06/20/14 14:34	1
Beryllium	ND		0.0020	0.00030	mg/L		06/16/14 12:05	06/20/14 14:34	1
Boron	**0.020**		0.020	0.0040	mg/L		06/16/14 12:05	06/20/14 14:34	1
Cadmium	ND		0.0020	0.00050	mg/L		06/16/14 12:05	06/20/14 14:34	1
Calcium	**72**		0.50	0.10	mg/L		06/16/14 12:05	06/20/14 14:34	1
Chromium	**0.0038**	**J**	0.0040	0.0010	mg/L		06/16/14 12:05	06/20/14 14:34	1
Cobalt	**0.0014**	**J**	0.0040	0.00063	mg/L		06/16/14 12:05	06/20/14 14:34	1
Copper	**0.0054**	**J**	0.010	0.0016	mg/L		06/16/14 12:05	06/20/14 14:34	1
Iron	**0.22**		0.050	0.019	mg/L		06/16/14 12:05	06/20/14 14:34	1
Lead	ND		0.010	0.0030	mg/L		06/16/14 12:05	06/20/14 14:34	1
Magnesium	**15**		0.20	0.043	mg/L		06/16/14 12:05	06/20/14 14:34	1
Manganese	**0.44**		0.0030	0.00040	mg/L		06/16/14 12:05	06/20/14 14:34	1
Nickel	**0.010**		0.010	0.0013	mg/L		06/16/14 12:05	06/20/14 14:34	1
Potassium	**2.2**		0.50	0.10	mg/L		06/16/14 12:05	06/20/14 14:34	1
Selenium	ND		0.025	0.0087	mg/L		06/16/14 12:05	06/20/14 14:34	1
Silver	ND		0.0060	0.0017	mg/L		06/16/14 12:05	06/20/14 14:34	1
Sodium	**4.1**		1.0	0.32	mg/L		06/16/14 12:05	06/20/14 14:34	1
Thallium	ND		0.020	0.010	mg/L		06/16/14 12:05	06/20/14 14:34	1
Vanadium	ND		0.0050	0.0015	mg/L		06/16/14 12:05	06/20/14 14:34	1
Zinc	**0.0055**	**J B**	0.010	0.0015	mg/L		06/16/14 12:05	06/20/14 14:34	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		06/16/14 14:30	06/17/14 10:11	1

Method: 7470A - Mercury (CVAA) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		06/17/14 10:15	06/17/14 14:55	1

Client Sample Results

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-61861-1

Client Sample ID: GW-B
Date Collected: 06/12/14 14:45
Date Received: 06/13/14 09:00

Lab Sample ID: 480-61861-3
Matrix: Water

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**0.82**		0.50	0.28	mg/L			06/20/14 11:32	1
Sulfate	**23**		2.0	0.35	mg/L			06/20/14 11:32	1
Alkalinity, Total	**260**		100	40	mg/L			06/20/14 12:30	10
Ammonia	**0.14**		0.020	0.0090	mg/L			06/24/14 18:38	1
Total Kjeldahl Nitrogen	**2.7**		0.20	0.15	mg/L		06/18/14 19:32	06/19/14 10:12	1
Nitrate as N	**0.31**		0.050	0.020	mg/L			06/13/14 16:27	1
Chemical Oxygen Demand	**110**		10	5.0	mg/L			06/16/14 17:30	1
Chromium, hexavalent	ND		0.010	0.0050	mg/L			06/13/14 10:03	1
Cyanide, Total	ND		0.010	0.0050	mg/L		06/20/14 15:55	06/23/14 08:24	1
Total Organic Carbon	**46**		1.0	0.43	mg/L			06/17/14 14:19	1
Phenolics, Total Recoverable	ND		0.010	0.0050	mg/L		06/23/14 17:30	06/24/14 11:14	1
Hardness	**250**		10	2.6	mg/L			06/24/14 10:29	1
Total Dissolved Solids	**420**		10	4.0	mg/L			06/16/14 23:18	1
Biochemical Oxygen Demand	**2.2**	**b**	2.0	2.0	mg/L			06/13/14 17:39	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	**160**		1.0	1.0	NTU			06/13/14 10:32	1
Color	**140**		10	10	Color Units			06/13/14 11:17	2

Client Sample ID: SW-02

Date Collected: 06/12/14 14:30
Date Received: 06/13/14 09:00

Lab Sample ID: 480-61861-4
Matrix: Water

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	ND		5.0	0.39	ug/L			06/18/14 05:55	1
1,1,2,2-Tetrachloroethane	ND		5.0	0.26	ug/L			06/18/14 05:55	1
1,1,2-Trichloroethane	ND		5.0	0.48	ug/L			06/18/14 05:55	1
1,1-Dichloroethane	ND		5.0	0.59	ug/L			06/18/14 05:55	1
1,1-Dichloroethene	ND		5.0	0.85	ug/L			06/18/14 05:55	1
1,2-Dichlorobenzene	ND		5.0	0.44	ug/L			06/18/14 05:55	1
1,2-Dichloroethane	ND		5.0	0.60	ug/L			06/18/14 05:55	1
1,2-Dichloropropane	ND		5.0	0.61	ug/L			06/18/14 05:55	1
1,3-Dichlorobenzene	ND		5.0	0.54	ug/L			06/18/14 05:55	1
1,4-Dichlorobenzene	ND		5.0	0.51	ug/L			06/18/14 05:55	1
2-Chloroethyl vinyl ether	ND		25	1.9	ug/L			06/18/14 05:55	1
Benzene	ND		5.0	0.60	ug/L			06/18/14 05:55	1
Bromodichloromethane	ND		5.0	0.54	ug/L			06/18/14 05:55	1
Bromoform	ND		5.0	0.47	ug/L			06/18/14 05:55	1
Bromomethane	ND		5.0	1.2	ug/L			06/18/14 05:55	1
Carbon tetrachloride	ND		5.0	0.51	ug/L			06/18/14 05:55	1
Chlorobenzene	ND		5.0	0.48	ug/L			06/18/14 05:55	1
Chloroethane	ND		5.0	0.87	ug/L			06/18/14 05:55	1
Chloroform	ND		5.0	0.54	ug/L			06/18/14 05:55	1
Chloromethane	ND		5.0	0.64	ug/L			06/18/14 05:55	1
cis-1,2-Dichloroethene	ND		5.0	0.57	ug/L			06/18/14 05:55	1
cis-1,3-Dichloropropene	ND		5.0	0.33	ug/L			06/18/14 05:55	1
Dibromochloromethane	ND		5.0	0.41	ug/L			06/18/14 05:55	1
Dichlorodifluoromethane	ND		5.0	0.28	ug/L			06/18/14 05:55	1
Ethylbenzene	ND		5.0	0.46	ug/L			06/18/14 05:55	1
Methylene Chloride	ND		5.0	0.81	ug/L			06/18/14 05:55	1
m-Xylene & p-Xylene	ND		10	1.1	ug/L			06/18/14 05:55	1
o-Xylene	ND		5.0	0.43	ug/L			06/18/14 05:55	1
Tetrachloroethene	ND		5.0	0.34	ug/L			06/18/14 05:55	1
Toluene	ND		5.0	0.45	ug/L			06/18/14 05:55	1
trans-1,2-Dichloroethene	ND		5.0	0.59	ug/L			06/18/14 05:55	1
trans-1,3-Dichloropropene	ND		5.0	0.44	ug/L			06/18/14 05:55	1
Trichloroethene	ND		5.0	0.60	ug/L			06/18/14 05:55	1
Trichlorofluoromethane	ND		5.0	0.45	ug/L			06/18/14 05:55	1
Vinyl chloride	ND		5.0	0.75	ug/L			06/18/14 05:55	1
Xylenes, Total	ND		10	1.1	ug/L			06/18/14 05:55	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*104*		*72 - 130*		*06/18/14 05:55*	*1*
4-Bromofluorobenzene (Surr)	*96*		*69 - 121*		*06/18/14 05:55*	*1*
Toluene-d8 (Surr)	*100*		*70 - 123*		*06/18/14 05:55*	*1*

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**0.55**		0.20	0.060	mg/L		06/16/14 08:00	06/18/14 22:08	1
Antimony	ND		0.020	0.0068	mg/L		06/16/14 08:00	06/18/14 22:08	1
Arsenic	ND		0.015	0.0056	mg/L		06/16/14 08:00	06/18/14 22:08	1
Barium	**0.024**		0.0020	0.00070	mg/L		06/16/14 08:00	06/18/14 22:08	1
Beryllium	ND		0.0020	0.00030	mg/L		06/16/14 08:00	06/18/14 22:08	1
Boron	**0.023**	**B**	0.020	0.0040	mg/L		06/16/14 08:00	06/18/14 22:08	1

Client Sample ID: SW-02
Date Collected: 06/12/14 14:30
Date Received: 06/13/14 09:00

Lab Sample ID: 480-61861-4
Matrix: Water

Method: 6010C - Metals (ICP) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.0020	0.00050	mg/L		06/16/14 08:00	06/18/14 22:08	1
Calcium	**44**		0.50	0.10	mg/L		06/16/14 08:00	06/18/14 22:08	1
Chromium	ND		0.0040	0.0010	mg/L		06/16/14 08:00	06/18/14 22:08	1
Copper	**0.0017**	**J**	0.010	0.0016	mg/L		06/16/14 08:00	06/18/14 22:08	1
Iron	**0.77**		0.050	0.019	mg/L		06/16/14 08:00	06/18/14 22:08	1
Lead	ND		0.010	0.0030	mg/L		06/16/14 08:00	06/18/14 22:08	1
Magnesium	**15**		0.20	0.043	mg/L		06/16/14 08:00	06/18/14 22:08	1
Manganese	**0.11**		0.0030	0.00040	mg/L		06/16/14 08:00	06/18/14 22:08	1
Nickel	ND		0.010	0.0013	mg/L		06/16/14 08:00	06/18/14 22:08	1
Potassium	**1.8**		0.50	0.10	mg/L		06/16/14 08:00	06/18/14 22:08	1
Selenium	ND		0.025	0.0087	mg/L		06/16/14 08:00	06/18/14 22:08	1
Silver	ND		0.0060	0.0017	mg/L		06/16/14 08:00	06/18/14 22:08	1
Sodium	**32**		1.0	0.32	mg/L		06/16/14 08:00	06/18/14 22:08	1
Thallium	ND		0.020	0.010	mg/L		06/16/14 08:00	06/18/14 22:08	1
Zinc	**0.0055**	**J**	0.010	0.0015	mg/L		06/16/14 08:00	06/18/14 22:08	1

Method: 6010C - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		0.20	0.060	mg/L		06/16/14 12:05	06/20/14 14:37	1
Antimony	ND		0.020	0.0068	mg/L		06/16/14 12:05	06/20/14 14:37	1
Arsenic	ND		0.015	0.0056	mg/L		06/16/14 12:05	06/20/14 14:37	1
Barium	**0.021**		0.0020	0.00070	mg/L		06/16/14 12:05	06/20/14 14:37	1
Beryllium	ND		0.0020	0.00030	mg/L		06/16/14 12:05	06/20/14 14:37	1
Boron	**0.021**		0.020	0.0040	mg/L		06/16/14 12:05	06/20/14 14:37	1
Cadmium	ND		0.0020	0.00050	mg/L		06/16/14 12:05	06/20/14 14:37	1
Calcium	**42**		0.50	0.10	mg/L		06/16/14 12:05	06/20/14 14:37	1
Chromium	**0.0019**	**J**	0.0040	0.0010	mg/L		06/16/14 12:05	06/20/14 14:37	1
Cobalt	ND		0.0040	0.00063	mg/L		06/16/14 12:05	06/20/14 14:37	1
Copper	**0.0016**	**J**	0.010	0.0016	mg/L		06/16/14 12:05	06/20/14 14:37	1
Iron	**0.026**	**J**	0.050	0.019	mg/L		06/16/14 12:05	06/20/14 14:37	1
Lead	ND		0.010	0.0030	mg/L		06/16/14 12:05	06/20/14 14:37	1
Magnesium	**15**		0.20	0.043	mg/L		06/16/14 12:05	06/20/14 14:37	1
Manganese	**0.0062**		0.0030	0.00040	mg/L		06/16/14 12:05	06/20/14 14:37	1
Nickel	ND		0.010	0.0013	mg/L		06/16/14 12:05	06/20/14 14:37	1
Potassium	**1.5**		0.50	0.10	mg/L		06/16/14 12:05	06/20/14 14:37	1
Selenium	**0.0090**	**J**	0.025	0.0087	mg/L		06/16/14 12:05	06/20/14 14:37	1
Silver	ND		0.0060	0.0017	mg/L		06/16/14 12:05	06/20/14 14:37	1
Sodium	**32**		1.0	0.32	mg/L		06/16/14 12:05	06/20/14 14:37	1
Thallium	ND		0.020	0.010	mg/L		06/16/14 12:05	06/20/14 14:37	1
Vanadium	ND		0.0050	0.0015	mg/L		06/16/14 12:05	06/20/14 14:37	1
Zinc	**0.0028**	**J B**	0.010	0.0015	mg/L		06/16/14 12:05	06/20/14 14:37	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		06/16/14 14:30	06/17/14 10:09	1

Method: 7470A - Mercury (CVAA) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		06/17/14 10:15	06/17/14 14:28	1

Client Sample Results

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-61861-1

Client Sample ID: SW-02
Date Collected: 06/12/14 14:30
Date Received: 06/13/14 09:00

Lab Sample ID: 480-61861-4
Matrix: Water

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**61**		0.50	0.28	mg/L			06/20/14 11:43	1
Sulfate	**14**		2.0	0.35	mg/L			06/20/14 11:43	1
Alkalinity, Total	**140**		50	20	mg/L			06/20/14 12:52	5
Ammonia	**0.053**		0.020	0.0090	mg/L			06/17/14 12:54	1
Total Kjeldahl Nitrogen	**0.44**		0.20	0.15	mg/L		06/18/14 19:32	06/19/14 10:12	1
Nitrate as N	**0.93**		0.050	0.020	mg/L			06/13/14 17:05	1
Chemical Oxygen Demand	**9.0**	**J**	10	5.0	mg/L			06/16/14 17:30	1
Chromium, hexavalent	ND		0.010	0.0050	mg/L			06/13/14 10:45	1
Cyanide, Total	ND		0.010	0.0050	mg/L		06/20/14 15:55	06/23/14 08:25	1
Total Organic Carbon	**4.4**		1.0	0.43	mg/L			06/17/14 17:10	1
Phenolics, Total Recoverable	ND		0.010	0.0050	mg/L		06/23/14 17:30	06/24/14 11:20	1
Hardness	**180**		4.0	1.1	mg/L			06/24/14 10:39	1
Total Dissolved Solids	**310**		10	4.0	mg/L			06/16/14 23:20	1
Biochemical Oxygen Demand	ND		2.0	2.0	mg/L			06/13/14 17:39	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	**17**		1.0	1.0	NTU			06/13/14 10:32	1
Color	**40**		5.0	5.0	Color Units			06/13/14 11:17	1

Client Sample ID: SW-01

Date Collected: 06/12/14 15:12
Date Received: 06/13/14 09:00

Lab Sample ID: 480-61861-5
Matrix: Water

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	ND		5.0	0.39	ug/L			06/18/14 06:19	1
1,1,2,2-Tetrachloroethane	ND		5.0	0.26	ug/L			06/18/14 06:19	1
1,1,2-Trichloroethane	ND		5.0	0.48	ug/L			06/18/14 06:19	1
1,1-Dichloroethane	ND		5.0	0.59	ug/L			06/18/14 06:19	1
1,1-Dichloroethene	ND		5.0	0.85	ug/L			06/18/14 06:19	1
1,2-Dichlorobenzene	ND		5.0	0.44	ug/L			06/18/14 06:19	1
1,2-Dichloroethane	ND		5.0	0.60	ug/L			06/18/14 06:19	1
1,2-Dichloropropane	ND		5.0	0.61	ug/L			06/18/14 06:19	1
1,3-Dichlorobenzene	ND		5.0	0.54	ug/L			06/18/14 06:19	1
1,4-Dichlorobenzene	ND		5.0	0.51	ug/L			06/18/14 06:19	1
2-Chloroethyl vinyl ether	ND		25	1.9	ug/L			06/18/14 06:19	1
Benzene	ND		5.0	0.60	ug/L			06/18/14 06:19	1
Bromodichloromethane	ND		5.0	0.54	ug/L			06/18/14 06:19	1
Bromoform	ND		5.0	0.47	ug/L			06/18/14 06:19	1
Bromomethane	ND		5.0	1.2	ug/L			06/18/14 06:19	1
Carbon tetrachloride	ND		5.0	0.51	ug/L			06/18/14 06:19	1
Chlorobenzene	ND		5.0	0.48	ug/L			06/18/14 06:19	1
Chloroethane	ND		5.0	0.87	ug/L			06/18/14 06:19	1
Chloroform	ND		5.0	0.54	ug/L			06/18/14 06:19	1
Chloromethane	ND		5.0	0.64	ug/L			06/18/14 06:19	1
cis-1,2-Dichloroethene	ND		5.0	0.57	ug/L			06/18/14 06:19	1
cis-1,3-Dichloropropene	ND		5.0	0.33	ug/L			06/18/14 06:19	1
Dibromochloromethane	ND		5.0	0.41	ug/L			06/18/14 06:19	1
Dichlorodifluoromethane	ND		5.0	0.28	ug/L			06/18/14 06:19	1
Ethylbenzene	ND		5.0	0.46	ug/L			06/18/14 06:19	1
Methylene Chloride	ND		5.0	0.81	ug/L			06/18/14 06:19	1
m-Xylene & p-Xylene	ND		10	1.1	ug/L			06/18/14 06:19	1
o-Xylene	ND		5.0	0.43	ug/L			06/18/14 06:19	1
Tetrachloroethene	ND		5.0	0.34	ug/L			06/18/14 06:19	1
Toluene	ND		5.0	0.45	ug/L			06/18/14 06:19	1
trans-1,2-Dichloroethene	ND		5.0	0.59	ug/L			06/18/14 06:19	1
trans-1,3-Dichloropropene	ND		5.0	0.44	ug/L			06/18/14 06:19	1
Trichloroethene	ND		5.0	0.60	ug/L			06/18/14 06:19	1
Trichlorofluoromethane	ND		5.0	0.45	ug/L			06/18/14 06:19	1
Vinyl chloride	ND		5.0	0.75	ug/L			06/18/14 06:19	1
Xylenes, Total	ND		10	1.1	ug/L			06/18/14 06:19	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*104*		*72 - 130*		*06/18/14 06:19*	*1*
4-Bromofluorobenzene (Surr)	*97*		*69 - 121*		*06/18/14 06:19*	*1*
Toluene-d8 (Surr)	*100*		*70 - 123*		*06/18/14 06:19*	*1*

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**0.57**		0.20	0.060	mg/L		06/16/14 08:00	06/18/14 22:13	1
Antimony	ND		0.020	0.0068	mg/L		06/16/14 08:00	06/18/14 22:13	1
Arsenic	ND		0.015	0.0056	mg/L		06/16/14 08:00	06/18/14 22:13	1
Barium	**0.024**		0.0020	0.00070	mg/L		06/16/14 08:00	06/18/14 22:13	1
Beryllium	ND		0.0020	0.00030	mg/L		06/16/14 08:00	06/18/14 22:13	1
Boron	**0.022**	**B**	0.020	0.0040	mg/L		06/16/14 08:00	06/18/14 22:13	1

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-61861-1

Client Sample ID: SW-01
Date Collected: 06/12/14 15:12
Date Received: 06/13/14 09:00

Lab Sample ID: 480-61861-5
Matrix: Water

Method: 6010C - Metals (ICP) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.0020	0.00050	mg/L		06/16/14 08:00	06/18/14 22:13	1
Calcium	**43**		0.50	0.10	mg/L		06/16/14 08:00	06/18/14 22:13	1
Chromium	ND		0.0040	0.0010	mg/L		06/16/14 08:00	06/18/14 22:13	1
Copper	ND		0.010	0.0016	mg/L		06/16/14 08:00	06/18/14 22:13	1
Iron	**0.81**		0.050	0.019	mg/L		06/16/14 08:00	06/18/14 22:13	1
Lead	ND		0.010	0.0030	mg/L		06/16/14 08:00	06/18/14 22:13	1
Magnesium	**15**		0.20	0.043	mg/L		06/16/14 08:00	06/18/14 22:13	1
Manganese	**0.11**		0.0030	0.00040	mg/L		06/16/14 08:00	06/18/14 22:13	1
Nickel	**0.0015**	**J**	0.010	0.0013	mg/L		06/16/14 08:00	06/18/14 22:13	1
Potassium	**1.8**		0.50	0.10	mg/L		06/16/14 08:00	06/18/14 22:13	1
Selenium	ND		0.025	0.0087	mg/L		06/16/14 08:00	06/18/14 22:13	1
Silver	ND		0.0060	0.0017	mg/L		06/16/14 08:00	06/18/14 22:13	1
Sodium	**32**		1.0	0.32	mg/L		06/16/14 08:00	06/18/14 22:13	1
Thallium	ND		0.020	0.010	mg/L		06/16/14 08:00	06/18/14 22:13	1
Zinc	**0.0060**	**J**	0.010	0.0015	mg/L		06/16/14 08:00	06/18/14 22:13	1

Method: 6010C - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		0.20	0.060	mg/L		06/16/14 12:05	06/20/14 14:40	1
Antimony	ND		0.020	0.0068	mg/L		06/16/14 12:05	06/20/14 14:40	1
Arsenic	ND		0.015	0.0056	mg/L		06/16/14 12:05	06/20/14 14:40	1
Barium	**0.022**		0.0020	0.00070	mg/L		06/16/14 12:05	06/20/14 14:40	1
Beryllium	ND		0.0020	0.00030	mg/L		06/16/14 12:05	06/20/14 14:40	1
Boron	**0.022**		0.020	0.0040	mg/L		06/16/14 12:05	06/20/14 14:40	1
Cadmium	ND		0.0020	0.00050	mg/L		06/16/14 12:05	06/20/14 14:40	1
Calcium	**42**		0.50	0.10	mg/L		06/16/14 12:05	06/20/14 14:40	1
Chromium	**0.0015**	**J**	0.0040	0.0010	mg/L		06/16/14 12:05	06/20/14 14:40	1
Cobalt	ND		0.0040	0.00063	mg/L		06/16/14 12:05	06/20/14 14:40	1
Copper	ND		0.010	0.0016	mg/L		06/16/14 12:05	06/20/14 14:40	1
Iron	**0.095**		0.050	0.019	mg/L		06/16/14 12:05	06/20/14 14:40	1
Lead	ND		0.010	0.0030	mg/L		06/16/14 12:05	06/20/14 14:40	1
Magnesium	**16**		0.20	0.043	mg/L		06/16/14 12:05	06/20/14 14:40	1
Manganese	**0.0059**		0.0030	0.00040	mg/L		06/16/14 12:05	06/20/14 14:40	1
Nickel	ND		0.010	0.0013	mg/L		06/16/14 12:05	06/20/14 14:40	1
Potassium	**1.6**		0.50	0.10	mg/L		06/16/14 12:05	06/20/14 14:40	1
Selenium	ND		0.025	0.0087	mg/L		06/16/14 12:05	06/20/14 14:40	1
Silver	ND		0.0060	0.0017	mg/L		06/16/14 12:05	06/20/14 14:40	1
Sodium	**33**		1.0	0.32	mg/L		06/16/14 12:05	06/20/14 14:40	1
Thallium	ND		0.020	0.010	mg/L		06/16/14 12:05	06/20/14 14:40	1
Vanadium	ND		0.0050	0.0015	mg/L		06/16/14 12:05	06/20/14 14:40	1
Zinc	**0.0047**	**J B**	0.010	0.0015	mg/L		06/16/14 12:05	06/20/14 14:40	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		06/16/14 14:30	06/17/14 10:13	1

Method: 7470A - Mercury (CVAA) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		06/17/14 10:15	06/17/14 14:37	1

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-61861-1

Client Sample ID: SW-01
Date Collected: 06/12/14 15:12
Date Received: 06/13/14 09:00

Lab Sample ID: 480-61861-5
Matrix: Water

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**61**		0.50	0.28	mg/L			06/20/14 11:53	1
Sulfate	**14**		2.0	0.35	mg/L			06/20/14 11:53	1
Alkalinity, Total	**130**		50	20	mg/L			06/20/14 12:51	5
Ammonia	**0.053**		0.020	0.0090	mg/L			06/17/14 12:55	1
Total Kjeldahl Nitrogen	**0.41**		0.20	0.15	mg/L		06/18/14 19:32	06/19/14 10:12	1
Nitrate as N	**0.91**		0.050	0.020	mg/L			06/13/14 16:30	1
Chemical Oxygen Demand	**10**		10	5.0	mg/L			06/16/14 17:30	1
Chromium, hexavalent	ND		0.010	0.0050	mg/L			06/13/14 10:08	1
Cyanide, Total	ND		0.010	0.0050	mg/L		06/19/14 17:30	06/20/14 10:33	1
Total Organic Carbon	**4.4**		1.0	0.43	mg/L			06/17/14 17:39	1
Phenolics, Total Recoverable	ND		0.010	0.0050	mg/L		06/23/14 20:30	06/24/14 11:08	1
Hardness	**180**		4.0	1.1	mg/L			06/24/14 10:57	1
Total Dissolved Solids	**310**		10	4.0	mg/L			06/16/14 23:22	1
Biochemical Oxygen Demand	ND		2.0	2.0	mg/L			06/13/14 17:39	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	**16**		1.0	1.0	NTU			06/13/14 10:32	1
Color	**35**		5.0	5.0	Color Units			06/13/14 11:17	1

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-61861-1

Client Sample ID: GW-3

Date Collected: 06/12/14 16:40
Date Received: 06/13/14 09:00

Lab Sample ID: 480-61861-6
Matrix: Water

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	ND		5.0	0.39	ug/L			06/18/14 06:43	1
1,1,2,2-Tetrachloroethane	ND		5.0	0.26	ug/L			06/18/14 06:43	1
1,1,2-Trichloroethane	ND		5.0	0.48	ug/L			06/18/14 06:43	1
1,1-Dichloroethane	ND		5.0	0.59	ug/L			06/18/14 06:43	1
1,1-Dichloroethene	ND		5.0	0.85	ug/L			06/18/14 06:43	1
1,2-Dichlorobenzene	ND		5.0	0.44	ug/L			06/18/14 06:43	1
1,2-Dichloroethane	ND		5.0	0.60	ug/L			06/18/14 06:43	1
1,2-Dichloropropane	ND		5.0	0.61	ug/L			06/18/14 06:43	1
1,3-Dichlorobenzene	ND		5.0	0.54	ug/L			06/18/14 06:43	1
1,4-Dichlorobenzene	ND		5.0	0.51	ug/L			06/18/14 06:43	1
2-Chloroethyl vinyl ether	ND		25	1.9	ug/L			06/18/14 06:43	1
Benzene	ND		5.0	0.60	ug/L			06/18/14 06:43	1
Bromodichloromethane	ND		5.0	0.54	ug/L			06/18/14 06:43	1
Bromoform	ND		5.0	0.47	ug/L			06/18/14 06:43	1
Bromomethane	ND		5.0	1.2	ug/L			06/18/14 06:43	1
Carbon tetrachloride	ND		5.0	0.51	ug/L			06/18/14 06:43	1
Chlorobenzene	ND		5.0	0.48	ug/L			06/18/14 06:43	1
Chloroethane	ND		5.0	0.87	ug/L			06/18/14 06:43	1
Chloroform	ND		5.0	0.54	ug/L			06/18/14 06:43	1
Chloromethane	ND		5.0	0.64	ug/L			06/18/14 06:43	1
cis-1,2-Dichloroethene	ND		5.0	0.57	ug/L			06/18/14 06:43	1
cis-1,3-Dichloropropene	ND		5.0	0.33	ug/L			06/18/14 06:43	1
Dibromochloromethane	ND		5.0	0.41	ug/L			06/18/14 06:43	1
Dichlorodifluoromethane	ND		5.0	0.28	ug/L			06/18/14 06:43	1
Ethylbenzene	ND		5.0	0.46	ug/L			06/18/14 06:43	1
Methylene Chloride	ND		5.0	0.81	ug/L			06/18/14 06:43	1
m-Xylene & p-Xylene	ND		10	1.1	ug/L			06/18/14 06:43	1
o-Xylene	ND		5.0	0.43	ug/L			06/18/14 06:43	1
Tetrachloroethene	ND		5.0	0.34	ug/L			06/18/14 06:43	1
Toluene	ND		5.0	0.45	ug/L			06/18/14 06:43	1
trans-1,2-Dichloroethene	ND		5.0	0.59	ug/L			06/18/14 06:43	1
trans-1,3-Dichloropropene	ND		5.0	0.44	ug/L			06/18/14 06:43	1
Trichloroethene	ND		5.0	0.60	ug/L			06/18/14 06:43	1
Trichlorofluoromethane	ND		5.0	0.45	ug/L			06/18/14 06:43	1
Vinyl chloride	ND		5.0	0.75	ug/L			06/18/14 06:43	1
Xylenes, Total	ND		10	1.1	ug/L			06/18/14 06:43	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*103*		*72 - 130*		*06/18/14 06:43*	*1*
4-Bromofluorobenzene (Surr)	*94*		*69 - 121*		*06/18/14 06:43*	*1*
Toluene-d8 (Surr)	*99*		*70 - 123*		*06/18/14 06:43*	*1*

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**0.21**		0.20	0.060	mg/L		06/16/14 08:00	06/18/14 22:16	1
Antimony	ND		0.020	0.0068	mg/L		06/16/14 08:00	06/18/14 22:16	1
Arsenic	**0.029**		0.015	0.0056	mg/L		06/16/14 08:00	06/18/14 22:16	1
Barium	**0.49**		0.0020	0.00070	mg/L		06/16/14 08:00	06/18/14 22:16	1
Beryllium	ND		0.0020	0.00030	mg/L		06/16/14 08:00	06/18/14 22:16	1
Boron	**0.17**	**B**	0.020	0.0040	mg/L		06/16/14 08:00	06/18/14 22:16	1

Client Sample ID: GW-3

Date Collected: 06/12/14 16:40
Date Received: 06/13/14 09:00

Lab Sample ID: 480-61861-6

Matrix: Water

Method: 6010C - Metals (ICP) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.0020	0.00050	mg/L		06/16/14 08:00	06/18/14 22:16	1
Calcium	**150**		0.50	0.10	mg/L		06/16/14 08:00	06/18/14 22:16	1
Chromium	ND		0.0040	0.0010	mg/L		06/16/14 08:00	06/18/14 22:16	1
Copper	ND		0.010	0.0016	mg/L		06/16/14 08:00	06/18/14 22:16	1
Iron	**13**		0.050	0.019	mg/L		06/16/14 08:00	06/18/14 22:16	1
Lead	ND		0.010	0.0030	mg/L		06/16/14 08:00	06/18/14 22:16	1
Magnesium	**48**		0.20	0.043	mg/L		06/16/14 08:00	06/18/14 22:16	1
Manganese	**1.4**		0.0030	0.00040	mg/L		06/16/14 08:00	06/18/14 22:16	1
Nickel	**0.0073**	**J**	0.010	0.0013	mg/L		06/16/14 08:00	06/18/14 22:16	1
Potassium	**8.0**		0.50	0.10	mg/L		06/16/14 08:00	06/18/14 22:16	1
Selenium	ND		0.025	0.0087	mg/L		06/16/14 08:00	06/18/14 22:16	1
Silver	ND		0.0060	0.0017	mg/L		06/16/14 08:00	06/18/14 22:16	1
Sodium	**45**		1.0	0.32	mg/L		06/16/14 08:00	06/18/14 22:16	1
Thallium	ND		0.020	0.010	mg/L		06/16/14 08:00	06/18/14 22:16	1
Zinc	**0.0054**	**J**	0.010	0.0015	mg/L		06/16/14 08:00	06/18/14 22:16	1

Method: 6010C - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		0.20	0.060	mg/L		06/16/14 12:05	06/20/14 14:52	1
Antimony	ND		0.020	0.0068	mg/L		06/16/14 12:05	06/20/14 14:52	1
Arsenic	**0.010**	**J**	0.015	0.0056	mg/L		06/16/14 12:05	06/20/14 14:52	1
Barium	**0.43**		0.0020	0.00070	mg/L		06/16/14 12:05	06/20/14 14:52	1
Beryllium	ND		0.0020	0.00030	mg/L		06/16/14 12:05	06/20/14 14:52	1
Boron	**0.17**		0.020	0.0040	mg/L		06/16/14 12:05	06/20/14 14:52	1
Cadmium	ND		0.0020	0.00050	mg/L		06/16/14 12:05	06/20/14 14:52	1
Calcium	**140**		0.50	0.10	mg/L		06/16/14 12:05	06/20/14 14:52	1
Chromium	**0.0018**	**J**	0.0040	0.0010	mg/L		06/16/14 12:05	06/20/14 14:52	1
Cobalt	**0.0024**	**J**	0.0040	0.00063	mg/L		06/16/14 12:05	06/20/14 14:52	1
Copper	ND		0.010	0.0016	mg/L		06/16/14 12:05	06/20/14 14:52	1
Iron	ND		0.050	0.019	mg/L		06/16/14 12:05	06/20/14 14:52	1
Lead	ND		0.010	0.0030	mg/L		06/16/14 12:05	06/20/14 14:52	1
Magnesium	**48**		0.20	0.043	mg/L		06/16/14 12:05	06/20/14 14:52	1
Manganese	**1.2**		0.0030	0.00040	mg/L		06/16/14 12:05	06/20/14 14:52	1
Nickel	**0.0064**	**J**	0.010	0.0013	mg/L		06/16/14 12:05	06/20/14 14:52	1
Potassium	**7.9**		0.50	0.10	mg/L		06/16/14 12:05	06/20/14 14:52	1
Selenium	**0.0091**	**J**	0.025	0.0087	mg/L		06/16/14 12:05	06/20/14 14:52	1
Silver	ND		0.0060	0.0017	mg/L		06/16/14 12:05	06/20/14 14:52	1
Sodium	**45**		1.0	0.32	mg/L		06/16/14 12:05	06/20/14 14:52	1
Thallium	ND		0.020	0.010	mg/L		06/16/14 12:05	06/20/14 14:52	1
Vanadium	ND		0.0050	0.0015	mg/L		06/16/14 12:05	06/20/14 14:52	1
Zinc	**0.0041**	**J B**	0.010	0.0015	mg/L		06/16/14 12:05	06/20/14 14:52	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		06/16/14 14:30	06/17/14 10:14	1

Method: 7470A - Mercury (CVAA) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		06/17/14 10:15	06/17/14 14:46	1

Client Sample Results

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-61861-1

Client Sample ID: GW-3
Date Collected: 06/12/14 16:40
Date Received: 06/13/14 09:00

Lab Sample ID: 480-61861-6
Matrix: Water

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**54**		0.50	0.28	mg/L			06/20/14 12:03	1
Sulfate	**67**		2.0	0.35	mg/L			06/20/14 12:03	1
Alkalinity, Total	**630**		100	40	mg/L			06/20/14 12:30	10
Ammonia	**6.3**		0.10	0.045	mg/L			06/17/14 15:07	5
Total Kjeldahl Nitrogen	**6.8**		0.40	0.30	mg/L		06/18/14 19:32	06/19/14 10:43	2
Nitrate as N	ND		0.050	0.020	mg/L			06/13/14 16:31	1
Chemical Oxygen Demand	**21**		10	5.0	mg/L			06/16/14 17:30	1
Chromium, hexavalent	ND		0.010	0.0050	mg/L			06/13/14 10:13	1
Cyanide, Total	ND		0.010	0.0050	mg/L		06/19/14 17:30	06/20/14 10:34	1
Total Organic Carbon	**5.5**		1.0	0.43	mg/L			06/17/14 18:07	1
Phenolics, Total Recoverable	ND		0.010	0.0050	mg/L		06/25/14 12:19	06/26/14 09:50	1
Hardness	**600**		20	5.3	mg/L			06/24/14 11:04	1
Total Dissolved Solids	**780**		10	4.0	mg/L			06/16/14 23:23	1
Biochemical Oxygen Demand	**14**	**b**	2.0	2.0	mg/L			06/13/14 17:39	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	**150**		1.0	1.0	NTU			06/13/14 10:32	1
Color	**5.0**		5.0	5.0	Color Units			06/13/14 11:17	1

Client Sample ID: GW-1

Date Collected: 06/12/14 16:15
Date Received: 06/13/14 09:00

Lab Sample ID: 480-61861-7
Matrix: Water

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	ND		5.0	0.39	ug/L			06/18/14 07:07	1
1,1,2,2-Tetrachloroethane	ND		5.0	0.26	ug/L			06/18/14 07:07	1
1,1,2-Trichloroethane	ND		5.0	0.48	ug/L			06/18/14 07:07	1
1,1-Dichloroethane	ND		5.0	0.59	ug/L			06/18/14 07:07	1
1,1-Dichloroethene	ND		5.0	0.85	ug/L			06/18/14 07:07	1
1,2-Dichlorobenzene	ND		5.0	0.44	ug/L			06/18/14 07:07	1
1,2-Dichloroethane	ND		5.0	0.60	ug/L			06/18/14 07:07	1
1,2-Dichloropropane	ND		5.0	0.61	ug/L			06/18/14 07:07	1
1,3-Dichlorobenzene	ND		5.0	0.54	ug/L			06/18/14 07:07	1
1,4-Dichlorobenzene	ND		5.0	0.51	ug/L			06/18/14 07:07	1
2-Chloroethyl vinyl ether	ND		25	1.9	ug/L			06/18/14 07:07	1
Benzene	ND		5.0	0.60	ug/L			06/18/14 07:07	1
Bromodichloromethane	ND		5.0	0.54	ug/L			06/18/14 07:07	1
Bromoform	ND		5.0	0.47	ug/L			06/18/14 07:07	1
Bromomethane	ND		5.0	1.2	ug/L			06/18/14 07:07	1
Carbon tetrachloride	ND		5.0	0.51	ug/L			06/18/14 07:07	1
Chlorobenzene	ND		5.0	0.48	ug/L			06/18/14 07:07	1
Chloroethane	ND		5.0	0.87	ug/L			06/18/14 07:07	1
Chloroform	ND		5.0	0.54	ug/L			06/18/14 07:07	1
Chloromethane	ND		5.0	0.64	ug/L			06/18/14 07:07	1
cis-1,2-Dichloroethene	ND		5.0	0.57	ug/L			06/18/14 07:07	1
cis-1,3-Dichloropropene	ND		5.0	0.33	ug/L			06/18/14 07:07	1
Dibromochloromethane	ND		5.0	0.41	ug/L			06/18/14 07:07	1
Dichlorodifluoromethane	ND		5.0	0.28	ug/L			06/18/14 07:07	1
Ethylbenzene	ND		5.0	0.46	ug/L			06/18/14 07:07	1
Methylene Chloride	ND		5.0	0.81	ug/L			06/18/14 07:07	1
m-Xylene & p-Xylene	ND		10	1.1	ug/L			06/18/14 07:07	1
o-Xylene	ND		5.0	0.43	ug/L			06/18/14 07:07	1
Tetrachloroethene	ND		5.0	0.34	ug/L			06/18/14 07:07	1
Toluene	ND		5.0	0.45	ug/L			06/18/14 07:07	1
trans-1,2-Dichloroethene	ND		5.0	0.59	ug/L			06/18/14 07:07	1
trans-1,3-Dichloropropene	ND		5.0	0.44	ug/L			06/18/14 07:07	1
Trichloroethene	ND		5.0	0.60	ug/L			06/18/14 07:07	1
Trichlorofluoromethane	ND		5.0	0.45	ug/L			06/18/14 07:07	1
Vinyl chloride	ND		5.0	0.75	ug/L			06/18/14 07:07	1
Xylenes, Total	ND		10	1.1	ug/L			06/18/14 07:07	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*106*		*72 - 130*		*06/18/14 07:07*	*1*
4-Bromofluorobenzene (Surr)	*96*		*69 - 121*		*06/18/14 07:07*	*1*
Toluene-d8 (Surr)	*102*		*70 - 123*		*06/18/14 07:07*	*1*

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**0.60**		0.20	0.060	mg/L		06/16/14 08:00	06/18/14 22:19	1
Antimony	ND		0.020	0.0068	mg/L		06/16/14 08:00	06/18/14 22:19	1
Arsenic	**0.12**		0.015	0.0056	mg/L		06/16/14 08:00	06/18/14 22:19	1
Barium	**1.2**		0.0020	0.00070	mg/L		06/16/14 08:00	06/18/14 22:19	1
Beryllium	ND		0.0020	0.00030	mg/L		06/16/14 08:00	06/18/14 22:19	1
Boron	**0.27**	**B**	0.020	0.0040	mg/L		06/16/14 08:00	06/18/14 22:19	1

Client Sample ID: GW-1
Date Collected: 06/12/14 16:15
Date Received: 06/13/14 09:00

Lab Sample ID: 480-61861-7
Matrix: Water

Method: 6010C - Metals (ICP) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	**0.00094**	**J**	0.0020	0.00050	mg/L		06/16/14 08:00	06/18/14 22:19	1
Calcium	**92**		0.50	0.10	mg/L		06/16/14 08:00	06/18/14 22:19	1
Chromium	ND		0.0040	0.0010	mg/L		06/16/14 08:00	06/18/14 22:19	1
Copper	ND		0.010	0.0016	mg/L		06/16/14 08:00	06/18/14 22:19	1
Iron	**11**		0.050	0.019	mg/L		06/16/14 08:00	06/18/14 22:19	1
Lead	ND		0.010	0.0030	mg/L		06/16/14 08:00	06/18/14 22:19	1
Magnesium	**57**		0.20	0.043	mg/L		06/16/14 08:00	06/18/14 22:19	1
Manganese	**0.28**		0.0030	0.00040	mg/L		06/16/14 08:00	06/18/14 22:19	1
Nickel	**0.013**		0.010	0.0013	mg/L		06/16/14 08:00	06/18/14 22:19	1
Potassium	**19**		0.50	0.10	mg/L		06/16/14 08:00	06/18/14 22:19	1
Selenium	ND		0.025	0.0087	mg/L		06/16/14 08:00	06/18/14 22:19	1
Silver	ND		0.0060	0.0017	mg/L		06/16/14 08:00	06/18/14 22:19	1
Sodium	**65**		1.0	0.32	mg/L		06/16/14 08:00	06/18/14 22:19	1
Thallium	ND		0.020	0.010	mg/L		06/16/14 08:00	06/18/14 22:19	1
Zinc	**0.012**		0.010	0.0015	mg/L		06/16/14 08:00	06/18/14 22:19	1

Method: 6010C - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		0.20	0.060	mg/L		06/16/14 12:05	06/20/14 14:56	1
Antimony	ND		0.020	0.0068	mg/L		06/16/14 12:05	06/20/14 14:56	1
Arsenic	**0.037**		0.015	0.0056	mg/L		06/16/14 12:05	06/20/14 14:56	1
Barium	**1.1**		0.0020	0.00070	mg/L		06/16/14 12:05	06/20/14 14:56	1
Beryllium	ND		0.0020	0.00030	mg/L		06/16/14 12:05	06/20/14 14:56	1
Boron	**0.28**		0.020	0.0040	mg/L		06/16/14 12:05	06/20/14 14:56	1
Cadmium	ND		0.0020	0.00050	mg/L		06/16/14 12:05	06/20/14 14:56	1
Calcium	**89**		0.50	0.10	mg/L		06/16/14 12:05	06/20/14 14:56	1
Chromium	**0.0019**	**J**	0.0040	0.0010	mg/L		06/16/14 12:05	06/20/14 14:56	1
Cobalt	**0.00063**	**J**	0.0040	0.00063	mg/L		06/16/14 12:05	06/20/14 14:56	1
Copper	ND		0.010	0.0016	mg/L		06/16/14 12:05	06/20/14 14:56	1
Iron	**0.019**	**J**	0.050	0.019	mg/L		06/16/14 12:05	06/20/14 14:56	1
Lead	**0.0038**	**J**	0.010	0.0030	mg/L		06/16/14 12:05	06/20/14 14:56	1
Magnesium	**60**		0.20	0.043	mg/L		06/16/14 12:05	06/20/14 14:56	1
Manganese	**0.23**		0.0030	0.00040	mg/L		06/16/14 12:05	06/20/14 14:56	1
Nickel	**0.012**		0.010	0.0013	mg/L		06/16/14 12:05	06/20/14 14:56	1
Potassium	**19**		0.50	0.10	mg/L		06/16/14 12:05	06/20/14 14:56	1
Selenium	ND		0.025	0.0087	mg/L		06/16/14 12:05	06/20/14 14:56	1
Silver	ND		0.0060	0.0017	mg/L		06/16/14 12:05	06/20/14 14:56	1
Sodium	**65**		1.0	0.32	mg/L		06/16/14 12:05	06/20/14 14:56	1
Thallium	ND		0.020	0.010	mg/L		06/16/14 12:05	06/20/14 14:56	1
Vanadium	ND		0.0050	0.0015	mg/L		06/16/14 12:05	06/20/14 14:56	1
Zinc	**0.0057**	**J B**	0.010	0.0015	mg/L		06/16/14 12:05	06/20/14 14:56	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		06/17/14 10:15	06/17/14 15:19	1

Method: 7470A - Mercury (CVAA) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		06/17/14 10:15	06/17/14 14:58	1

Client Sample Results

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-61861-1

Client Sample ID: GW-1

Date Collected: 06/12/14 16:15
Date Received: 06/13/14 09:00

Lab Sample ID: 480-61861-7
Matrix: Water

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**73**		0.50	0.28	mg/L			06/20/14 12:13	1
Sulfate	**4.7**		2.0	0.35	mg/L			06/20/14 12:13	1
Alkalinity, Total	**560**		100	40	mg/L			06/19/14 11:34	10
Ammonia	**18**		0.20	0.090	mg/L			06/17/14 15:08	10
Total Kjeldahl Nitrogen	**16**		2.0	1.5	mg/L		06/18/14 19:32	06/19/14 10:39	10
Nitrate as N	**0.076**		0.050	0.020	mg/L			06/13/14 16:32	1
Chemical Oxygen Demand	**31**		10	5.0	mg/L			06/19/14 10:09	1
Chromium, hexavalent	ND		0.010	0.0050	mg/L			06/13/14 10:17	1
Cyanide, Total	ND		0.010	0.0050	mg/L		06/20/14 15:55	06/23/14 08:29	1
Total Organic Carbon	**6.0**		1.0	0.43	mg/L			06/17/14 18:35	1
Phenolics, Total Recoverable	ND		0.010	0.0050	mg/L		06/23/14 20:30	06/24/14 11:08	1
Hardness	**490**		4.0	1.1	mg/L			06/24/14 09:36	1
Total Dissolved Solids	**690**		10	4.0	mg/L			06/16/14 23:25	1
Biochemical Oxygen Demand	ND		2.0	2.0	mg/L			06/13/14 17:39	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	**320**		1.0	1.0	NTU			06/13/14 10:32	1
Color	**25**		5.0	5.0	Color Units			06/13/14 11:17	1

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-61861-1

Client Sample ID: GW-2
Date Collected: 06/12/14 16:30
Date Received: 06/13/14 09:00

Lab Sample ID: 480-61861-8
Matrix: Water

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	ND		5.0	0.39	ug/L			06/18/14 07:30	1
1,1,2,2-Tetrachloroethane	ND		5.0	0.26	ug/L			06/18/14 07:30	1
1,1,2-Trichloroethane	ND		5.0	0.48	ug/L			06/18/14 07:30	1
1,1-Dichloroethane	ND		5.0	0.59	ug/L			06/18/14 07:30	1
1,1-Dichloroethene	ND		5.0	0.85	ug/L			06/18/14 07:30	1
1,2-Dichlorobenzene	ND		5.0	0.44	ug/L			06/18/14 07:30	1
1,2-Dichloroethane	ND		5.0	0.60	ug/L			06/18/14 07:30	1
1,2-Dichloropropane	ND		5.0	0.61	ug/L			06/18/14 07:30	1
1,3-Dichlorobenzene	ND		5.0	0.54	ug/L			06/18/14 07:30	1
1,4-Dichlorobenzene	ND		5.0	0.51	ug/L			06/18/14 07:30	1
2-Chloroethyl vinyl ether	ND		25	1.9	ug/L			06/18/14 07:30	1
Benzene	ND		5.0	0.60	ug/L			06/18/14 07:30	1
Bromodichloromethane	ND		5.0	0.54	ug/L			06/18/14 07:30	1
Bromoform	ND		5.0	0.47	ug/L			06/18/14 07:30	1
Bromomethane	ND		5.0	1.2	ug/L			06/18/14 07:30	1
Carbon tetrachloride	ND		5.0	0.51	ug/L			06/18/14 07:30	1
Chlorobenzene	ND		5.0	0.48	ug/L			06/18/14 07:30	1
Chloroethane	ND		5.0	0.87	ug/L			06/18/14 07:30	1
Chloroform	ND		5.0	0.54	ug/L			06/18/14 07:30	1
Chloromethane	ND		5.0	0.64	ug/L			06/18/14 07:30	1
cis-1,2-Dichloroethene	ND		5.0	0.57	ug/L			06/18/14 07:30	1
cis-1,3-Dichloropropene	ND		5.0	0.33	ug/L			06/18/14 07:30	1
Dibromochloromethane	ND		5.0	0.41	ug/L			06/18/14 07:30	1
Dichlorodifluoromethane	ND		5.0	0.28	ug/L			06/18/14 07:30	1
Ethylbenzene	ND		5.0	0.46	ug/L			06/18/14 07:30	1
Methylene Chloride	ND		5.0	0.81	ug/L			06/18/14 07:30	1
m-Xylene & p-Xylene	ND		10	1.1	ug/L			06/18/14 07:30	1
o-Xylene	ND		5.0	0.43	ug/L			06/18/14 07:30	1
Tetrachloroethene	ND		5.0	0.34	ug/L			06/18/14 07:30	1
Toluene	ND		5.0	0.45	ug/L			06/18/14 07:30	1
trans-1,2-Dichloroethene	ND		5.0	0.59	ug/L			06/18/14 07:30	1
trans-1,3-Dichloropropene	ND		5.0	0.44	ug/L			06/18/14 07:30	1
Trichloroethene	ND		5.0	0.60	ug/L			06/18/14 07:30	1
Trichlorofluoromethane	ND		5.0	0.45	ug/L			06/18/14 07:30	1
Vinyl chloride	ND		5.0	0.75	ug/L			06/18/14 07:30	1
Xylenes, Total	ND		10	1.1	ug/L			06/18/14 07:30	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*100*		*72 - 130*		*06/18/14 07:30*	*1*
4-Bromofluorobenzene (Surr)	*96*		*69 - 121*		*06/18/14 07:30*	*1*
Toluene-d8 (Surr)	*99*		*70 - 123*		*06/18/14 07:30*	*1*

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**1.4**		0.20	0.060	mg/L		06/16/14 08:00	06/18/14 22:22	1
Antimony	ND		0.020	0.0068	mg/L		06/16/14 08:00	06/18/14 22:22	1
Arsenic	**0.086**		0.015	0.0056	mg/L		06/16/14 08:00	06/18/14 22:22	1
Barium	**0.38**		0.0020	0.00070	mg/L		06/16/14 08:00	06/18/14 22:22	1
Beryllium	ND		0.0020	0.00030	mg/L		06/16/14 08:00	06/18/14 22:22	1
Boron	**0.17**	**B**	0.020	0.0040	mg/L		06/16/14 08:00	06/18/14 22:22	1

Client Sample ID: GW-2
Date Collected: 06/12/14 16:30
Date Received: 06/13/14 09:00

Lab Sample ID: 480-61861-8
Matrix: Water

Method: 6010C - Metals (ICP) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	**0.00062**	**J**	0.0020	0.00050	mg/L		06/16/14 08:00	06/18/14 22:22	1
Calcium	**120**		0.50	0.10	mg/L		06/16/14 08:00	06/18/14 22:22	1
Chromium	**0.0020**	**J**	0.0040	0.0010	mg/L		06/16/14 08:00	06/18/14 22:22	1
Copper	**0.0027**	**J**	0.010	0.0016	mg/L		06/16/14 08:00	06/18/14 22:22	1
Iron	**5.3**		0.050	0.019	mg/L		06/16/14 08:00	06/18/14 22:22	1
Lead	**0.0042**	**J**	0.010	0.0030	mg/L		06/16/14 08:00	06/18/14 22:22	1
Magnesium	**44**		0.20	0.043	mg/L		06/16/14 08:00	06/18/14 22:22	1
Manganese	**1.8**		0.0030	0.00040	mg/L		06/16/14 08:00	06/18/14 22:22	1
Nickel	**0.0091**	**J**	0.010	0.0013	mg/L		06/16/14 08:00	06/18/14 22:22	1
Potassium	**12**		0.50	0.10	mg/L		06/16/14 08:00	06/18/14 22:22	1
Selenium	ND		0.025	0.0087	mg/L		06/16/14 08:00	06/18/14 22:22	1
Silver	ND		0.0060	0.0017	mg/L		06/16/14 08:00	06/18/14 22:22	1
Sodium	**45**		1.0	0.32	mg/L		06/16/14 08:00	06/18/14 22:22	1
Thallium	ND		0.020	0.010	mg/L		06/16/14 08:00	06/18/14 22:22	1
Zinc	**0.020**		0.010	0.0015	mg/L		06/16/14 08:00	06/18/14 22:22	1

Method: 6010C - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		0.20	0.060	mg/L		06/16/14 12:05	06/20/14 14:59	1
Antimony	ND		0.020	0.0068	mg/L		06/16/14 12:05	06/20/14 14:59	1
Arsenic	**0.049**		0.015	0.0056	mg/L		06/16/14 12:05	06/20/14 14:59	1
Barium	**0.40**		0.0020	0.00070	mg/L		06/16/14 12:05	06/20/14 14:59	1
Beryllium	ND		0.0020	0.00030	mg/L		06/16/14 12:05	06/20/14 14:59	1
Boron	**0.18**		0.020	0.0040	mg/L		06/16/14 12:05	06/20/14 14:59	1
Cadmium	ND		0.0020	0.00050	mg/L		06/16/14 12:05	06/20/14 14:59	1
Calcium	**120**		0.50	0.10	mg/L		06/16/14 12:05	06/20/14 14:59	1
Chromium	**0.0020**	**J**	0.0040	0.0010	mg/L		06/16/14 12:05	06/20/14 14:59	1
Cobalt	**0.0019**	**J**	0.0040	0.00063	mg/L		06/16/14 12:05	06/20/14 14:59	1
Copper	ND		0.010	0.0016	mg/L		06/16/14 12:05	06/20/14 14:59	1
Iron	ND		0.050	0.019	mg/L		06/16/14 12:05	06/20/14 14:59	1
Lead	ND		0.010	0.0030	mg/L		06/16/14 12:05	06/20/14 14:59	1
Magnesium	**45**		0.20	0.043	mg/L		06/16/14 12:05	06/20/14 14:59	1
Manganese	**1.6**		0.0030	0.00040	mg/L		06/16/14 12:05	06/20/14 14:59	1
Nickel	**0.0071**	**J**	0.010	0.0013	mg/L		06/16/14 12:05	06/20/14 14:59	1
Potassium	**12**		0.50	0.10	mg/L		06/16/14 12:05	06/20/14 14:59	1
Selenium	ND		0.025	0.0087	mg/L		06/16/14 12:05	06/20/14 14:59	1
Silver	ND		0.0060	0.0017	mg/L		06/16/14 12:05	06/20/14 14:59	1
Sodium	**47**		1.0	0.32	mg/L		06/16/14 12:05	06/20/14 14:59	1
Thallium	ND		0.020	0.010	mg/L		06/16/14 12:05	06/20/14 14:59	1
Vanadium	ND		0.0050	0.0015	mg/L		06/16/14 12:05	06/20/14 14:59	1
Zinc	**0.0088**	**J B**	0.010	0.0015	mg/L		06/16/14 12:05	06/20/14 14:59	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		06/17/14 10:15	06/17/14 15:11	1

Method: 7470A - Mercury (CVAA) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		06/17/14 10:15	06/17/14 14:43	1

Client Sample ID: GW-2

Date Collected: 06/12/14 16:30
Date Received: 06/13/14 09:00

Lab Sample ID: 480-61861-8
Matrix: Water

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**58**		0.50	0.28	mg/L			06/20/14 12:23	1
Sulfate	**11**		2.0	0.35	mg/L			06/20/14 12:23	1
Alkalinity, Total	**610**		100	40	mg/L			06/20/14 12:30	10
Ammonia	**8.8**		0.10	0.045	mg/L			06/17/14 15:09	5
Total Kjeldahl Nitrogen	**8.6**		1.0	0.75	mg/L		06/18/14 19:32	06/19/14 10:39	5
Nitrate as N	**0.57**		0.050	0.020	mg/L			06/13/14 16:33	1
Chemical Oxygen Demand	ND		10	5.0	mg/L			06/19/14 10:09	1
Chromium, hexavalent	ND		0.010	0.0050	mg/L			06/13/14 10:22	1
Cyanide, Total	**0.0053**	**J**	0.010	0.0050	mg/L		06/19/14 17:30	06/20/14 10:36	1
Total Organic Carbon	**5.9**		1.0	0.43	mg/L			06/17/14 19:03	1
Phenolics, Total Recoverable	ND		0.010	0.0050	mg/L		06/23/14 20:30	06/24/14 11:09	1
Hardness	**500**		10	2.6	mg/L			06/24/14 11:08	1
Total Dissolved Solids	**660**		10	4.0	mg/L			06/16/14 23:27	1
Biochemical Oxygen Demand	ND		2.0	2.0	mg/L			06/13/14 17:39	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	**120**		1.0	1.0	NTU			06/13/14 10:32	1
Color	**15**		5.0	5.0	Color Units			06/13/14 11:17	1

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-61861-1

Client Sample ID: TRIP BLANK
Date Collected: 06/12/14 13:25
Date Received: 06/13/14 09:00

Lab Sample ID: 480-61861-9
Matrix: Water

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	ND		5.0	0.39	ug/L			06/18/14 07:54	1
1,1,2,2-Tetrachloroethane	ND		5.0	0.26	ug/L			06/18/14 07:54	1
1,1,2-Trichloroethane	ND		5.0	0.48	ug/L			06/18/14 07:54	1
1,1-Dichloroethane	ND		5.0	0.59	ug/L			06/18/14 07:54	1
1,1-Dichloroethene	ND		5.0	0.85	ug/L			06/18/14 07:54	1
1,2-Dichlorobenzene	ND		5.0	0.44	ug/L			06/18/14 07:54	1
1,2-Dichloroethane	ND		5.0	0.60	ug/L			06/18/14 07:54	1
1,2-Dichloropropane	ND		5.0	0.61	ug/L			06/18/14 07:54	1
1,3-Dichlorobenzene	ND		5.0	0.54	ug/L			06/18/14 07:54	1
1,4-Dichlorobenzene	ND		5.0	0.51	ug/L			06/18/14 07:54	1
2-Chloroethyl vinyl ether	ND		25	1.9	ug/L			06/18/14 07:54	1
Benzene	ND		5.0	0.60	ug/L			06/18/14 07:54	1
Bromodichloromethane	ND		5.0	0.54	ug/L			06/18/14 07:54	1
Bromoform	ND		5.0	0.47	ug/L			06/18/14 07:54	1
Bromomethane	ND		5.0	1.2	ug/L			06/18/14 07:54	1
Carbon tetrachloride	ND		5.0	0.51	ug/L			06/18/14 07:54	1
Chlorobenzene	ND		5.0	0.48	ug/L			06/18/14 07:54	1
Chloroethane	ND		5.0	0.87	ug/L			06/18/14 07:54	1
Chloroform	ND		5.0	0.54	ug/L			06/18/14 07:54	1
Chloromethane	ND		5.0	0.64	ug/L			06/18/14 07:54	1
cis-1,2-Dichloroethene	ND		5.0	0.57	ug/L			06/18/14 07:54	1
cis-1,3-Dichloropropene	ND		5.0	0.33	ug/L			06/18/14 07:54	1
Dibromochloromethane	ND		5.0	0.41	ug/L			06/18/14 07:54	1
Dichlorodifluoromethane	ND		5.0	0.28	ug/L			06/18/14 07:54	1
Ethylbenzene	ND		5.0	0.46	ug/L			06/18/14 07:54	1
Methylene Chloride	ND		5.0	0.81	ug/L			06/18/14 07:54	1
m-Xylene & p-Xylene	ND		10	1.1	ug/L			06/18/14 07:54	1
o-Xylene	ND		5.0	0.43	ug/L			06/18/14 07:54	1
Tetrachloroethene	ND		5.0	0.34	ug/L			06/18/14 07:54	1
Toluene	ND		5.0	0.45	ug/L			06/18/14 07:54	1
trans-1,2-Dichloroethene	ND		5.0	0.59	ug/L			06/18/14 07:54	1
trans-1,3-Dichloropropene	ND		5.0	0.44	ug/L			06/18/14 07:54	1
Trichloroethene	ND		5.0	0.60	ug/L			06/18/14 07:54	1
Trichlorofluoromethane	ND		5.0	0.45	ug/L			06/18/14 07:54	1
Vinyl chloride	ND		5.0	0.75	ug/L			06/18/14 07:54	1
Xylenes, Total	ND		10	1.1	ug/L			06/18/14 07:54	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*104*		*72 - 130*		*06/18/14 07:54*	*1*
4-Bromofluorobenzene (Surr)	*97*		*69 - 121*		*06/18/14 07:54*	*1*
Toluene-d8 (Surr)	*99*		*70 - 123*		*06/18/14 07:54*	*1*

Method: 624 - Volatile Organic Compounds (GC/MS)

Matrix: Water

Prep Type: Total/NA

		Percent Surrogate Recovery (Acceptance Limits)		
		12DCE	BFB	TOL
Lab Sample ID	Client Sample ID	(72-130)	(69-121)	(70-123)
480-61861-2	GW-A	100	95	97
480-61861-3	GW-B	103	94	98
480-61861-4	SW-02	104	96	100
480-61861-5	SW-01	104	97	100
480-61861-6	GW-3	103	94	99
480-61861-7	GW-1	106	96	102
480-61861-8	GW-2	100	96	99
480-61861-9	TRIP BLANK	104	97	99
LCS 480-188163/5	Lab Control Sample	96	97	98
MB 480-188163/7	Method Blank	101	97	98

Surrogate Legend

12DCE = 1,2-Dichloroethane-d4 (Surr)
BFB = 4-Bromofluorobenzene (Surr)
TOL = Toluene-d8 (Surr)

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-61861-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 480-188163/7
Matrix: Water
Analysis Batch: 188163

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	ND		5.0	0.39	ug/L			06/17/14 13:19	1
1,1,2,2-Tetrachloroethane	ND		5.0	0.26	ug/L			06/17/14 13:19	1
1,1,2-Trichloroethane	ND		5.0	0.48	ug/L			06/17/14 13:19	1
1,1-Dichloroethane	ND		5.0	0.59	ug/L			06/17/14 13:19	1
1,1-Dichloroethene	ND		5.0	0.85	ug/L			06/17/14 13:19	1
1,2-Dichlorobenzene	ND		5.0	0.44	ug/L			06/17/14 13:19	1
1,2-Dichloroethane	ND		5.0	0.60	ug/L			06/17/14 13:19	1
1,2-Dichloropropane	ND		5.0	0.61	ug/L			06/17/14 13:19	1
1,3-Dichlorobenzene	ND		5.0	0.54	ug/L			06/17/14 13:19	1
1,4-Dichlorobenzene	ND		5.0	0.51	ug/L			06/17/14 13:19	1
2-Chloroethyl vinyl ether	ND		25	1.9	ug/L			06/17/14 13:19	1
Benzene	ND		5.0	0.60	ug/L			06/17/14 13:19	1
Bromodichloromethane	ND		5.0	0.54	ug/L			06/17/14 13:19	1
Bromoform	ND		5.0	0.47	ug/L			06/17/14 13:19	1
Bromomethane	ND		5.0	1.2	ug/L			06/17/14 13:19	1
Carbon tetrachloride	ND		5.0	0.51	ug/L			06/17/14 13:19	1
Chlorobenzene	ND		5.0	0.48	ug/L			06/17/14 13:19	1
Chloroethane	ND		5.0	0.87	ug/L			06/17/14 13:19	1
Chloroform	ND		5.0	0.54	ug/L			06/17/14 13:19	1
Chloromethane	ND		5.0	0.64	ug/L			06/17/14 13:19	1
cis-1,2-Dichloroethene	ND		5.0	0.57	ug/L			06/17/14 13:19	1
cis-1,3-Dichloropropene	ND		5.0	0.33	ug/L			06/17/14 13:19	1
Dibromochloromethane	ND		5.0	0.41	ug/L			06/17/14 13:19	1
Dichlorodifluoromethane	ND		5.0	0.28	ug/L			06/17/14 13:19	1
Ethylbenzene	ND		5.0	0.46	ug/L			06/17/14 13:19	1
Methylene Chloride	ND		5.0	0.81	ug/L			06/17/14 13:19	1
m-Xylene & p-Xylene	ND		10	1.1	ug/L			06/17/14 13:19	1
o-Xylene	ND		5.0	0.43	ug/L			06/17/14 13:19	1
Tetrachloroethene	ND		5.0	0.34	ug/L			06/17/14 13:19	1
Toluene	ND		5.0	0.45	ug/L			06/17/14 13:19	1
trans-1,2-Dichloroethene	ND		5.0	0.59	ug/L			06/17/14 13:19	1
trans-1,3-Dichloropropene	ND		5.0	0.44	ug/L			06/17/14 13:19	1
Trichloroethene	ND		5.0	0.60	ug/L			06/17/14 13:19	1
Trichlorofluoromethane	ND		5.0	0.45	ug/L			06/17/14 13:19	1
Vinyl chloride	ND		5.0	0.75	ug/L			06/17/14 13:19	1
Xylenes, Total	ND		10	1.1	ug/L			06/17/14 13:19	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*101*		*72 - 130*		*06/17/14 13:19*	*1*
4-Bromofluorobenzene (Surr)	*97*		*69 - 121*		*06/17/14 13:19*	*1*
Toluene-d8 (Surr)	*98*		*70 - 123*		*06/17/14 13:19*	*1*

Lab Sample ID: LCS 480-188163/5
Matrix: Water
Analysis Batch: 188163

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1,1-Trichloroethane	20.0	20.0		ug/L		100	52 - 162

TestAmerica Buffalo

Method: 624 - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 480-188163/5
Matrix: Water
Analysis Batch: 188163

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1,2,2-Tetrachloroethane	20.0	19.2		ug/L		96	46 - 157
1,1,2-Trichloroethane	20.0	19.1		ug/L		96	52 - 150
1,1-Dichloroethane	20.0	19.5		ug/L		98	59 - 155
1,1-Dichloroethene	20.0	20.2		ug/L		101	1 - 234
1,2-Dichlorobenzene	20.0	20.5		ug/L		102	18 - 190
1,2-Dichloroethane	20.0	19.0		ug/L		95	49 - 155
1,2-Dichloropropane	20.0	19.0		ug/L		95	1 - 210
1,3-Dichlorobenzene	20.0	19.6		ug/L		98	59 - 156
1,4-Dichlorobenzene	20.0	19.8		ug/L		99	18 - 190
2-Chloroethyl vinyl ether	20.0	16.9	J	ug/L		84	1 - 305
Benzene	20.0	20.0		ug/L		100	37 - 151
Bromodichloromethane	20.0	19.2		ug/L		96	35 - 155
Bromoform	20.0	16.5		ug/L		83	45 - 169
Bromomethane	20.0	24.9		ug/L		125	1 - 242
Carbon tetrachloride	20.0	21.9		ug/L		109	70 - 140
Chlorobenzene	20.0	20.1		ug/L		100	37 - 160
Chloroethane	20.0	22.2		ug/L		111	14 - 230
Chloroform	20.0	19.7		ug/L		99	51 - 138
Chloromethane	20.0	20.1		ug/L		101	1 - 273
cis-1,2-Dichloroethene	20.0	20.1		ug/L		100	
cis-1,3-Dichloropropene	20.0	18.4		ug/L		92	1 - 227
Dibromochloromethane	20.0	18.4		ug/L		92	53 - 149
Dichlorodifluoromethane	20.0	20.7		ug/L		104	
Ethylbenzene	20.0	20.6		ug/L		103	37 - 162
Methylene Chloride	20.0	17.3		ug/L		86	1 - 221
m-Xylene & p-Xylene	20.0	19.6		ug/L		98	79 - 120
o-Xylene	20.0	20.0		ug/L		100	79 - 120
Tetrachloroethene	20.0	20.2		ug/L		101	64 - 148
Toluene	20.0	19.5		ug/L		98	47 - 150
trans-1,2-Dichloroethene	20.0	20.3		ug/L		102	54 - 156
trans-1,3-Dichloropropene	20.0	18.9		ug/L		95	17 - 183
Trichloroethene	20.0	19.7		ug/L		99	71 - 157
Trichlorofluoromethane	20.0	20.9		ug/L		105	17 - 181
Vinyl chloride	20.0	20.4		ug/L		102	1 - 251

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*96*		*72 - 130*
4-Bromofluorobenzene (Surr)	*97*		*69 - 121*
Toluene-d8 (Surr)	*98*		*70 - 123*

Method: 6010C - Metals (ICP)

Lab Sample ID: MB 480-187751/1-A
Matrix: Water
Analysis Batch: 188615

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 187751

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		0.20	0.060	mg/L		06/16/14 08:00	06/18/14 21:37	1

Method: 6010C - Metals (ICP) (Continued)

Lab Sample ID: MB 480-187751/1-A
Matrix: Water
Analysis Batch: 188615

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 187751

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.020	0.0068	mg/L		06/16/14 08:00	06/18/14 21:37	1
Arsenic	ND		0.015	0.0056	mg/L		06/16/14 08:00	06/18/14 21:37	1
Barium	ND		0.0020	0.00070	mg/L		06/16/14 08:00	06/18/14 21:37	1
Beryllium	ND		0.0020	0.00030	mg/L		06/16/14 08:00	06/18/14 21:37	1
Boron	0.00443	J	0.020	0.0040	mg/L		06/16/14 08:00	06/18/14 21:37	1
Cadmium	ND		0.0020	0.00050	mg/L		06/16/14 08:00	06/18/14 21:37	1
Calcium	ND		0.50	0.10	mg/L		06/16/14 08:00	06/18/14 21:37	1
Chromium	ND		0.0040	0.0010	mg/L		06/16/14 08:00	06/18/14 21:37	1
Copper	ND		0.010	0.0016	mg/L		06/16/14 08:00	06/18/14 21:37	1
Iron	ND		0.050	0.019	mg/L		06/16/14 08:00	06/18/14 21:37	1
Lead	ND		0.010	0.0030	mg/L		06/16/14 08:00	06/18/14 21:37	1
Magnesium	ND		0.20	0.043	mg/L		06/16/14 08:00	06/18/14 21:37	1
Manganese	ND		0.0030	0.00040	mg/L		06/16/14 08:00	06/18/14 21:37	1
Nickel	ND		0.010	0.0013	mg/L		06/16/14 08:00	06/18/14 21:37	1
Potassium	ND		0.50	0.10	mg/L		06/16/14 08:00	06/18/14 21:37	1
Selenium	ND		0.025	0.0087	mg/L		06/16/14 08:00	06/18/14 21:37	1
Silver	ND		0.0060	0.0017	mg/L		06/16/14 08:00	06/18/14 21:37	1
Sodium	ND		1.0	0.32	mg/L		06/16/14 08:00	06/18/14 21:37	1
Thallium	ND		0.020	0.010	mg/L		06/16/14 08:00	06/18/14 21:37	1
Zinc	ND		0.010	0.0015	mg/L		06/16/14 08:00	06/18/14 21:37	1

Lab Sample ID: LCS 480-187751/2-A
Matrix: Water
Analysis Batch: 188615

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 187751

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	10.0	10.4		mg/L		104	80 - 120
Antimony	0.200	0.204		mg/L		102	80 - 120
Arsenic	0.200	0.201		mg/L		100	80 - 120
Barium	0.200	0.206		mg/L		103	80 - 120
Beryllium	0.200	0.202		mg/L		101	80 - 120
Boron	0.200	0.209		mg/L		105	80 - 120
Cadmium	0.200	0.205		mg/L		102	80 - 120
Calcium	10.0	9.76		mg/L		98	80 - 120
Chromium	0.200	0.210		mg/L		105	80 - 120
Copper	0.200	0.207		mg/L		103	80 - 120
Iron	10.0	9.75		mg/L		97	80 - 120
Lead	0.200	0.203		mg/L		102	80 - 120
Magnesium	10.0	10.8		mg/L		108	80 - 120
Manganese	0.200	0.212		mg/L		106	80 - 120
Nickel	0.200	0.201		mg/L		100	80 - 120
Potassium	10.0	9.78		mg/L		98	80 - 120
Selenium	0.200	0.205		mg/L		103	80 - 120
Silver	0.0500	0.0500		mg/L		100	80 - 120
Sodium	10.0	9.62		mg/L		96	80 - 120
Thallium	0.200	0.214		mg/L		107	80 - 120
Zinc	0.200	0.208		mg/L		104	80 - 120

Method: 6010C - Metals (ICP) (Continued)

Lab Sample ID: MB 480-187770/1-B
Matrix: Water
Analysis Batch: 189205

Client Sample ID: Method Blank
Prep Type: Dissolved
Prep Batch: 187888

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		0.20	0.060	mg/L		06/16/14 12:05	06/20/14 14:22	1
Antimony	ND		0.020	0.0068	mg/L		06/16/14 12:05	06/20/14 14:22	1
Arsenic	ND		0.015	0.0056	mg/L		06/16/14 12:05	06/20/14 14:22	1
Barium	ND		0.0020	0.00070	mg/L		06/16/14 12:05	06/20/14 14:22	1
Beryllium	ND		0.0020	0.00030	mg/L		06/16/14 12:05	06/20/14 14:22	1
Boron	ND		0.020	0.0040	mg/L		06/16/14 12:05	06/20/14 14:22	1
Cadmium	ND		0.0020	0.00050	mg/L		06/16/14 12:05	06/20/14 14:22	1
Calcium	ND		0.50	0.10	mg/L		06/16/14 12:05	06/20/14 14:22	1
Chromium	ND		0.0040	0.0010	mg/L		06/16/14 12:05	06/20/14 14:22	1
Cobalt	ND		0.0040	0.00063	mg/L		06/16/14 12:05	06/20/14 14:22	1
Copper	ND		0.010	0.0016	mg/L		06/16/14 12:05	06/20/14 14:22	1
Iron	ND		0.050	0.019	mg/L		06/16/14 12:05	06/20/14 14:22	1
Lead	ND		0.010	0.0030	mg/L		06/16/14 12:05	06/20/14 14:22	1
Magnesium	ND		0.20	0.043	mg/L		06/16/14 12:05	06/20/14 14:22	1
Manganese	ND		0.0030	0.00040	mg/L		06/16/14 12:05	06/20/14 14:22	1
Nickel	ND		0.010	0.0013	mg/L		06/16/14 12:05	06/20/14 14:22	1
Potassium	ND		0.50	0.10	mg/L		06/16/14 12:05	06/20/14 14:22	1
Selenium	ND		0.025	0.0087	mg/L		06/16/14 12:05	06/20/14 14:22	1
Silver	ND		0.0060	0.0017	mg/L		06/16/14 12:05	06/20/14 14:22	1
Sodium	ND		1.0	0.32	mg/L		06/16/14 12:05	06/20/14 14:22	1
Thallium	ND		0.020	0.010	mg/L		06/16/14 12:05	06/20/14 14:22	1
Vanadium	ND		0.0050	0.0015	mg/L		06/16/14 12:05	06/20/14 14:22	1
Zinc	0.00158	J	0.010	0.0015	mg/L		06/16/14 12:05	06/20/14 14:22	1

Lab Sample ID: LCS 480-187770/2-B
Matrix: Water
Analysis Batch: 189205

Client Sample ID: Lab Control Sample
Prep Type: Dissolved
Prep Batch: 187888

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	10.0	10.3		mg/L		103	80 - 120
Antimony	0.200	0.202		mg/L		101	80 - 120
Arsenic	0.200	0.202		mg/L		101	80 - 120
Barium	0.200	0.216		mg/L		108	80 - 120
Beryllium	0.200	0.204		mg/L		102	80 - 120
Boron	0.200	0.206		mg/L		103	80 - 120
Cadmium	0.200	0.200		mg/L		100	80 - 120
Calcium	10.0	9.43		mg/L		94	80 - 120
Chromium	0.200	0.198		mg/L		99	80 - 120
Cobalt	0.200	0.201		mg/L		101	80 - 120
Copper	0.200	0.204		mg/L		102	80 - 120
Iron	10.0	9.96		mg/L		100	80 - 120
Lead	0.200	0.199		mg/L		100	80 - 120
Magnesium	10.0	10.5		mg/L		105	80 - 120
Manganese	0.200	0.205		mg/L		102	80 - 120
Nickel	0.200	0.196		mg/L		98	80 - 120
Potassium	10.0	9.86		mg/L		99	80 - 120
Selenium	0.200	0.204		mg/L		102	80 - 120
Silver	0.0500	0.0518		mg/L		104	80 - 120

Method: 6010C - Metals (ICP) (Continued)

Lab Sample ID: LCS 480-187770/2-B
Matrix: Water
Analysis Batch: 189205

Client Sample ID: Lab Control Sample
Prep Type: Dissolved
Prep Batch: 187888

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Sodium	10.0	10.1		mg/L		101	80 - 120
Thallium	0.200	0.210		mg/L		105	80 - 120
Vanadium	0.200	0.210		mg/L		105	80 - 120
Zinc	0.200	0.197		mg/L		98	80 - 120

Lab Sample ID: LCSD 480-187770/3-B
Matrix: Water
Analysis Batch: 189205

Client Sample ID: Lab Control Sample Dup
Prep Type: Dissolved
Prep Batch: 187888

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Aluminum	10.0	10.4		mg/L		104	80 - 120	1	20
Antimony	0.200	0.201		mg/L		101	80 - 120	0	20
Arsenic	0.200	0.199		mg/L		99	80 - 120	2	20
Barium	0.200	0.215		mg/L		107	80 - 120	0	20
Beryllium	0.200	0.205		mg/L		103	80 - 120	1	20
Boron	0.200	0.208		mg/L		104	80 - 120	1	20
Cadmium	0.200	0.203		mg/L		101	80 - 120	1	20
Calcium	10.0	9.73		mg/L		97	80 - 120	3	20
Chromium	0.200	0.204		mg/L		102	80 - 120	3	20
Cobalt	0.200	0.205		mg/L		102	80 - 120	2	20
Copper	0.200	0.207		mg/L		103	80 - 120	1	20
Iron	10.0	10.1		mg/L		101	80 - 120	2	20
Lead	0.200	0.201		mg/L		100	80 - 120	1	20
Magnesium	10.0	10.5		mg/L		105	80 - 120	1	20
Manganese	0.200	0.207		mg/L		104	80 - 120	1	20
Nickel	0.200	0.199		mg/L		99	80 - 120	1	20
Potassium	10.0	9.89		mg/L		99	80 - 120	0	20
Selenium	0.200	0.204		mg/L		102	80 - 120	0	20
Silver	0.0500	0.0518		mg/L		104	80 - 120	0	20
Sodium	10.0	10.1		mg/L		101	80 - 120	0	20
Thallium	0.200	0.210		mg/L		105	80 - 120	0	20
Vanadium	0.200	0.212		mg/L		106	80 - 120	1	20
Zinc	0.200	0.202		mg/L		101	80 - 120	3	20

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 480-187990/1-A
Matrix: Water
Analysis Batch: 188161

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 187990

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		06/16/14 14:30	06/17/14 09:26	1

Lab Sample ID: LCS 480-187990/2-A
Matrix: Water
Analysis Batch: 188161

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 187990

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.00667	0.00613		mg/L		92	80 - 120

Method: 7470A - Mercury (CVAA) (Continued)

Lab Sample ID: MB 480-187992/1-A
Matrix: Water
Analysis Batch: 188305

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 187992

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		06/17/14 10:15	06/17/14 13:11	1

Lab Sample ID: LCS 480-187992/2-A
Matrix: Water
Analysis Batch: 188305

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 187992

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.00667	0.00707		mg/L		106	80 - 120

Lab Sample ID: MB 480-188082/1-A
Matrix: Water
Analysis Batch: 188305

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 188082

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		06/17/14 10:15	06/17/14 14:05	1

Lab Sample ID: LCS 480-188082/2-A
Matrix: Water
Analysis Batch: 188305

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 188082

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.00667	0.00693		mg/L		104	80 - 120

Lab Sample ID: MB 480-188119/1-A
Matrix: Water
Analysis Batch: 188305

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 188119

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		06/17/14 10:15	06/17/14 15:04	1

Lab Sample ID: LCS 480-188119/2-A
Matrix: Water
Analysis Batch: 188305

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 188119

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.00667	0.00697		mg/L		104	80 - 120

Lab Sample ID: 480-61861-8 MS
Matrix: Water
Analysis Batch: 188305

Client Sample ID: GW-2
Prep Type: Total/NA
Prep Batch: 188119

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	ND		0.00667	0.00693		mg/L		104	75 - 125

Lab Sample ID: 480-61861-8 MSD
Matrix: Water
Analysis Batch: 188305

Client Sample ID: GW-2
Prep Type: Total/NA
Prep Batch: 188119

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	ND		0.00667	0.00710		mg/L		106	75 - 125	2	20

Method: 180.1 - Turbidity, Nephelometric

Lab Sample ID: MB 480-187550/27
Matrix: Water
Analysis Batch: 187550

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	ND		1.0	1.0	NTU			06/13/14 08:37	1

Lab Sample ID: 480-61861-5 DU
Matrix: Water
Analysis Batch: 187550

Client Sample ID: SW-01
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Turbidity	16		14.7		NTU		7	20

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 480-188730/100
Matrix: Water
Analysis Batch: 188730

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.50	0.28	mg/L			06/20/14 09:31	1
Sulfate	ND		2.0	0.35	mg/L			06/20/14 09:31	1

Lab Sample ID: LCS 480-188730/99
Matrix: Water
Analysis Batch: 188730

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	20.0	19.8		mg/L		99	90 - 110
Sulfate	20.0	19.3		mg/L		96	90 - 110

Method: 310.2 - Alkalinity

Lab Sample ID: MB 480-188771/28
Matrix: Water
Analysis Batch: 188771

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total	ND		10	4.0	mg/L			06/19/14 10:07	1

Lab Sample ID: MB 480-188771/46
Matrix: Water
Analysis Batch: 188771

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total	ND		10	4.0	mg/L			06/19/14 11:04	1

Lab Sample ID: MB 480-188771/58
Matrix: Water
Analysis Batch: 188771

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total	ND		10	4.0	mg/L			06/19/14 11:22	1

Method: 310.2 - Alkalinity (Continued)

Lab Sample ID: LCS 480-188771/27
Matrix: Water
Analysis Batch: 188771
Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity, Total	50.0	45.3		mg/L		91	90 - 110

Lab Sample ID: LCS 480-188771/45
Matrix: Water
Analysis Batch: 188771
Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity, Total	50.0	52.7		mg/L		105	90 - 110

Lab Sample ID: LCS 480-188771/57
Matrix: Water
Analysis Batch: 188771
Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity, Total	50.0	51.1		mg/L		102	90 - 110

Lab Sample ID: MB 480-189017/67
Matrix: Water
Analysis Batch: 189017
Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total	ND		10	4.0	mg/L			06/20/14 12:17	1

Lab Sample ID: MB 480-189017/92
Matrix: Water
Analysis Batch: 189017
Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total	ND		10	4.0	mg/L			06/20/14 12:51	1

Lab Sample ID: LCS 480-189017/66
Matrix: Water
Analysis Batch: 189017
Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity, Total	50.0	49.2		mg/L		98	90 - 110

Lab Sample ID: LCS 480-189017/91
Matrix: Water
Analysis Batch: 189017
Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity, Total	50.0	51.4		mg/L		103	90 - 110

Method: 350.1 - Nitrogen, Ammonia

Lab Sample ID: MB 480-188210/147
Matrix: Water
Analysis Batch: 188210

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	ND		0.020	0.0090	mg/L			06/17/14 12:31	1

Lab Sample ID: MB 480-188210/171
Matrix: Water
Analysis Batch: 188210

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	ND		0.020	0.0090	mg/L			06/17/14 12:52	1

Lab Sample ID: MB 480-188210/51
Matrix: Water
Analysis Batch: 188210

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	ND		0.020	0.0090	mg/L			06/17/14 11:07	1

Lab Sample ID: LCS 480-188210/148
Matrix: Water
Analysis Batch: 188210

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Ammonia	1.00	1.03		mg/L		103	90 - 110

Lab Sample ID: LCS 480-188210/172
Matrix: Water
Analysis Batch: 188210

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Ammonia	1.00	1.03		mg/L		103	90 - 110

Lab Sample ID: LCS 480-188210/52
Matrix: Water
Analysis Batch: 188210

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Ammonia	1.00	1.04		mg/L		104	90 - 110

Lab Sample ID: MB 480-188240/27
Matrix: Water
Analysis Batch: 188240

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	ND		0.020	0.0090	mg/L			06/17/14 14:01	1

Lab Sample ID: MB 480-188240/75
Matrix: Water
Analysis Batch: 188240

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	ND		0.020	0.0090	mg/L			06/17/14 14:49	1

Lab Sample ID: LCS 480-188240/28
Matrix: Water
Analysis Batch: 188240

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Ammonia	1.00	1.02		mg/L		102	90 - 110

Lab Sample ID: LCS 480-188240/76
Matrix: Water
Analysis Batch: 188240

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Ammonia	1.00	1.01		mg/L		101	90 - 110

Lab Sample ID: MB 480-189620/15
Matrix: Water
Analysis Batch: 189620

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	ND		0.020	0.0090	mg/L			06/24/14 18:28	1

Lab Sample ID: LCS 480-189620/16
Matrix: Water
Analysis Batch: 189620

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Ammonia	1.00	1.03		mg/L		103	90 - 110

Method: 351.2 - Nitrogen, Total Kjeldahl

Lab Sample ID: MB 480-188543/1-A
Matrix: Water
Analysis Batch: 188683

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 188543

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Kjeldahl Nitrogen	ND		0.20	0.15	mg/L		06/18/14 19:32	06/19/14 09:26	1

Lab Sample ID: LCS 480-188543/2-A
Matrix: Water
Analysis Batch: 188683

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 188543

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Kjeldahl Nitrogen	2.50	2.34		mg/L		94	90 - 110

Method: 410.4 - COD

Lab Sample ID: MB 480-188035/27
Matrix: Water
Analysis Batch: 188035

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chemical Oxygen Demand	ND		10	5.0	mg/L			06/16/14 17:30	1

Method: 410.4 - COD (Continued)

Lab Sample ID: MB 480-188035/3
Matrix: Water
Analysis Batch: 188035

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chemical Oxygen Demand	ND		10	5.0	mg/L			06/16/14 17:30	1

Lab Sample ID: LCS 480-188035/28
Matrix: Water
Analysis Batch: 188035

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chemical Oxygen Demand	25.0	24.0		mg/L		96	90 - 110

Lab Sample ID: LCS 480-188035/4
Matrix: Water
Analysis Batch: 188035

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chemical Oxygen Demand	25.0	24.9		mg/L		100	90 - 110

Lab Sample ID: 480-61861-4 MS
Matrix: Water
Analysis Batch: 188035

Client Sample ID: SW-02
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chemical Oxygen Demand	9.0	J	50.0	59.4		mg/L		101	75 - 125

Lab Sample ID: 480-61861-5 DU
Matrix: Water
Analysis Batch: 188035

Client Sample ID: SW-01
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Chemical Oxygen Demand	10		6.08	J	mg/L		49	20

Lab Sample ID: MB 480-188711/27
Matrix: Water
Analysis Batch: 188711

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chemical Oxygen Demand	ND		10	5.0	mg/L			06/19/14 10:17	1

Lab Sample ID: MB 480-188711/3
Matrix: Water
Analysis Batch: 188711

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chemical Oxygen Demand	ND		10	5.0	mg/L			06/19/14 09:56	1

Lab Sample ID: LCS 480-188711/28
Matrix: Water
Analysis Batch: 188711

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chemical Oxygen Demand	25.0	26.9		mg/L		108	90 - 110

Lab Sample ID: LCS 480-188711/4
Matrix: Water
Analysis Batch: 188711

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chemical Oxygen Demand	25.0	25.6		mg/L		102	90 - 110

Method: 7196A - Chromium, Hexavalent

Lab Sample ID: MB 480-187532/27
Matrix: Water
Analysis Batch: 187532

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hexavalent	ND		0.010	0.0050	mg/L			06/13/14 10:36	1

Lab Sample ID: MB 480-187532/3
Matrix: Water
Analysis Batch: 187532

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hexavalent	ND		0.010	0.0050	mg/L			06/13/14 08:44	1

Lab Sample ID: LCS 480-187532/28
Matrix: Water
Analysis Batch: 187532

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium, hexavalent	0.0500	0.0454		mg/L		91	85 - 115

Lab Sample ID: LCS 480-187532/4
Matrix: Water
Analysis Batch: 187532

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium, hexavalent	0.0500	0.0470		mg/L		94	85 - 115

Lab Sample ID: 480-61861-4 MS
Matrix: Water
Analysis Batch: 187532

Client Sample ID: SW-02
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium, hexavalent	ND		0.0500	0.0511		mg/L		102	85 - 115

Lab Sample ID: 480-61861-4 DU
Matrix: Water
Analysis Batch: 187532

Client Sample ID: SW-02
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Chromium, hexavalent	ND		ND		mg/L		NC	15

QC Sample Results

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-61861-1

Method: 9012B - Cyanide, Total andor Amenable

Lab Sample ID: MB 480-188827/1-A
Matrix: Water
Analysis Batch: 188961

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 188827

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	ND		0.010	0.0050	mg/L		06/19/14 17:30	06/20/14 10:20	1

Lab Sample ID: LCS 480-188827/2-A
Matrix: Water
Analysis Batch: 188961

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 188827

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cyanide, Total	0.250	0.244		mg/L		98	90 - 110

Lab Sample ID: MB 480-189045/1-A
Matrix: Water
Analysis Batch: 189315

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 189045

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	ND		0.010	0.0050	mg/L		06/20/14 15:55	06/23/14 08:12	1

Lab Sample ID: LCS 480-189045/2-A
Matrix: Water
Analysis Batch: 189315

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 189045

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cyanide, Total	0.400	0.372		mg/L		93	90 - 110

Method: 9060A - Organic Carbon, Total (TOC)

Lab Sample ID: MB 480-188308/15
Matrix: Water
Analysis Batch: 188308

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon	ND		1.0	0.43	mg/L			06/17/14 04:48	1

Lab Sample ID: MB 480-188308/39
Matrix: Water
Analysis Batch: 188308

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon	ND		1.0	0.43	mg/L			06/17/14 16:13	1

Lab Sample ID: LCS 480-188308/16
Matrix: Water
Analysis Batch: 188308

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Organic Carbon	60.0	62.8		mg/L		105	90 - 110

Method: 9060A - Organic Carbon, Total (TOC) (Continued)

Lab Sample ID: LCS 480-188308/40
Matrix: Water
Analysis Batch: 188308

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Organic Carbon	60.0	62.1		mg/L		104	90 - 110

Lab Sample ID: 480-61861-3 MS
Matrix: Water
Analysis Batch: 188308

Client Sample ID: GW-B
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Organic Carbon	46		20.0	60.8		mg/L		76	54 - 131

Lab Sample ID: 480-61861-2 DU
Matrix: Water
Analysis Batch: 188308

Client Sample ID: GW-A
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Organic Carbon	6.9		6.95		mg/L		1	20

Lab Sample ID: 480-61861-8 DU
Matrix: Water
Analysis Batch: 188308

Client Sample ID: GW-2
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Total Organic Carbon	5.9		5.92		mg/L		0.4	20

Method: 9066 - Phenolics, Total Recoverable

Lab Sample ID: MB 480-189398/1-A
Matrix: Water
Analysis Batch: 189543

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 189398

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Phenolics, Total Recoverable	ND		0.010	0.0050	mg/L		06/23/14 17:30	06/24/14 11:25	1

Lab Sample ID: LCS 480-189398/2-A
Matrix: Water
Analysis Batch: 189543

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 189398

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Phenolics, Total Recoverable	0.100	0.105		mg/L		105	90 - 110

Lab Sample ID: MB 480-189401/1-A
Matrix: Water
Analysis Batch: 189543

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 189401

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Phenolics, Total Recoverable	ND		0.010	0.0050	mg/L		06/23/14 20:30	06/24/14 11:20	1

Method: 9066 - Phenolics, Total Recoverable (Continued)

Lab Sample ID: LCS 480-189401/2-A
Matrix: Water
Analysis Batch: 189543

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 189401

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Phenolics, Total Recoverable	0.100	0.100		mg/L		100	90 - 110

Lab Sample ID: 480-61861-5 DU
Matrix: Water
Analysis Batch: 189543

Client Sample ID: SW-01
Prep Type: Total/NA
Prep Batch: 189401

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Phenolics, Total Recoverable	ND		ND		mg/L		NC	20

Lab Sample ID: MB 480-189825/1-A
Matrix: Water
Analysis Batch: 190040

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 189825

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Phenolics, Total Recoverable	ND		0.010	0.0050	mg/L		06/25/14 12:19	06/26/14 08:51	1

Lab Sample ID: LCS 480-189825/2-A
Matrix: Water
Analysis Batch: 190040

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 189825

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Phenolics, Total Recoverable	0.100	0.0974		mg/L		97	90 - 110

Method: SM 2120B - Color, Colorimetric

Lab Sample ID: MB 480-187631/27
Matrix: Water
Analysis Batch: 187631

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Color	ND		5.0	5.0	Color Units			06/13/14 11:17	1

Lab Sample ID: MB 480-187631/3
Matrix: Water
Analysis Batch: 187631

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Color	ND		5.0	5.0	Color Units			06/13/14 11:17	1

Lab Sample ID: LCS 480-187631/28
Matrix: Water
Analysis Batch: 187631

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Color	30.0	30.0		Color Units		100	90 - 110

Method: SM 2120B - Color, Colorimetric (Continued)

Lab Sample ID: LCS 480-187631/4
Matrix: Water
Analysis Batch: 187631

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Color	30.0	30.0		Color Units		100	90 - 110

Lab Sample ID: 480-61861-7 DU
Matrix: Water
Analysis Batch: 187631

Client Sample ID: GW-1
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Color	25		25.0		Color Units		0	20

Method: SM 2340C - Hardness, Total

Lab Sample ID: MB 480-189609/27
Matrix: Water
Analysis Batch: 189609

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hardness	ND		2.0	0.53	mg/L			06/24/14 10:50	1

Lab Sample ID: MB 480-189609/3
Matrix: Water
Analysis Batch: 189609

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hardness	ND		2.0	0.53	mg/L			06/24/14 09:26	1

Lab Sample ID: LCS 480-189609/28
Matrix: Water
Analysis Batch: 189609

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Hardness	298	288		mg/L		97	90 - 110

Lab Sample ID: LCS 480-189609/4
Matrix: Water
Analysis Batch: 189609

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Hardness	298	292		mg/L		98	90 - 110

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 480-188045/1
Matrix: Water
Analysis Batch: 188045

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		10	4.0	mg/L			06/16/14 22:59	1

Method: SM 2540C - Solids, Total Dissolved (TDS) (Continued)

Lab Sample ID: LCS 480-188045/2
Matrix: Water
Analysis Batch: 188045

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	503	488		mg/L		97	85 - 115

Method: SM 5210B - BOD, 5-Day

Lab Sample ID: USB 480-187695/1
Matrix: Water
Analysis Batch: 187695

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	USB Result	USB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Biochemical Oxygen Demand	ND		2.0	2.0	mg/L			06/13/14 17:39	1

Lab Sample ID: LCS 480-187695/2
Matrix: Water
Analysis Batch: 187695

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Biochemical Oxygen Demand	198	208		mg/L		105	85 - 115

GC/MS VOA

Analysis Batch: 188163

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-2	GW-A	Total/NA	Water	624	
480-61861-3	GW-B	Total/NA	Water	624	
480-61861-4	SW-02	Total/NA	Water	624	
480-61861-5	SW-01	Total/NA	Water	624	
480-61861-6	GW-3	Total/NA	Water	624	
480-61861-7	GW-1	Total/NA	Water	624	
480-61861-8	GW-2	Total/NA	Water	624	
480-61861-9	TRIP BLANK	Total/NA	Water	624	
LCS 480-188163/5	Lab Control Sample	Total/NA	Water	624	
MB 480-188163/7	Method Blank	Total/NA	Water	624	

Metals

Prep Batch: 187751

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-2	GW-A	Total/NA	Water	3005A	
480-61861-3	GW-B	Total/NA	Water	3005A	
480-61861-4	SW-02	Total/NA	Water	3005A	
480-61861-5	SW-01	Total/NA	Water	3005A	
480-61861-6	GW-3	Total/NA	Water	3005A	
480-61861-7	GW-1	Total/NA	Water	3005A	
480-61861-8	GW-2	Total/NA	Water	3005A	
LCS 480-187751/2-A	Lab Control Sample	Total/NA	Water	3005A	
MB 480-187751/1-A	Method Blank	Total/NA	Water	3005A	

Filtration Batch: 187770

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-2	GW-A	Dissolved	Water	FILTRATION	
480-61861-3	GW-B	Dissolved	Water	FILTRATION	
480-61861-4	SW-02	Dissolved	Water	FILTRATION	
480-61861-5	SW-01	Dissolved	Water	FILTRATION	
480-61861-6	GW-3	Dissolved	Water	FILTRATION	
480-61861-7	GW-1	Dissolved	Water	FILTRATION	
480-61861-8	GW-2	Dissolved	Water	FILTRATION	
LCS 480-187770/2-B	Lab Control Sample	Dissolved	Water	FILTRATION	
LCSD 480-187770/3-B	Lab Control Sample Dup	Dissolved	Water	FILTRATION	
MB 480-187770/1-B	Method Blank	Dissolved	Water	FILTRATION	

Prep Batch: 187888

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-2	GW-A	Dissolved	Water	3005A	187770
480-61861-3	GW-B	Dissolved	Water	3005A	187770
480-61861-4	SW-02	Dissolved	Water	3005A	187770
480-61861-5	SW-01	Dissolved	Water	3005A	187770
480-61861-6	GW-3	Dissolved	Water	3005A	187770
480-61861-7	GW-1	Dissolved	Water	3005A	187770
480-61861-8	GW-2	Dissolved	Water	3005A	187770
LCS 480-187770/2-B	Lab Control Sample	Dissolved	Water	3005A	187770
LCSD 480-187770/3-B	Lab Control Sample Dup	Dissolved	Water	3005A	187770
MB 480-187770/1-B	Method Blank	Dissolved	Water	3005A	187770

Metals (Continued)

Prep Batch: 187990

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-2	GW-A	Total/NA	Water	7470A	
480-61861-3	GW-B	Total/NA	Water	7470A	
480-61861-4	SW-02	Total/NA	Water	7470A	
480-61861-5	SW-01	Total/NA	Water	7470A	
480-61861-6	GW-3	Total/NA	Water	7470A	
LCS 480-187990/2-A	Lab Control Sample	Total/NA	Water	7470A	
MB 480-187990/1-A	Method Blank	Total/NA	Water	7470A	

Prep Batch: 187992

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-2	GW-A	Dissolved	Water	7470A	187770
LCS 480-187992/2-A	Lab Control Sample	Total/NA	Water	7470A	
MB 480-187992/1-A	Method Blank	Total/NA	Water	7470A	

Prep Batch: 188082

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-3	GW-B	Dissolved	Water	7470A	187770
480-61861-4	SW-02	Dissolved	Water	7470A	187770
480-61861-5	SW-01	Dissolved	Water	7470A	187770
480-61861-6	GW-3	Dissolved	Water	7470A	187770
480-61861-7	GW-1	Dissolved	Water	7470A	187770
480-61861-8	GW-2	Dissolved	Water	7470A	187770
LCS 480-188082/2-A	Lab Control Sample	Total/NA	Water	7470A	
MB 480-188082/1-A	Method Blank	Total/NA	Water	7470A	

Prep Batch: 188119

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-7	GW-1	Total/NA	Water	7470A	
480-61861-8	GW-2	Total/NA	Water	7470A	
480-61861-8 MS	GW-2	Total/NA	Water	7470A	
480-61861-8 MSD	GW-2	Total/NA	Water	7470A	
LCS 480-188119/2-A	Lab Control Sample	Total/NA	Water	7470A	
MB 480-188119/1-A	Method Blank	Total/NA	Water	7470A	

Analysis Batch: 188161

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-2	GW-A	Total/NA	Water	7470A	187990
480-61861-3	GW-B	Total/NA	Water	7470A	187990
480-61861-4	SW-02	Total/NA	Water	7470A	187990
480-61861-5	SW-01	Total/NA	Water	7470A	187990
480-61861-6	GW-3	Total/NA	Water	7470A	187990
LCS 480-187990/2-A	Lab Control Sample	Total/NA	Water	7470A	187990
MB 480-187990/1-A	Method Blank	Total/NA	Water	7470A	187990

Analysis Batch: 188305

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-2	GW-A	Dissolved	Water	7470A	187992
480-61861-3	GW-B	Dissolved	Water	7470A	188082
480-61861-4	SW-02	Dissolved	Water	7470A	188082
480-61861-5	SW-01	Dissolved	Water	7470A	188082
480-61861-6	GW-3	Dissolved	Water	7470A	188082

Metals (Continued)

Analysis Batch: 188305 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-7	GW-1	Dissolved	Water	7470A	188082
480-61861-7	GW-1	Total/NA	Water	7470A	188119
480-61861-8	GW-2	Dissolved	Water	7470A	188082
480-61861-8	GW-2	Total/NA	Water	7470A	188119
480-61861-8 MS	GW-2	Total/NA	Water	7470A	188119
480-61861-8 MSD	GW-2	Total/NA	Water	7470A	188119
LCS 480-187992/2-A	Lab Control Sample	Total/NA	Water	7470A	187992
LCS 480-188082/2-A	Lab Control Sample	Total/NA	Water	7470A	188082
LCS 480-188119/2-A	Lab Control Sample	Total/NA	Water	7470A	188119
MB 480-187992/1-A	Method Blank	Total/NA	Water	7470A	187992
MB 480-188082/1-A	Method Blank	Total/NA	Water	7470A	188082
MB 480-188119/1-A	Method Blank	Total/NA	Water	7470A	188119

Analysis Batch: 188615

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-2	GW-A	Total/NA	Water	6010C	187751
480-61861-3	GW-B	Total/NA	Water	6010C	187751
480-61861-4	SW-02	Total/NA	Water	6010C	187751
480-61861-5	SW-01	Total/NA	Water	6010C	187751
480-61861-6	GW-3	Total/NA	Water	6010C	187751
480-61861-7	GW-1	Total/NA	Water	6010C	187751
480-61861-8	GW-2	Total/NA	Water	6010C	187751
LCS 480-187751/2-A	Lab Control Sample	Total/NA	Water	6010C	187751
MB 480-187751/1-A	Method Blank	Total/NA	Water	6010C	187751

Analysis Batch: 189205

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-2	GW-A	Dissolved	Water	6010C	187888
480-61861-3	GW-B	Dissolved	Water	6010C	187888
480-61861-4	SW-02	Dissolved	Water	6010C	187888
480-61861-5	SW-01	Dissolved	Water	6010C	187888
480-61861-6	GW-3	Dissolved	Water	6010C	187888
480-61861-7	GW-1	Dissolved	Water	6010C	187888
480-61861-8	GW-2	Dissolved	Water	6010C	187888
LCS 480-187770/2-B	Lab Control Sample	Dissolved	Water	6010C	187888
LCSD 480-187770/3-B	Lab Control Sample Dup	Dissolved	Water	6010C	187888
MB 480-187770/1-B	Method Blank	Dissolved	Water	6010C	187888

General Chemistry

Analysis Batch: 187532

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-2	GW-A	Total/NA	Water	7196A	
480-61861-3	GW-B	Total/NA	Water	7196A	
480-61861-4	SW-02	Total/NA	Water	7196A	
480-61861-4 DU	SW-02	Total/NA	Water	7196A	
480-61861-4 MS	SW-02	Total/NA	Water	7196A	
480-61861-5	SW-01	Total/NA	Water	7196A	
480-61861-6	GW-3	Total/NA	Water	7196A	
480-61861-7	GW-1	Total/NA	Water	7196A	

General Chemistry (Continued)

Analysis Batch: 187532 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-8	GW-2	Total/NA	Water	7196A	
LCS 480-187532/28	Lab Control Sample	Total/NA	Water	7196A	
LCS 480-187532/4	Lab Control Sample	Total/NA	Water	7196A	
MB 480-187532/27	Method Blank	Total/NA	Water	7196A	
MB 480-187532/3	Method Blank	Total/NA	Water	7196A	

Analysis Batch: 187550

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-2	GW-A	Total/NA	Water	180.1	
480-61861-3	GW-B	Total/NA	Water	180.1	
480-61861-4	SW-02	Total/NA	Water	180.1	
480-61861-5	SW-01	Total/NA	Water	180.1	
480-61861-5 DU	SW-01	Total/NA	Water	180.1	
480-61861-6	GW-3	Total/NA	Water	180.1	
480-61861-7	GW-1	Total/NA	Water	180.1	
480-61861-8	GW-2	Total/NA	Water	180.1	
LCS 480-187550/28	Lab Control Sample	Total/NA	Water	180.1	
MB 480-187550/27	Method Blank	Total/NA	Water	180.1	

Analysis Batch: 187631

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-2	GW-A	Total/NA	Water	SM 2120B	
480-61861-3	GW-B	Total/NA	Water	SM 2120B	
480-61861-4	SW-02	Total/NA	Water	SM 2120B	
480-61861-5	SW-01	Total/NA	Water	SM 2120B	
480-61861-6	GW-3	Total/NA	Water	SM 2120B	
480-61861-7	GW-1	Total/NA	Water	SM 2120B	
480-61861-7 DU	GW-1	Total/NA	Water	SM 2120B	
480-61861-8	GW-2	Total/NA	Water	SM 2120B	
LCS 480-187631/28	Lab Control Sample	Total/NA	Water	SM 2120B	
LCS 480-187631/4	Lab Control Sample	Total/NA	Water	SM 2120B	
MB 480-187631/27	Method Blank	Total/NA	Water	SM 2120B	
MB 480-187631/3	Method Blank	Total/NA	Water	SM 2120B	

Analysis Batch: 187693

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-2	GW-A	Total/NA	Water	353.2	
480-61861-3	GW-B	Total/NA	Water	353.2	
480-61861-4	SW-02	Total/NA	Water	353.2	
480-61861-5	SW-01	Total/NA	Water	353.2	
480-61861-6	GW-3	Total/NA	Water	353.2	
480-61861-7	GW-1	Total/NA	Water	353.2	
480-61861-8	GW-2	Total/NA	Water	353.2	

Analysis Batch: 187695

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-2	GW-A	Total/NA	Water	SM 5210B	
480-61861-3	GW-B	Total/NA	Water	SM 5210B	
480-61861-4	SW-02	Total/NA	Water	SM 5210B	
480-61861-5	SW-01	Total/NA	Water	SM 5210B	
480-61861-6	GW-3	Total/NA	Water	SM 5210B	

General Chemistry (Continued)

Analysis Batch: 187695 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-7	GW-1	Total/NA	Water	SM 5210B	
480-61861-8	GW-2	Total/NA	Water	SM 5210B	
LCS 480-187695/2	Lab Control Sample	Total/NA	Water	SM 5210B	
USB 480-187695/1	Method Blank	Total/NA	Water	SM 5210B	

Analysis Batch: 188035

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-2	GW-A	Total/NA	Water	410.4	
480-61861-3	GW-B	Total/NA	Water	410.4	
480-61861-4	SW-02	Total/NA	Water	410.4	
480-61861-4 MS	SW-02	Total/NA	Water	410.4	
480-61861-5	SW-01	Total/NA	Water	410.4	
480-61861-5 DU	SW-01	Total/NA	Water	410.4	
480-61861-6	GW-3	Total/NA	Water	410.4	
LCS 480-188035/28	Lab Control Sample	Total/NA	Water	410.4	
LCS 480-188035/4	Lab Control Sample	Total/NA	Water	410.4	
MB 480-188035/27	Method Blank	Total/NA	Water	410.4	
MB 480-188035/3	Method Blank	Total/NA	Water	410.4	

Analysis Batch: 188045

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-2	GW-A	Total/NA	Water	SM 2540C	
480-61861-3	GW-B	Total/NA	Water	SM 2540C	
480-61861-4	SW-02	Total/NA	Water	SM 2540C	
480-61861-5	SW-01	Total/NA	Water	SM 2540C	
480-61861-6	GW-3	Total/NA	Water	SM 2540C	
480-61861-7	GW-1	Total/NA	Water	SM 2540C	
480-61861-8	GW-2	Total/NA	Water	SM 2540C	
LCS 480-188045/2	Lab Control Sample	Total/NA	Water	SM 2540C	
MB 480-188045/1	Method Blank	Total/NA	Water	SM 2540C	

Analysis Batch: 188210

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-2	GW-A	Total/NA	Water	350.1	
480-61861-4	SW-02	Total/NA	Water	350.1	
480-61861-5	SW-01	Total/NA	Water	350.1	
LCS 480-188210/148	Lab Control Sample	Total/NA	Water	350.1	
LCS 480-188210/172	Lab Control Sample	Total/NA	Water	350.1	
LCS 480-188210/52	Lab Control Sample	Total/NA	Water	350.1	
MB 480-188210/147	Method Blank	Total/NA	Water	350.1	
MB 480-188210/171	Method Blank	Total/NA	Water	350.1	
MB 480-188210/51	Method Blank	Total/NA	Water	350.1	

Analysis Batch: 188240

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-6	GW-3	Total/NA	Water	350.1	
480-61861-7	GW-1	Total/NA	Water	350.1	
480-61861-8	GW-2	Total/NA	Water	350.1	
LCS 480-188240/28	Lab Control Sample	Total/NA	Water	350.1	
LCS 480-188240/76	Lab Control Sample	Total/NA	Water	350.1	
MB 480-188240/27	Method Blank	Total/NA	Water	350.1	

General Chemistry (Continued)

Analysis Batch: 188240 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 480-188240/75	Method Blank	Total/NA	Water	350.1	

Analysis Batch: 188308

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-2	GW-A	Total/NA	Water	9060A	
480-61861-2 DU	GW-A	Total/NA	Water	9060A	
480-61861-3	GW-B	Total/NA	Water	9060A	
480-61861-3 MS	GW-B	Total/NA	Water	9060A	
480-61861-4	SW-02	Total/NA	Water	9060A	
480-61861-5	SW-01	Total/NA	Water	9060A	
480-61861-6	GW-3	Total/NA	Water	9060A	
480-61861-7	GW-1	Total/NA	Water	9060A	
480-61861-8	GW-2	Total/NA	Water	9060A	
480-61861-8 DU	GW-2	Total/NA	Water	9060A	
LCS 480-188308/16	Lab Control Sample	Total/NA	Water	9060A	
LCS 480-188308/40	Lab Control Sample	Total/NA	Water	9060A	
MB 480-188308/15	Method Blank	Total/NA	Water	9060A	
MB 480-188308/39	Method Blank	Total/NA	Water	9060A	

Prep Batch: 188543

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-2	GW-A	Total/NA	Water	351.2	
480-61861-3	GW-B	Total/NA	Water	351.2	
480-61861-4	SW-02	Total/NA	Water	351.2	
480-61861-5	SW-01	Total/NA	Water	351.2	
480-61861-6	GW-3	Total/NA	Water	351.2	
480-61861-7	GW-1	Total/NA	Water	351.2	
480-61861-8	GW-2	Total/NA	Water	351.2	
LCS 480-188543/2-A	Lab Control Sample	Total/NA	Water	351.2	
MB 480-188543/1-A	Method Blank	Total/NA	Water	351.2	

Analysis Batch: 188683

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-2	GW-A	Total/NA	Water	351.2	188543
480-61861-3	GW-B	Total/NA	Water	351.2	188543
480-61861-4	SW-02	Total/NA	Water	351.2	188543
480-61861-5	SW-01	Total/NA	Water	351.2	188543
480-61861-6	GW-3	Total/NA	Water	351.2	188543
480-61861-7	GW-1	Total/NA	Water	351.2	188543
480-61861-8	GW-2	Total/NA	Water	351.2	188543
LCS 480-188543/2-A	Lab Control Sample	Total/NA	Water	351.2	188543
MB 480-188543/1-A	Method Blank	Total/NA	Water	351.2	188543

Analysis Batch: 188711

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-7	GW-1	Total/NA	Water	410.4	
480-61861-8	GW-2	Total/NA	Water	410.4	
LCS 480-188711/28	Lab Control Sample	Total/NA	Water	410.4	
LCS 480-188711/4	Lab Control Sample	Total/NA	Water	410.4	
MB 480-188711/27	Method Blank	Total/NA	Water	410.4	
MB 480-188711/3	Method Blank	Total/NA	Water	410.4	

General Chemistry (Continued)

Analysis Batch: 188730

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-2	GW-A	Total/NA	Water	300.0	
480-61861-3	GW-B	Total/NA	Water	300.0	
480-61861-4	SW-02	Total/NA	Water	300.0	
480-61861-5	SW-01	Total/NA	Water	300.0	
480-61861-6	GW-3	Total/NA	Water	300.0	
480-61861-7	GW-1	Total/NA	Water	300.0	
480-61861-8	GW-2	Total/NA	Water	300.0	
LCS 480-188730/99	Lab Control Sample	Total/NA	Water	300.0	
MB 480-188730/100	Method Blank	Total/NA	Water	300.0	

Analysis Batch: 188771

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-7	GW-1	Total/NA	Water	310.2	
LCS 480-188771/27	Lab Control Sample	Total/NA	Water	310.2	
LCS 480-188771/45	Lab Control Sample	Total/NA	Water	310.2	
LCS 480-188771/57	Lab Control Sample	Total/NA	Water	310.2	
MB 480-188771/28	Method Blank	Total/NA	Water	310.2	
MB 480-188771/46	Method Blank	Total/NA	Water	310.2	
MB 480-188771/58	Method Blank	Total/NA	Water	310.2	

Prep Batch: 188827

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-2	GW-A	Total/NA	Water	9012B	
480-61861-5	SW-01	Total/NA	Water	9012B	
480-61861-6	GW-3	Total/NA	Water	9012B	
480-61861-8	GW-2	Total/NA	Water	9012B	
LCS 480-188827/2-A	Lab Control Sample	Total/NA	Water	9012B	
MB 480-188827/1-A	Method Blank	Total/NA	Water	9012B	

Analysis Batch: 188961

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-2	GW-A	Total/NA	Water	9012B	188827
480-61861-5	SW-01	Total/NA	Water	9012B	188827
480-61861-6	GW-3	Total/NA	Water	9012B	188827
480-61861-8	GW-2	Total/NA	Water	9012B	188827
LCS 480-188827/2-A	Lab Control Sample	Total/NA	Water	9012B	188827
MB 480-188827/1-A	Method Blank	Total/NA	Water	9012B	188827

Analysis Batch: 189017

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-2	GW-A	Total/NA	Water	310.2	
480-61861-3	GW-B	Total/NA	Water	310.2	
480-61861-4	SW-02	Total/NA	Water	310.2	
480-61861-5	SW-01	Total/NA	Water	310.2	
480-61861-6	GW-3	Total/NA	Water	310.2	
480-61861-8	GW-2	Total/NA	Water	310.2	
LCS 480-189017/66	Lab Control Sample	Total/NA	Water	310.2	
LCS 480-189017/91	Lab Control Sample	Total/NA	Water	310.2	
MB 480-189017/67	Method Blank	Total/NA	Water	310.2	
MB 480-189017/92	Method Blank	Total/NA	Water	310.2	

General Chemistry (Continued)

Prep Batch: 189045

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-3	GW-B	Total/NA	Water	9012B	
480-61861-4	SW-02	Total/NA	Water	9012B	
480-61861-7	GW-1	Total/NA	Water	9012B	
LCS 480-189045/2-A	Lab Control Sample	Total/NA	Water	9012B	
MB 480-189045/1-A	Method Blank	Total/NA	Water	9012B	

Analysis Batch: 189315

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-3	GW-B	Total/NA	Water	9012B	189045
480-61861-4	SW-02	Total/NA	Water	9012B	189045
480-61861-7	GW-1	Total/NA	Water	9012B	189045
LCS 480-189045/2-A	Lab Control Sample	Total/NA	Water	9012B	189045
MB 480-189045/1-A	Method Blank	Total/NA	Water	9012B	189045

Prep Batch: 189398

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-2	GW-A	Total/NA	Water	Distill/Phenol	
480-61861-3	GW-B	Total/NA	Water	Distill/Phenol	
480-61861-4	SW-02	Total/NA	Water	Distill/Phenol	
LCS 480-189398/2-A	Lab Control Sample	Total/NA	Water	Distill/Phenol	
MB 480-189398/1-A	Method Blank	Total/NA	Water	Distill/Phenol	

Prep Batch: 189401

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-5	SW-01	Total/NA	Water	Distill/Phenol	
480-61861-5 DU	SW-01	Total/NA	Water	Distill/Phenol	
480-61861-7	GW-1	Total/NA	Water	Distill/Phenol	
480-61861-8	GW-2	Total/NA	Water	Distill/Phenol	
LCS 480-189401/2-A	Lab Control Sample	Total/NA	Water	Distill/Phenol	
MB 480-189401/1-A	Method Blank	Total/NA	Water	Distill/Phenol	

Analysis Batch: 189543

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-2	GW-A	Total/NA	Water	9066	189398
480-61861-3	GW-B	Total/NA	Water	9066	189398
480-61861-4	SW-02	Total/NA	Water	9066	189398
480-61861-5	SW-01	Total/NA	Water	9066	189401
480-61861-5 DU	SW-01	Total/NA	Water	9066	189401
480-61861-7	GW-1	Total/NA	Water	9066	189401
480-61861-8	GW-2	Total/NA	Water	9066	189401
LCS 480-189398/2-A	Lab Control Sample	Total/NA	Water	9066	189398
LCS 480-189401/2-A	Lab Control Sample	Total/NA	Water	9066	189401
MB 480-189398/1-A	Method Blank	Total/NA	Water	9066	189398
MB 480-189401/1-A	Method Blank	Total/NA	Water	9066	189401

Analysis Batch: 189609

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-2	GW-A	Total/NA	Water	SM 2340C	
480-61861-3	GW-B	Total/NA	Water	SM 2340C	
480-61861-4	SW-02	Total/NA	Water	SM 2340C	
480-61861-5	SW-01	Total/NA	Water	SM 2340C	

General Chemistry (Continued)

Analysis Batch: 189609 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-6	GW-3	Total/NA	Water	SM 2340C	
480-61861-7	GW-1	Total/NA	Water	SM 2340C	
480-61861-8	GW-2	Total/NA	Water	SM 2340C	
LCS 480-189609/28	Lab Control Sample	Total/NA	Water	SM 2340C	
LCS 480-189609/4	Lab Control Sample	Total/NA	Water	SM 2340C	
MB 480-189609/27	Method Blank	Total/NA	Water	SM 2340C	
MB 480-189609/3	Method Blank	Total/NA	Water	SM 2340C	

Analysis Batch: 189620

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-3	GW-B	Total/NA	Water	350.1	
LCS 480-189620/16	Lab Control Sample	Total/NA	Water	350.1	
MB 480-189620/15	Method Blank	Total/NA	Water	350.1	

Prep Batch: 189825

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-6	GW-3	Total/NA	Water	Distill/Phenol	
LCS 480-189825/2-A	Lab Control Sample	Total/NA	Water	Distill/Phenol	
MB 480-189825/1-A	Method Blank	Total/NA	Water	Distill/Phenol	

Analysis Batch: 190040

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-61861-6	GW-3	Total/NA	Water	9066	189825
LCS 480-189825/2-A	Lab Control Sample	Total/NA	Water	9066	189825
MB 480-189825/1-A	Method Blank	Total/NA	Water	9066	189825

Client Sample ID: GW-A
Date Collected: 06/12/14 14:00
Date Received: 06/13/14 09:00

Lab Sample ID: 480-61861-2
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	188163	06/18/14 05:07	RAS	TAL BUF
Dissolved	Filtration	FILTRATION			187770	06/14/14 11:38	ZL	TAL BUF
Dissolved	Prep	3005A			187888	06/16/14 12:05	EHD	TAL BUF
Dissolved	Analysis	6010C		1	189205	06/20/14 14:31	MTM2	TAL BUF
Total/NA	Prep	3005A			187751	06/16/14 08:00	ZL	TAL BUF
Total/NA	Analysis	6010C		1	188615	06/18/14 22:05	MTM2	TAL BUF
Dissolved	Filtration	FILTRATION			187770	06/14/14 11:38	ZL	TAL BUF
Dissolved	Prep	7470A			187992	06/17/14 10:15	LRK	TAL BUF
Dissolved	Analysis	7470A		1	188305	06/17/14 14:02	LRK	TAL BUF
Total/NA	Prep	7470A			187990	06/16/14 14:30	LRK	TAL BUF
Total/NA	Analysis	7470A		1	188161	06/17/14 10:03	LRK	TAL BUF
Total/NA	Analysis	180.1		1	187550	06/13/14 08:37	VAJ	TAL BUF
Total/NA	Analysis	300.0		1	188730	06/20/14 11:22	KRC	TAL BUF
Total/NA	Analysis	310.2		5	189017	06/20/14 12:52	JTS	TAL BUF
Total/NA	Analysis	350.1		1	188210	06/17/14 12:47	KMF	TAL BUF
Total/NA	Prep	351.2			188543	06/18/14 19:32	CLT	TAL BUF
Total/NA	Analysis	351.2		1	188683	06/19/14 10:12	NCH	TAL BUF
Total/NA	Analysis	353.2		1	187693	06/13/14 16:24	CLT	TAL BUF
Total/NA	Analysis	410.4		1	188035	06/16/14 17:30	JMB	TAL BUF
Total/NA	Analysis	7196A		1	187532	06/13/14 09:59	KJ1	TAL BUF
Total/NA	Prep	9012B			188827	06/19/14 17:30	JMB	TAL BUF
Total/NA	Analysis	9012B		1	188961	06/20/14 10:32	JTS	TAL BUF
Total/NA	Analysis	9060A		1	188308	06/17/14 13:22	KRC	TAL BUF
Total/NA	Prep	Distill/Phenol			189398	06/23/14 17:30	CLT	TAL BUF
Total/NA	Analysis	9066		1	189543	06/24/14 11:20	NCH	TAL BUF
Total/NA	Analysis	SM 2120B		1	187631	06/13/14 11:17	VAJ	TAL BUF
Total/NA	Analysis	SM 2340C		1	189609	06/24/14 10:32	KMF	TAL BUF
Total/NA	Analysis	SM 2540C		1	188045	06/16/14 23:16	KS	TAL BUF
Total/NA	Analysis	SM 5210B		1	187695	06/13/14 17:39	CLT	TAL BUF

Client Sample ID: GW-B
Date Collected: 06/12/14 14:45
Date Received: 06/13/14 09:00

Lab Sample ID: 480-61861-3
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	188163	06/18/14 05:31	RAS	TAL BUF
Dissolved	Filtration	FILTRATION			187770	06/14/14 11:38	ZL	TAL BUF
Dissolved	Prep	3005A			187888	06/16/14 12:05	EHD	TAL BUF
Dissolved	Analysis	6010C		1	189205	06/20/14 14:34	MTM2	TAL BUF
Total/NA	Prep	3005A			187751	06/16/14 08:00	ZL	TAL BUF
Total/NA	Analysis	6010C		1	188615	06/18/14 22:10	MTM2	TAL BUF
Dissolved	Filtration	FILTRATION			187770	06/14/14 11:38	ZL	TAL BUF

Client Sample ID: GW-B
Date Collected: 06/12/14 14:45
Date Received: 06/13/14 09:00

Lab Sample ID: 480-61861-3
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Dissolved	Prep	7470A			188082	06/17/14 10:15	LRK	TAL BUF
Dissolved	Analysis	7470A		1	188305	06/17/14 14:55	LRK	TAL BUF
Total/NA	Prep	7470A			187990	06/16/14 14:30	LRK	TAL BUF
Total/NA	Analysis	7470A		1	188161	06/17/14 10:11	LRK	TAL BUF
Total/NA	Analysis	180.1		1	187550	06/13/14 10:32	VAJ	TAL BUF
Total/NA	Analysis	300.0		1	188730	06/20/14 11:32	KRC	TAL BUF
Total/NA	Analysis	310.2		10	189017	06/20/14 12:30	JTS	TAL BUF
Total/NA	Analysis	350.1		1	189620	06/24/14 18:38	RS	TAL BUF
Total/NA	Prep	351.2			188543	06/18/14 19:32	CLT	TAL BUF
Total/NA	Analysis	351.2		1	188683	06/19/14 10:12	NCH	TAL BUF
Total/NA	Analysis	353.2		1	187693	06/13/14 16:27	CLT	TAL BUF
Total/NA	Analysis	410.4		1	188035	06/16/14 17:30	JMB	TAL BUF
Total/NA	Analysis	7196A		1	187532	06/13/14 10:03	KJ1	TAL BUF
Total/NA	Prep	9012B			189045	06/20/14 15:55	JMB	TAL BUF
Total/NA	Analysis	9012B		1	189315	06/23/14 08:24	JTS	TAL BUF
Total/NA	Analysis	9060A		1	188308	06/17/14 14:19	KRC	TAL BUF
Total/NA	Prep	Distill/Phenol			189398	06/23/14 17:30	CLT	TAL BUF
Total/NA	Analysis	9066		1	189543	06/24/14 11:14	NCH	TAL BUF
Total/NA	Analysis	SM 2120B		2	187631	06/13/14 11:17	VAJ	TAL BUF
Total/NA	Analysis	SM 2340C		1	189609	06/24/14 10:29	KMF	TAL BUF
Total/NA	Analysis	SM 2540C		1	188045	06/16/14 23:18	KS	TAL BUF
Total/NA	Analysis	SM 5210B		1	187695	06/13/14 17:39	CLT	TAL BUF

Client Sample ID: SW-02
Date Collected: 06/12/14 14:30
Date Received: 06/13/14 09:00

Lab Sample ID: 480-61861-4
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	188163	06/18/14 05:55	RAS	TAL BUF
Dissolved	Filtration	FILTRATION			187770	06/14/14 11:38	ZL	TAL BUF
Dissolved	Prep	3005A			187888	06/16/14 12:05	EHD	TAL BUF
Dissolved	Analysis	6010C		1	189205	06/20/14 14:37	MTM2	TAL BUF
Total/NA	Prep	3005A			187751	06/16/14 08:00	ZL	TAL BUF
Total/NA	Analysis	6010C		1	188615	06/18/14 22:08	MTM2	TAL BUF
Dissolved	Filtration	FILTRATION			187770	06/14/14 11:38	ZL	TAL BUF
Dissolved	Prep	7470A			188082	06/17/14 10:15	LRK	TAL BUF
Dissolved	Analysis	7470A		1	188305	06/17/14 14:28	LRK	TAL BUF
Total/NA	Prep	7470A			187990	06/16/14 14:30	LRK	TAL BUF
Total/NA	Analysis	7470A		1	188161	06/17/14 10:09	LRK	TAL BUF
Total/NA	Analysis	180.1		1	187550	06/13/14 10:32	VAJ	TAL BUF
Total/NA	Analysis	300.0		1	188730	06/20/14 11:43	KRC	TAL BUF
Total/NA	Analysis	310.2		5	189017	06/20/14 12:52	JTS	TAL BUF

Client Sample ID: SW-02
Lab Sample ID: 480-61861-4
Date Collected: 06/12/14 14:30
Matrix: Water
Date Received: 06/13/14 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	350.1		1	188210	06/17/14 12:54	KMF	TAL BUF
Total/NA	Prep	351.2			188543	06/18/14 19:32	CLT	TAL BUF
Total/NA	Analysis	351.2		1	188683	06/19/14 10:12	NCH	TAL BUF
Total/NA	Analysis	353.2		1	187693	06/13/14 17:05	CLT	TAL BUF
Total/NA	Analysis	410.4		1	188035	06/16/14 17:30	JMB	TAL BUF
Total/NA	Analysis	7196A		1	187532	06/13/14 10:45	KJ1	TAL BUF
Total/NA	Prep	9012B			189045	06/20/14 15:55	JMB	TAL BUF
Total/NA	Analysis	9012B		1	189315	06/23/14 08:25	JTS	TAL BUF
Total/NA	Analysis	9060A		1	188308	06/17/14 17:10	KRC	TAL BUF
Total/NA	Prep	Distill/Phenol			189398	06/23/14 17:30	CLT	TAL BUF
Total/NA	Analysis	9066		1	189543	06/24/14 11:20	NCH	TAL BUF
Total/NA	Analysis	SM 2120B		1	187631	06/13/14 11:17	VAJ	TAL BUF
Total/NA	Analysis	SM 2340C		1	189609	06/24/14 10:39	KMF	TAL BUF
Total/NA	Analysis	SM 2540C		1	188045	06/16/14 23:20	KS	TAL BUF
Total/NA	Analysis	SM 5210B		1	187695	06/13/14 17:39	CLT	TAL BUF

Client Sample ID: SW-01
Lab Sample ID: 480-61861-5
Date Collected: 06/12/14 15:12
Matrix: Water
Date Received: 06/13/14 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	188163	06/18/14 06:19	RAS	TAL BUF
Dissolved	Filtration	FILTRATION			187770	06/14/14 11:38	ZL	TAL BUF
Dissolved	Prep	3005A			187888	06/16/14 12:05	EHD	TAL BUF
Dissolved	Analysis	6010C		1	189205	06/20/14 14:40	MTM2	TAL BUF
Total/NA	Prep	3005A			187751	06/16/14 08:00	ZL	TAL BUF
Total/NA	Analysis	6010C		1	188615	06/18/14 22:13	MTM2	TAL BUF
Dissolved	Filtration	FILTRATION			187770	06/14/14 11:38	ZL	TAL BUF
Dissolved	Prep	7470A			188082	06/17/14 10:15	LRK	TAL BUF
Dissolved	Analysis	7470A		1	188305	06/17/14 14:37	LRK	TAL BUF
Total/NA	Prep	7470A			187990	06/16/14 14:30	LRK	TAL BUF
Total/NA	Analysis	7470A		1	188161	06/17/14 10:13	LRK	TAL BUF
Total/NA	Analysis	180.1		1	187550	06/13/14 10:32	VAJ	TAL BUF
Total/NA	Analysis	300.0		1	188730	06/20/14 11:53	KRC	TAL BUF
Total/NA	Analysis	310.2		5	189017	06/20/14 12:51	JTS	TAL BUF
Total/NA	Analysis	350.1		1	188210	06/17/14 12:55	KMF	TAL BUF
Total/NA	Prep	351.2			188543	06/18/14 19:32	CLT	TAL BUF
Total/NA	Analysis	351.2		1	188683	06/19/14 10:12	NCH	TAL BUF
Total/NA	Analysis	353.2		1	187693	06/13/14 16:30	CLT	TAL BUF
Total/NA	Analysis	410.4		1	188035	06/16/14 17:30	JMB	TAL BUF
Total/NA	Analysis	7196A		1	187532	06/13/14 10:08	KJ1	TAL BUF
Total/NA	Prep	9012B			188827	06/19/14 17:30	JMB	TAL BUF

Client Sample ID: SW-01
Date Collected: 06/12/14 15:12
Date Received: 06/13/14 09:00

Lab Sample ID: 480-61861-5
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	9012B		1	188961	06/20/14 10:33	JTS	TAL BUF
Total/NA	Analysis	9060A		1	188308	06/17/14 17:39	KRC	TAL BUF
Total/NA	Prep	Distill/Phenol			189401	06/23/14 20:30	CLT	TAL BUF
Total/NA	Analysis	9066		1	189543	06/24/14 11:08	NCH	TAL BUF
Total/NA	Analysis	SM 2120B		1	187631	06/13/14 11:17	VAJ	TAL BUF
Total/NA	Analysis	SM 2340C		1	189609	06/24/14 10:57	KMF	TAL BUF
Total/NA	Analysis	SM 2540C		1	188045	06/16/14 23:22	KS	TAL BUF
Total/NA	Analysis	SM 5210B		1	187695	06/13/14 17:39	CLT	TAL BUF

Client Sample ID: GW-3
Date Collected: 06/12/14 16:40
Date Received: 06/13/14 09:00

Lab Sample ID: 480-61861-6
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	188163	06/18/14 06:43	RAS	TAL BUF
Dissolved	Filtration	FILTRATION			187770	06/14/14 11:38	ZL	TAL BUF
Dissolved	Prep	3005A			187888	06/16/14 12:05	EHD	TAL BUF
Dissolved	Analysis	6010C		1	189205	06/20/14 14:52	MTM2	TAL BUF
Total/NA	Prep	3005A			187751	06/16/14 08:00	ZL	TAL BUF
Total/NA	Analysis	6010C		1	188615	06/18/14 22:16	MTM2	TAL BUF
Dissolved	Filtration	FILTRATION			187770	06/14/14 11:38	ZL	TAL BUF
Dissolved	Prep	7470A			188082	06/17/14 10:15	LRK	TAL BUF
Dissolved	Analysis	7470A		1	188305	06/17/14 14:46	LRK	TAL BUF
Total/NA	Prep	7470A			187990	06/16/14 14:30	LRK	TAL BUF
Total/NA	Analysis	7470A		1	188161	06/17/14 10:14	LRK	TAL BUF
Total/NA	Analysis	180.1		1	187550	06/13/14 10:32	VAJ	TAL BUF
Total/NA	Analysis	300.0		1	188730	06/20/14 12:03	KRC	TAL BUF
Total/NA	Analysis	310.2		10	189017	06/20/14 12:30	JTS	TAL BUF
Total/NA	Analysis	350.1		5	188240	06/17/14 15:07	KMF	TAL BUF
Total/NA	Prep	351.2			188543	06/18/14 19:32	CLT	TAL BUF
Total/NA	Analysis	351.2		2	188683	06/19/14 10:43	NCH	TAL BUF
Total/NA	Analysis	353.2		1	187693	06/13/14 16:31	CLT	TAL BUF
Total/NA	Analysis	410.4		1	188035	06/16/14 17:30	JMB	TAL BUF
Total/NA	Analysis	7196A		1	187532	06/13/14 10:13	KJ1	TAL BUF
Total/NA	Prep	9012B			188827	06/19/14 17:30	JMB	TAL BUF
Total/NA	Analysis	9012B		1	188961	06/20/14 10:34	JTS	TAL BUF
Total/NA	Analysis	9060A		1	188308	06/17/14 18:07	KRC	TAL BUF
Total/NA	Prep	Distill/Phenol			189825	06/25/14 12:19	RP	TAL BUF
Total/NA	Analysis	9066		1	190040	06/26/14 09:50	NCH	TAL BUF
Total/NA	Analysis	SM 2120B		1	187631	06/13/14 11:17	VAJ	TAL BUF
Total/NA	Analysis	SM 2340C		1	189609	06/24/14 11:04	KMF	TAL BUF
Total/NA	Analysis	SM 2540C		1	188045	06/16/14 23:23	KS	TAL BUF

Client Sample ID: GW-3
Date Collected: 06/12/14 16:40
Date Received: 06/13/14 09:00

Lab Sample ID: 480-61861-6
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	SM 5210B		1	187695	06/13/14 17:39	CLT	TAL BUF

Client Sample ID: GW-1
Date Collected: 06/12/14 16:15
Date Received: 06/13/14 09:00

Lab Sample ID: 480-61861-7
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	188163	06/18/14 07:07	RAS	TAL BUF
Dissolved	Filtration	FILTRATION			187770	06/14/14 11:38	ZL	TAL BUF
Dissolved	Prep	3005A			187888	06/16/14 12:05	EHD	TAL BUF
Dissolved	Analysis	6010C		1	189205	06/20/14 14:56	MTM2	TAL BUF
Total/NA	Prep	3005A			187751	06/16/14 08:00	ZL	TAL BUF
Total/NA	Analysis	6010C		1	188615	06/18/14 22:19	MTM2	TAL BUF
Dissolved	Filtration	FILTRATION			187770	06/14/14 11:38	ZL	TAL BUF
Dissolved	Prep	7470A			188082	06/17/14 10:15	LRK	TAL BUF
Dissolved	Analysis	7470A		1	188305	06/17/14 14:58	LRK	TAL BUF
Total/NA	Prep	7470A			188119	06/17/14 10:15	LRK	TAL BUF
Total/NA	Analysis	7470A		1	188305	06/17/14 15:19	LRK	TAL BUF
Total/NA	Analysis	180.1		1	187550	06/13/14 10:32	VAJ	TAL BUF
Total/NA	Analysis	300.0		1	188730	06/20/14 12:13	KRC	TAL BUF
Total/NA	Analysis	310.2		10	188771	06/19/14 11:34	JTS	TAL BUF
Total/NA	Analysis	350.1		10	188240	06/17/14 15:08	KMF	TAL BUF
Total/NA	Prep	351.2			188543	06/18/14 19:32	CLT	TAL BUF
Total/NA	Analysis	351.2		10	188683	06/19/14 10:39	NCH	TAL BUF
Total/NA	Analysis	353.2		1	187693	06/13/14 16:32	CLT	TAL BUF
Total/NA	Analysis	410.4		1	188711	06/19/14 10:09	KJ1	TAL BUF
Total/NA	Analysis	7196A		1	187532	06/13/14 10:17	KJ1	TAL BUF
Total/NA	Prep	9012B			189045	06/20/14 15:55	JMB	TAL BUF
Total/NA	Analysis	9012B		1	189315	06/23/14 08:29	JTS	TAL BUF
Total/NA	Analysis	9060A		1	188308	06/17/14 18:35	KRC	TAL BUF
Total/NA	Prep	Distill/Phenol			189401	06/23/14 20:30	CLT	TAL BUF
Total/NA	Analysis	9066		1	189543	06/24/14 11:08	NCH	TAL BUF
Total/NA	Analysis	SM 2120B		1	187631	06/13/14 11:17	VAJ	TAL BUF
Total/NA	Analysis	SM 2340C		1	189609	06/24/14 09:36	KMF	TAL BUF
Total/NA	Analysis	SM 2540C		1	188045	06/16/14 23:25	KS	TAL BUF
Total/NA	Analysis	SM 5210B		1	187695	06/13/14 17:39	CLT	TAL BUF

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-61861-1

Client Sample ID: GW-2
Date Collected: 06/12/14 16:30
Date Received: 06/13/14 09:00

Lab Sample ID: 480-61861-8
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	188163	06/18/14 07:30	RAS	TAL BUF
Dissolved	Filtration	FILTRATION			187770	06/14/14 11:38	ZL	TAL BUF
Dissolved	Prep	3005A			187888	06/16/14 12:05	EHD	TAL BUF
Dissolved	Analysis	6010C		1	189205	06/20/14 14:59	MTM2	TAL BUF
Total/NA	Prep	3005A			187751	06/16/14 08:00	ZL	TAL BUF
Total/NA	Analysis	6010C		1	188615	06/18/14 22:22	MTM2	TAL BUF
Dissolved	Filtration	FILTRATION			187770	06/14/14 11:38	ZL	TAL BUF
Dissolved	Prep	7470A			188082	06/17/14 10:15	LRK	TAL BUF
Dissolved	Analysis	7470A		1	188305	06/17/14 14:43	LRK	TAL BUF
Total/NA	Prep	7470A			188119	06/17/14 10:15	LRK	TAL BUF
Total/NA	Analysis	7470A		1	188305	06/17/14 15:11	LRK	TAL BUF
Total/NA	Analysis	180.1		1	187550	06/13/14 10:32	VAJ	TAL BUF
Total/NA	Analysis	300.0		1	188730	06/20/14 12:23	KRC	TAL BUF
Total/NA	Analysis	310.2		10	189017	06/20/14 12:30	JTS	TAL BUF
Total/NA	Analysis	350.1		5	188240	06/17/14 15:09	KMF	TAL BUF
Total/NA	Prep	351.2			188543	06/18/14 19:32	CLT	TAL BUF
Total/NA	Analysis	351.2		5	188683	06/19/14 10:39	NCH	TAL BUF
Total/NA	Analysis	353.2		1	187693	06/13/14 16:33	CLT	TAL BUF
Total/NA	Analysis	410.4		1	188711	06/19/14 10:09	KJ1	TAL BUF
Total/NA	Analysis	7196A		1	187532	06/13/14 10:22	KJ1	TAL BUF
Total/NA	Prep	9012B			188827	06/19/14 17:30	JMB	TAL BUF
Total/NA	Analysis	9012B		1	188961	06/20/14 10:36	JTS	TAL BUF
Total/NA	Analysis	9060A		1	188308	06/17/14 19:03	KRC	TAL BUF
Total/NA	Prep	Distill/Phenol			189401	06/23/14 20:30	CLT	TAL BUF
Total/NA	Analysis	9066		1	189543	06/24/14 11:09	NCH	TAL BUF
Total/NA	Analysis	SM 2120B		1	187631	06/13/14 11:17	VAJ	TAL BUF
Total/NA	Analysis	SM 2340C		1	189609	06/24/14 11:08	KMF	TAL BUF
Total/NA	Analysis	SM 2540C		1	188045	06/16/14 23:27	KS	TAL BUF
Total/NA	Analysis	SM 5210B		1	187695	06/13/14 17:39	CLT	TAL BUF

Client Sample ID: TRIP BLANK
Date Collected: 06/12/14 13:25
Date Received: 06/13/14 09:00

Lab Sample ID: 480-61861-9
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	188163	06/18/14 07:54	RAS	TAL BUF

Laboratory References:

TAL BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

Laboratory: TestAmerica Buffalo

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Arkansas DEQ	State Program	6	88-0686	07-06-14
California	State Program	9	1169CA	09-30-14
Connecticut	State Program	1	PH-0568	09-30-14
Florida	NELAP	4	E87672	06-30-14 *
Georgia	State Program	4	N/A	03-31-15
Illinois	NELAP	5	200003	09-30-14
Iowa	State Program	7	374	03-01-15
Kansas	NELAP	7	E-10187	01-31-15
Kentucky (DW)	State Program	4	90029	12-31-14
Kentucky (UST)	State Program	4	30	03-31-15
Louisiana	NELAP	6	02031	06-30-14 *
Maine	State Program	1	NY00044	12-04-14
Maryland	State Program	3	294	03-31-15
Massachusetts	State Program	1	M-NY044	06-30-14 *
Michigan	State Program	5	9937	03-31-15
Minnesota	NELAP	5	036-999-337	12-31-14
New Hampshire	NELAP	1	2337	11-17-14
New Jersey	NELAP	2	NY455	06-30-14 *
New York	NELAP	2	10026	03-31-15
North Dakota	State Program	8	R-176	03-31-14 *
Oklahoma	State Program	6	9421	08-31-14
Oregon	NELAP	10	NY200003	06-09-15
Pennsylvania	NELAP	3	68-00281	07-31-14
Rhode Island	State Program	1	LAO00328	12-30-14
Tennessee	State Program	4	TN02970	03-31-15
Texas	NELAP	6	T104704412-11-2	07-31-14
USDA	Federal		P330-11-00386	11-22-14
Virginia	NELAP	3	460185	09-14-14
Washington	State Program	10	C784	02-10-15
Wisconsin	State Program	5	998310390	08-31-14

* Certification renewal pending - certification considered valid.

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-61861-1

Method	Method Description	Protocol	Laboratory
624	Volatile Organic Compounds (GC/MS)	40CFR136A	TAL BUF
6010C	Metals (ICP)	SW846	TAL BUF
7470A	Mercury (CVAA)	SW846	TAL BUF
180.1	Turbidity, Nephelometric	MCAWW	TAL BUF
300.0	Anions, Ion Chromatography	MCAWW	TAL BUF
310.2	Alkalinity	MCAWW	TAL BUF
350.1	Nitrogen, Ammonia	MCAWW	TAL BUF
351.2	Nitrogen, Total Kjeldahl	MCAWW	TAL BUF
353.2	Nitrate	EPA	TAL BUF
410.4	COD	MCAWW	TAL BUF
7196A	Chromium, Hexavalent	SW846	TAL BUF
9012B	Cyanide, Total andor Amenable	SW846	TAL BUF
9060A	Organic Carbon, Total (TOC)	SW846	TAL BUF
9066	Phenolics, Total Recoverable	SW846	TAL BUF
SM 2120B	Color, Colorimetric	SM	TAL BUF
SM 2340C	Hardness, Total	SM	TAL BUF
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL BUF
SM 5210B	BOD, 5-Day	SM	TAL BUF

Protocol References:

40CFR136A = "Methods for Organic Chemical Analysis of Municipal Industrial Wastewater", 40CFR, Part 136, Appendix A, October 26, 1984 and subsequent revisions.
EPA = US Environmental Protection Agency
MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.
SM = "Standard Methods For The Examination Of Water And Wastewater",
SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

Sample Summary

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-61861-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
480-61861-2	GW-A	Water	06/12/14 14:00	06/13/14 09:00
480-61861-3	GW-B	Water	06/12/14 14:45	06/13/14 09:00
480-61861-4	SW-02	Water	06/12/14 14:30	06/13/14 09:00
480-61861-5	SW-01	Water	06/12/14 15:12	06/13/14 09:00
480-61861-6	GW-3	Water	06/12/14 16:40	06/13/14 09:00
480-61861-7	GW-1	Water	06/12/14 16:15	06/13/14 09:00
480-61861-8	GW-2	Water	06/12/14 16:30	06/13/14 09:00
480-61861-9	TRIP BLANK	Water	06/12/14 13:25	06/13/14 09:00

TestAmerica Albany
25 Kraft Road
Albany, NY 12205

Chain of Custoc

480-61861 Chain of Custody

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: SDB	Lab PM: Shaffer, Lisa E	COC No: 480-50696-13527.1
Client Contact: Stephen Burton	Phone: 518 456 4900	E-Mail: lisa.shaffer@testamericainc.com	Page: Page 1 of 2
Company: Sterling Environmental Engineering PC			Job #:
Address: 24 Wade Road	Due Date Requested:		
City: Latham	TAT Requested (days):		
State, Zip: NY, 12110			
Phone:	PO #: Purchase Order not required		
Email: stephen.burton@sterlingenvironmental.com	WO #:		
Project Name: Orange County Landfill	Project #: 48005786		
Site: New York	SSOW#:		

Analysis Requested

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	300.0_28D - Chloride,Sulfate,Bromide	350.1, 351.2, 410.4	6010C - NY Part 360 Baseline Metals	2340C - Hardness	6010C, 7470A	9066 - Phenolics, Total Recoverable	9060A - Total Organic Carbon	5210B - Biochemical Oxygen Demand	2540C_Calcd - Total Dissolved Solids	9012B - Cyanide, Total	180.1, 2120B, 353.2, 353.2_Nitrite, Nitrate_Calc	7196A - Chromium, hexavalent	310.2 - Alkalinity, Total	Total Number of containers	Special Instructions/Note:
				Preservation Code:			N	S	D	D	D	S	A	N	N	B	N	N	N		
GW-A	6/12/14	14:00	G	Water	N	N	X	X	X	X	X	X	X	X	X	X	X	X	X	15	
GW-B	↓	14:45	↓	Water	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	15	
SW-02	↓	14:30	↓	Water	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	15	
SW-01	↓	15:42	↓	Water	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
GW-3	↓	16:40	↓	Water	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
GW-1	↓	16:15	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓		
GW-2	↓	16:30	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	

Possible Hazard Identification
☑ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☑ Disposal By Lab ☐ Archive For ______ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:		Method of Shipment:	
Relinquished by: SDB [signature]	Date/Time: 6/12/14 20:00	Company: STERLING	Received by: [signature]	Date/Time: 6/13/14 0900	Company: [signature]
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:
Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:		Cooler Temperature(s) °C and Other Remarks: 3.0, 3.2, 3.5 #1		

TestAmerica Albany
25 Kraft Road
Albany, NY 12205

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information	Sampler: SDB	Lab PM: Shaffer, Lisa E	Carrier Tracking No(s):	COC No: 480-50696-13527.2
Client Contact: Stephen Burton	Phone: 518 4564900	E-Mail: lisa.shaffer@testamericainc.com		Page: Page 2 of 2
Company: Sterling Environmental Engineering PC		Analysis Requested		Job #:
Address: 24 Wade Road	Due Date Requested:			
City: Latham	TAT Requested (days):			
State, Zip: NY, 12110				
Phone:	PO #: Purchase Order not required			
Email: stephen.burton@sterlingenvironmental.com	WO #:			
Project Name: Orange County Landfill	Project #: 48005786			
Site: New York	SSOW#:			

Preservation Codes:
A - HCL, B - NaOH, C - Zn Acetate, D - Nitric Acid, E - NaHSO4, F - MeOH, G - Amchlor, H - Ascorbic Acid, I - Ice, J - DI Water, K - EDTA, L - EDA
M - Hexane, N - None, O - AsNaO2, P - Na2O4S, Q - Na2SO3, R - Na2S2SO3, S - H2SO4, T - TSP Dodecahydrate, U - Acetone, V - MCAA, W - ph 4-5, Z - other (specify)
Other:

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	7470A - Mercury	Total Number of containers	Special Instructions/Note:
			Preservation Code:				N		
GW-A	6/12/14	14:00	G	Water	N	N	X	1	
GW-B	↓	14:45	↓	Water	↓	↓	X	1	
SW-02	↓	14:30	↓	Water	↓	↓	X	1	
SW-01	↓	15:12	↓	Water	↓	↓	↓	↓	
GW-3	↓	16:40	↓	Water	↓	↓	↓	↓	
GW-1	↓	16:15	↓	↓	↓	↓	↓	↓	
GW-2	↓	16:30	↓	↓	↓	↓	↓	↓	

Possible Hazard Identification
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown ☐ Radiological

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return To Client ☒ Disposal By Lab ☐ Archive For ____ Months

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:

Relinquished by:	Date/Time:	Company	Received by:	Date/Time:	Company
[signature]	6/12/14 20:00	STERLING	[signature]	6/13/14 0900	[signature]

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks: 3.0, 3.2, 3.5 #1

TestAmerica Albany
25 Kraft Road
Albany, NY 12205

Chain of Custody Record

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING

Client Information			
Client Contact: Stephen Burton	Sampler: SDB	Lab PM: Shaffer, Lisa E	Carrier Tracking No(s):
Company: Sterling Environmental Engineering PC	Phone: 518 456 4900	E-Mail: lisa.shaffer@testamericainc.com	COC No: 480-50833-13578.1
Address: 24 Wade Road	Due Date Requested:		Page: Page 1 of 1
City: Latham	TAT Requested (days):		Job #:
State, Zip: NY, 12110			
Phone:	PO #: Purchase Order not required		
Email: stephen.burton@sterlingenvironmental.com	WO #:		
Project Name: Orange County Landfill	Project #: 48005786		
Site: New York	SSOW#:		

Analysis Requested

Sample Identification	Sample Date	Sample Time	Sample Type (C=comp, G=grab)	Matrix (W=water, S=solid, O=waste/oil, BT=Tissue, A=Air)	Field Filtered Sample (Yes or No)	Perform MS/MSD (Yes or No)	624_5ml_UP - Volatile Organics	Total Number of containers	Special Instructions/Note:
				Preservation Code:			N		
SW-01	6/12/14	15:12	G	Water	N	N	X	3	
GW-3	↓	16:40	↓	Water	↓	↓	↓	↓	
GW-2	↓	16:15	↓	Water	↓	↓	↓	↓	
GW-A	↓	14:00	↓	Water	↓	↓	↓	↓	
GW-B	↓	14:45	↓	Water	↓	↓	↓	↓	
SW-02	↓	14:30	↓	Water	↓	↓	↓	↓	
GW-2	↓	16:30	↓	Water	↓	↓	↓	↓	
TRIP BLANK	↓	13:25	↓	Water	↓	↓	↓	↓	
				Water					
				Water					

Preservation Codes:

A - HCL	M - Hexane
B - NaOH	N - None
C - Zn Acetate	O - AsNaO2
D - Nitric Acid	P - Na2O4S
E - NaHSO4	Q - Na2SO3
F - MeOH	R - Na2S2SO3
G - Amchlor	S - H2SO4
H - Ascorbic Acid	T - TSP Dodecahydrate
I - Ice	U - Acetone
J - DI Water	V - MCAA
K - EDTA	W - ph 4-5
L - EDA	Z - other (specify)

Other:

Possible Hazard Identification
☑ *Non-Hazard* ☐ *Flammable* ☐ *Skin Irritant* ☐ *Poison B* ☐ *Unknown* ☐ *Radiological*

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ *Return To Client* ☐ *Disposal By Lab* ☐ *Archive For* ____ *Months*

Deliverable Requested: I, II, III, IV, Other (specify)

Special Instructions/QC Requirements:

Empty Kit Relinquished by:	Date:	Time:	Method of Shipment:		
Relinquished by: SDB [signature]	Date/Time: 6/12/14 20:00	Company: STERLING	Received by: [signature]	Date/Time: 6/13/14 0940	Company: [signature]
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:
Relinquished by:	Date/Time:	Company:	Received by:	Date/Time:	Company:

Custody Seals Intact: Δ Yes Δ No	Custody Seal No.:	Cooler Temperature(s) °C and Other Remarks: 3.0, 3.2, 3.5 #1

Login Sample Receipt Checklist

Client: Sterling Environmental Engineering PC

Job Number: 480-61861-1

Login Number: 61861
List Number: 1
Creator: Janish, Carl M

List Source: TestAmerica Buffalo

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Sampling Company provided.	True	STERLING
Samples received within 48 hours of sampling.	True	
Samples requiring field filtration have been filtered in the field.	True	
Chlorine Residual checked.	True	

APPENDIX I

OCTOBER 6, 2014 ANALYTICAL RESULTS

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Buffalo
10 Hazelwood Drive
Amherst, NY 14228-2298
Tel: (716)691-2600

TestAmerica Job ID: 480-68691-1
Client Project/Site: Orange County Landfill
Sampling Event: Leachate Baseline

For:
Sterling Environmental Engineering PC
24 Wade Road
Latham, New York 12110

Attn: Mr. Mark Williams

Authorized for release by:
10/17/2014 11:26:04 AM
Anne Pridgeon, Project Management Assistant I
anne.pridgeon@testamericainc.com

Designee for

Lisa Shaffer, Project Manager II
(716)504-9816
lisa.shaffer@testamericainc.com

The test results in this report meet all 2003 NELAC and 2009 TNI requirements for accredited parameters, exceptions are noted in this report. This report may not be reproduced except in full, and with written approval from the laboratory. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

Table of Contents

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Metals

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
B	Compound was found in the blank and sample.

General Chemistry

Qualifier	Qualifier Description
b	Result Detected in the Unseeded Control blank (USB).
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
4	MS, MSD: The analyte present in the original sample is greater than 4 times the matrix spike concentration; therefore, control limits are not applicable.
F1	MS and/or MSD Recovery exceeds the control limits
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA, DLCK or MRL standard: Instrument related QC exceeds the control limits.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Job ID: 480-68691-1

Laboratory: TestAmerica Buffalo

Narrative

Job Narrative
480-68691-1

Comments
No additional comments.

Receipt
The samples were received on 10/7/2014 9:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 3 coolers at receipt time were 2.8° C, 3.9° C and 4.2° C.

GC/MS VOA
Method(s) 624: The following volatiles samples were diluted due to foaming at the time of purging during the original sample analysis: MH-5 (480-68691-1). Elevated reporting limits (RLs) are provided.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Metals
Method(s) 6010C: The method blank for batch 480-206499 contained total iron and zinc above the method detection limits. These target analyte concentrations were less than the reporting limits (RLs); therefore, re-extraction and/or re-analysis of samples MH-5 (480-68691-1) was not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry
Method(s) SM 2120B: Associated samples were filtered prior to analysis. Results are reported as true color. MH-5 (480-68691-1)

Method(s) 350.1: The method blank for batch 206737 contained ammonia above the method detection limit. This target analyte concentration was less than the reporting limit (RL); therefore, re-analysis of samples was not performed. MH-5 (480-68691-1)

Method(s) SM 2540C: Due to the matrix, the initial volume(s) used for the following sample(s) deviated from the standard procedure: MH-5 (480-68691-1). The reporting limits (RLs) have been adjusted proportionately.

Method(s) SM 5210B: The USB dilution water D.O. depletion was greater than 0.2 mg/L but less than the reporting limit of 2.0 mg/L. The associated sample results in batch 206654 are reported. (USB 480-206654/1)

Method(s) 310.2: The method blank for batch 207719 contained Alkalintiy above the method detection limit. This target analyte concentration was less than the reporting limit (RL); therefore, re-extraction and/or re-analysis of samples was not performed.MH-5 (480-68691-1)

Method(s) 410.4: The method blank for batch 208155 contained chemical oxygen demand above the method detection limit. This target analyte concentration was less than the reporting limit (RL); therefore, re-extraction and/or re-analysis of samples was not performed.MH-5 (480-68691-1)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Detection Summary

Client: Sterling Environmental Engineering PC TestAmerica Job ID: 480-68691-1
Project/Site: Orange County Landfill

Client Sample ID: MH-5 Lab Sample ID: 480-68691-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Chloroethane	20	J	50	8.7	ug/L	10		624	Total/NA
Aluminum	0.16	J	0.20	0.060	mg/L	1		6010C	Total/NA
Arsenic	0.031		0.015	0.0056	mg/L	1		6010C	Total/NA
Barium	1.9		0.0020	0.00070	mg/L	1		6010C	Total/NA
Boron	1.0		0.020	0.0040	mg/L	1		6010C	Total/NA
Calcium	180		0.50	0.10	mg/L	1		6010C	Total/NA
Chromium	0.0054		0.0040	0.0010	mg/L	1		6010C	Total/NA
Copper	0.0038	J	0.010	0.0016	mg/L	1		6010C	Total/NA
Iron	47	B	0.050	0.019	mg/L	1		6010C	Total/NA
Magnesium	53		0.20	0.043	mg/L	1		6010C	Total/NA
Manganese	2.2		0.0030	0.00040	mg/L	1		6010C	Total/NA
Nickel	0.028		0.010	0.0013	mg/L	1		6010C	Total/NA
Potassium	67		0.50	0.10	mg/L	1		6010C	Total/NA
Sodium	370		1.0	0.32	mg/L	1		6010C	Total/NA
Zinc	0.014	B	0.010	0.0015	mg/L	1		6010C	Total/NA
Chloride	520		2.5	2.0	mg/L	5		300.0	Total/NA
Sulfate	4.6		2.0	0.13	mg/L	1		300.0	Total/NA
Alkalinity, Total	1300	B	500	200	mg/L	50		310.2	Total/NA
Ammonia	130	B	2.0	0.90	mg/L	100		350.1	Total/NA
Total Kjeldahl Nitrogen	140		10	7.5	mg/L	50		351.2	Total/NA
Nitrate as N	0.24		0.050	0.020	mg/L	1		353.2	Total/NA
Chemical Oxygen Demand	250	B	40	20	mg/L	4		410.4	Total/NA
Cyanide, Total	0.0083	J	0.010	0.0050	mg/L	1		9012B	Total/NA
Total Organic Carbon	57		1.0	0.43	mg/L	1		9060A	Total/NA
Phenolics, Total Recoverable	0.0075	J	0.010	0.0050	mg/L	1		9066	Total/NA
Hardness as calcium carbonate	760		20	5.3	mg/L	1		SM 2340C	Total/NA
Total Dissolved Solids	1000		20	8.0	mg/L	1		SM 2540C	Total/NA
Biochemical Oxygen Demand	16	b	2.0	2.0	mg/L	1		SM 5210B	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Turbidity	440		1.0	1.0	NTU	1		180.1	Total/NA
Color	40		5.0	5.0	Color Units	1		SM 2120B	Total/NA

This Detection Summary does not include radiochemical test results.

Client Sample ID: MH-5

Lab Sample ID: 480-68691-1

Date Collected: 10/06/14 15:30

Matrix: Leachate

Date Received: 10/07/14 09:00

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	ND		50	3.9	ug/L			10/09/14 03:54	10
1,1,2,2-Tetrachloroethane	ND		50	2.6	ug/L			10/09/14 03:54	10
1,1,2-Trichloroethane	ND		50	4.8	ug/L			10/09/14 03:54	10
1,1-Dichloroethane	ND		50	5.9	ug/L			10/09/14 03:54	10
1,1-Dichloroethene	ND		50	8.5	ug/L			10/09/14 03:54	10
1,2-Dichlorobenzene	ND		50	4.4	ug/L			10/09/14 03:54	10
1,2-Dichloroethane	ND		50	6.0	ug/L			10/09/14 03:54	10
1,2-Dichloropropane	ND		50	6.1	ug/L			10/09/14 03:54	10
1,3-Dichlorobenzene	ND		50	5.4	ug/L			10/09/14 03:54	10
1,4-Dichlorobenzene	ND		50	5.1	ug/L			10/09/14 03:54	10
2-Chloroethyl vinyl ether	ND		250	19	ug/L			10/09/14 03:54	10
Benzene	ND		50	6.0	ug/L			10/09/14 03:54	10
Bromodichloromethane	ND		50	5.4	ug/L			10/09/14 03:54	10
Bromoform	ND		50	4.7	ug/L			10/09/14 03:54	10
Bromomethane	ND		50	12	ug/L			10/09/14 03:54	10
Carbon tetrachloride	ND		50	5.1	ug/L			10/09/14 03:54	10
Chlorobenzene	ND		50	4.8	ug/L			10/09/14 03:54	10
Chloroethane	**20**	**J**	50	8.7	ug/L			10/09/14 03:54	10
Chloroform	ND		50	5.4	ug/L			10/09/14 03:54	10
Chloromethane	ND		50	6.4	ug/L			10/09/14 03:54	10
cis-1,2-Dichloroethene	ND		50	5.7	ug/L			10/09/14 03:54	10
cis-1,3-Dichloropropene	ND		50	3.3	ug/L			10/09/14 03:54	10
Dibromochloromethane	ND		50	4.1	ug/L			10/09/14 03:54	10
Dichlorodifluoromethane	ND		50	2.8	ug/L			10/09/14 03:54	10
Ethylbenzene	ND		50	4.6	ug/L			10/09/14 03:54	10
Methylene Chloride	ND		50	8.1	ug/L			10/09/14 03:54	10
m-Xylene & p-Xylene	ND		100	11	ug/L			10/09/14 03:54	10
o-Xylene	ND		50	4.3	ug/L			10/09/14 03:54	10
Tetrachloroethene	ND		50	3.4	ug/L			10/09/14 03:54	10
Toluene	ND		50	4.5	ug/L			10/09/14 03:54	10
trans-1,2-Dichloroethene	ND		50	5.9	ug/L			10/09/14 03:54	10
trans-1,3-Dichloropropene	ND		50	4.4	ug/L			10/09/14 03:54	10
Trichloroethene	ND		50	6.0	ug/L			10/09/14 03:54	10
Trichlorofluoromethane	ND		50	4.5	ug/L			10/09/14 03:54	10
Vinyl chloride	ND		50	7.5	ug/L			10/09/14 03:54	10
Xylenes, Total	ND		100	11	ug/L			10/09/14 03:54	10

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*102*		*72 - 130*		*10/09/14 03:54*	*10*
4-Bromofluorobenzene (Surr)	*98*		*69 - 121*		*10/09/14 03:54*	*10*
Toluene-d8 (Surr)	*98*		*70 - 123*		*10/09/14 03:54*	*10*

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**0.16**	**J**	0.20	0.060	mg/L		10/08/14 08:55	10/08/14 19:44	1
Antimony	ND		0.020	0.0068	mg/L		10/08/14 08:55	10/08/14 19:44	1
Arsenic	**0.031**		0.015	0.0056	mg/L		10/08/14 08:55	10/08/14 19:44	1
Barium	**1.9**		0.0020	0.00070	mg/L		10/08/14 08:55	10/08/14 19:44	1
Beryllium	ND		0.0020	0.00030	mg/L		10/08/14 08:55	10/08/14 19:44	1
Boron	**1.0**		0.020	0.0040	mg/L		10/08/14 08:55	10/08/14 19:44	1

Client Sample ID: MH-5

Date Collected: 10/06/14 15:30
Date Received: 10/07/14 09:00

Lab Sample ID: 480-68691-1

Matrix: Leachate

Method: 6010C - Metals (ICP) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.0020	0.00050	mg/L		10/08/14 08:55	10/08/14 19:44	1
Calcium	**180**		0.50	0.10	mg/L		10/08/14 08:55	10/08/14 19:44	1
Chromium	**0.0054**		0.0040	0.0010	mg/L		10/08/14 08:55	10/08/14 19:44	1
Copper	**0.0038**	**J**	0.010	0.0016	mg/L		10/08/14 08:55	10/08/14 19:44	1
Iron	**47**	**B**	0.050	0.019	mg/L		10/08/14 08:55	10/08/14 19:44	1
Lead	ND		0.010	0.0030	mg/L		10/08/14 08:55	10/08/14 19:44	1
Magnesium	**53**		0.20	0.043	mg/L		10/08/14 08:55	10/08/14 19:44	1
Manganese	**2.2**		0.0030	0.00040	mg/L		10/08/14 08:55	10/08/14 19:44	1
Nickel	**0.028**		0.010	0.0013	mg/L		10/08/14 08:55	10/08/14 19:44	1
Potassium	**67**		0.50	0.10	mg/L		10/08/14 08:55	10/08/14 19:44	1
Selenium	ND		0.025	0.0087	mg/L		10/08/14 08:55	10/08/14 19:44	1
Silver	ND		0.0060	0.0017	mg/L		10/08/14 08:55	10/08/14 19:44	1
Sodium	**370**		1.0	0.32	mg/L		10/08/14 08:55	10/08/14 19:44	1
Thallium	ND		0.020	0.010	mg/L		10/08/14 08:55	10/08/14 19:44	1
Zinc	**0.014**	**B**	0.010	0.0015	mg/L		10/08/14 08:55	10/08/14 19:44	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		10/08/14 10:50	10/09/14 12:09	1

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**520**		2.5	2.0	mg/L			10/13/14 16:15	5
Sulfate	**4.6**		2.0	0.13	mg/L			10/10/14 03:07	1
Alkalinity, Total	**1300**	**B**	500	200	mg/L			10/14/14 15:32	50
Ammonia	**130**	**B**	2.0	0.90	mg/L			10/08/14 23:01	100
Total Kjeldahl Nitrogen	**140**		10	7.5	mg/L		10/09/14 09:14	10/10/14 04:23	50
Nitrate as N	**0.24**		0.050	0.020	mg/L			10/07/14 21:58	1
Chemical Oxygen Demand	**250**	**B**	40	20	mg/L			10/16/14 09:12	4
Chromium, hexavalent	ND		0.010	0.0050	mg/L			10/07/14 11:08	1
Cyanide, Total	**0.0083**	**J**	0.010	0.0050	mg/L		10/13/14 15:25	10/13/14 22:52	1
Total Organic Carbon	**57**		1.0	0.43	mg/L			10/12/14 08:05	1
Phenolics, Total Recoverable	**0.0075**	**J**	0.010	0.0050	mg/L		10/09/14 09:30	10/13/14 20:36	1
Hardness as calcium carbonate	**760**		20	5.3	mg/L			10/09/14 11:55	1
Total Dissolved Solids	**1000**		20	8.0	mg/L			10/09/14 23:42	1
Biochemical Oxygen Demand	**16**	**b**	2.0	2.0	mg/L			10/08/14 14:37	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	**440**		1.0	1.0	NTU			10/07/14 23:00	1
Color	**40**		5.0	5.0	Color Units			10/07/14 23:20	1

Surrogate Summary

Method: 624 - Volatile Organic Compounds (GC/MS)

Matrix: Leachate **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)		
		12DCE	BFB	TOL
Lab Sample ID	Client Sample ID	(72-130)	(69-121)	(70-123)
480-68691-1	MH-5	102	98	98

Surrogate Legend

12DCE = 1,2-Dichloroethane-d4 (Surr)
BFB = 4-Bromofluorobenzene (Surr)
TOL = Toluene-d8 (Surr)

Method: 624 - Volatile Organic Compounds (GC/MS)

Matrix: Water **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)		
		12DCE	BFB	TOL
Lab Sample ID	Client Sample ID	(72-130)	(69-121)	(70-123)
LCS 480-206699/6	Lab Control Sample	100	101	101
MB 480-206699/8	Method Blank	104	101	99

Surrogate Legend

12DCE = 1,2-Dichloroethane-d4 (Surr)
BFB = 4-Bromofluorobenzene (Surr)
TOL = Toluene-d8 (Surr)

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 480-206699/8
Matrix: Water
Analysis Batch: 206699

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	ND		5.0	0.39	ug/L			10/08/14 23:03	1
1,1,2,2-Tetrachloroethane	ND		5.0	0.26	ug/L			10/08/14 23:03	1
1,1,2-Trichloroethane	ND		5.0	0.48	ug/L			10/08/14 23:03	1
1,1-Dichloroethane	ND		5.0	0.59	ug/L			10/08/14 23:03	1
1,1-Dichloroethene	ND		5.0	0.85	ug/L			10/08/14 23:03	1
1,2-Dichlorobenzene	ND		5.0	0.44	ug/L			10/08/14 23:03	1
1,2-Dichloroethane	ND		5.0	0.60	ug/L			10/08/14 23:03	1
1,2-Dichloropropane	ND		5.0	0.61	ug/L			10/08/14 23:03	1
1,3-Dichlorobenzene	ND		5.0	0.54	ug/L			10/08/14 23:03	1
1,4-Dichlorobenzene	ND		5.0	0.51	ug/L			10/08/14 23:03	1
2-Chloroethyl vinyl ether	ND		25	1.9	ug/L			10/08/14 23:03	1
Benzene	ND		5.0	0.60	ug/L			10/08/14 23:03	1
Bromodichloromethane	ND		5.0	0.54	ug/L			10/08/14 23:03	1
Bromoform	ND		5.0	0.47	ug/L			10/08/14 23:03	1
Bromomethane	ND		5.0	1.2	ug/L			10/08/14 23:03	1
Carbon tetrachloride	ND		5.0	0.51	ug/L			10/08/14 23:03	1
Chlorobenzene	ND		5.0	0.48	ug/L			10/08/14 23:03	1
Chloroethane	ND		5.0	0.87	ug/L			10/08/14 23:03	1
Chloroform	ND		5.0	0.54	ug/L			10/08/14 23:03	1
Chloromethane	ND		5.0	0.64	ug/L			10/08/14 23:03	1
cis-1,2-Dichloroethene	ND		5.0	0.57	ug/L			10/08/14 23:03	1
cis-1,3-Dichloropropene	ND		5.0	0.33	ug/L			10/08/14 23:03	1
Dibromochloromethane	ND		5.0	0.41	ug/L			10/08/14 23:03	1
Dichlorodifluoromethane	ND		5.0	0.28	ug/L			10/08/14 23:03	1
Ethylbenzene	ND		5.0	0.46	ug/L			10/08/14 23:03	1
Methylene Chloride	ND		5.0	0.81	ug/L			10/08/14 23:03	1
m-Xylene & p-Xylene	ND		10	1.1	ug/L			10/08/14 23:03	1
o-Xylene	ND		5.0	0.43	ug/L			10/08/14 23:03	1
Tetrachloroethene	ND		5.0	0.34	ug/L			10/08/14 23:03	1
Toluene	ND		5.0	0.45	ug/L			10/08/14 23:03	1
trans-1,2-Dichloroethene	ND		5.0	0.59	ug/L			10/08/14 23:03	1
trans-1,3-Dichloropropene	ND		5.0	0.44	ug/L			10/08/14 23:03	1
Trichloroethene	ND		5.0	0.60	ug/L			10/08/14 23:03	1
Trichlorofluoromethane	ND		5.0	0.45	ug/L			10/08/14 23:03	1
Vinyl chloride	ND		5.0	0.75	ug/L			10/08/14 23:03	1
Xylenes, Total	ND		10	1.1	ug/L			10/08/14 23:03	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*104*		*72 - 130*		*10/08/14 23:03*	*1*
4-Bromofluorobenzene (Surr)	*101*		*69 - 121*		*10/08/14 23:03*	*1*
Toluene-d8 (Surr)	*99*		*70 - 123*		*10/08/14 23:03*	*1*

Lab Sample ID: LCS 480-206699/6
Matrix: Water
Analysis Batch: 206699

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1,1-Trichloroethane	20.0	18.6		ug/L		93	52 - 162

Method: 624 - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 480-206699/6
Matrix: Water
Analysis Batch: 206699

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1,2,2-Tetrachloroethane	20.0	18.8		ug/L		94	46 - 157
1,1,2-Trichloroethane	20.0	18.6		ug/L		93	52 - 150
1,1-Dichloroethane	20.0	19.6		ug/L		98	59 - 155
1,1-Dichloroethene	20.0	18.6		ug/L		93	1 - 234
1,2-Dichlorobenzene	20.0	19.6		ug/L		98	18 - 190
1,2-Dichloroethane	20.0	19.1		ug/L		96	49 - 155
1,2-Dichloropropane	20.0	18.4		ug/L		92	1 - 210
1,3-Dichlorobenzene	20.0	19.3		ug/L		97	59 - 156
1,4-Dichlorobenzene	20.0	19.2		ug/L		96	18 - 190
2-Chloroethyl vinyl ether	20.0	17.0	J	ug/L		85	1 - 305
Benzene	20.0	19.6		ug/L		98	37 - 151
Bromodichloromethane	20.0	18.1		ug/L		91	35 - 155
Bromoform	20.0	17.4		ug/L		87	45 - 169
Bromomethane	20.0	24.4		ug/L		122	1 - 242
Carbon tetrachloride	20.0	18.1		ug/L		91	70 - 140
Chlorobenzene	20.0	19.1		ug/L		96	37 - 160
Chloroethane	20.0	22.3		ug/L		111	14 - 230
Chloroform	20.0	19.4		ug/L		97	51 - 138
Chloromethane	20.0	19.2		ug/L		96	1 - 273
cis-1,2-Dichloroethene	20.0	19.6		ug/L		98	
cis-1,3-Dichloropropene	20.0	18.4		ug/L		92	1 - 227
Dibromochloromethane	20.0	18.3		ug/L		91	53 - 149
Dichlorodifluoromethane	20.0	17.2		ug/L		86	
Ethylbenzene	20.0	20.1		ug/L		100	37 - 162
Methylene Chloride	20.0	18.4		ug/L		92	1 - 221
m-Xylene & p-Xylene	20.0	19.5		ug/L		97	79 - 120
o-Xylene	20.0	20.8		ug/L		104	79 - 120
Tetrachloroethene	20.0	18.5		ug/L		92	64 - 148
Toluene	20.0	19.5		ug/L		98	47 - 150
trans-1,2-Dichloroethene	20.0	19.4		ug/L		97	54 - 156
trans-1,3-Dichloropropene	20.0	19.6		ug/L		98	17 - 183
Trichloroethene	20.0	19.0		ug/L		95	71 - 157
Trichlorofluoromethane	20.0	18.8		ug/L		94	17 - 181
Vinyl chloride	20.0	18.4		ug/L		92	1 - 251

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*100*		*72 - 130*
4-Bromofluorobenzene (Surr)	*101*		*69 - 121*
Toluene-d8 (Surr)	*101*		*70 - 123*

Method: 6010C - Metals (ICP)

Lab Sample ID: MB 480-206499/1-A
Matrix: Water
Analysis Batch: 207036

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 206499

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		0.20	0.060	mg/L		10/08/14 08:55	10/09/14 13:26	1

Method: 6010C - Metals (ICP) (Continued)

Lab Sample ID: MB 480-206499/1-A
Matrix: Water
Analysis Batch: 207036

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 206499

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.020	0.0068	mg/L		10/08/14 08:55	10/09/14 13:26	1
Arsenic	ND		0.015	0.0056	mg/L		10/08/14 08:55	10/09/14 13:26	1
Barium	ND		0.0020	0.00070	mg/L		10/08/14 08:55	10/09/14 13:26	1
Beryllium	ND		0.0020	0.00030	mg/L		10/08/14 08:55	10/09/14 13:26	1
Boron	ND		0.020	0.0040	mg/L		10/08/14 08:55	10/09/14 13:26	1
Cadmium	ND		0.0020	0.00050	mg/L		10/08/14 08:55	10/09/14 13:26	1
Calcium	ND		0.50	0.10	mg/L		10/08/14 08:55	10/09/14 13:26	1
Chromium	ND		0.0040	0.0010	mg/L		10/08/14 08:55	10/09/14 13:26	1
Copper	ND		0.010	0.0016	mg/L		10/08/14 08:55	10/09/14 13:26	1
Iron	0.0326	J	0.050	0.019	mg/L		10/08/14 08:55	10/09/14 13:26	1
Lead	ND		0.010	0.0030	mg/L		10/08/14 08:55	10/09/14 13:26	1
Magnesium	ND		0.20	0.043	mg/L		10/08/14 08:55	10/09/14 13:26	1
Manganese	ND		0.0030	0.00040	mg/L		10/08/14 08:55	10/09/14 13:26	1
Nickel	ND		0.010	0.0013	mg/L		10/08/14 08:55	10/09/14 13:26	1
Potassium	ND		0.50	0.10	mg/L		10/08/14 08:55	10/09/14 13:26	1
Selenium	ND		0.025	0.0087	mg/L		10/08/14 08:55	10/09/14 13:26	1
Silver	ND		0.0060	0.0017	mg/L		10/08/14 08:55	10/09/14 13:26	1
Sodium	ND		1.0	0.32	mg/L		10/08/14 08:55	10/09/14 13:26	1
Thallium	ND		0.020	0.010	mg/L		10/08/14 08:55	10/09/14 13:26	1
Zinc	0.00455	J	0.010	0.0015	mg/L		10/08/14 08:55	10/09/14 13:26	1

Lab Sample ID: LCS 480-206499/2-A
Matrix: Water
Analysis Batch: 206924

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 206499

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	10.0	8.95		mg/L		89	80 - 120
Antimony	0.200	0.192		mg/L		96	80 - 120
Arsenic	0.201	0.184		mg/L		92	80 - 120
Barium	0.200	0.217		mg/L		108	80 - 120
Beryllium	0.201	0.197		mg/L		98	80 - 120
Cadmium	0.201	0.188		mg/L		94	80 - 120
Chromium	0.201	0.188		mg/L		94	80 - 120
Copper	0.201	0.214		mg/L		107	80 - 120
Iron	10.0	9.07		mg/L		91	80 - 120
Lead	0.201	0.187		mg/L		93	80 - 120
Magnesium	10.0	10.2		mg/L		101	80 - 120
Manganese	0.201	0.202		mg/L		101	80 - 120
Nickel	0.201	0.183		mg/L		91	80 - 120
Potassium	10.0	9.25		mg/L		92	80 - 120
Selenium	0.201	0.189		mg/L		94	80 - 120
Silver	0.0500	0.0528		mg/L		106	80 - 120
Sodium	10.0	9.32		mg/L		93	80 - 120
Zinc	0.201	0.206		mg/L		103	80 - 120

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 480-206575/1-A
Matrix: Water
Analysis Batch: 206912

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 206575

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		10/08/14 10:50	10/09/14 12:06	1

Lab Sample ID: LCS 480-206575/2-A
Matrix: Water
Analysis Batch: 206912

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 206575

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.00667	0.00675		mg/L		101	80 - 120

Method: 180.1 - Turbidity, Nephelometric

Lab Sample ID: MB 480-206480/3
Matrix: Water
Analysis Batch: 206480

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	ND		1.0	1.0	NTU			10/07/14 23:00	1

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 240-150879/27
Matrix: Water
Analysis Batch: 150879

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.50	0.41	mg/L			10/10/14 01:10	1
Sulfate	ND		2.0	0.13	mg/L			10/10/14 01:10	1

Lab Sample ID: LCS 240-150879/28
Matrix: Water
Analysis Batch: 150879

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	47.7		mg/L		95	90 - 110
Sulfate	50.0	47.3		mg/L		95	90 - 110

Lab Sample ID: MB 240-151358/27
Matrix: Water
Analysis Batch: 151358

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.50	0.41	mg/L			10/13/14 20:21	1
Sulfate	ND		2.0	0.13	mg/L			10/13/14 20:21	1

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: MB 240-151358/3
Matrix: Water
Analysis Batch: 151358
Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.50	0.41	mg/L			10/13/14 13:47	1
Sulfate	ND		2.0	0.13	mg/L			10/13/14 13:47	1

Lab Sample ID: LCS 240-151358/28
Matrix: Water
Analysis Batch: 151358
Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	53.2		mg/L		106	90 - 110
Sulfate	50.0	49.0		mg/L		98	90 - 110

Lab Sample ID: LCS 240-151358/4
Matrix: Water
Analysis Batch: 151358
Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	52.7		mg/L		105	90 - 110
Sulfate	50.0	48.9		mg/L		98	90 - 110

Method: 310.2 - Alkalinity

Lab Sample ID: MB 480-207719/185
Matrix: Water
Analysis Batch: 207719
Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total	ND		10	4.0	mg/L			10/14/14 15:04	1

Lab Sample ID: MB 480-207719/192
Matrix: Water
Analysis Batch: 207719
Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total	ND		10	4.0	mg/L			10/14/14 15:06	1

Lab Sample ID: MB 480-207719/203
Matrix: Water
Analysis Batch: 207719
Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total	4.00	J	10	4.0	mg/L			10/14/14 15:17	1

Lab Sample ID: LCS 480-207719/186
Matrix: Water
Analysis Batch: 207719
Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity, Total	50.0	51.4		mg/L		103	90 - 110

Method: 310.2 - Alkalinity (Continued)

Lab Sample ID: LCS 480-207719/193
Matrix: Water
Analysis Batch: 207719

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity, Total	50.0	51.0		mg/L		102	90 - 110

Lab Sample ID: LCS 480-207719/204
Matrix: Water
Analysis Batch: 207719

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity, Total	50.0	50.2		mg/L		100	90 - 110

Method: 350.1 - Nitrogen, Ammonia

Lab Sample ID: MB 480-206737/3
Matrix: Water
Analysis Batch: 206737

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	0.00905	J	0.020	0.0090	mg/L			10/08/14 22:54	1

Lab Sample ID: MB 480-206737/75
Matrix: Water
Analysis Batch: 206737

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	0.0111	J	0.020	0.0090	mg/L			10/08/14 23:56	1

Lab Sample ID: LCS 480-206737/4
Matrix: Water
Analysis Batch: 206737

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Ammonia	1.00	0.997		mg/L		100	90 - 110

Lab Sample ID: LCS 480-206737/76
Matrix: Water
Analysis Batch: 206737

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Ammonia	1.00	0.990		mg/L		99	90 - 110

Lab Sample ID: 480-68691-1 MS
Matrix: Leachate
Analysis Batch: 206737

Client Sample ID: MH-5
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Ammonia	130	B	20.0	143	4	mg/L		90	90 - 110

Method: 351.2 - Nitrogen, Total Kjeldahl

Lab Sample ID: MB 480-206899/1-A
Matrix: Water
Analysis Batch: 207003

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 206899

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Kjeldahl Nitrogen	ND		0.20	0.15	mg/L		10/09/14 09:14	10/09/14 18:23	1

Lab Sample ID: LCS 480-206899/2-A
Matrix: Water
Analysis Batch: 207003

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 206899

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Kjeldahl Nitrogen	2.50	2.59		mg/L		104	90 - 110

Method: 410.4 - COD

Lab Sample ID: MB 480-208155/27
Matrix: Water
Analysis Batch: 208155

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chemical Oxygen Demand	8.34	J	10	5.0	mg/L			10/16/14 09:12	1

Lab Sample ID: MB 480-208155/3
Matrix: Water
Analysis Batch: 208155

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chemical Oxygen Demand	ND		10	5.0	mg/L			10/16/14 09:12	1

Lab Sample ID: MB 480-208155/51
Matrix: Water
Analysis Batch: 208155

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chemical Oxygen Demand	7.37	J	10	5.0	mg/L			10/16/14 09:12	1

Lab Sample ID: LCS 480-208155/28
Matrix: Water
Analysis Batch: 208155

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chemical Oxygen Demand	25.0	26.7		mg/L		107	90 - 110

Lab Sample ID: LCS 480-208155/4
Matrix: Water
Analysis Batch: 208155

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chemical Oxygen Demand	25.0	25.1		mg/L		100	90 - 110

Method: 410.4 - COD (Continued)

Lab Sample ID: LCS 480-208155/52
Matrix: Water
Analysis Batch: 208155

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chemical Oxygen Demand	25.0	22.5		mg/L		90	90 - 110

Method: 7196A - Chromium, Hexavalent

Lab Sample ID: MB 480-206384/3
Matrix: Water
Analysis Batch: 206384

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hexavalent	ND		0.010	0.0050	mg/L			10/07/14 11:08	1

Lab Sample ID: LCS 480-206384/4
Matrix: Water
Analysis Batch: 206384

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium, hexavalent	0.0500	0.0520		mg/L		104	85 - 115

Lab Sample ID: 480-68691-1 MS
Matrix: Leachate
Analysis Batch: 206384

Client Sample ID: MH-5
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium, hexavalent	ND		0.100	0.160	F1	mg/L		160	85 - 115

Method: 9012B - Cyanide, Total andor Amenable

Lab Sample ID: MB 480-207517/1-A
Matrix: Water
Analysis Batch: 207541

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 207517

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	ND	^	0.010	0.0050	mg/L		10/13/14 15:25	10/13/14 22:41	1

Lab Sample ID: LCS 480-207517/2-A
Matrix: Water
Analysis Batch: 207541

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 207517

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cyanide, Total	0.250	0.232		mg/L		93	90 - 110

Lab Sample ID: 480-68691-1 MS
Matrix: Leachate
Analysis Batch: 207541

Client Sample ID: MH-5
Prep Type: Total/NA
Prep Batch: 207517

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Cyanide, Total	0.0083	J	0.100	0.0427	F1	mg/L		34	90 - 110

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-68691-1

Method: 9060A - Organic Carbon, Total (TOC)

Lab Sample ID: MB 480-207429/27
Matrix: Water
Analysis Batch: 207429

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon	ND		1.0	0.43	mg/L			10/12/14 04:47	1

Lab Sample ID: LCS 480-207429/28
Matrix: Water
Analysis Batch: 207429

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Organic Carbon	60.0	60.8		mg/L		101	90 - 110

Method: 9066 - Phenolics, Total Recoverable

Lab Sample ID: MB 480-206888/1-A
Matrix: Water
Analysis Batch: 207542

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 206888

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Phenolics, Total Recoverable	ND		0.010	0.0050	mg/L		10/09/14 09:30	10/13/14 19:12	1

Lab Sample ID: LCS 480-206888/2-A
Matrix: Water
Analysis Batch: 207542

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 206888

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Phenolics, Total Recoverable	0.100	0.106		mg/L		106	90 - 110

Method: SM 2120B - Color, Colorimetric

Lab Sample ID: MB 480-206725/3
Matrix: Water
Analysis Batch: 206725

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Color	ND		5.0	5.0	Color Units			10/07/14 23:20	1

Lab Sample ID: LCS 480-206725/4
Matrix: Water
Analysis Batch: 206725

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Color	30.0	30.0		Color Units		100	90 - 110

Method: SM 2340C - Hardness, Total (mg/l as CaC03)

Lab Sample ID: MB 480-206969/51
Matrix: Water
Analysis Batch: 206969

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hardness as calcium carbonate	ND		2.0	0.53	mg/L			10/09/14 11:55	1

Lab Sample ID: MB 480-206969/75
Matrix: Water
Analysis Batch: 206969

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hardness as calcium carbonate	ND		2.0	0.53	mg/L			10/09/14 11:55	1

Lab Sample ID: LCS 480-206969/52
Matrix: Water
Analysis Batch: 206969

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Hardness as calcium carbonate	298	288		mg/L		97	90 - 110

Lab Sample ID: LCS 480-206969/76
Matrix: Water
Analysis Batch: 206969

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Hardness as calcium carbonate	298	284		mg/L		95	90 - 110

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 480-206989/1
Matrix: Water
Analysis Batch: 206989

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		10	4.0	mg/L			10/09/14 23:42	1

Lab Sample ID: LCS 480-206989/2
Matrix: Water
Analysis Batch: 206989

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	504	485		mg/L		96	85 - 115

Method: SM 5210B - BOD, 5-Day

Lab Sample ID: USB 480-206654/1
Matrix: Water
Analysis Batch: 206654

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	USB Result	USB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Biochemical Oxygen Demand	ND		2.0	2.0	mg/L			10/08/14 14:37	1

Method: SM 5210B - BOD, 5-Day (Continued)

Lab Sample ID: LCS 480-206654/2
Matrix: Water
Analysis Batch: 206654

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Biochemical Oxygen Demand	198	203		mg/L		102	85 - 115

QC Association Summary

GC/MS VOA

Analysis Batch: 206699

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68691-1	MH-5	Total/NA	Leachate	624	
LCS 480-206699/6	Lab Control Sample	Total/NA	Water	624	
MB 480-206699/8	Method Blank	Total/NA	Water	624	

Metals

Prep Batch: 206499

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68691-1	MH-5	Total/NA	Leachate	3005A	
LCS 480-206499/2-A	Lab Control Sample	Total/NA	Water	3005A	
MB 480-206499/1-A	Method Blank	Total/NA	Water	3005A	

Prep Batch: 206575

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68691-1	MH-5	Total/NA	Leachate	7470A	
LCS 480-206575/2-A	Lab Control Sample	Total/NA	Water	7470A	
MB 480-206575/1-A	Method Blank	Total/NA	Water	7470A	

Analysis Batch: 206912

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68691-1	MH-5	Total/NA	Leachate	7470A	206575
LCS 480-206575/2-A	Lab Control Sample	Total/NA	Water	7470A	206575
MB 480-206575/1-A	Method Blank	Total/NA	Water	7470A	206575

Analysis Batch: 206924

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68691-1	MH-5	Total/NA	Leachate	6010C	206499
LCS 480-206499/2-A	Lab Control Sample	Total/NA	Water	6010C	206499

Analysis Batch: 207036

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 480-206499/1-A	Method Blank	Total/NA	Water	6010C	206499

General Chemistry

Analysis Batch: 150879

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68691-1	MH-5	Total/NA	Leachate	300.0	
LCS 240-150879/28	Lab Control Sample	Total/NA	Water	300.0	
MB 240-150879/27	Method Blank	Total/NA	Water	300.0	

Analysis Batch: 151358

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68691-1	MH-5	Total/NA	Leachate	300.0	
LCS 240-151358/28	Lab Control Sample	Total/NA	Water	300.0	
LCS 240-151358/4	Lab Control Sample	Total/NA	Water	300.0	
MB 240-151358/27	Method Blank	Total/NA	Water	300.0	
MB 240-151358/3	Method Blank	Total/NA	Water	300.0	

General Chemistry (Continued)

Analysis Batch: 206384

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68691-1	MH-5	Total/NA	Leachate	7196A	
480-68691-1 MS	MH-5	Total/NA	Leachate	7196A	
LCS 480-206384/4	Lab Control Sample	Total/NA	Water	7196A	
MB 480-206384/3	Method Blank	Total/NA	Water	7196A	

Analysis Batch: 206477

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68691-1	MH-5	Total/NA	Leachate	353.2	

Analysis Batch: 206480

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68691-1	MH-5	Total/NA	Leachate	180.1	
LCS 480-206480/4	Lab Control Sample	Total/NA	Water	180.1	
MB 480-206480/3	Method Blank	Total/NA	Water	180.1	

Analysis Batch: 206654

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68691-1	MH-5	Total/NA	Leachate	SM 5210B	
LCS 480-206654/2	Lab Control Sample	Total/NA	Water	SM 5210B	
USB 480-206654/1	Method Blank	Total/NA	Water	SM 5210B	

Analysis Batch: 206725

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68691-1	MH-5	Total/NA	Leachate	SM 2120B	
LCS 480-206725/4	Lab Control Sample	Total/NA	Water	SM 2120B	
MB 480-206725/3	Method Blank	Total/NA	Water	SM 2120B	

Analysis Batch: 206737

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68691-1	MH-5	Total/NA	Leachate	350.1	
480-68691-1 MS	MH-5	Total/NA	Leachate	350.1	
LCS 480-206737/4	Lab Control Sample	Total/NA	Water	350.1	
LCS 480-206737/76	Lab Control Sample	Total/NA	Water	350.1	
MB 480-206737/3	Method Blank	Total/NA	Water	350.1	
MB 480-206737/75	Method Blank	Total/NA	Water	350.1	

Prep Batch: 206888

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68691-1	MH-5	Total/NA	Leachate	Distill/Phenol	
LCS 480-206888/2-A	Lab Control Sample	Total/NA	Water	Distill/Phenol	
MB 480-206888/1-A	Method Blank	Total/NA	Water	Distill/Phenol	

Prep Batch: 206899

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68691-1	MH-5	Total/NA	Leachate	351.2	
LCS 480-206899/2-A	Lab Control Sample	Total/NA	Water	351.2	
MB 480-206899/1-A	Method Blank	Total/NA	Water	351.2	

Analysis Batch: 206969

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68691-1	MH-5	Total/NA	Leachate	SM 2340C	

General Chemistry (Continued)

Analysis Batch: 206969 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 480-206969/52	Lab Control Sample	Total/NA	Water	SM 2340C	
LCS 480-206969/76	Lab Control Sample	Total/NA	Water	SM 2340C	
MB 480-206969/51	Method Blank	Total/NA	Water	SM 2340C	
MB 480-206969/75	Method Blank	Total/NA	Water	SM 2340C	

Analysis Batch: 206989

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68691-1	MH-5	Total/NA	Leachate	SM 2540C	
LCS 480-206989/2	Lab Control Sample	Total/NA	Water	SM 2540C	
MB 480-206989/1	Method Blank	Total/NA	Water	SM 2540C	

Analysis Batch: 207003

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68691-1	MH-5	Total/NA	Leachate	351.2	206899
LCS 480-206899/2-A	Lab Control Sample	Total/NA	Water	351.2	206899
MB 480-206899/1-A	Method Blank	Total/NA	Water	351.2	206899

Analysis Batch: 207429

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68691-1	MH-5	Total/NA	Leachate	9060A	
LCS 480-207429/28	Lab Control Sample	Total/NA	Water	9060A	
MB 480-207429/27	Method Blank	Total/NA	Water	9060A	

Prep Batch: 207517

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68691-1	MH-5	Total/NA	Leachate	9012B	
480-68691-1 MS	MH-5	Total/NA	Leachate	9012B	
LCS 480-207517/2-A	Lab Control Sample	Total/NA	Water	9012B	
MB 480-207517/1-A	Method Blank	Total/NA	Water	9012B	

Analysis Batch: 207541

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68691-1	MH-5	Total/NA	Leachate	9012B	207517
480-68691-1 MS	MH-5	Total/NA	Leachate	9012B	207517
LCS 480-207517/2-A	Lab Control Sample	Total/NA	Water	9012B	207517
MB 480-207517/1-A	Method Blank	Total/NA	Water	9012B	207517

Analysis Batch: 207542

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68691-1	MH-5	Total/NA	Leachate	9066	206888
LCS 480-206888/2-A	Lab Control Sample	Total/NA	Water	9066	206888
MB 480-206888/1-A	Method Blank	Total/NA	Water	9066	206888

Analysis Batch: 207719

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68691-1	MH-5	Total/NA	Leachate	310.2	
LCS 480-207719/186	Lab Control Sample	Total/NA	Water	310.2	
LCS 480-207719/193	Lab Control Sample	Total/NA	Water	310.2	
LCS 480-207719/204	Lab Control Sample	Total/NA	Water	310.2	
MB 480-207719/185	Method Blank	Total/NA	Water	310.2	
MB 480-207719/192	Method Blank	Total/NA	Water	310.2	

General Chemistry (Continued)

Analysis Batch: 207719 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
MB 480-207719/203	Method Blank	Total/NA	Water	310.2	

Analysis Batch: 208155

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68691-1	MH-5	Total/NA	Leachate	410.4	
LCS 480-208155/28	Lab Control Sample	Total/NA	Water	410.4	
LCS 480-208155/4	Lab Control Sample	Total/NA	Water	410.4	
LCS 480-208155/52	Lab Control Sample	Total/NA	Water	410.4	
MB 480-208155/27	Method Blank	Total/NA	Water	410.4	
MB 480-208155/3	Method Blank	Total/NA	Water	410.4	
MB 480-208155/51	Method Blank	Total/NA	Water	410.4	

Lab Chronicle

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-68691-1

Client Sample ID: MH-5
Date Collected: 10/06/14 15:30
Date Received: 10/07/14 09:00

Lab Sample ID: 480-68691-1
Matrix: Leachate

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		10	206699	10/09/14 03:54	ABF	TAL BUF
Total/NA	Prep	3005A			206499	10/08/14 08:55	SLB	TAL BUF
Total/NA	Analysis	6010C		1	206924	10/08/14 19:44	AMH	TAL BUF
Total/NA	Prep	7470A			206575	10/08/14 10:50	LRK	TAL BUF
Total/NA	Analysis	7470A		1	206912	10/09/14 12:09	LRK	TAL BUF
Total/NA	Analysis	180.1		1	206480	10/07/14 23:00	CLT	TAL BUF
Total/NA	Analysis	300.0		5	151358	10/13/14 16:15	LKG	TAL CAN
Total/NA	Analysis	300.0		1	150879	10/10/14 03:07	JMB	TAL CAN
Total/NA	Analysis	310.2		50	207719	10/14/14 15:32	NCH	TAL BUF
Total/NA	Analysis	350.1		100	206737	10/08/14 23:01	RS	TAL BUF
Total/NA	Prep	351.2			206899	10/09/14 09:14	LAW	TAL BUF
Total/NA	Analysis	351.2		50	207003	10/10/14 04:23	CLT	TAL BUF
Total/NA	Analysis	353.2		1	206477	10/07/14 21:58	RS	TAL BUF
Total/NA	Analysis	410.4		4	208155	10/16/14 09:12	KMF	TAL BUF
Total/NA	Analysis	7196A		1	206384	10/07/14 11:08	NCH	TAL BUF
Total/NA	Prep	9012B			207517	10/13/14 15:25	MDL	TAL BUF
Total/NA	Analysis	9012B		1	207541	10/13/14 22:52	RS	TAL BUF
Total/NA	Analysis	9060A		1	207429	10/12/14 08:05	MRF	TAL BUF
Total/NA	Prep	Distill/Phenol			206888	10/09/14 09:30	MRF	TAL BUF
Total/NA	Analysis	9066		1	207542	10/13/14 20:36	JMB	TAL BUF
Total/NA	Analysis	SM 2120B		1	206725	10/07/14 23:20	RS	TAL BUF
Total/NA	Analysis	SM 2340C		1	206969	10/09/14 11:55	KMF	TAL BUF
Total/NA	Analysis	SM 2540C		1	206989	10/09/14 23:42	JMB	TAL BUF
Total/NA	Analysis	SM 5210B		1	206654	10/08/14 14:37	MDL	TAL BUF

Laboratory References:

TAL BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

TAL CAN = TestAmerica Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

Laboratory: TestAmerica Buffalo

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Arkansas DEQ	State Program	6	88-0686	07-06-15
California	State Program	9	1169CA	09-30-14 *
Connecticut	State Program	1	PH-0568	09-30-14 *
Florida	NELAP	4	E87672	06-30-15
Georgia	State Program	4	N/A	03-31-15
Georgia	State Program	4	956	03-31-15
Illinois	NELAP	5	200003	09-30-14 *
Iowa	State Program	7	374	03-01-15
Kansas	NELAP	7	E-10187	01-31-15
Kentucky (DW)	State Program	4	90029	12-31-14
Kentucky (UST)	State Program	4	30	03-31-15
Louisiana	NELAP	6	02031	06-30-14 *
Maine	State Program	1	NY00044	12-04-14
Maryland	State Program	3	294	03-31-15
Massachusetts	State Program	1	M-NY044	06-30-15
Michigan	State Program	5	9937	03-31-15
Minnesota	NELAP	5	036-999-337	12-31-14
New Hampshire	NELAP	1	2337	11-17-14
New Jersey	NELAP	2	NY455	06-30-15
New York	NELAP	2	10026	03-31-15
North Dakota	State Program	8	R-176	03-31-14 *
Oklahoma	State Program	6	9421	08-31-15
Oregon	NELAP	10	NY200003	06-09-15
Pennsylvania	NELAP	3	68-00281	07-31-15
Rhode Island	State Program	1	LAO00328	12-30-14
Tennessee	State Program	4	TN02970	03-31-15
Texas	NELAP	6	T104704412-11-2	07-31-15
USDA	Federal		P330-11-00386	11-22-14
Virginia	NELAP	3	460185	09-14-15
Washington	State Program	10	C784	02-10-15
West Virginia DEP	State Program	3	252	09-30-14 *
Wisconsin	State Program	5	998310390	08-31-15

Laboratory: TestAmerica Canton

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
California	NELAP	9	01144CA	06-30-14 *
California	State Program	9	2927	04-30-15
Connecticut	State Program	1	PH-0590	12-31-14
Florida	NELAP	4	E87225	06-30-15
Georgia	State Program	4	N/A	06-30-15
Illinois	NELAP	5	200004	07-31-15
Kansas	NELAP	7	E-10336	01-31-15
Kentucky (UST)	State Program	4	58	06-30-15
L-A-B	DoD ELAP		L2315	07-18-16
Minnesota	NELAP	5	039-999-348	12-31-14
Nevada	State Program	9	OH-000482008A	07-31-15
New Jersey	NELAP	2	OH001	06-30-15
New York	NELAP	2	10975	03-31-15

* Certification renewal pending - certification considered valid.

Laboratory: TestAmerica Canton (Continued)

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Ohio VAP	State Program	5	CL0024	10-31-15
Pennsylvania	NELAP	3	68-00340	08-31-15
Texas	NELAP	6		08-31-15
USDA	Federal		P330-13-00319	11-26-16
Virginia	NELAP	3	460175	09-14-15
Washington	State Program	10	C971	01-12-15
West Virginia DEP	State Program	3	210	12-31-14
Wisconsin	State Program	5	999518190	08-31-15

Method Summary

Method	Method Description	Protocol	Laboratory
624	Volatile Organic Compounds (GC/MS)	40CFR136A	TAL BUF
6010C	Metals (ICP)	SW846	TAL BUF
7470A	Mercury (CVAA)	SW846	TAL BUF
180.1	Turbidity, Nephelometric	MCAWW	TAL BUF
300.0	Anions, Ion Chromatography	MCAWW	TAL CAN
310.2	Alkalinity	MCAWW	TAL BUF
350.1	Nitrogen, Ammonia	MCAWW	TAL BUF
351.2	Nitrogen, Total Kjeldahl	MCAWW	TAL BUF
353.2	Nitrate	EPA	TAL BUF
410.4	COD	MCAWW	TAL BUF
7196A	Chromium, Hexavalent	SW846	TAL BUF
9012B	Cyanide, Total andor Amenable	SW846	TAL BUF
9060A	Organic Carbon, Total (TOC)	SW846	TAL BUF
9066	Phenolics, Total Recoverable	SW846	TAL BUF
SM 2120B	Color, Colorimetric	SM	TAL BUF
SM 2340C	Hardness, Total (mg/l as CaC03)	SM	TAL BUF
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL BUF
SM 5210B	BOD, 5-Day	SM	TAL BUF

Protocol References:

40CFR136A = "Methods for Organic Chemical Analysis of Municipal Industrial Wastewater", 40CFR, Part 136, Appendix A, October 26, 1984 and subsequent revisions.

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater",

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

TAL CAN = TestAmerica Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

Sample Summary

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
480-68691-1	MH-5	Leachate	10/06/14 15:30	10/07/14 09:00

Detection Limit Exceptions Summary

Client: Sterling Environmental Engineering PC
TestAmerica Job ID: 480-68691-1
Project/Site: Orange County Landfill

The requested project specific reporting limits listed below were less than laboratory standard quantitation limits (PQL) but greater than or equal to the laboratory method detection limits (MDL). It must be noted that results reported below lab standard quantitation limits may result in false positive/false negative values and less accurate quantitation. Routine laboratory procedures do not indicate corrective action for detections below the laboratory's PQL.

Method	Matrix	Analyte	Units	Client RL	Lab PQL
300.0	Leachate	Chloride	mg/L	0.50	1

TestAmerica Buffalo
10 Hazelwood Drive
Amherst, NY 14228
Phone: 716.691.2600

480-68691 Chain of Custody

Chain of Custody Record

040128

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
TestAmerica Laboratories, Inc.
TAL-8210 (0713)

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

Client Contact	
Company Name:	Sterling Environmental
Address:	24 Wade Road
City/State/Zip:	Latham NY 12110
Phone:	(518) 456-4900
Fax:	
Project Name:	Orange County Landfill
Site:	OC Landfill
P O #	2010-15

Project Manager: Mark Williams
Tel/Fax:
Site Contact: Cody Sargood
Lab Contact: Lisa Shaffer
Date: 10/6/14
Carrier:
COC No: 1 of 1 COCs
Sampler:
For Lab Use Only:
Walk-in Client:
Lab Sampling:
Job / SDG No.:

Analysis Turnaround Time
☐ CALENDAR DAYS ☒ WORKING DAYS
TAT if different from Below 5 Days
☐ 2 weeks
☒ 1 week
☐ 2 days
☐ 1 day

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y / N)	Perform MS / MSD (Y / N)	Chloride Sulfate	COD TKN	Mercury	Hardness, Phenolics	TOC, BOD TDS	Cyanide Total	VOC	Nitrate, Nitrite	Turbidity, Color	Hex. Chromium	Alkalinity Total	Baseline Metals	Sample Specific Notes:
Seep Monitoring Point	10/6/14	9:15	G	Water	8	N	N				X	X	X	X						
DUP-1	↓	—	↓	↓	8	↓	↓				X	X	X	X						
MH-5	↓	15:30	↓	↓	17	↓	↓	X	X	X	X	X	X	X	X	X	X	X	X	
SW-8	↓	15:15	↓	↓	17	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	
Trip Blanks	↓	—	—	↓	2	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	↓	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.
☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return to Client ☐ Disposal by Lab ☒ Archive for 1 Months

Special Instructions/QC Requirements & Comments: 5 Day TOT; Analysis Listed On Bottles - More Samples to arrive for Seep-MP and DUP1

Custody Seals Intact: ☐ Yes ☐ No
Custody Seal No.:
Cooler Temp. (°C): Obs'd: Corr'd:
Therm ID No.:

Relinquished by: [signature]	Company: Sterling	Date/Time: 10/6 5:50pm	Received by: [signature]	Company:	Date/Time: 10/7/14 0900
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

3.8, 3.9, 4.2 #2

15

Login Sample Receipt Checklist

Client: Sterling Environmental Engineering PC

Job Number: 480-68691-1

Login Number: 68691
List Number: 1
Creator: Janish, Carl M

List Source: TestAmerica Buffalo

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Sampling Company provided.	True	STERLING
Samples received within 48 hours of sampling.	True	
Samples requiring field filtration have been filtered in the field.	N/A	
Chlorine Residual checked.	N/A	

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.
TestAmerica Buffalo
10 Hazelwood Drive
Amherst, NY 14228-2298
Tel: (716)691-2600

TestAmerica Job ID: 480-68692-1
Client Project/Site: Orange County Landfill
Sampling Event: Groundwater Baseline

For:
Sterling Environmental Engineering PC
24 Wade Road
Latham, New York 12110

Attn: Mr. Mark Williams

Authorized for release by:
10/17/2014 11:17:32 AM
Anne Pridgeon, Project Management Assistant I
anne.pridgeon@testamericainc.com

Designee for

Lisa Shaffer, Project Manager II
(716)504-9816
lisa.shaffer@testamericainc.com

Table of Contents

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-68692-1

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

Metals

Qualifier	Qualifier Description
B	Compound was found in the blank and sample.
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.

General Chemistry

Qualifier	Qualifier Description
b	Result Detected in the Unseeded Control blank (USB).
B	Compound was found in the blank and sample.
F1	MS and/or MSD Recovery exceeds the control limits
J	Result is less than the RL but greater than or equal to the MDL and the concentration is an approximate value.
^	ICV,CCV,ICB,CCB, ISA, ISB, CRI, CRA, DLCK or MRL standard: Instrument related QC exceeds the control limits.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains no Free Liquid
DER	Duplicate error ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision level concentration
MDA	Minimum detectable activity
EDL	Estimated Detection Limit
MDC	Minimum detectable concentration
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative error ratio
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Job ID: 480-68692-1

Laboratory: TestAmerica Buffalo

Narrative

Job Narrative
480-68692-1

Comments
No additional comments.

Receipt
The samples were received on 10/7/2014 9:00 AM; the samples arrived in good condition, properly preserved and, where required, on ice. The temperatures of the 3 coolers at receipt time were 3.8° C, 3.9° C and 4.2° C.

Except:

Method(s) 7196A: The following samples were received outside of holding time: PZ-14-3 (480-68692-2), PZ-14-5 (480-68692-1). No time listed, therefore default TALS time of 00:00 was used.

GC/MS VOA
No analytical or quality issues were noted, other than those described in the Definitions/Glossary page.

Metals
Method(s) 6010C: The method blank for batch 480-206494 contained dissolved copper and zinc above the method detection limits. These target analyte concentrations were less than the reporting limit (RL); therefore, re-extraction and/or re-analysis of samples PZ-14-3 (480-68692-2), PZ-14-5 (480-68692-1) was not performed.

Method(s) 6010C: The method blank for batch 480-206494 contained dissolved boron above the method detection limit. This target analyte concentration was less than the reporting limit (RL); therefore, re-extraction and/or re-analysis of samples PZ-14-3 (480-68692-2), PZ-14-5 (480-68692-1) was not performed.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

General Chemistry
Method(s) SM 2120B: Associated samples were filtered prior to analysis. Results are reported as true color. (480-68692-1 DU), PZ-14-3 (480-68692-2), PZ-14-5 (480-68692-1)

Method(s) 350.1: The method blank for batch 206737 contained ammonia above the method detection limit. This target analyte concentration was less than the reporting limit (RL); therefore, re-analysis of samples was not performed. PZ-14-5 (480-68692-1)

Method(s) SM 5210B: The USB dilution water D.O. depletion was greater than 0.2 mg/L but less than the reporting limit of 2.0 mg/L. The associated sample results in batch 206522 are reported. (USB 480-206522/1)

Method(s) SM 5210B: The sample duplicate precision for the following sample associated with batch 206522 was outside control limits: (480-68692-2 DU).

Method(s) 310.2: The method blank for batch 207719 contained Alkalintiy above the method detection limit. This target analyte concentration was less than the reporting limit (RL); therefore, re-extraction and/or re-analysis of samples was not performed.PZ-14-5 (480-68692-1)

Method(s) 310.2: The method blank for batch 207973 contained Alkalinity above the method detection limit. This target analyte concentration was less than the reporting limit (RL); therefore, re-extraction and/or re-analysis of samples was not performed.PZ-14-3 (480-68692-2)

Method(s) 410.4: The method blank for batch 208155 contained chemical oxygen demand above the method detection limit. This target analyte concentration was less than the reporting limit (RL); therefore, re-extraction and/or re-analysis of samples was not performed.PZ-14-3 (480-68692-2), PZ-14-5 (480-68692-1)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-68692-1

Client Sample ID: PZ-14-5

Lab Sample ID: 480-68692-1

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	0.73		0.20	0.060	mg/L	1		6010C	Total/NA
Arsenic	0.057		0.015	0.0056	mg/L	1		6010C	Total/NA
Barium	0.51		0.0020	0.00070	mg/L	1		6010C	Total/NA
Boron	0.21		0.020	0.0040	mg/L	1		6010C	Total/NA
Calcium	140		0.50	0.10	mg/L	1		6010C	Total/NA
Chromium	0.0076		0.0040	0.0010	mg/L	1		6010C	Total/NA
Copper	0.0072	J	0.010	0.0016	mg/L	1		6010C	Total/NA
Iron	4.8	B	0.050	0.019	mg/L	1		6010C	Total/NA
Magnesium	54		0.20	0.043	mg/L	1		6010C	Total/NA
Manganese	1.0		0.0030	0.00040	mg/L	1		6010C	Total/NA
Nickel	0.028		0.010	0.0013	mg/L	1		6010C	Total/NA
Potassium	9.8		0.50	0.10	mg/L	1		6010C	Total/NA
Sodium	87		1.0	0.32	mg/L	1		6010C	Total/NA
Zinc	0.026	B	0.010	0.0015	mg/L	1		6010C	Total/NA
Aluminum	2.7		0.20	0.060	mg/L	1		6010C	Dissolved
Arsenic	0.055		0.015	0.0056	mg/L	1		6010C	Dissolved
Barium	0.47		0.0020	0.00070	mg/L	1		6010C	Dissolved
Boron	0.20	B	0.020	0.0040	mg/L	1		6010C	Dissolved
Calcium	130		0.50	0.10	mg/L	1		6010C	Dissolved
Chromium	0.016		0.0040	0.0010	mg/L	1		6010C	Dissolved
Copper	0.011	B	0.010	0.0016	mg/L	1		6010C	Dissolved
Iron	7.7		0.050	0.019	mg/L	1		6010C	Dissolved
Lead	0.0051	J	0.010	0.0030	mg/L	1		6010C	Dissolved
Magnesium	52		0.20	0.043	mg/L	1		6010C	Dissolved
Manganese	1.1		0.0030	0.00040	mg/L	1		6010C	Dissolved
Nickel	0.032		0.010	0.0013	mg/L	1		6010C	Dissolved
Potassium	9.7		0.50	0.10	mg/L	1		6010C	Dissolved
Sodium	85		1.0	0.32	mg/L	1		6010C	Dissolved
Zinc	0.036	B	0.010	0.0015	mg/L	1		6010C	Dissolved
Chloride	79		0.50	0.41	mg/L	1		300.0	Total/NA
Sulfate	30		2.0	0.13	mg/L	1		300.0	Total/NA
Alkalinity, Total	600	B	100	40	mg/L	10		310.2	Total/NA
Ammonia	9.1	B	0.20	0.090	mg/L	10		350.1	Total/NA
Total Kjeldahl Nitrogen	9.2		1.0	0.75	mg/L	5		351.2	Total/NA
Nitrate as N	0.090		0.050	0.020	mg/L	1		353.2	Total/NA
Chemical Oxygen Demand	32	B	10	5.0	mg/L	1		410.4	Total/NA
Cyanide, Total	0.23		0.010	0.0050	mg/L	1		9012B	Total/NA
Total Organic Carbon	8.9		1.0	0.43	mg/L	1		9060A	Total/NA
Phenolics, Total Recoverable	0.026		0.010	0.0050	mg/L	1		9066	Total/NA
Hardness	580		10	2.6	mg/L	1		SM 2340C	Total/NA
Total Dissolved Solids	780		10	4.0	mg/L	1		SM 2540C	Total/NA
Biochemical Oxygen Demand	7.1	b	2.0	2.0	mg/L	1		SM 5210B	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Turbidity	240		1.0	1.0	NTU	1		180.1	Total/NA

Client Sample ID: PZ-14-3

Lab Sample ID: 480-68692-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Aluminum	6.3		0.20	0.060	mg/L	1		6010C	Total/NA
Arsenic	0.094		0.015	0.0056	mg/L	1		6010C	Total/NA

This Detection Summary does not include radiochemical test results.

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Client Sample ID: PZ-14-3 (Continued)

Lab Sample ID: 480-68692-2

Analyte	Result	Qualifier	RL	MDL	Unit	Dil Fac	D	Method	Prep Type
Barium	0.63		0.0020	0.00070	mg/L	1		6010C	Total/NA
Beryllium	0.00047	J	0.0020	0.00030	mg/L	1		6010C	Total/NA
Boron	0.18		0.020	0.0040	mg/L	1		6010C	Total/NA
Calcium	180		0.50	0.10	mg/L	1		6010C	Total/NA
Chromium	0.028		0.0040	0.0010	mg/L	1		6010C	Total/NA
Copper	0.091		0.010	0.0016	mg/L	1		6010C	Total/NA
Iron	18	B	0.050	0.019	mg/L	1		6010C	Total/NA
Lead	0.017		0.010	0.0030	mg/L	1		6010C	Total/NA
Magnesium	56		0.20	0.043	mg/L	1		6010C	Total/NA
Manganese	2.0		0.0030	0.00040	mg/L	1		6010C	Total/NA
Nickel	0.025		0.010	0.0013	mg/L	1		6010C	Total/NA
Potassium	9.3		0.50	0.10	mg/L	1		6010C	Total/NA
Sodium	60		1.0	0.32	mg/L	1		6010C	Total/NA
Zinc	0.087	B	0.010	0.0015	mg/L	1		6010C	Total/NA
Aluminum	8.7		0.20	0.060	mg/L	1		6010C	Dissolved
Arsenic	0.092		0.015	0.0056	mg/L	1		6010C	Dissolved
Barium	0.59		0.0020	0.00070	mg/L	1		6010C	Dissolved
Beryllium	0.00048	J	0.0020	0.00030	mg/L	1		6010C	Dissolved
Boron	0.17	B	0.020	0.0040	mg/L	1		6010C	Dissolved
Calcium	150		0.50	0.10	mg/L	1		6010C	Dissolved
Chromium	0.032		0.0040	0.0010	mg/L	1		6010C	Dissolved
Copper	0.083	B	0.010	0.0016	mg/L	1		6010C	Dissolved
Iron	22		0.050	0.019	mg/L	1		6010C	Dissolved
Lead	0.015		0.010	0.0030	mg/L	1		6010C	Dissolved
Magnesium	54		0.20	0.043	mg/L	1		6010C	Dissolved
Manganese	1.7		0.0030	0.00040	mg/L	1		6010C	Dissolved
Nickel	0.030		0.010	0.0013	mg/L	1		6010C	Dissolved
Potassium	9.1		0.50	0.10	mg/L	1		6010C	Dissolved
Sodium	58		1.0	0.32	mg/L	1		6010C	Dissolved
Zinc	0.087	B	0.010	0.0015	mg/L	1		6010C	Dissolved
Chloride	61		0.50	0.41	mg/L	1		300.0	Total/NA
Sulfate	34		2.0	0.13	mg/L	1		300.0	Total/NA
Alkalinity, Total	570	B	100	40	mg/L	10		310.2	Total/NA
Ammonia	5.3		0.10	0.045	mg/L	5		350.1	Total/NA
Total Kjeldahl Nitrogen	5.9		0.40	0.30	mg/L	2		351.2	Total/NA
Nitrate as N	0.69		0.050	0.020	mg/L	1		353.2	Total/NA
Chemical Oxygen Demand	23	B	10	5.0	mg/L	1		410.4	Total/NA
Total Organic Carbon	3.2		1.0	0.43	mg/L	1		9060A	Total/NA
Hardness	610		10	2.6	mg/L	1		SM 2340C	Total/NA
Total Dissolved Solids	680		10	4.0	mg/L	1		SM 2540C	Total/NA

Analyte	Result	Qualifier	RL	RL	Unit	Dil Fac	D	Method	Prep Type
Turbidity	450		1.0	1.0	NTU	1		180.1	Total/NA

Client Sample ID: TB1

Lab Sample ID: 480-68692-3

No Detections.

This Detection Summary does not include radiochemical test results.

Client Sample ID: PZ-14-5
Date Collected: 10/06/14 12:55
Date Received: 10/07/14 09:00

Lab Sample ID: 480-68692-1
Matrix: Ground Water

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	ND		5.0	0.39	ug/L			10/09/14 04:19	1
1,1,2,2-Tetrachloroethane	ND		5.0	0.26	ug/L			10/09/14 04:19	1
1,1,2-Trichloroethane	ND		5.0	0.48	ug/L			10/09/14 04:19	1
1,1-Dichloroethane	ND		5.0	0.59	ug/L			10/09/14 04:19	1
1,1-Dichloroethene	ND		5.0	0.85	ug/L			10/09/14 04:19	1
1,2-Dichlorobenzene	ND		5.0	0.44	ug/L			10/09/14 04:19	1
1,2-Dichloroethane	ND		5.0	0.60	ug/L			10/09/14 04:19	1
1,2-Dichloropropane	ND		5.0	0.61	ug/L			10/09/14 04:19	1
1,3-Dichlorobenzene	ND		5.0	0.54	ug/L			10/09/14 04:19	1
1,4-Dichlorobenzene	ND		5.0	0.51	ug/L			10/09/14 04:19	1
2-Chloroethyl vinyl ether	ND		25	1.9	ug/L			10/09/14 04:19	1
Benzene	ND		5.0	0.60	ug/L			10/09/14 04:19	1
Bromodichloromethane	ND		5.0	0.54	ug/L			10/09/14 04:19	1
Bromoform	ND		5.0	0.47	ug/L			10/09/14 04:19	1
Bromomethane	ND		5.0	1.2	ug/L			10/09/14 04:19	1
Carbon tetrachloride	ND		5.0	0.51	ug/L			10/09/14 04:19	1
Chlorobenzene	ND		5.0	0.48	ug/L			10/09/14 04:19	1
Chloroethane	ND		5.0	0.87	ug/L			10/09/14 04:19	1
Chloroform	ND		5.0	0.54	ug/L			10/09/14 04:19	1
Chloromethane	ND		5.0	0.64	ug/L			10/09/14 04:19	1
cis-1,2-Dichloroethene	ND		5.0	0.57	ug/L			10/09/14 04:19	1
cis-1,3-Dichloropropene	ND		5.0	0.33	ug/L			10/09/14 04:19	1
Dibromochloromethane	ND		5.0	0.41	ug/L			10/09/14 04:19	1
Dichlorodifluoromethane	ND		5.0	0.28	ug/L			10/09/14 04:19	1
Ethylbenzene	ND		5.0	0.46	ug/L			10/09/14 04:19	1
Methylene Chloride	ND		5.0	0.81	ug/L			10/09/14 04:19	1
m-Xylene & p-Xylene	ND		10	1.1	ug/L			10/09/14 04:19	1
o-Xylene	ND		5.0	0.43	ug/L			10/09/14 04:19	1
Tetrachloroethene	ND		5.0	0.34	ug/L			10/09/14 04:19	1
Toluene	ND		5.0	0.45	ug/L			10/09/14 04:19	1
trans-1,2-Dichloroethene	ND		5.0	0.59	ug/L			10/09/14 04:19	1
trans-1,3-Dichloropropene	ND		5.0	0.44	ug/L			10/09/14 04:19	1
Trichloroethene	ND		5.0	0.60	ug/L			10/09/14 04:19	1
Trichlorofluoromethane	ND		5.0	0.45	ug/L			10/09/14 04:19	1
Vinyl chloride	ND		5.0	0.75	ug/L			10/09/14 04:19	1
Xylenes, Total	ND		10	1.1	ug/L			10/09/14 04:19	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*104*		*72 - 130*		*10/09/14 04:19*	*1*
4-Bromofluorobenzene (Surr)	*104*		*69 - 121*		*10/09/14 04:19*	*1*
Toluene-d8 (Surr)	*99*		*70 - 123*		*10/09/14 04:19*	*1*

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**0.73**		0.20	0.060	mg/L		10/08/14 08:55	10/08/14 19:13	1
Antimony	ND		0.020	0.0068	mg/L		10/08/14 08:55	10/08/14 19:13	1
Arsenic	**0.057**		0.015	0.0056	mg/L		10/08/14 08:55	10/08/14 19:13	1
Barium	**0.51**		0.0020	0.00070	mg/L		10/08/14 08:55	10/08/14 19:13	1
Beryllium	ND		0.0020	0.00030	mg/L		10/08/14 08:55	10/08/14 19:13	1
Boron	**0.21**		0.020	0.0040	mg/L		10/08/14 08:55	10/09/14 13:47	1

Client Sample ID: PZ-14-5

Date Collected: 10/06/14 12:55
Date Received: 10/07/14 09:00

Lab Sample ID: 480-68692-1
Matrix: Ground Water

Method: 6010C - Metals (ICP) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.0020	0.00050	mg/L		10/08/14 08:55	10/08/14 19:13	1
Calcium	**140**		0.50	0.10	mg/L		10/08/14 08:55	10/09/14 13:47	1
Chromium	**0.0076**		0.0040	0.0010	mg/L		10/08/14 08:55	10/08/14 19:13	1
Copper	**0.0072**	**J**	0.010	0.0016	mg/L		10/08/14 08:55	10/08/14 19:13	1
Iron	**4.8**	**B**	0.050	0.019	mg/L		10/08/14 08:55	10/08/14 19:13	1
Lead	ND		0.010	0.0030	mg/L		10/08/14 08:55	10/08/14 19:13	1
Magnesium	**54**		0.20	0.043	mg/L		10/08/14 08:55	10/08/14 19:13	1
Manganese	**1.0**		0.0030	0.00040	mg/L		10/08/14 08:55	10/08/14 19:13	1
Nickel	**0.028**		0.010	0.0013	mg/L		10/08/14 08:55	10/08/14 19:13	1
Potassium	**9.8**		0.50	0.10	mg/L		10/08/14 08:55	10/08/14 19:13	1
Selenium	ND		0.025	0.0087	mg/L		10/08/14 08:55	10/08/14 19:13	1
Silver	ND		0.0060	0.0017	mg/L		10/08/14 08:55	10/08/14 19:13	1
Sodium	**87**		1.0	0.32	mg/L		10/08/14 08:55	10/08/14 19:13	1
Thallium	ND		0.020	0.010	mg/L		10/08/14 08:55	10/08/14 19:13	1
Zinc	**0.026**	**B**	0.010	0.0015	mg/L		10/08/14 08:55	10/08/14 19:13	1

Method: 6010C - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**2.7**		0.20	0.060	mg/L		10/08/14 08:57	10/08/14 23:45	1
Antimony	ND		0.020	0.0068	mg/L		10/08/14 08:57	10/08/14 23:45	1
Arsenic	**0.055**		0.015	0.0056	mg/L		10/08/14 08:57	10/08/14 23:45	1
Barium	**0.47**		0.0020	0.00070	mg/L		10/08/14 08:57	10/08/14 23:45	1
Beryllium	ND		0.0020	0.00030	mg/L		10/08/14 08:57	10/08/14 23:45	1
Boron	**0.20**	**B**	0.020	0.0040	mg/L		10/08/14 08:57	10/09/14 14:19	1
Cadmium	ND		0.0020	0.00050	mg/L		10/08/14 08:57	10/08/14 23:45	1
Calcium	**130**		0.50	0.10	mg/L		10/08/14 08:57	10/08/14 23:45	1
Chromium	**0.016**		0.0040	0.0010	mg/L		10/08/14 08:57	10/08/14 23:45	1
Copper	**0.011**	**B**	0.010	0.0016	mg/L		10/08/14 08:57	10/08/14 23:45	1
Iron	**7.7**		0.050	0.019	mg/L		10/08/14 08:57	10/08/14 23:45	1
Lead	**0.0051**	**J**	0.010	0.0030	mg/L		10/08/14 08:57	10/08/14 23:45	1
Magnesium	**52**		0.20	0.043	mg/L		10/08/14 08:57	10/08/14 23:45	1
Manganese	**1.1**		0.0030	0.00040	mg/L		10/08/14 08:57	10/08/14 23:45	1
Nickel	**0.032**		0.010	0.0013	mg/L		10/08/14 08:57	10/08/14 23:45	1
Potassium	**9.7**		0.50	0.10	mg/L		10/08/14 08:57	10/08/14 23:45	1
Selenium	ND		0.025	0.0087	mg/L		10/08/14 08:57	10/08/14 23:45	1
Silver	ND		0.0060	0.0017	mg/L		10/08/14 08:57	10/08/14 23:45	1
Sodium	**85**		1.0	0.32	mg/L		10/08/14 08:57	10/08/14 23:45	1
Thallium	ND		0.020	0.010	mg/L		10/08/14 08:57	10/08/14 23:45	1
Zinc	**0.036**	**B**	0.010	0.0015	mg/L		10/08/14 08:57	10/08/14 23:45	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		10/08/14 10:50	10/09/14 11:27	1

Method: 7470A - Mercury (CVAA) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		10/13/14 08:55	10/13/14 13:40	1

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-68692-1

Client Sample ID: PZ-14-5
Date Collected: 10/06/14 12:55
Date Received: 10/07/14 09:00

Lab Sample ID: 480-68692-1
Matrix: Ground Water

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	79		0.50	0.41	mg/L			10/10/14 01:49	1
Sulfate	30		2.0	0.13	mg/L			10/10/14 01:49	1
Alkalinity, Total	600	B	100	40	mg/L			10/14/14 15:18	10
Ammonia	9.1	B	0.20	0.090	mg/L			10/08/14 23:04	10
Total Kjeldahl Nitrogen	9.2		1.0	0.75	mg/L		10/09/14 09:14	10/10/14 04:00	5
Nitrate as N	0.090		0.050	0.020	mg/L			10/07/14 21:59	1
Chemical Oxygen Demand	32	B	10	5.0	mg/L			10/16/14 09:12	1
Chromium, hexavalent	ND		0.010	0.0050	mg/L			10/07/14 11:08	1
Cyanide, Total	0.23		0.010	0.0050	mg/L		10/13/14 15:25	10/13/14 22:55	1
Total Organic Carbon	8.9		1.0	0.43	mg/L			10/12/14 08:34	1
Phenolics, Total Recoverable	0.026		0.010	0.0050	mg/L		10/09/14 09:30	10/13/14 20:36	1
Hardness	580		10	2.6	mg/L			10/09/14 11:55	1
Total Dissolved Solids	780		10	4.0	mg/L			10/10/14 23:57	1
Biochemical Oxygen Demand	7.1	b	2.0	2.0	mg/L			10/07/14 23:53	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	240		1.0	1.0	NTU			10/07/14 23:00	1
Color	ND		5.0	5.0	Color Units			10/07/14 23:20	1

Client Sample ID: PZ-14-3

Date Collected: 10/06/14 11:25
Date Received: 10/07/14 09:00

Lab Sample ID: 480-68692-2

Matrix: Ground Water

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	ND		5.0	0.39	ug/L			10/09/14 04:44	1
1,1,2,2-Tetrachloroethane	ND		5.0	0.26	ug/L			10/09/14 04:44	1
1,1,2-Trichloroethane	ND		5.0	0.48	ug/L			10/09/14 04:44	1
1,1-Dichloroethane	ND		5.0	0.59	ug/L			10/09/14 04:44	1
1,1-Dichloroethene	ND		5.0	0.85	ug/L			10/09/14 04:44	1
1,2-Dichlorobenzene	ND		5.0	0.44	ug/L			10/09/14 04:44	1
1,2-Dichloroethane	ND		5.0	0.60	ug/L			10/09/14 04:44	1
1,2-Dichloropropane	ND		5.0	0.61	ug/L			10/09/14 04:44	1
1,3-Dichlorobenzene	ND		5.0	0.54	ug/L			10/09/14 04:44	1
1,4-Dichlorobenzene	ND		5.0	0.51	ug/L			10/09/14 04:44	1
2-Chloroethyl vinyl ether	ND		25	1.9	ug/L			10/09/14 04:44	1
Benzene	ND		5.0	0.60	ug/L			10/09/14 04:44	1
Bromodichloromethane	ND		5.0	0.54	ug/L			10/09/14 04:44	1
Bromoform	ND		5.0	0.47	ug/L			10/09/14 04:44	1
Bromomethane	ND		5.0	1.2	ug/L			10/09/14 04:44	1
Carbon tetrachloride	ND		5.0	0.51	ug/L			10/09/14 04:44	1
Chlorobenzene	ND		5.0	0.48	ug/L			10/09/14 04:44	1
Chloroethane	ND		5.0	0.87	ug/L			10/09/14 04:44	1
Chloroform	ND		5.0	0.54	ug/L			10/09/14 04:44	1
Chloromethane	ND		5.0	0.64	ug/L			10/09/14 04:44	1
cis-1,2-Dichloroethene	ND		5.0	0.57	ug/L			10/09/14 04:44	1
cis-1,3-Dichloropropene	ND		5.0	0.33	ug/L			10/09/14 04:44	1
Dibromochloromethane	ND		5.0	0.41	ug/L			10/09/14 04:44	1
Dichlorodifluoromethane	ND		5.0	0.28	ug/L			10/09/14 04:44	1
Ethylbenzene	ND		5.0	0.46	ug/L			10/09/14 04:44	1
Methylene Chloride	ND		5.0	0.81	ug/L			10/09/14 04:44	1
m-Xylene & p-Xylene	ND		10	1.1	ug/L			10/09/14 04:44	1
o-Xylene	ND		5.0	0.43	ug/L			10/09/14 04:44	1
Tetrachloroethene	ND		5.0	0.34	ug/L			10/09/14 04:44	1
Toluene	ND		5.0	0.45	ug/L			10/09/14 04:44	1
trans-1,2-Dichloroethene	ND		5.0	0.59	ug/L			10/09/14 04:44	1
trans-1,3-Dichloropropene	ND		5.0	0.44	ug/L			10/09/14 04:44	1
Trichloroethene	ND		5.0	0.60	ug/L			10/09/14 04:44	1
Trichlorofluoromethane	ND		5.0	0.45	ug/L			10/09/14 04:44	1
Vinyl chloride	ND		5.0	0.75	ug/L			10/09/14 04:44	1
Xylenes, Total	ND		10	1.1	ug/L			10/09/14 04:44	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*105*		*72 - 130*		*10/09/14 04:44*	*1*
4-Bromofluorobenzene (Surr)	*98*		*69 - 121*		*10/09/14 04:44*	*1*
Toluene-d8 (Surr)	*99*		*70 - 123*		*10/09/14 04:44*	*1*

Method: 6010C - Metals (ICP)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**6.3**		0.20	0.060	mg/L		10/08/14 08:55	10/08/14 19:15	1
Antimony	ND		0.020	0.0068	mg/L		10/08/14 08:55	10/08/14 19:15	1
Arsenic	**0.094**		0.015	0.0056	mg/L		10/08/14 08:55	10/08/14 19:15	1
Barium	**0.63**		0.0020	0.00070	mg/L		10/08/14 08:55	10/08/14 19:15	1
Beryllium	**0.00047**	**J**	0.0020	0.00030	mg/L		10/08/14 08:55	10/08/14 19:15	1
Boron	**0.18**		0.020	0.0040	mg/L		10/08/14 08:55	10/09/14 13:57	1

Client Sample ID: PZ-14-3

Date Collected: 10/06/14 11:25
Date Received: 10/07/14 09:00

Lab Sample ID: 480-68692-2
Matrix: Ground Water

Method: 6010C - Metals (ICP) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cadmium	ND		0.0020	0.00050	mg/L		10/08/14 08:55	10/08/14 19:15	1
Calcium	**180**		0.50	0.10	mg/L		10/08/14 08:55	10/09/14 13:57	1
Chromium	**0.028**		0.0040	0.0010	mg/L		10/08/14 08:55	10/08/14 19:15	1
Copper	**0.091**		0.010	0.0016	mg/L		10/08/14 08:55	10/08/14 19:15	1
Iron	**18**	**B**	0.050	0.019	mg/L		10/08/14 08:55	10/08/14 19:15	1
Lead	**0.017**		0.010	0.0030	mg/L		10/08/14 08:55	10/08/14 19:15	1
Magnesium	**56**		0.20	0.043	mg/L		10/08/14 08:55	10/08/14 19:15	1
Manganese	**2.0**		0.0030	0.00040	mg/L		10/08/14 08:55	10/08/14 19:15	1
Nickel	**0.025**		0.010	0.0013	mg/L		10/08/14 08:55	10/08/14 19:15	1
Potassium	**9.3**		0.50	0.10	mg/L		10/08/14 08:55	10/08/14 19:15	1
Selenium	ND		0.025	0.0087	mg/L		10/08/14 08:55	10/08/14 19:15	1
Silver	ND		0.0060	0.0017	mg/L		10/08/14 08:55	10/08/14 19:15	1
Sodium	**60**		1.0	0.32	mg/L		10/08/14 08:55	10/08/14 19:15	1
Thallium	ND		0.020	0.010	mg/L		10/08/14 08:55	10/08/14 19:15	1
Zinc	**0.087**	**B**	0.010	0.0015	mg/L		10/08/14 08:55	10/08/14 19:15	1

Method: 6010C - Metals (ICP) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	**8.7**		0.20	0.060	mg/L		10/08/14 08:57	10/08/14 23:47	1
Antimony	ND		0.020	0.0068	mg/L		10/08/14 08:57	10/08/14 23:47	1
Arsenic	**0.092**		0.015	0.0056	mg/L		10/08/14 08:57	10/08/14 23:47	1
Barium	**0.59**		0.0020	0.00070	mg/L		10/08/14 08:57	10/08/14 23:47	1
Beryllium	**0.00048**	**J**	0.0020	0.00030	mg/L		10/08/14 08:57	10/08/14 23:47	1
Boron	**0.17**	**B**	0.020	0.0040	mg/L		10/08/14 08:57	10/09/14 14:29	1
Cadmium	ND		0.0020	0.00050	mg/L		10/08/14 08:57	10/08/14 23:47	1
Calcium	**150**		0.50	0.10	mg/L		10/08/14 08:57	10/08/14 23:47	1
Chromium	**0.032**		0.0040	0.0010	mg/L		10/08/14 08:57	10/08/14 23:47	1
Copper	**0.083**	**B**	0.010	0.0016	mg/L		10/08/14 08:57	10/08/14 23:47	1
Iron	**22**		0.050	0.019	mg/L		10/08/14 08:57	10/08/14 23:47	1
Lead	**0.015**		0.010	0.0030	mg/L		10/08/14 08:57	10/08/14 23:47	1
Magnesium	**54**		0.20	0.043	mg/L		10/08/14 08:57	10/08/14 23:47	1
Manganese	**1.7**		0.0030	0.00040	mg/L		10/08/14 08:57	10/08/14 23:47	1
Nickel	**0.030**		0.010	0.0013	mg/L		10/08/14 08:57	10/08/14 23:47	1
Potassium	**9.1**		0.50	0.10	mg/L		10/08/14 08:57	10/08/14 23:47	1
Selenium	ND		0.025	0.0087	mg/L		10/08/14 08:57	10/08/14 23:47	1
Silver	ND		0.0060	0.0017	mg/L		10/08/14 08:57	10/08/14 23:47	1
Sodium	**58**		1.0	0.32	mg/L		10/08/14 08:57	10/08/14 23:47	1
Thallium	ND		0.020	0.010	mg/L		10/08/14 08:57	10/08/14 23:47	1
Zinc	**0.087**	**B**	0.010	0.0015	mg/L		10/08/14 08:57	10/08/14 23:47	1

Method: 7470A - Mercury (CVAA)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		10/08/14 10:50	10/09/14 11:29	1

Method: 7470A - Mercury (CVAA) - Dissolved

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		10/13/14 08:55	10/13/14 13:47	1

Client Sample Results

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-68692-1

Client Sample ID: PZ-14-3
Date Collected: 10/06/14 11:25
Date Received: 10/07/14 09:00

Lab Sample ID: 480-68692-2
Matrix: Ground Water

General Chemistry

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	**61**		0.50	0.41	mg/L			10/10/14 02:47	1
Sulfate	**34**		2.0	0.13	mg/L			10/10/14 02:47	1
Alkalinity, Total	**570**	**B**	100	40	mg/L			10/15/14 08:45	10
Ammonia	**5.3**		0.10	0.045	mg/L			10/09/14 00:43	5
Total Kjeldahl Nitrogen	**5.9**		0.40	0.30	mg/L		10/09/14 09:14	10/10/14 04:00	2
Nitrate as N	**0.69**		0.050	0.020	mg/L			10/07/14 22:00	1
Chemical Oxygen Demand	**23**	**B**	10	5.0	mg/L			10/16/14 09:12	1
Chromium, hexavalent	ND		0.010	0.0050	mg/L			10/07/14 11:08	1
Cyanide, Total	ND		0.010	0.0050	mg/L		10/13/14 15:25	10/13/14 22:56	1
Total Organic Carbon	**3.2**		1.0	0.43	mg/L			10/12/14 09:02	1
Phenolics, Total Recoverable	ND		0.010	0.0050	mg/L		10/09/14 09:30	10/13/14 20:36	1
Hardness	**610**		10	2.6	mg/L			10/09/14 11:55	1
Total Dissolved Solids	**680**		10	4.0	mg/L			10/13/14 00:14	1
Biochemical Oxygen Demand	ND		2.0	2.0	mg/L			10/07/14 23:53	1

Analyte	Result	Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	**450**		1.0	1.0	NTU			10/07/14 23:00	1
Color	ND		5.0	5.0	Color Units			10/07/14 23:20	1

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-68692-1

Client Sample ID: TB1
Date Collected: 10/06/14 00:00
Date Received: 10/07/14 09:00

Lab Sample ID: 480-68692-3
Matrix: Water

Method: 624 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	ND		5.0	0.39	ug/L			10/09/14 05:09	1
1,1,2,2-Tetrachloroethane	ND		5.0	0.26	ug/L			10/09/14 05:09	1
1,1,2-Trichloroethane	ND		5.0	0.48	ug/L			10/09/14 05:09	1
1,1-Dichloroethane	ND		5.0	0.59	ug/L			10/09/14 05:09	1
1,1-Dichloroethene	ND		5.0	0.85	ug/L			10/09/14 05:09	1
1,2-Dichlorobenzene	ND		5.0	0.44	ug/L			10/09/14 05:09	1
1,2-Dichloroethane	ND		5.0	0.60	ug/L			10/09/14 05:09	1
1,2-Dichloropropane	ND		5.0	0.61	ug/L			10/09/14 05:09	1
1,3-Dichlorobenzene	ND		5.0	0.54	ug/L			10/09/14 05:09	1
1,4-Dichlorobenzene	ND		5.0	0.51	ug/L			10/09/14 05:09	1
2-Chloroethyl vinyl ether	ND		25	1.9	ug/L			10/09/14 05:09	1
Benzene	ND		5.0	0.60	ug/L			10/09/14 05:09	1
Bromodichloromethane	ND		5.0	0.54	ug/L			10/09/14 05:09	1
Bromoform	ND		5.0	0.47	ug/L			10/09/14 05:09	1
Bromomethane	ND		5.0	1.2	ug/L			10/09/14 05:09	1
Carbon tetrachloride	ND		5.0	0.51	ug/L			10/09/14 05:09	1
Chlorobenzene	ND		5.0	0.48	ug/L			10/09/14 05:09	1
Chloroethane	ND		5.0	0.87	ug/L			10/09/14 05:09	1
Chloroform	ND		5.0	0.54	ug/L			10/09/14 05:09	1
Chloromethane	ND		5.0	0.64	ug/L			10/09/14 05:09	1
cis-1,2-Dichloroethene	ND		5.0	0.57	ug/L			10/09/14 05:09	1
cis-1,3-Dichloropropene	ND		5.0	0.33	ug/L			10/09/14 05:09	1
Dibromochloromethane	ND		5.0	0.41	ug/L			10/09/14 05:09	1
Dichlorodifluoromethane	ND		5.0	0.28	ug/L			10/09/14 05:09	1
Ethylbenzene	ND		5.0	0.46	ug/L			10/09/14 05:09	1
Methylene Chloride	ND		5.0	0.81	ug/L			10/09/14 05:09	1
m-Xylene & p-Xylene	ND		10	1.1	ug/L			10/09/14 05:09	1
o-Xylene	ND		5.0	0.43	ug/L			10/09/14 05:09	1
Tetrachloroethene	ND		5.0	0.34	ug/L			10/09/14 05:09	1
Toluene	ND		5.0	0.45	ug/L			10/09/14 05:09	1
trans-1,2-Dichloroethene	ND		5.0	0.59	ug/L			10/09/14 05:09	1
trans-1,3-Dichloropropene	ND		5.0	0.44	ug/L			10/09/14 05:09	1
Trichloroethene	ND		5.0	0.60	ug/L			10/09/14 05:09	1
Trichlorofluoromethane	ND		5.0	0.45	ug/L			10/09/14 05:09	1
Vinyl chloride	ND		5.0	0.75	ug/L			10/09/14 05:09	1
Xylenes, Total	ND		10	1.1	ug/L			10/09/14 05:09	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*104*		*72 - 130*		*10/09/14 05:09*	*1*
4-Bromofluorobenzene (Surr)	*98*		*69 - 121*		*10/09/14 05:09*	*1*
Toluene-d8 (Surr)	*98*		*70 - 123*		*10/09/14 05:09*	*1*

Surrogate Summary

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-68692-1

Method: 624 - Volatile Organic Compounds (GC/MS)

Matrix: Ground Water **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)		
		12DCE	BFB	TOL
Lab Sample ID	Client Sample ID	(72-130)	(69-121)	(70-123)
480-68692-1	PZ-14-5	104	104	99
480-68692-2	PZ-14-3	105	98	99

Surrogate Legend

12DCE = 1,2-Dichloroethane-d4 (Surr)
BFB = 4-Bromofluorobenzene (Surr)
TOL = Toluene-d8 (Surr)

Method: 624 - Volatile Organic Compounds (GC/MS)

Matrix: Water **Prep Type: Total/NA**

		Percent Surrogate Recovery (Acceptance Limits)		
		12DCE	BFB	TOL
Lab Sample ID	Client Sample ID	(72-130)	(69-121)	(70-123)
480-68692-3	TB1	104	98	98
LCS 480-206699/6	Lab Control Sample	100	101	101
MB 480-206699/8	Method Blank	104	101	99

Surrogate Legend

12DCE = 1,2-Dichloroethane-d4 (Surr)
BFB = 4-Bromofluorobenzene (Surr)
TOL = Toluene-d8 (Surr)

Method: 624 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 480-206699/8
Matrix: Water
Analysis Batch: 206699

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	ND		5.0	0.39	ug/L			10/08/14 23:03	1
1,1,2,2-Tetrachloroethane	ND		5.0	0.26	ug/L			10/08/14 23:03	1
1,1,2-Trichloroethane	ND		5.0	0.48	ug/L			10/08/14 23:03	1
1,1-Dichloroethane	ND		5.0	0.59	ug/L			10/08/14 23:03	1
1,1-Dichloroethene	ND		5.0	0.85	ug/L			10/08/14 23:03	1
1,2-Dichlorobenzene	ND		5.0	0.44	ug/L			10/08/14 23:03	1
1,2-Dichloroethane	ND		5.0	0.60	ug/L			10/08/14 23:03	1
1,2-Dichloropropane	ND		5.0	0.61	ug/L			10/08/14 23:03	1
1,3-Dichlorobenzene	ND		5.0	0.54	ug/L			10/08/14 23:03	1
1,4-Dichlorobenzene	ND		5.0	0.51	ug/L			10/08/14 23:03	1
2-Chloroethyl vinyl ether	ND		25	1.9	ug/L			10/08/14 23:03	1
Benzene	ND		5.0	0.60	ug/L			10/08/14 23:03	1
Bromodichloromethane	ND		5.0	0.54	ug/L			10/08/14 23:03	1
Bromoform	ND		5.0	0.47	ug/L			10/08/14 23:03	1
Bromomethane	ND		5.0	1.2	ug/L			10/08/14 23:03	1
Carbon tetrachloride	ND		5.0	0.51	ug/L			10/08/14 23:03	1
Chlorobenzene	ND		5.0	0.48	ug/L			10/08/14 23:03	1
Chloroethane	ND		5.0	0.87	ug/L			10/08/14 23:03	1
Chloroform	ND		5.0	0.54	ug/L			10/08/14 23:03	1
Chloromethane	ND		5.0	0.64	ug/L			10/08/14 23:03	1
cis-1,2-Dichloroethene	ND		5.0	0.57	ug/L			10/08/14 23:03	1
cis-1,3-Dichloropropene	ND		5.0	0.33	ug/L			10/08/14 23:03	1
Dibromochloromethane	ND		5.0	0.41	ug/L			10/08/14 23:03	1
Dichlorodifluoromethane	ND		5.0	0.28	ug/L			10/08/14 23:03	1
Ethylbenzene	ND		5.0	0.46	ug/L			10/08/14 23:03	1
Methylene Chloride	ND		5.0	0.81	ug/L			10/08/14 23:03	1
m-Xylene & p-Xylene	ND		10	1.1	ug/L			10/08/14 23:03	1
o-Xylene	ND		5.0	0.43	ug/L			10/08/14 23:03	1
Tetrachloroethene	ND		5.0	0.34	ug/L			10/08/14 23:03	1
Toluene	ND		5.0	0.45	ug/L			10/08/14 23:03	1
trans-1,2-Dichloroethene	ND		5.0	0.59	ug/L			10/08/14 23:03	1
trans-1,3-Dichloropropene	ND		5.0	0.44	ug/L			10/08/14 23:03	1
Trichloroethene	ND		5.0	0.60	ug/L			10/08/14 23:03	1
Trichlorofluoromethane	ND		5.0	0.45	ug/L			10/08/14 23:03	1
Vinyl chloride	ND		5.0	0.75	ug/L			10/08/14 23:03	1
Xylenes, Total	ND		10	1.1	ug/L			10/08/14 23:03	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*104*		*72 - 130*		*10/08/14 23:03*	*1*
4-Bromofluorobenzene (Surr)	*101*		*69 - 121*		*10/08/14 23:03*	*1*
Toluene-d8 (Surr)	*99*		*70 - 123*		*10/08/14 23:03*	*1*

Lab Sample ID: LCS 480-206699/6
Matrix: Water
Analysis Batch: 206699

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1,1-Trichloroethane	20.0	18.6		ug/L		93	52 - 162

Method: 624 - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 480-206699/6
Matrix: Water
Analysis Batch: 206699

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
1,1,2,2-Tetrachloroethane	20.0	18.8		ug/L		94	46 - 157
1,1,2-Trichloroethane	20.0	18.6		ug/L		93	52 - 150
1,1-Dichloroethane	20.0	19.6		ug/L		98	59 - 155
1,1-Dichloroethene	20.0	18.6		ug/L		93	1 - 234
1,2-Dichlorobenzene	20.0	19.6		ug/L		98	18 - 190
1,2-Dichloroethane	20.0	19.1		ug/L		96	49 - 155
1,2-Dichloropropane	20.0	18.4		ug/L		92	1 - 210
1,3-Dichlorobenzene	20.0	19.3		ug/L		97	59 - 156
1,4-Dichlorobenzene	20.0	19.2		ug/L		96	18 - 190
2-Chloroethyl vinyl ether	20.0	17.0	J	ug/L		85	1 - 305
Benzene	20.0	19.6		ug/L		98	37 - 151
Bromodichloromethane	20.0	18.1		ug/L		91	35 - 155
Bromoform	20.0	17.4		ug/L		87	45 - 169
Bromomethane	20.0	24.4		ug/L		122	1 - 242
Carbon tetrachloride	20.0	18.1		ug/L		91	70 - 140
Chlorobenzene	20.0	19.1		ug/L		96	37 - 160
Chloroethane	20.0	22.3		ug/L		111	14 - 230
Chloroform	20.0	19.4		ug/L		97	51 - 138
Chloromethane	20.0	19.2		ug/L		96	1 - 273
cis-1,2-Dichloroethene	20.0	19.6		ug/L		98	
cis-1,3-Dichloropropene	20.0	18.4		ug/L		92	1 - 227
Dibromochloromethane	20.0	18.3		ug/L		91	53 - 149
Dichlorodifluoromethane	20.0	17.2		ug/L		86	
Ethylbenzene	20.0	20.1		ug/L		100	37 - 162
Methylene Chloride	20.0	18.4		ug/L		92	1 - 221
m-Xylene & p-Xylene	20.0	19.5		ug/L		97	79 - 120
o-Xylene	20.0	20.8		ug/L		104	79 - 120
Tetrachloroethene	20.0	18.5		ug/L		92	64 - 148
Toluene	20.0	19.5		ug/L		98	47 - 150
trans-1,2-Dichloroethene	20.0	19.4		ug/L		97	54 - 156
trans-1,3-Dichloropropene	20.0	19.6		ug/L		98	17 - 183
Trichloroethene	20.0	19.0		ug/L		95	71 - 157
Trichlorofluoromethane	20.0	18.8		ug/L		94	17 - 181
Vinyl chloride	20.0	18.4		ug/L		92	1 - 251

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*100*		*72 - 130*
4-Bromofluorobenzene (Surr)	*101*		*69 - 121*
Toluene-d8 (Surr)	*101*		*70 - 123*

Method: 6010C - Metals (ICP)

Lab Sample ID: MB 480-206499/1-A
Matrix: Water
Analysis Batch: 207036

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 206499

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		0.20	0.060	mg/L		10/08/14 08:55	10/09/14 13:26	1

Method: 6010C - Metals (ICP) (Continued)

Lab Sample ID: MB 480-206499/1-A
Matrix: Water
Analysis Batch: 207036

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 206499

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Antimony	ND		0.020	0.0068	mg/L		10/08/14 08:55	10/09/14 13:26	1
Arsenic	ND		0.015	0.0056	mg/L		10/08/14 08:55	10/09/14 13:26	1
Barium	ND		0.0020	0.00070	mg/L		10/08/14 08:55	10/09/14 13:26	1
Beryllium	ND		0.0020	0.00030	mg/L		10/08/14 08:55	10/09/14 13:26	1
Boron	ND		0.020	0.0040	mg/L		10/08/14 08:55	10/09/14 13:26	1
Cadmium	ND		0.0020	0.00050	mg/L		10/08/14 08:55	10/09/14 13:26	1
Calcium	ND		0.50	0.10	mg/L		10/08/14 08:55	10/09/14 13:26	1
Chromium	ND		0.0040	0.0010	mg/L		10/08/14 08:55	10/09/14 13:26	1
Copper	ND		0.010	0.0016	mg/L		10/08/14 08:55	10/09/14 13:26	1
Iron	0.0326	J	0.050	0.019	mg/L		10/08/14 08:55	10/09/14 13:26	1
Lead	ND		0.010	0.0030	mg/L		10/08/14 08:55	10/09/14 13:26	1
Magnesium	ND		0.20	0.043	mg/L		10/08/14 08:55	10/09/14 13:26	1
Manganese	ND		0.0030	0.00040	mg/L		10/08/14 08:55	10/09/14 13:26	1
Nickel	ND		0.010	0.0013	mg/L		10/08/14 08:55	10/09/14 13:26	1
Potassium	ND		0.50	0.10	mg/L		10/08/14 08:55	10/09/14 13:26	1
Selenium	ND		0.025	0.0087	mg/L		10/08/14 08:55	10/09/14 13:26	1
Silver	ND		0.0060	0.0017	mg/L		10/08/14 08:55	10/09/14 13:26	1
Sodium	ND		1.0	0.32	mg/L		10/08/14 08:55	10/09/14 13:26	1
Thallium	ND		0.020	0.010	mg/L		10/08/14 08:55	10/09/14 13:26	1
Zinc	0.00455	J	0.010	0.0015	mg/L		10/08/14 08:55	10/09/14 13:26	1

Lab Sample ID: LCS 480-206499/2-A
Matrix: Water
Analysis Batch: 206924

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 206499

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	10.0	8.95		mg/L		89	80 - 120
Antimony	0.200	0.192		mg/L		96	80 - 120
Arsenic	0.201	0.184		mg/L		92	80 - 120
Barium	0.200	0.217		mg/L		108	80 - 120
Beryllium	0.201	0.197		mg/L		98	80 - 120
Cadmium	0.201	0.188		mg/L		94	80 - 120
Chromium	0.201	0.188		mg/L		94	80 - 120
Copper	0.201	0.214		mg/L		107	80 - 120
Iron	10.0	9.07		mg/L		91	80 - 120
Lead	0.201	0.187		mg/L		93	80 - 120
Magnesium	10.0	10.2		mg/L		101	80 - 120
Manganese	0.201	0.202		mg/L		101	80 - 120
Nickel	0.201	0.183		mg/L		91	80 - 120
Potassium	10.0	9.25		mg/L		92	80 - 120
Selenium	0.201	0.189		mg/L		94	80 - 120
Silver	0.0500	0.0528		mg/L		106	80 - 120
Sodium	10.0	9.32		mg/L		93	80 - 120
Zinc	0.201	0.206		mg/L		103	80 - 120

Method: 6010C - Metals (ICP) (Continued)

Lab Sample ID: LCS 480-206499/2-A
Matrix: Water
Analysis Batch: 207036

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 206499

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Boron	0.200	0.201		mg/L		100	80 - 120
Calcium	10.0	9.78		mg/L		98	80 - 120
Thallium	0.200	0.206		mg/L		103	80 - 120

Lab Sample ID: MB 480-206494/1-A
Matrix: Water
Analysis Batch: 206785

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 206494

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Aluminum	ND		0.20	0.060	mg/L		10/08/14 08:57	10/08/14 23:14	1
Antimony	ND		0.020	0.0068	mg/L		10/08/14 08:57	10/08/14 23:14	1
Arsenic	ND		0.015	0.0056	mg/L		10/08/14 08:57	10/08/14 23:14	1
Barium	ND		0.0020	0.00070	mg/L		10/08/14 08:57	10/08/14 23:14	1
Beryllium	ND		0.0020	0.00030	mg/L		10/08/14 08:57	10/08/14 23:14	1
Cadmium	ND		0.0020	0.00050	mg/L		10/08/14 08:57	10/08/14 23:14	1
Calcium	ND		0.50	0.10	mg/L		10/08/14 08:57	10/08/14 23:14	1
Chromium	ND		0.0040	0.0010	mg/L		10/08/14 08:57	10/08/14 23:14	1
Copper	0.00182	J	0.010	0.0016	mg/L		10/08/14 08:57	10/08/14 23:14	1
Iron	ND		0.050	0.019	mg/L		10/08/14 08:57	10/08/14 23:14	1
Lead	ND		0.010	0.0030	mg/L		10/08/14 08:57	10/08/14 23:14	1
Magnesium	ND		0.20	0.043	mg/L		10/08/14 08:57	10/08/14 23:14	1
Manganese	ND		0.0030	0.00040	mg/L		10/08/14 08:57	10/08/14 23:14	1
Nickel	ND		0.010	0.0013	mg/L		10/08/14 08:57	10/08/14 23:14	1
Potassium	ND		0.50	0.10	mg/L		10/08/14 08:57	10/08/14 23:14	1
Selenium	ND		0.025	0.0087	mg/L		10/08/14 08:57	10/08/14 23:14	1
Silver	ND		0.0060	0.0017	mg/L		10/08/14 08:57	10/08/14 23:14	1
Thallium	ND		0.020	0.010	mg/L		10/08/14 08:57	10/08/14 23:14	1
Zinc	0.00545	J	0.010	0.0015	mg/L		10/08/14 08:57	10/08/14 23:14	1

Lab Sample ID: MB 480-206494/1-A
Matrix: Water
Analysis Batch: 207038

Client Sample ID: Method Blank
Prep Type: Total Recoverable
Prep Batch: 206494

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Boron	0.0104	J	0.020	0.0040	mg/L		10/08/14 08:57	10/09/14 14:13	1
Sodium	ND		1.0	0.32	mg/L		10/08/14 08:57	10/09/14 14:13	1

Lab Sample ID: LCS 480-206494/2-A
Matrix: Water
Analysis Batch: 206785

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 206494

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Aluminum	10.0	8.81		mg/L		88	80 - 120
Antimony	0.200	0.191		mg/L		96	80 - 120
Arsenic	0.201	0.181		mg/L		90	80 - 120
Barium	0.200	0.213		mg/L		106	80 - 120
Beryllium	0.201	0.192		mg/L		96	80 - 120
Cadmium	0.201	0.185		mg/L		92	80 - 120
Calcium	10.0	8.46		mg/L		84	80 - 120

Method: 6010C - Metals (ICP) (Continued)

Lab Sample ID: LCS 480-206494/2-A
Matrix: Water
Analysis Batch: 206785

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 206494

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium	0.201	0.182		mg/L		91	80 - 120
Copper	0.201	0.201		mg/L		100	80 - 120
Iron	10.0	8.88		mg/L		89	80 - 120
Lead	0.201	0.182		mg/L		91	80 - 120
Magnesium	10.0	9.86		mg/L		99	80 - 120
Manganese	0.201	0.198		mg/L		99	80 - 120
Nickel	0.201	0.181		mg/L		90	80 - 120
Potassium	10.0	9.19		mg/L		92	80 - 120
Selenium	0.201	0.180		mg/L		90	80 - 120
Silver	0.0500	0.0513		mg/L		103	80 - 120
Thallium	0.200	0.199		mg/L		100	80 - 120
Zinc	0.201	0.196		mg/L		98	80 - 120

Lab Sample ID: LCS 480-206494/2-A
Matrix: Water
Analysis Batch: 207038

Client Sample ID: Lab Control Sample
Prep Type: Total Recoverable
Prep Batch: 206494

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Boron	0.200	0.209		mg/L		104	80 - 120
Sodium	10.0	9.51		mg/L		95	80 - 120

Method: 7470A - Mercury (CVAA)

Lab Sample ID: MB 480-206574/1-A
Matrix: Water
Analysis Batch: 206912

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 206574

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		10/08/14 10:50	10/09/14 11:15	1

Lab Sample ID: LCS 480-206574/2-A
Matrix: Water
Analysis Batch: 206912

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 206574

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.00667	0.00712		mg/L		107	80 - 120

Lab Sample ID: MB 480-207374/1-A
Matrix: Water
Analysis Batch: 207557

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 207374

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Mercury	ND		0.00020	0.00012	mg/L		10/13/14 08:55	10/13/14 13:32	1

Method: 7470A - Mercury (CVAA) (Continued)

Lab Sample ID: LCS 480-207374/2-A
Matrix: Water
Analysis Batch: 207557

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 207374

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	0.00667	0.00710		mg/L		106	80 - 120

Lab Sample ID: 480-68692-1 MS
Matrix: Ground Water
Analysis Batch: 207557

Client Sample ID: PZ-14-5
Prep Type: Dissolved
Prep Batch: 207374

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Mercury	ND		0.00667	0.00685		mg/L		103	80 - 120

Lab Sample ID: 480-68692-1 MSD
Matrix: Ground Water
Analysis Batch: 207557

Client Sample ID: PZ-14-5
Prep Type: Dissolved
Prep Batch: 207374

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Mercury	ND		0.00667	0.00675		mg/L		101	80 - 120	1	20

Method: 180.1 - Turbidity, Nephelometric

Lab Sample ID: MB 480-206480/3
Matrix: Water
Analysis Batch: 206480

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Turbidity	ND		1.0	1.0	NTU			10/07/14 23:00	1

Lab Sample ID: 480-68692-1 DU
Matrix: Ground Water
Analysis Batch: 206480

Client Sample ID: PZ-14-5
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Turbidity	240		247		NTU		3	20

Method: 300.0 - Anions, Ion Chromatography

Lab Sample ID: MB 240-150879/27
Matrix: Water
Analysis Batch: 150879

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chloride	ND		0.50	0.41	mg/L			10/10/14 01:10	1
Sulfate	ND		2.0	0.13	mg/L			10/10/14 01:10	1

Lab Sample ID: LCS 240-150879/28
Matrix: Water
Analysis Batch: 150879

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	50.0	47.7		mg/L		95	90 - 110
Sulfate	50.0	47.3		mg/L		95	90 - 110

Method: 300.0 - Anions, Ion Chromatography (Continued)

Lab Sample ID: 480-68692-1 MS
Matrix: Ground Water
Analysis Batch: 150879

Client Sample ID: PZ-14-5
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chloride	79		50.0	128		mg/L		98	80 - 120
Sulfate	30		50.0	80.2		mg/L		100	80 - 120

Lab Sample ID: 480-68692-1 MSD
Matrix: Ground Water
Analysis Batch: 150879

Client Sample ID: PZ-14-5
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MSD Result	MSD Qualifier	Unit	D	%Rec	%Rec. Limits	RPD	RPD Limit
Chloride	79		50.0	123		mg/L		88	80 - 120	4	20
Sulfate	30		50.0	77.2		mg/L		94	80 - 120	4	20

Method: 310.2 - Alkalinity

Lab Sample ID: MB 480-207719/185
Matrix: Water
Analysis Batch: 207719

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total	ND		10	4.0	mg/L			10/14/14 15:04	1

Lab Sample ID: MB 480-207719/192
Matrix: Water
Analysis Batch: 207719

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total	ND		10	4.0	mg/L			10/14/14 15:06	1

Lab Sample ID: MB 480-207719/203
Matrix: Water
Analysis Batch: 207719

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total	4.00	J	10	4.0	mg/L			10/14/14 15:17	1

Lab Sample ID: LCS 480-207719/186
Matrix: Water
Analysis Batch: 207719

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity, Total	50.0	51.4		mg/L		103	90 - 110

Lab Sample ID: LCS 480-207719/193
Matrix: Water
Analysis Batch: 207719

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity, Total	50.0	51.0		mg/L		102	90 - 110

Method: 310.2 - Alkalinity (Continued)

Lab Sample ID: LCS 480-207719/204
Matrix: Water
Analysis Batch: 207719

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity, Total	50.0	50.2		mg/L		100	90 - 110

Lab Sample ID: MB 480-207973/12
Matrix: Water
Analysis Batch: 207973

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total	5.07	J	10	4.0	mg/L			10/15/14 08:34	1

Lab Sample ID: MB 480-207973/26
Matrix: Water
Analysis Batch: 207973

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Alkalinity, Total	4.34	J	10	4.0	mg/L			10/15/14 08:38	1

Lab Sample ID: LCS 480-207973/13
Matrix: Water
Analysis Batch: 207973

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity, Total	50.0	52.6		mg/L		105	90 - 110

Lab Sample ID: LCS 480-207973/27
Matrix: Water
Analysis Batch: 207973

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Alkalinity, Total	50.0	51.5		mg/L		103	90 - 110

Method: 350.1 - Nitrogen, Ammonia

Lab Sample ID: MB 480-206737/123
Matrix: Water
Analysis Batch: 206737

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	ND		0.020	0.0090	mg/L			10/09/14 00:39	1

Lab Sample ID: MB 480-206737/3
Matrix: Water
Analysis Batch: 206737

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	0.00905	J	0.020	0.0090	mg/L			10/08/14 22:54	1

Method: 350.1 - Nitrogen, Ammonia (Continued)

Lab Sample ID: MB 480-206737/75
Matrix: Water
Analysis Batch: 206737

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	0.0111	J	0.020	0.0090	mg/L			10/08/14 23:56	1

Lab Sample ID: MB 480-206737/99
Matrix: Water
Analysis Batch: 206737

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Ammonia	0.00994	J	0.020	0.0090	mg/L			10/09/14 00:18	1

Lab Sample ID: LCS 480-206737/100
Matrix: Water
Analysis Batch: 206737

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Ammonia	1.00	0.990		mg/L		99	90 - 110

Lab Sample ID: LCS 480-206737/124
Matrix: Water
Analysis Batch: 206737

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Ammonia	1.00	0.989		mg/L		99	90 - 110

Lab Sample ID: LCS 480-206737/4
Matrix: Water
Analysis Batch: 206737

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Ammonia	1.00	0.997		mg/L		100	90 - 110

Lab Sample ID: LCS 480-206737/76
Matrix: Water
Analysis Batch: 206737

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Ammonia	1.00	0.990		mg/L		99	90 - 110

Method: 351.2 - Nitrogen, Total Kjeldahl

Lab Sample ID: MB 480-206899/1-A
Matrix: Water
Analysis Batch: 207003

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 206899

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Kjeldahl Nitrogen	ND		0.20	0.15	mg/L		10/09/14 09:14	10/09/14 18:23	1

Method: 351.2 - Nitrogen, Total Kjeldahl (Continued)

Lab Sample ID: LCS 480-206899/2-A
Matrix: Water
Analysis Batch: 207003

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 206899

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Kjeldahl Nitrogen	2.50	2.59		mg/L		104	90 - 110

Method: 410.4 - COD

Lab Sample ID: MB 480-208155/27
Matrix: Water
Analysis Batch: 208155

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chemical Oxygen Demand	8.34	J	10	5.0	mg/L			10/16/14 09:12	1

Lab Sample ID: MB 480-208155/3
Matrix: Water
Analysis Batch: 208155

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chemical Oxygen Demand	ND		10	5.0	mg/L			10/16/14 09:12	1

Lab Sample ID: MB 480-208155/51
Matrix: Water
Analysis Batch: 208155

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chemical Oxygen Demand	7.37	J	10	5.0	mg/L			10/16/14 09:12	1

Lab Sample ID: LCS 480-208155/28
Matrix: Water
Analysis Batch: 208155

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chemical Oxygen Demand	25.0	26.7		mg/L		107	90 - 110

Lab Sample ID: LCS 480-208155/4
Matrix: Water
Analysis Batch: 208155

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chemical Oxygen Demand	25.0	25.1		mg/L		100	90 - 110

Lab Sample ID: LCS 480-208155/52
Matrix: Water
Analysis Batch: 208155

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chemical Oxygen Demand	25.0	22.5		mg/L		90	90 - 110

Method: 7196A - Chromium, Hexavalent

Lab Sample ID: MB 480-206384/3
Matrix: Water
Analysis Batch: 206384

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Chromium, hexavalent	ND		0.010	0.0050	mg/L			10/07/14 11:08	1

Lab Sample ID: LCS 480-206384/4
Matrix: Water
Analysis Batch: 206384

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium, hexavalent	0.0500	0.0520		mg/L		104	85 - 115

Lab Sample ID: 480-68692-2 MS
Matrix: Ground Water
Analysis Batch: 206384

Client Sample ID: PZ-14-3
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	Spike Added	MS Result	MS Qualifier	Unit	D	%Rec	%Rec. Limits
Chromium, hexavalent	ND		0.0500	0.103	F1	mg/L		205	85 - 115

Method: 9012B - Cyanide, Total andor Amenable

Lab Sample ID: MB 480-207517/1-A
Matrix: Water
Analysis Batch: 207541

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 207517

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Cyanide, Total	ND	^	0.010	0.0050	mg/L		10/13/14 15:25	10/13/14 22:41	1

Lab Sample ID: LCS 480-207517/2-A
Matrix: Water
Analysis Batch: 207541

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 207517

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Cyanide, Total	0.250	0.232		mg/L		93	90 - 110

Method: 9060A - Organic Carbon, Total (TOC)

Lab Sample ID: MB 480-207429/27
Matrix: Water
Analysis Batch: 207429

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Organic Carbon	ND		1.0	0.43	mg/L			10/12/14 04:47	1

Lab Sample ID: LCS 480-207429/28
Matrix: Water
Analysis Batch: 207429

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Organic Carbon	60.0	60.8		mg/L		101	90 - 110

Method: 9066 - Phenolics, Total Recoverable

Lab Sample ID: MB 480-206888/1-A
Matrix: Water
Analysis Batch: 207542

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 206888

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Phenolics, Total Recoverable	ND		0.010	0.0050	mg/L		10/09/14 09:30	10/13/14 19:12	1

Lab Sample ID: LCS 480-206888/2-A
Matrix: Water
Analysis Batch: 207542

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 206888

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Phenolics, Total Recoverable	0.100	0.106		mg/L		106	90 - 110

Method: SM 2120B - Color, Colorimetric

Lab Sample ID: MB 480-206725/3
Matrix: Water
Analysis Batch: 206725

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	RL	Unit	D	Prepared	Analyzed	Dil Fac
Color	ND		5.0	5.0	Color Units			10/07/14 23:20	1

Lab Sample ID: LCS 480-206725/4
Matrix: Water
Analysis Batch: 206725

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Color	30.0	30.0		Color Units		100	90 - 110

Lab Sample ID: 480-68692-1 DU
Matrix: Ground Water
Analysis Batch: 206725

Client Sample ID: PZ-14-5
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Color	ND		ND		Color Units		NC	20

Method: SM 2340C - Hardness, Total (mg/l as CaC03)

Lab Sample ID: MB 480-206969/51
Matrix: Water
Analysis Batch: 206969

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hardness	ND		2.0	0.53	mg/L			10/09/14 11:55	1

Lab Sample ID: MB 480-206969/75
Matrix: Water
Analysis Batch: 206969

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Hardness	ND		2.0	0.53	mg/L			10/09/14 11:55	1

Method: SM 2340C - Hardness, Total (mg/l as CaC03) (Continued)

Lab Sample ID: LCS 480-206969/52
Matrix: Water
Analysis Batch: 206969

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Hardness	298	288		mg/L		97	90 - 110

Lab Sample ID: LCS 480-206969/76
Matrix: Water
Analysis Batch: 206969

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Hardness	298	284		mg/L		95	90 - 110

Method: SM 2540C - Solids, Total Dissolved (TDS)

Lab Sample ID: MB 480-207217/1
Matrix: Water
Analysis Batch: 207217

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		10	4.0	mg/L			10/10/14 23:57	1

Lab Sample ID: LCS 480-207217/2
Matrix: Water
Analysis Batch: 207217

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	504	500		mg/L		99	85 - 115

Lab Sample ID: MB 480-207341/1
Matrix: Water
Analysis Batch: 207341

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Total Dissolved Solids	ND		10	4.0	mg/L			10/13/14 00:14	1

Lab Sample ID: LCS 480-207341/2
Matrix: Water
Analysis Batch: 207341

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Total Dissolved Solids	504	512		mg/L		102	85 - 115

Method: SM 5210B - BOD, 5-Day

Lab Sample ID: USB 480-206522/1
Matrix: Water
Analysis Batch: 206522

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	USB Result	USB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Biochemical Oxygen Demand	ND		2.0	2.0	mg/L			10/07/14 23:53	1

Method: SM 5210B - BOD, 5-Day (Continued)

Lab Sample ID: LCS 480-206522/2
Matrix: Water
Analysis Batch: 206522

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec. Limits
Biochemical Oxygen Demand	198	215		mg/L		109	85 - 115

Lab Sample ID: 480-68692-2 DU
Matrix: Ground Water
Analysis Batch: 206522

Client Sample ID: PZ-14-3
Prep Type: Total/NA

Analyte	Sample Result	Sample Qualifier	DU Result	DU Qualifier	Unit	D	RPD	RPD Limit
Biochemical Oxygen Demand	ND		5.02		mg/L		NC	20

GC/MS VOA

Analysis Batch: 206699

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-1	PZ-14-5	Total/NA	Ground Water	624	
480-68692-2	PZ-14-3	Total/NA	Ground Water	624	
480-68692-3	TB1	Total/NA	Water	624	
LCS 480-206699/6	Lab Control Sample	Total/NA	Water	624	
MB 480-206699/8	Method Blank	Total/NA	Water	624	

Metals

Prep Batch: 206494

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-1	PZ-14-5	Dissolved	Ground Water	3005A	
480-68692-2	PZ-14-3	Dissolved	Ground Water	3005A	
LCS 480-206494/2-A	Lab Control Sample	Total Recoverable	Water	3005A	
MB 480-206494/1-A	Method Blank	Total Recoverable	Water	3005A	

Prep Batch: 206499

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-1	PZ-14-5	Total/NA	Ground Water	3005A	
480-68692-2	PZ-14-3	Total/NA	Ground Water	3005A	
LCS 480-206499/2-A	Lab Control Sample	Total/NA	Water	3005A	
MB 480-206499/1-A	Method Blank	Total/NA	Water	3005A	

Prep Batch: 206574

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-1	PZ-14-5	Total/NA	Ground Water	7470A	
480-68692-2	PZ-14-3	Total/NA	Ground Water	7470A	
LCS 480-206574/2-A	Lab Control Sample	Total/NA	Water	7470A	
MB 480-206574/1-A	Method Blank	Total/NA	Water	7470A	

Analysis Batch: 206785

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-1	PZ-14-5	Dissolved	Ground Water	6010C	206494
480-68692-2	PZ-14-3	Dissolved	Ground Water	6010C	206494
LCS 480-206494/2-A	Lab Control Sample	Total Recoverable	Water	6010C	206494
MB 480-206494/1-A	Method Blank	Total Recoverable	Water	6010C	206494

Analysis Batch: 206912

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-1	PZ-14-5	Total/NA	Ground Water	7470A	206574
480-68692-2	PZ-14-3	Total/NA	Ground Water	7470A	206574
LCS 480-206574/2-A	Lab Control Sample	Total/NA	Water	7470A	206574
MB 480-206574/1-A	Method Blank	Total/NA	Water	7470A	206574

Analysis Batch: 206924

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-1	PZ-14-5	Total/NA	Ground Water	6010C	206499
480-68692-2	PZ-14-3	Total/NA	Ground Water	6010C	206499
LCS 480-206499/2-A	Lab Control Sample	Total/NA	Water	6010C	206499

Metals (Continued)

Analysis Batch: 207036

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-1	PZ-14-5	Total/NA	Ground Water	6010C	206499
480-68692-2	PZ-14-3	Total/NA	Ground Water	6010C	206499
LCS 480-206499/2-A	Lab Control Sample	Total/NA	Water	6010C	206499
MB 480-206499/1-A	Method Blank	Total/NA	Water	6010C	206499

Analysis Batch: 207038

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-1	PZ-14-5	Dissolved	Ground Water	6010C	206494
480-68692-2	PZ-14-3	Dissolved	Ground Water	6010C	206494
LCS 480-206494/2-A	Lab Control Sample	Total Recoverable	Water	6010C	206494
MB 480-206494/1-A	Method Blank	Total Recoverable	Water	6010C	206494

Prep Batch: 207374

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-1	PZ-14-5	Dissolved	Ground Water	7470A	
480-68692-1 MS	PZ-14-5	Dissolved	Ground Water	7470A	
480-68692-1 MSD	PZ-14-5	Dissolved	Ground Water	7470A	
480-68692-2	PZ-14-3	Dissolved	Ground Water	7470A	
LCS 480-207374/2-A	Lab Control Sample	Total/NA	Water	7470A	
MB 480-207374/1-A	Method Blank	Total/NA	Water	7470A	

Analysis Batch: 207557

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-1	PZ-14-5	Dissolved	Ground Water	7470A	207374
480-68692-1 MS	PZ-14-5	Dissolved	Ground Water	7470A	207374
480-68692-1 MSD	PZ-14-5	Dissolved	Ground Water	7470A	207374
480-68692-2	PZ-14-3	Dissolved	Ground Water	7470A	207374
LCS 480-207374/2-A	Lab Control Sample	Total/NA	Water	7470A	207374
MB 480-207374/1-A	Method Blank	Total/NA	Water	7470A	207374

General Chemistry

Analysis Batch: 150879

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-1	PZ-14-5	Total/NA	Ground Water	300.0	
480-68692-1 MS	PZ-14-5	Total/NA	Ground Water	300.0	
480-68692-1 MSD	PZ-14-5	Total/NA	Ground Water	300.0	
480-68692-2	PZ-14-3	Total/NA	Ground Water	300.0	
LCS 240-150879/28	Lab Control Sample	Total/NA	Water	300.0	
MB 240-150879/27	Method Blank	Total/NA	Water	300.0	

Analysis Batch: 206384

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-1	PZ-14-5	Total/NA	Ground Water	7196A	
480-68692-2	PZ-14-3	Total/NA	Ground Water	7196A	
480-68692-2 MS	PZ-14-3	Total/NA	Ground Water	7196A	
LCS 480-206384/4	Lab Control Sample	Total/NA	Water	7196A	
MB 480-206384/3	Method Blank	Total/NA	Water	7196A	

General Chemistry (Continued)

Analysis Batch: 206477

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-1	PZ-14-5	Total/NA	Ground Water	353.2	
480-68692-2	PZ-14-3	Total/NA	Ground Water	353.2	

Analysis Batch: 206480

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-1	PZ-14-5	Total/NA	Ground Water	180.1	
480-68692-1 DU	PZ-14-5	Total/NA	Ground Water	180.1	
480-68692-2	PZ-14-3	Total/NA	Ground Water	180.1	
LCS 480-206480/4	Lab Control Sample	Total/NA	Water	180.1	
MB 480-206480/3	Method Blank	Total/NA	Water	180.1	

Analysis Batch: 206522

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-1	PZ-14-5	Total/NA	Ground Water	SM 5210B	
480-68692-2	PZ-14-3	Total/NA	Ground Water	SM 5210B	
480-68692-2 DU	PZ-14-3	Total/NA	Ground Water	SM 5210B	
LCS 480-206522/2	Lab Control Sample	Total/NA	Water	SM 5210B	
USB 480-206522/1	Method Blank	Total/NA	Water	SM 5210B	

Analysis Batch: 206725

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-1	PZ-14-5	Total/NA	Ground Water	SM 2120B	
480-68692-1 DU	PZ-14-5	Total/NA	Ground Water	SM 2120B	
480-68692-2	PZ-14-3	Total/NA	Ground Water	SM 2120B	
LCS 480-206725/4	Lab Control Sample	Total/NA	Water	SM 2120B	
MB 480-206725/3	Method Blank	Total/NA	Water	SM 2120B	

Analysis Batch: 206737

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-1	PZ-14-5	Total/NA	Ground Water	350.1	
480-68692-2	PZ-14-3	Total/NA	Ground Water	350.1	
LCS 480-206737/100	Lab Control Sample	Total/NA	Water	350.1	
LCS 480-206737/124	Lab Control Sample	Total/NA	Water	350.1	
LCS 480-206737/4	Lab Control Sample	Total/NA	Water	350.1	
LCS 480-206737/76	Lab Control Sample	Total/NA	Water	350.1	
MB 480-206737/123	Method Blank	Total/NA	Water	350.1	
MB 480-206737/3	Method Blank	Total/NA	Water	350.1	
MB 480-206737/75	Method Blank	Total/NA	Water	350.1	
MB 480-206737/99	Method Blank	Total/NA	Water	350.1	

Prep Batch: 206888

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-1	PZ-14-5	Total/NA	Ground Water	Distill/Phenol	
480-68692-2	PZ-14-3	Total/NA	Ground Water	Distill/Phenol	
LCS 480-206888/2-A	Lab Control Sample	Total/NA	Water	Distill/Phenol	
MB 480-206888/1-A	Method Blank	Total/NA	Water	Distill/Phenol	

Prep Batch: 206899

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-1	PZ-14-5	Total/NA	Ground Water	351.2	
480-68692-2	PZ-14-3	Total/NA	Ground Water	351.2	

General Chemistry (Continued)

Prep Batch: 206899 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 480-206899/2-A	Lab Control Sample	Total/NA	Water	351.2	
MB 480-206899/1-A	Method Blank	Total/NA	Water	351.2	

Analysis Batch: 206969

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-1	PZ-14-5	Total/NA	Ground Water	SM 2340C	
480-68692-2	PZ-14-3	Total/NA	Ground Water	SM 2340C	
LCS 480-206969/52	Lab Control Sample	Total/NA	Water	SM 2340C	
LCS 480-206969/76	Lab Control Sample	Total/NA	Water	SM 2340C	
MB 480-206969/51	Method Blank	Total/NA	Water	SM 2340C	
MB 480-206969/75	Method Blank	Total/NA	Water	SM 2340C	

Analysis Batch: 207003

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-1	PZ-14-5	Total/NA	Ground Water	351.2	206899
480-68692-2	PZ-14-3	Total/NA	Ground Water	351.2	206899
LCS 480-206899/2-A	Lab Control Sample	Total/NA	Water	351.2	206899
MB 480-206899/1-A	Method Blank	Total/NA	Water	351.2	206899

Analysis Batch: 207217

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-1	PZ-14-5	Total/NA	Ground Water	SM 2540C	
LCS 480-207217/2	Lab Control Sample	Total/NA	Water	SM 2540C	
MB 480-207217/1	Method Blank	Total/NA	Water	SM 2540C	

Analysis Batch: 207341

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-2	PZ-14-3	Total/NA	Ground Water	SM 2540C	
LCS 480-207341/2	Lab Control Sample	Total/NA	Water	SM 2540C	
MB 480-207341/1	Method Blank	Total/NA	Water	SM 2540C	

Analysis Batch: 207429

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-1	PZ-14-5	Total/NA	Ground Water	9060A	
480-68692-2	PZ-14-3	Total/NA	Ground Water	9060A	
LCS 480-207429/28	Lab Control Sample	Total/NA	Water	9060A	
MB 480-207429/27	Method Blank	Total/NA	Water	9060A	

Prep Batch: 207517

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-1	PZ-14-5	Total/NA	Ground Water	9012B	
480-68692-2	PZ-14-3	Total/NA	Ground Water	9012B	
LCS 480-207517/2-A	Lab Control Sample	Total/NA	Water	9012B	
MB 480-207517/1-A	Method Blank	Total/NA	Water	9012B	

Analysis Batch: 207541

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-1	PZ-14-5	Total/NA	Ground Water	9012B	207517
480-68692-2	PZ-14-3	Total/NA	Ground Water	9012B	207517
LCS 480-207517/2-A	Lab Control Sample	Total/NA	Water	9012B	207517
MB 480-207517/1-A	Method Blank	Total/NA	Water	9012B	207517

General Chemistry (Continued)

Analysis Batch: 207542

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-1	PZ-14-5	Total/NA	Ground Water	9066	206888
480-68692-2	PZ-14-3	Total/NA	Ground Water	9066	206888
LCS 480-206888/2-A	Lab Control Sample	Total/NA	Water	9066	206888
MB 480-206888/1-A	Method Blank	Total/NA	Water	9066	206888

Analysis Batch: 207719

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-1	PZ-14-5	Total/NA	Ground Water	310.2	
LCS 480-207719/186	Lab Control Sample	Total/NA	Water	310.2	
LCS 480-207719/193	Lab Control Sample	Total/NA	Water	310.2	
LCS 480-207719/204	Lab Control Sample	Total/NA	Water	310.2	
MB 480-207719/185	Method Blank	Total/NA	Water	310.2	
MB 480-207719/192	Method Blank	Total/NA	Water	310.2	
MB 480-207719/203	Method Blank	Total/NA	Water	310.2	

Analysis Batch: 207973

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-2	PZ-14-3	Total/NA	Ground Water	310.2	
LCS 480-207973/13	Lab Control Sample	Total/NA	Water	310.2	
LCS 480-207973/27	Lab Control Sample	Total/NA	Water	310.2	
MB 480-207973/12	Method Blank	Total/NA	Water	310.2	
MB 480-207973/26	Method Blank	Total/NA	Water	310.2	

Analysis Batch: 208155

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
480-68692-1	PZ-14-5	Total/NA	Ground Water	410.4	
480-68692-2	PZ-14-3	Total/NA	Ground Water	410.4	
LCS 480-208155/28	Lab Control Sample	Total/NA	Water	410.4	
LCS 480-208155/4	Lab Control Sample	Total/NA	Water	410.4	
LCS 480-208155/52	Lab Control Sample	Total/NA	Water	410.4	
MB 480-208155/27	Method Blank	Total/NA	Water	410.4	
MB 480-208155/3	Method Blank	Total/NA	Water	410.4	
MB 480-208155/51	Method Blank	Total/NA	Water	410.4	

Client Sample ID: PZ-14-5

Lab Sample ID: 480-68692-1

Date Collected: 10/06/14 12:55

Matrix: Ground Water

Date Received: 10/07/14 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	206699	10/09/14 04:19	ABF	TAL BUF
Dissolved	Prep	3005A			206494	10/08/14 08:57	SLB	TAL BUF
Dissolved	Analysis	6010C		1	206785	10/08/14 23:45	LMH	TAL BUF
Dissolved	Prep	3005A			206494	10/08/14 08:57	SLB	TAL BUF
Dissolved	Analysis	6010C		1	207038	10/09/14 14:19	LMH	TAL BUF
Total/NA	Prep	3005A			206499	10/08/14 08:55	SLB	TAL BUF
Total/NA	Analysis	6010C		1	206924	10/08/14 19:13	AMH	TAL BUF
Total/NA	Prep	3005A			206499	10/08/14 08:55	SLB	TAL BUF
Total/NA	Analysis	6010C		1	207036	10/09/14 13:47	AMH	TAL BUF
Dissolved	Prep	7470A			207374	10/13/14 08:55	LRK	TAL BUF
Dissolved	Analysis	7470A		1	207557	10/13/14 13:40	LRK	TAL BUF
Total/NA	Prep	7470A			206574	10/08/14 10:50	LRK	TAL BUF
Total/NA	Analysis	7470A		1	206912	10/09/14 11:27	LRK	TAL BUF
Total/NA	Analysis	180.1		1	206480	10/07/14 23:00	CLT	TAL BUF
Total/NA	Analysis	300.0		1	150879	10/10/14 01:49	JMB	TAL CAN
Total/NA	Analysis	310.2		10	207719	10/14/14 15:18	NCH	TAL BUF
Total/NA	Analysis	350.1		10	206737	10/08/14 23:04	RS	TAL BUF
Total/NA	Prep	351.2			206899	10/09/14 09:14	LAW	TAL BUF
Total/NA	Analysis	351.2		5	207003	10/10/14 04:00	CLT	TAL BUF
Total/NA	Analysis	353.2		1	206477	10/07/14 21:59	RS	TAL BUF
Total/NA	Analysis	410.4		1	208155	10/16/14 09:12	KMF	TAL BUF
Total/NA	Analysis	7196A		1	206384	10/07/14 11:08	NCH	TAL BUF
Total/NA	Prep	9012B			207517	10/13/14 15:25	MDL	TAL BUF
Total/NA	Analysis	9012B		1	207541	10/13/14 22:55	RS	TAL BUF
Total/NA	Analysis	9060A		1	207429	10/12/14 08:34	MRF	TAL BUF
Total/NA	Prep	Distill/Phenol			206888	10/09/14 09:30	MRF	TAL BUF
Total/NA	Analysis	9066		1	207542	10/13/14 20:36	JMB	TAL BUF
Total/NA	Analysis	SM 2120B		1	206725	10/07/14 23:20	RS	TAL BUF
Total/NA	Analysis	SM 2340C		1	206969	10/09/14 11:55	KMF	TAL BUF
Total/NA	Analysis	SM 2540C		1	207217	10/10/14 23:57	JMB	TAL BUF
Total/NA	Analysis	SM 5210B		1	206522	10/07/14 23:53	LAW	TAL BUF

Client Sample ID: PZ-14-3

Lab Sample ID: 480-68692-2

Date Collected: 10/06/14 11:25

Matrix: Ground Water

Date Received: 10/07/14 09:00

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	206699	10/09/14 04:44	ABF	TAL BUF
Dissolved	Prep	3005A			206494	10/08/14 08:57	SLB	TAL BUF
Dissolved	Analysis	6010C		1	206785	10/08/14 23:47	LMH	TAL BUF
Dissolved	Prep	3005A			206494	10/08/14 08:57	SLB	TAL BUF
Dissolved	Analysis	6010C		1	207038	10/09/14 14:29	LMH	TAL BUF

Client: Sterling Environmental Engineering PC
Project/Site: Orange County Landfill

TestAmerica Job ID: 480-68692-1

Client Sample ID: PZ-14-3
Date Collected: 10/06/14 11:25
Date Received: 10/07/14 09:00

Lab Sample ID: 480-68692-2
Matrix: Ground Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Prep	3005A			206499	10/08/14 08:55	SLB	TAL BUF
Total/NA	Analysis	6010C		1	206924	10/08/14 19:15	AMH	TAL BUF
Total/NA	Prep	3005A			206499	10/08/14 08:55	SLB	TAL BUF
Total/NA	Analysis	6010C		1	207036	10/09/14 13:57	AMH	TAL BUF
Dissolved	Prep	7470A			207374	10/13/14 08:55	LRK	TAL BUF
Dissolved	Analysis	7470A		1	207557	10/13/14 13:47	LRK	TAL BUF
Total/NA	Prep	7470A			206574	10/08/14 10:50	LRK	TAL BUF
Total/NA	Analysis	7470A		1	206912	10/09/14 11:29	LRK	TAL BUF
Total/NA	Analysis	180.1		1	206480	10/07/14 23:00	CLT	TAL BUF
Total/NA	Analysis	300.0		1	150879	10/10/14 02:47	JMB	TAL CAN
Total/NA	Analysis	310.2		10	207973	10/15/14 08:45	NCH	TAL BUF
Total/NA	Analysis	350.1		5	206737	10/09/14 00:43	RS	TAL BUF
Total/NA	Prep	351.2			206899	10/09/14 09:14	LAW	TAL BUF
Total/NA	Analysis	351.2		2	207003	10/10/14 04:00	CLT	TAL BUF
Total/NA	Analysis	353.2		1	206477	10/07/14 22:00	RS	TAL BUF
Total/NA	Analysis	410.4		1	208155	10/16/14 09:12	KMF	TAL BUF
Total/NA	Analysis	7196A		1	206384	10/07/14 11:08	NCH	TAL BUF
Total/NA	Prep	9012B			207517	10/13/14 15:25	MDL	TAL BUF
Total/NA	Analysis	9012B		1	207541	10/13/14 22:56	RS	TAL BUF
Total/NA	Analysis	9060A		1	207429	10/12/14 09:02	MRF	TAL BUF
Total/NA	Prep	Distill/Phenol			206888	10/09/14 09:30	MRF	TAL BUF
Total/NA	Analysis	9066		1	207542	10/13/14 20:36	JMB	TAL BUF
Total/NA	Analysis	SM 2120B		1	206725	10/07/14 23:20	RS	TAL BUF
Total/NA	Analysis	SM 2340C		1	206969	10/09/14 11:55	KMF	TAL BUF
Total/NA	Analysis	SM 2540C		1	207341	10/13/14 00:14	VAJ	TAL BUF
Total/NA	Analysis	SM 5210B		1	206522	10/07/14 23:53	LAW	TAL BUF

Client Sample ID: TB1
Date Collected: 10/06/14 00:00
Date Received: 10/07/14 09:00

Lab Sample ID: 480-68692-3
Matrix: Water

Prep Type	Batch Type	Batch Method	Run	Dilution Factor	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624		1	206699	10/09/14 05:09	ABF	TAL BUF

Laboratory References:

TAL BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

TAL CAN = TestAmerica Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

Laboratory: TestAmerica Buffalo

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Arkansas DEQ	State Program	6	88-0686	07-06-15
California	State Program	9	1169CA	09-30-14 *
Connecticut	State Program	1	PH-0568	09-30-14 *
Florida	NELAP	4	E87672	06-30-15
Georgia	State Program	4	N/A	03-31-15
Georgia	State Program	4	956	03-31-15
Illinois	NELAP	5	200003	09-30-14 *
Iowa	State Program	7	374	03-01-15
Kansas	NELAP	7	E-10187	01-31-15
Kentucky (DW)	State Program	4	90029	12-31-14
Kentucky (UST)	State Program	4	30	03-31-15
Louisiana	NELAP	6	02031	06-30-14 *
Maine	State Program	1	NY00044	12-04-14
Maryland	State Program	3	294	03-31-15
Massachusetts	State Program	1	M-NY044	06-30-15
Michigan	State Program	5	9937	03-31-15
Minnesota	NELAP	5	036-999-337	12-31-14
New Hampshire	NELAP	1	2337	11-17-14
New Jersey	NELAP	2	NY455	06-30-15
New York	NELAP	2	10026	03-31-15
North Dakota	State Program	8	R-176	03-31-14 *
Oklahoma	State Program	6	9421	08-31-15
Oregon	NELAP	10	NY200003	06-09-15
Pennsylvania	NELAP	3	68-00281	07-31-15
Rhode Island	State Program	1	LAO00328	12-30-14
Tennessee	State Program	4	TN02970	03-31-15
Texas	NELAP	6	T104704412-11-2	07-31-15
USDA	Federal		P330-11-00386	11-22-14
Virginia	NELAP	3	460185	09-14-15
Washington	State Program	10	C784	02-10-15
West Virginia DEP	State Program	3	252	09-30-14 *
Wisconsin	State Program	5	998310390	08-31-15

Laboratory: TestAmerica Canton

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
California	NELAP	9	01144CA	06-30-14 *
California	State Program	9	2927	04-30-15
Connecticut	State Program	1	PH-0590	12-31-14
Florida	NELAP	4	E87225	06-30-15
Georgia	State Program	4	N/A	06-30-15
Illinois	NELAP	5	200004	07-31-15
Kansas	NELAP	7	E-10336	01-31-15
Kentucky (UST)	State Program	4	58	06-30-15
L-A-B	DoD ELAP		L2315	07-18-16
Minnesota	NELAP	5	039-999-348	12-31-14
Nevada	State Program	9	OH-000482008A	07-31-15
New Jersey	NELAP	2	OH001	06-30-15
New York	NELAP	2	10975	03-31-15

* Certification renewal pending - certification considered valid.

Laboratory: TestAmerica Canton (Continued)

All certifications held by this laboratory are listed. Not all certifications are applicable to this report.

Authority	Program	EPA Region	Certification ID	Expiration Date
Ohio VAP	State Program	5	CL0024	10-31-15
Pennsylvania	NELAP	3	68-00340	08-31-15
Texas	NELAP	6		08-31-15
USDA	Federal		P330-13-00319	11-26-16
Virginia	NELAP	3	460175	09-14-15
Washington	State Program	10	C971	01-12-15
West Virginia DEP	State Program	3	210	12-31-14
Wisconsin	State Program	5	999518190	08-31-15

Method	Method Description	Protocol	Laboratory
624	Volatile Organic Compounds (GC/MS)	40CFR136A	TAL BUF
6010C	Metals (ICP)	SW846	TAL BUF
7470A	Mercury (CVAA)	SW846	TAL BUF
180.1	Turbidity, Nephelometric	MCAWW	TAL BUF
300.0	Anions, Ion Chromatography	MCAWW	TAL CAN
310.2	Alkalinity	MCAWW	TAL BUF
350.1	Nitrogen, Ammonia	MCAWW	TAL BUF
351.2	Nitrogen, Total Kjeldahl	MCAWW	TAL BUF
353.2	Nitrate	EPA	TAL BUF
410.4	COD	MCAWW	TAL BUF
7196A	Chromium, Hexavalent	SW846	TAL BUF
9012B	Cyanide, Total andor Amenable	SW846	TAL BUF
9060A	Organic Carbon, Total (TOC)	SW846	TAL BUF
9066	Phenolics, Total Recoverable	SW846	TAL BUF
SM 2120B	Color, Colorimetric	SM	TAL BUF
SM 2340C	Hardness, Total (mg/l as CaC03)	SM	TAL BUF
SM 2540C	Solids, Total Dissolved (TDS)	SM	TAL BUF
SM 5210B	BOD, 5-Day	SM	TAL BUF

Protocol References:

40CFR136A = "Methods for Organic Chemical Analysis of Municipal Industrial Wastewater", 40CFR, Part 136, Appendix A, October 26, 1984 and subsequent revisions.

EPA = US Environmental Protection Agency

MCAWW = "Methods For Chemical Analysis Of Water And Wastes", EPA-600/4-79-020, March 1983 And Subsequent Revisions.

SM = "Standard Methods For The Examination Of Water And Wastewater",

SW846 = "Test Methods For Evaluating Solid Waste, Physical/Chemical Methods", Third Edition, November 1986 And Its Updates.

Laboratory References:

TAL BUF = TestAmerica Buffalo, 10 Hazelwood Drive, Amherst, NY 14228-2298, TEL (716)691-2600

TAL CAN = TestAmerica Canton, 4101 Shuffel Street NW, North Canton, OH 44720, TEL (330)497-9396

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
480-68692-1	PZ-14-5	Ground Water	10/06/14 12:55	10/07/14 09:00
480-68692-2	PZ-14-3	Ground Water	10/06/14 11:25	10/07/14 09:00
480-68692-3	TB1	Water	10/06/14 00:00	10/07/14 09:00

Detection Limit Exceptions Summary

Client: Sterling Environmental Engineering PC	TestAmerica Job ID: 480-68692-1
Project/Site: Orange County Landfill

The requested project specific reporting limits listed below were less than laboratory standard quantitation limits (PQL) but greater than or equal to the laboratory method detection limits (MDL). It must be noted that results reported below lab standard quantitation limits may result in false positive/false negative values and less accurate quantitation. Routine laboratory procedures do not indicate corrective action for detections below the laboratory's PQL.

Method	Matrix	Analyte	Units	Client RL	Lab PQL
300.0	Ground Water	Chloride	mg/L	0.50	1

14

TestAmerica Bu
10 Hazelwood Drive
Amherst, NY 14228
Phone: 716.691.2600

480-68692 Chain of Custody

Chain of Custody Record

039837

TestAmerica
THE LEADER IN ENVIRONMENTAL TESTING
TestAmerica Laboratories, Inc.
TAL-8210 (0713)

Regulatory Program: ☐ DW ☐ NPDES ☐ RCRA ☐ Other:

Client Contact	Project Manager: Mark Williams	Site Contact: Cody Snyder	Date: 10/6/14	COC No:
Company Name: Sterling Env. Eng, PC	Tel/Fax:	Lab Contact:	Carrier:	1 of 1 COCs
Address: 24 Wade Road	Analysis Turnaround Time			Sampler:
City/State/Zip: Lathan NY 12110	☐ CALENDAR DAYS ☒ WORKING DAYS			For Lab Use Only:
Phone: 518-456-4900	TAT if different from Below			Walk-in Client:
Fax:	☐ 2 weeks			Lab Sampling:
Project Name: Orange County Landfill	☒ 1 week — 5 days			
Site:	☐ 2 days			Job / SDG No.:
PO# 2010-15	☐ 1 day			

Sample Identification	Sample Date	Sample Time	Sample Type (C=Comp, G=Grab)	Matrix	# of Cont.	Filtered Sample (Y/N)	Perform MS / MSD (Y/N)	Chloride, Sulfate	COD, TKN, Ammonia	Baseline Metals	Mercury, Hardness	Phenolics, TOC	BOD, TDS, Cyanide	Volatile Organics	Nitrite, Nitrate	Color, Turbidity	hexavalent chromium	Alkalinity	Sample Specific Notes
PZ-14-5	10/6		G	GW	18			X	X	X	X	X	X	X	X	X	X		
PZ-14-3	10/6		G	GW	18			X	X	X	X	X	X	X	X	X	X	X	

Preservation Used: 1= Ice, 2= HCl; 3= H2SO4; 4=HNO3; 5=NaOH; 6= Other

Possible Hazard Identification:
Are any samples from a listed EPA Hazardous Waste? Please List any EPA Waste Codes for the sample in the Comments Section if the lab is to dispose of the sample.

☒ Non-Hazard ☐ Flammable ☐ Skin Irritant ☐ Poison B ☐ Unknown

Sample Disposal (A fee may be assessed if samples are retained longer than 1 month)
☐ Return to Client ☐ Disposal by Lab ☒ Archive for 1 Months

Special Instructions/QC Requirements & Comments:

Custody Seals Intact: ☐ Yes ☐ No | Custody Seal No.: | Cooler Temp. (°C): Obs'd: ____ Corr'd: ____ | Therm ID No.: ____

Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
[signature]			[signature]	TAB	10-7-14 0900
Relinquished by:	Company:	Date/Time:	Received by:	Company:	Date/Time:
Relinquished by:	Company:	Date/Time:	Received in Laboratory by:	Company:	Date/Time:

#2 3.8, 3.9, 4.2

15

Login Sample Receipt Checklist

Client: Sterling Environmental Engineering PC

Job Number: 480-68692-1

Login Number: 68692
List Number: 1
Creator: Janish, Carl M

List Source: TestAmerica Buffalo

Question	Answer	Comment
Radioactivity either was not measured or, if measured, is at or below background	True	
The cooler's custody seal, if present, is intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	False	No: No date or time on COC or containers
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the sample IDs on the containers and the COC.	True	
Samples are received within Holding Time.	False	CR+6
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	False	No: No date or time on COC or sample containers
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
VOA sample vials do not have headspace or bubble is <6mm (1/4") in diameter.	True	
If necessary, staff have been informed of any short hold time or quick TAT needs	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Sampling Company provided.	True	sterling
Samples received within 48 hours of sampling.	True	
Samples requiring field filtration have been filtered in the field.	True	
Chlorine Residual checked.	True	

APPENDIX J

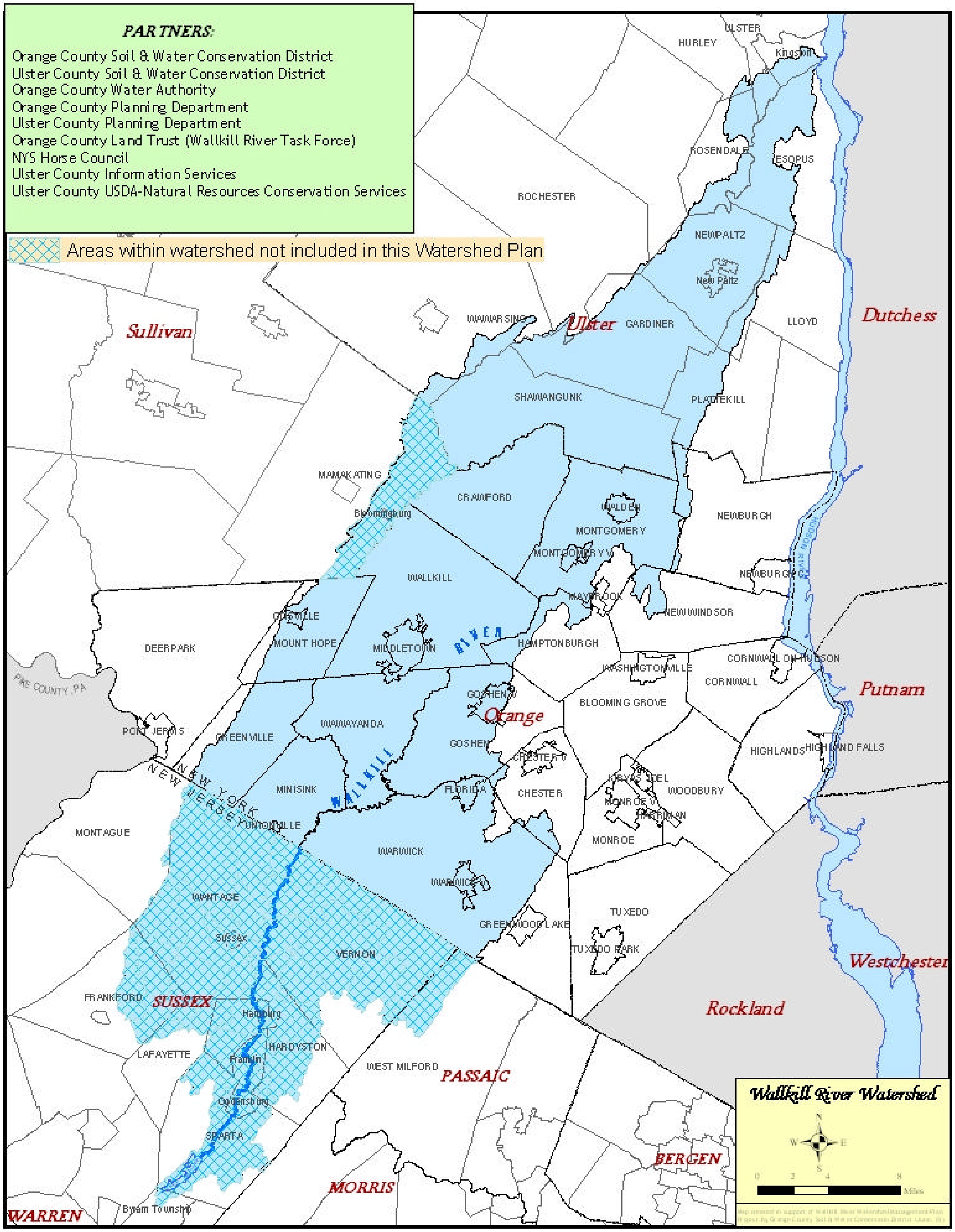
WALLKILL RIVER STUDIES

Wallkill River Watershed Conservation and Management Plan

Project Staff:

Orange County Soil and Water Conservation District
Ulster County Soil and Water Conservation District
Orange County Planning Department
Orange County Water Authority
Ulster County Planning Department

Funded in part by a grant from the
New York State Department of Environmental Conservation's
Hudson River Estuary Program



Cover painting by: Gene Bové
Wallkill River School
www.WallkillRiverSchool.com

Project Steering Committee

James Beaumont	Orange County Water Authority
Kris Breitenfeld	Orange County Soil and Water Conservation District
Gary Capella	Ulster County Soil and Water Conservation District
Virginia Craft	Ulster County Planning Department
Scott Cuppett	NYSDEC Estuary Program
Leonard DeBuck	Farmer, Warwick Town Councilman
Kelly Dobbins	Orange County Planning Department
John Gebhards	Orange County Land Trust
Patricia Henighan	Wallkill River Task Force
Jill Knapp	Wallkill River Task Force
Lewis Lain	Town Supervisor, Minisink
Nick Miller	Biologist, Metropolitan Conservation Alliance
Nathaniel Sadjek	NJ Wallkill River Management Group
Karen Schneller-McDonald	Biologist, Hickory Creek Consulting
William Tully	Orange County Citizens Foundation, Chester Town Supervisor
James Ullrich	Environmental Scientist, Alpine Group
Ed Sims	Orange County Health Department
Kevin Sumner	Orange County Soil and Water Conservation District
Jake Wedemeyer	Ulster County Soil and Water Conservation District
Chip Watson	Orange County Horse Council/NY Horse Council
Alan Dumas	Ulster County Health Department

GIS/Mapping Committee

Kelly Dobbins	Orange County Planning Department
Jake Wedemeyer	Ulster County Soil and Water Conservation District
Daniel Munoz	Orange County Water Authority/Orange County Dept. of Information Services
Kevin Sumner	Orange County Soil and Water Conservation District

Education and Outreach Committee

Kris Breitenfeld	Orange County Soil and Water Conservation District
Lucy Joyce	Cornell Cooperative Extension-Orange County
Gary Capella	Ulster County Soil and Water Conservation District
Mary Ellen Matisse	Village of Walden Trustee

Biodiversity Committee

Kelly Dobbins	Orange County Planning Department
Leslie Zucker	NYS Department of Environmental Conservation
Jake Wedemeyer	Ulster County Soil and Water Conservation District
Karen Schneller-McDonald	Hickory Creek Consulting
Karen Strong	NYS Department of Environmental Conservation

ACKNOWLEDGMENTS

A crucial development in the history of Wallkill Watershed protection efforts was the scheduling of a Wallkill River conference in 1998. Held at Orange County Community College and organized by the Orange County Land Trust (OCLT), this conference could be considered the birth of the Wallkill River Task Force (WRTF) – a 'project' of the OCLT. While some focus on this Watershed was already occurring amongst government agencies, the WRTF created a non-governmental group that actively sought the volunteer participation of farmers, business people and other 'ordinary' citizens, in addition to government and conservation agency employees, to provide for broad-based leadership in protecting the Wallkill River and its watershed lands.

The first coordinator of the WRTF was Ann Botshon, and it would be difficult to overstate her contribution to Wallkill (and Orange County-wide) natural resource protection. Her impassioned efforts gave inspiration to many people, myself included.

Former OCLT Executive Director John Gebhards fostered the formation of the WRTF, and has actively participated in the Watershed Management Plan process. Former WRTF Coordinators Jill Knapp and Patricia Henighan have also provided invaluable support. Former Orange County Water Authority (OCWA) Executive Director, Jay Beaumont, provided generous technical support to the Project from his staff, notably Dan Munoz, and was a member of the Project Steering Committee (PSC). Jamie Lo, a former employee of OCWA and intern at Orange County Soil and Water Conservation District, provided crucial mapping assistance as well as contagious enthusiasm to the Project. Kelly Dobbins, a planner with the Orange County Planning Department, made huge contributions to many sections of the Plan, served on the Biodiversity and GIS/Mapping committees, and prepared many of the maps. Simon Gruber, an environmental consultant, provided key writing and research assistance. My colleague Kris Breitenfeld endured a seemingly endless barrage of additions and changes in the final editing process. Scott Cuppett and the NYSDEC Hudson River Estuary Program provided grant funding and 'hands-off' Project oversight that allowed us to make the Plan our own. Gary Capella and all his partners on the Ulster side helped us transcend municipal boundaries and more nearly approach a true *watershed* plan.

I would like to personally thank all these people, and let them know how much I valued working with them on this project. Finally, I would like to thank all the watershed residents, too numerous to list, who took time out of their schedules to attend Project Steering Committee meetings and review and comment on the working Plan, as well as those who quietly toil on projects - some of which are mentioned in the Plan, but all of which help to provide inspiration to the rest of us to continue working to protect and improve the Wallkill River and its Valley.

Kevin Sumner
Orange County Soil and Water Conservation District

Table of Contents

**NOTE: These two appendices are quite lengthy so are only available in digital format or by special request in hard copy format.

I. INTRODUCTION

Background

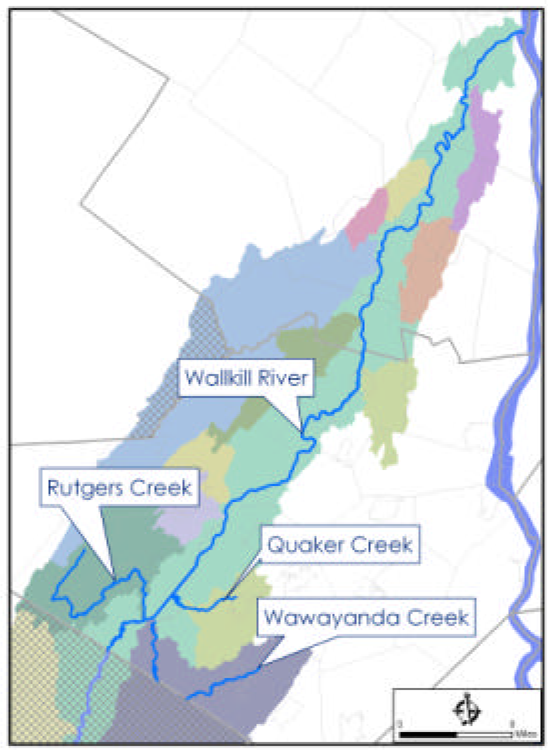
Conservation activities have been underway in the Wallkill Watershed for decades, as they have been in watersheds across the country. For example, farmers have been implementing runoff control practices, and developers have been required by most local planning boards to address stormwater management.

In recent years, though, financial and technical resources available to conservation agencies have increasingly been targeted to watersheds with documented water quality problems or with well-formulated plans that identify and prioritize management needs. Anticipating this trend, and recognizing the value of having a proactive long term plan, the Orange County Soil and Water Conservation District (SWCD) and USDA Soil Conservation Service (SCS) developed a water management plan for the Wallkill River Watershed in the late 1980's. Although not as sophisticated as current-day watershed management plans supported by computer-generated maps and other new technologies, this early planning effort began a twenty-five year period in Orange County of elevated attention on this watershed. Similar attention was being given to the Wallkill in neighboring municipalities as well.

The SWCD/SCS plan received no formal funding, but was a precursor to and impetus for the *Wallkill-Rondout USDA Water Quality Demonstration Program (1990-1998)* – a multi-agency and multi-county effort that directed in excess of $1 million in federal funding, primarily to agricultural water management. While generally deemed a great success – both in terms of enhancing interagency/inter-county coordination and accelerating the adoption of farm management practices (notably Integrated Pest Management in the Black Dirt Region) – project partners were frustrated with their limited ability to address other water quality issues including urban and suburban runoff. During this same time frame, a forward-thinking USDA employee named Malcolm Henning convinced the Wallkill Valley Drainage Improvement Association – a group of Black Dirt Region farmers charged with overseeing Wallkill River drainage matters – that nominating the Wallkill and several of its tributaries for inclusion on New York State's newly forming Priority Waterbodies List (PWL) (Map 1) was a good idea. Over the succeeding twenty years, many proposals involving the Wallkill have received more favorable review at least partially because of the emphasis placed on the PWL by current funding sources. More funding is available for agricultural **and** non-agricultural conservation work in both Orange and Ulster Counties.

Wallkill Watershed Waterbodies Listed on NYSDEC's Priority Waterbodies List:

- Upper Wallkill River Main Stem
- Quaker Creek
- Wawayanda Creek
- Rutgers Creek
- Lower Wallkill River Main Stem



Map 1: Priority Waterbodies

Purpose of the Plan

While water quality managers felt that problem sources were fairly well understood and significant resources were already being targeted to nonpoint source control programs, it was recognized that preparation of a comprehensive management plan for the Wallkill Watershed held the potential to direct existing resources more efficiently and increase the likelihood of securing additional resources. Various documents, including Water Quality Strategies prepared by County Water Quality Coordinating Committees (WQCC) and Nonpoint Source Assessments prepared by the Lower Hudson Coalition of Conservation Districts (LHCCD) had already begun the process of identifying and prioritizing management needs on a watershed basis. In September of 2001, Orange and Ulster SWCD's and the Orange County Land Trust, in cooperation with numerous other agencies, submitted a proposal to the New York State Department of Environmental Conservation's Hudson River Estuary Program (HREP) to prepare a Conservation and Management Plan for the Wallkill River Watershed. The proposal was approved, and work on the Management Plan formally began in spring of 2004.

Goals of the Plan

Specific goals of this Plan include:

- consolidating existing information on the watershed's resources, and establishing a foundation for future research and educational efforts;
- identifying gaps in information that are pertinent to future planning efforts, and developing a research strategy for obtaining needed data;
- assessing trends that will impact both water quality and quantity;
- presenting maps, tables and related informational formats that summarize key aspects of the watershed and management needs;
- **providing guidance to communities and other stakeholders on management practices that are environmentally, socially and economically sustainable; and providing assistance to them in the adoption of these practices; and**
- **providing a ready list of projects and actions that can be implemented to protect and improve the watershed.**

The last two items are in bold to reinforce the emphasis the authors wish to place on practical implementation measures. We are hopeful and confident that the data, maps and related information presented in the Plan will be useful for many purposes. More importantly, though, **we want the Plan to lead directly to action.** Many of the recommended actions, such as construction projects, will have direct expenses and will require dedicated funding to implement. Some ideas for sources of funding are presented. For other recommended actions, such as policy or program changes, costs may be more related to the personnel needed to promote and carry out the changes. These costs are sometimes less well recognized by potential funders, but are equally important to achieving goals.

Overall Planning Approach

Watershed stakeholders met in September 2004 at the first formal public meeting of this planning initiative. Approximately 40 individuals representing various organizations, municipalities and agencies in Orange and Ulster Counties and New Jersey attended and participated in a process to identify the important issues facing the watershed. The top issues identified as concerns by participants follow (not in priority order):

1. **Buffers**—suggested to protect water quality in streams and wetlands.

Grass strip buffers Rutgers Creek tributary from cropland.

2. **Biodiversity/Habitat** –identified as major concerns for both terrestrial and aquatic ecosystems in the watershed.

3. **Regulations - Implementation, Enforcement & Funding** – enforcing existing regulations and providing funding for implementation of practices was especially of concern.

4. **Recreation Opportunities** – increasing access to the river received widespread support.

5. **Wastewater Issues**– cited in various forms, including the need to revamp old infrastructure, the impacts of failing septic systems, the concern about managing development, and capacity of existing treatment facilities.

6. **Pesticides and other Pollutants** – received considerable attention and are tied closely with both the agricultural and the (sub)urban use of the land in the watershed.

7. **Agriculture** –listed regarding both concerns for maintaining the industry, as well as its impacts on water quality.

8. **Development/Sprawl** –associated with stormwater runoff, the need to implement local land use planning, the loss of habitat, and concerns about maintaining safe and adequate water supplies.

9. **Wetlands** –cited as an issue in terms of both loss and degradation.

10. **Groundwater** – ensuring sufficient recharge and concerns about contamination.

11. **Public awareness & local planning**.

12. **Non Point Source (NPS) Issues** –was mentioned separately and included in many of the other issues - particularly stormwater runoff.

It is the intention and the hope of the Plan writers that all of these issues have been addressed to the extent practical.

Guidance in the development of watershed plans has been presented by, among others, the Center for Watershed Protection (CWP) **(cwp.org)** and the US Environmental Protection Agency (EPA) **(epa.gov)**. Documents such as CWP's 'Rapid Watershed Assessment Planning Manual' and EPA's 'Community-based Watershed Management' were consulted by the preparers of this Plan. In addition, representatives from several of the project partners attended a two-day workshop on watershed planning in July of 2005 presented by staff from the CWP.

It goes without saying that the level of detail and scope of any watershed plan will be strongly influenced by the level of human and financial resources devoted to its preparation. The primary source of support for this Plan was a $40,000 grant from the NYSDEC Hudson River Estuary Program. An enormous amount of value was added to the project by contributions from many agencies and individuals who did not charge their time or expenses to the $40,000 grant. Nevertheless, we are dealing with a watershed nearly 800 square miles in size extending into four counties and two states. Even excluding the NJ portion, which received limited attention in this Plan, some 600 square miles remain. An example to put this issue in perspective is provided by guidance from CWP which suggests that $150,000 to $200,000 be budgeted for planning watersheds less than 50 square miles. Obviously then, given the size of the Wallkill and the available funding, a somewhat different approach was necessary.

As recommended by the Center for Watershed Protection, the Wallkill Watershed was divided into smaller watersheds, or subwatersheds (also called subbasins). The creation of smaller units of analysis enabled the project partners to assess different parts of the Watershed individually, and then make comparisons among the subwatersheds. (Map 2)

This approach yielded a total of 14 study areas for the Orange and Ulster portions of the Wallkill. For planning purposes, the direct drainage to the Wallkill (not via a major tributary) was treated as two sub-watershed areas, one each for Ulster and Orange. The name and size of these study areas is summarized in Table 1.

Although it is not defined entirely by drainage divides, the Black Dirt Region of Orange County will receive some attention as a separate study area given its unique, and in many ways homogeneous, characteristics.

One important factor in determining the approach to a given watershed plan is the percentage of impervious surfaces in the study area. Extensive research has been devoted to this topic. This research demonstrates that when 10% of a sub-watershed's land area has been converted to impervious surfaces, significant impacts will be discernable in the receiving stream. (Figure 1) When impervious cover exceeds 25%, stream impacts become more severe and difficult to mitigate. These numbers can provide guidance to planners. When imperviousness is in the 'threatened' 5 to 10% range, management efforts to avoid further stream impacts would be an important goal. Typically, such planning efforts would be done at a 'sub-watershed' level equating to approximately 10 square miles. When watershed imperviousness is lower (below 5-10 %), water quality degradation is likely caused by factors other than impervious land cover. Therefore, management efforts should take a different approach.

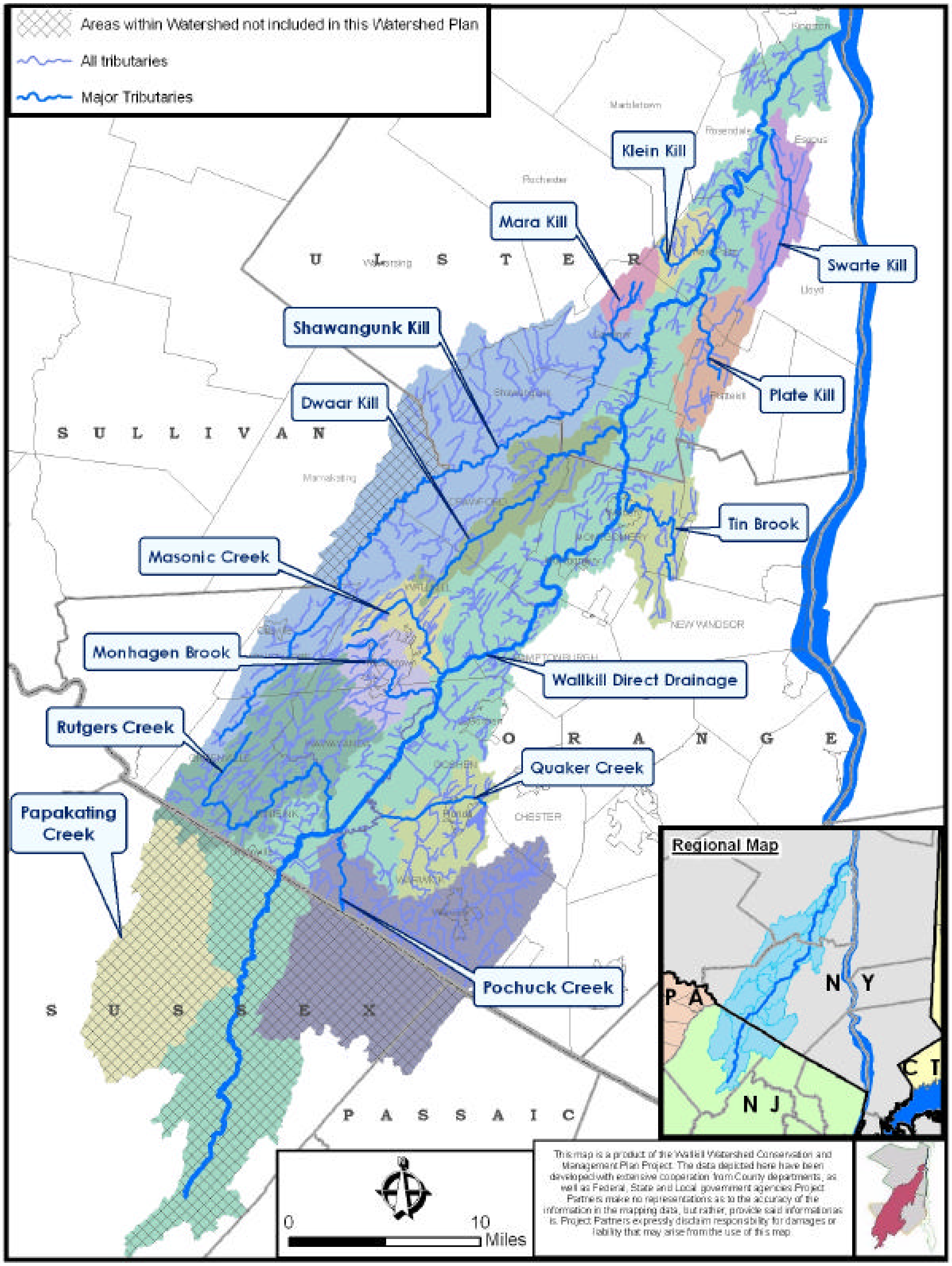
With this guidance in mind, the Plan Partners decided to make impervious surface mapping a priority project early in the planning process. To the extent possible, the Plan uses impervious area concerns as a primary factor in sections dealing with sub-watersheds.

Figure 1: As imperviousness approaches 10%, streams are likely to be degraded.

	area (acres)	% of Entire Wallkill Watershed (NY & NJ)	acres farmland (USDA)*	% Farmland (USDA)*	acres agricultural land (PCC)*	% agricultural land (PCC)*	% impervious cover	Land Cover within Subwatershed (%) Natural	Ag	Urban/ Suburb	Land Cover within Stream Corridor (%) Natural	Field/Ag	Urban/Suburban	Public access points to water
Dwaar Kill	17,916	3.5%	3,509	19.6%	3,312	18.5%		63	25	12	76	13	10	1
Masonic Creek	8,179	1.6%	389	4.8%	820	10.0%	10.3	50	19	31	57	18	23	0
Monhagen Brook	10,997	2.1%	1,385	12.6%	1,054	9.6%	12.3	54	16	33	48	14	34	1
Pochuck Creek	67,789	13.2%	5,772	8.5%	7,418	10.9%	4.7	68	21	11	33	58	9	1
Quaker Creek	16,338	3.2%	4,296	26.3%	5,933	36.3%	4.5	58	31	11	16	69	15	1
Rutgers Creek	38,184	7.4%	7,004	18.3%	8,264	21.6%	4.4				58	30	11	0
Shawangunk Kill	90,503	17.6%	4,528	5.0%	6,415	7.1%	4.2	77	13	11	67	21	12	1
Tin Brook	12,265	2.4%	1,759	14.3%	2,079	17.0%	4.9	69	15	16	56	17	27	1
Mara Kill	4,488	0.9%	330								59	9	26	2
Klein Kill	5,168	1.0%	310					90	6	4	77	16	7	1
Swarte Kill	10,381	2.0%	1,103					91	4	5	91	1	8	2
Platte Kill	11,996	2.3%	5,839					72	17	11	62	22	14	0
Direct Drainage (Orange)	180,326	35.1%	20,452	27.38%	27,536	36.86%		56	31	16	48	34	14	11
Direct Drainage (Ulster)											63	19	18	4

* For the purposes of this Plan, agricultural land use was examined using two distinct data sources. The Property Class Code data is assigned by local assessors. A given parcel is assigned only one PCC, even though large parcels normally contain multiple land uses. In some cases, a parcel that contains agricultural land may not receive an agricultural PCC. The USDA figures are based on actual farm field acreages within land tracts that normally encompass larger acreages. This data is derived from reporting that farmers make to local USDA offices. It is believed that most commercial farmers report their acreage into this system.

Table 1 – Subwatershed Characteristics



Map 2: Wallkill River Subwatersheds

II. EXISTING CONDITIONS

River and Watershed Characteristics

A tributary of the Hudson River, the Wallkill River flows through two states, from its source in Lake Mohawk in Sparta Township, New Jersey. Flowing 27 miles in New Jersey, the watershed drains 208 square miles in 13 municipalities. Approximately 96% of the NJ portion of watershed is in Sussex County, the remaining 4% in Passaic County. In Orange County, New York, the river drains 382 square miles, nearly half of the county, as it flows for 40 miles before reaching Ulster County. Twenty-two towns, villages and cities in Orange County drain wholly or partially to the Wallkill. In Ulster County, the river flows 26 miles draining 170 square miles before merging with Rondout Creek near Kingston, then flowing on to the Hudson River. The total watershed is about 785 square miles in size. In New York State, the Wallkill River is fed by 69 tributaries. In Orange County, there are 16 named tributaries. In Ulster County, there are 14 named tributaries. The water quality of the tributaries is variable (see sub-watershed sections of the Plan for more information).

Land use within the watershed is extremely diverse, ranging from agriculture and forestland to extensive commercial and residential development. Refer to Map 4 for land use breakdowns for the whole watershed and for major sub-watersheds. As can be seen from the comparison of 1993 and 2004 land use data, the trend in this watershed is towards decreasing agricultural land and increasing urban/suburban land use. This trend undoubtedly comes as no surprise to watershed residents, though presentation of these data provides greater validity and a degree of measure to this common understanding.

History of the Wallkill River

The Wallkill River main channel as it passes through the Orange County Black Dirt Region has undergone considerable modification over the last 200 years. Figure 2 shows the 'original' path of the Wallkill, before agricultural drainage improvement projects, and the current path. In addition to being rerouted, some sections of the channel have been enlarged and excavated below their natural bed. Major tributaries to the Wallkill in this Region have undergone similar modification.

An extremely interesting chapter of history occurred in this area in the 1800's, which is sometimes described as the Muskrat and Beaver War. (Appendix A**)** Landowners with agricultural interests (the muskrats) battled figuratively and literally with mill and related business owners (the beavers) over whether the Wallkill would be dug

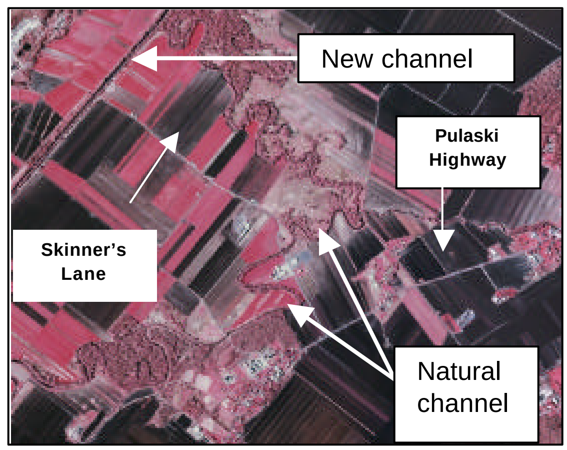
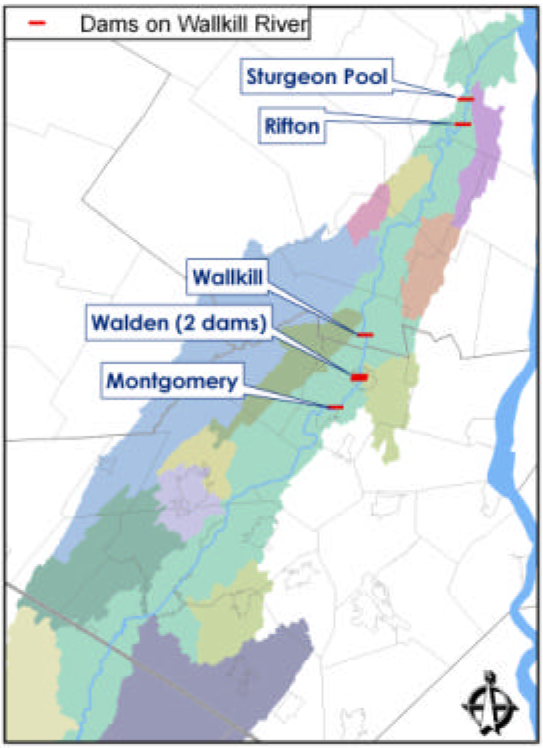


Figure 2: Natural and new channels of the Wallkill River

and maintained as an agricultural drainage channel or dammed for water power. Ultimately, the farmers won this war and additional drainage projects continued through the 1900's resulting in the agricultural landscape and drainage network we see today.

On the main stem of the Wallkill, there are dams at Montgomery, Walden, Wallkill, Rifton and Sturgeon Pool (Map 3). Dams clearly have major environmental impacts on river systems; at the same time they have served valuable historical functions such as hydroelectric power and mill operation. Most of the dams on the Wallkill continue to function in these capacities. This Plan inventories the Wallkill dams, but does not further evaluate their functions or future other than brief general mention of their environmental impacts. (Appendix F)



Map 3: Dams on the Wallkill River

Land Resources

1. Land Use Analysis

Land use/land cover may be analyzed in many different ways, dependant largely on available time, financial and data resources. The analysis done for this Plan was based on Property Class Code (PCC) information as assigned by local assessors. There are a number of issues with these data that must be kept in mind when interpreting these results. One is that, even though the PCC list is State-generated and each assessor has the same list, there is some variability in the approach individual assessors use in assigning these codes. An additional issue is that PCC's are assigned based on tax parcels. Therefore, any given parcel, regardless of size, receives only one PCC even though multiple land uses often occur on these parcels. With these limitations in mind, though, the PCC database offers a source of land use data that can be fairly easily used to generate land use maps for the Watershed. An additional advantage of this approach for the purposes of this Project is that PCC databases exist for the early 1990's (Orange County only), which can be readily contrasted with more recent data sets. Though somewhat generalized, the land use maps generated from these data use the same categories- therefore provide a fairly reliable evaluation of trends over the period covered by the two data sets. (Map 4)

A couple of modifications were made to the data in order to better meet the intent of the analysis. First, the 'residential' PCC was divided into 'large lot residential' and all other 'residential' using a threshold of 10 acres. Although there is a 'large lot residential' category available in the PCC system, this category appeared to be largely unused (at least by the OC data we reviewed). The thinking here was that residential parcels over ten acres were probably more accurately described as open space. This decision was independent of – and not based on – town zoning requirements. Instead, it assumes that the improvements for a typical residence would normally be concentrated on one or two acres, with the balance of the 'residential' parcel more likely to resemble the land cover associated with the undeveloped category. GIS technicians created a new 'field' in the PCC database, and used GIS tools to place the residential parcels greater than 10 acres in the new 'large lot residential' category. This adjustment proved to have a large influence on the results, given the large percentage of parcels that receive the residential PCC.

A cursory review of the 'community service (CS)' category was also undertaken. Normal procedure was to treat community service-coded parcels as 'developed'. However, where aerial photo review or other anecdotal knowledge of CS parcels indicated extensive open lands, a re-assignment into a new 'open community service' category was applied. Changes to the results from this adjustment were small compared to the residential code adjustment. Assignment of the various PCC categories to the headings of either 'developed' or 'undeveloped' also involved some judgment.

A summary of the results from this analysis are presented in Table 2 and in Map 4. In each of the nine Orange County subwatershed areas, 'developed' land increased (by from 4 to 9%). As expected, the land use category that showed the largest increase was residential. Roads increased significantly as well.

A small number of anomalies did emerge. For example, in several of the basins agricultural acreage increased considerably. Undoubtedly, this was a result of revised PCC assignment on otherwise unchanged parcels, not actual increases in agricultural land use.

Watershed	1993 developed	1993 undeveloped	2004 developed	2004 undeveloped
Dwarr Kill	17%	83%	26%	74%
Rutgers Creek	21%	79%	28%	72%
Wallkill Direct Drainage	23%	77%	29%	71%
Tin Brook	26%	74%	30%	70%
Quaker Creek	23%	77%	30%	70%
Pochuck Creek	27%	73%	33%	67%
Shawangunk Kill	25%	75%	33%	67%
Masonic Creek	39%	61%	46%	54%
Monhagen Brook	45%	55%	51%	49%

Table 2: Comparison of developed & undeveloped land by subwatersheds.

In a few cases, categories such as industrial lands decreased in a particular basin from 1993 to 2004. Resources did not permit technicians to fully explore all these apparent anomalies. Overall, though, the results are reasonable and, we feel, can be considered useful within the set of cautions mentioned above.

2. Protected Lands

There are substantial protected areas within the Wallkill Watershed (Map 5). Notable blocks of protected lands include Highland Lakes State Park in the Towns of Wallkill and Crawford; the US Fish & Wildlife Shawangunk Grasslands National Wildlife Refuge (560 Ac); Mohonk Conservancy - home to more than 30 species of rare plants or animals (3500 Ac-roughly ½ total acreage); the Sam's Point Preserve - 1600 of 5400 acres in the watershed; Minnewaska State Park (roughly 1/3 of this 4000 acre park is in the Watershed); a portion of Stewart State Forest; four county parks; two county-owned water supply sites; and municipal water supply lands owned by the City of Middletown in the Town of Wallkill and the Village of New Paltz in the Town of New Paltz.

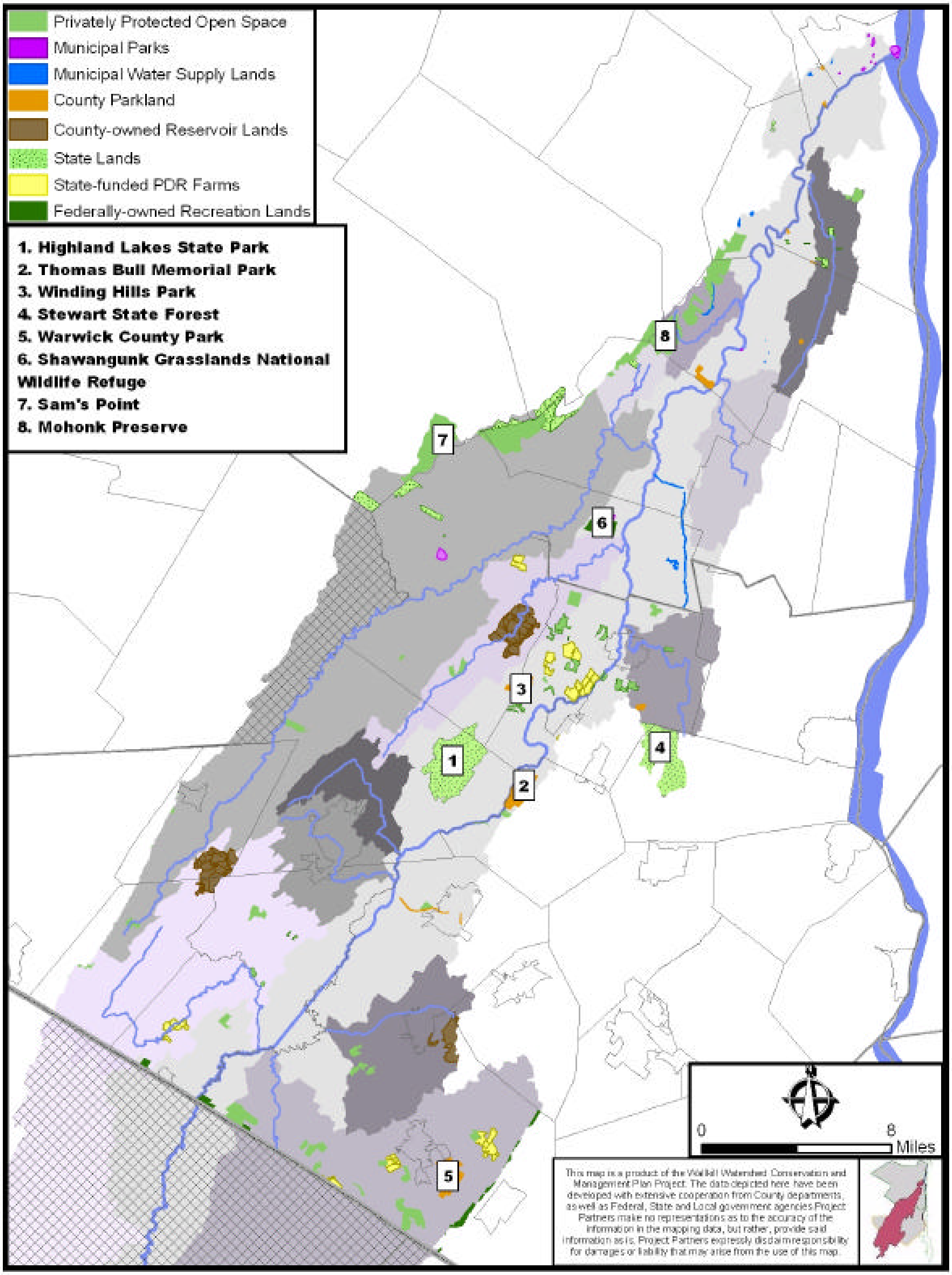
Protected lands on the Wallkill River itself are, in large part, clustered in the Town of Montgomery. The Town has taken initiative to protect the banks of the Wallkill through conservation easements within clustered subdivisions and partnered with other organizations to protect farmland on the River. There are also three municipal parks on the River in Montgomery: two smaller parks (Twin Island Fishing Spot and Riverfront Park) and the larger Benedict Farm Park. The Village of New Paltz has established a ¼ mile riparian greenway along the Wallkill River, which features a riparian buffer, community gardens and the Historic Huguenot settlement.

The County of Orange, as well, owns 1.6 miles of Wallkill River frontage at Thomas Bull Memorial Park, Town of Hamptonburgh. Although access to the River within the Park is currently limited, a riverfront trail may be developed at this Park in the future. South of Thomas Bull Memorial Park, also in Hamptonburgh, the Orange County Land Trust owns a public nature preserve called Hamptonburgh Preserve and also holds a conservation easement (closed to general public) on a linear riverfront segment near Stony Ford Road. Ulster County maintains a ¼ mile stretch of the Wallkill River with public access for boating (car top) and fishing at the Fairgrounds on Libertyville Rd. There are other public access sites in Ulster County, identified on Map 12, for fishing and boating maintained by NYS DEC or assorted municipalities.

To date, the US Fish and Wildlife Service holds the most extensive amount of land along the Wallkill River, within the 5,100-acre Wallkill River National Wildlife Refuge. The majority of this land is in New Jersey, beginning as far south as Route 23, but extends north into the Town of Warwick, New York, where over 150 acres of black dirt are being engineered to revert back to their natural, frequently-flooded habitat.

The Wallkill River's major tributaries have few, but important, public access points. Protected lands along the major tributaries that are open to the public include Orange County Land Trust's Moonbeams Preserve on the Shawangunk Kill (Town of Wallkill), the Village of Walden's Wooster Grove Park on the Tin Brook, the Mohonk Preserve which protects the headwaters of the Kleine Kill and the Van Veederkill Park on the VanVeederkill in the Town of Shawangunk.

Conservation easements and municipal ownership



Map 5: Protected Lands

for water supply protect other lands containing major tributaries, but are not open to the public.

Open Space Values of Agricultural Lands
Although usually not formally protected, agricultural lands afford benefits to the community similar to those provided by public lands as described above. Therefore, a brief discussion follows on the open space values of agricultural lands.

Several portions of this Plan discuss the potential water quality impacts from agriculture. Poorly managed agricultural land clearly can negatively impact water and related natural resources. Well-managed agricultural land, though, is widely believed to be preferable to other land uses such as urban/suburban land use – both in terms of water quality and enhancement of other natural resources such as wildlife. One example that supports this contention is that of the New York City Watershed management program. Nationally recognized as a successful model for protecting drinking water supplies via land management (avoiding the more costly option of filtration plant construction), this program recognizes agriculture as a **preferred land use**. As regards wildlife, vast expanses of monoculture, it can be argued, do not provide the variety of habitats required by most wildlife species. In the Hudson Valley and the Wallkill Watershed, habitat loss from vast expanses of agriculture is hardly a concern. Instead, agricultural lands are being lost at an alarming rate – usually being replaced by residential and commercial development with much lower habitat value. Where farmlands can be maintained, they most often **enhance** wildlife habitat by providing food sources and cover types that would otherwise be in short supply in the local landscape. Farm water quality protection efforts in the Watershed are described in some detail in this Plan, and local farmer participation in these programs is quite high. Plan writers, therefore, are confidant in endorsing vigorous farmland preservation efforts as a major recommendation of this Plan.

Such efforts are well underway in the Watershed. Over **3,000 acres** of farmland in the Orange County portion of the Wallkill Watershed have been **protected via conservation easements** purchased with various combinations of State, federal and local funding. Momentum is gaining in Ulster County, also, where 400 acres are in the process of closing conservation easements.

It should be noted in this context that interest amongst landowners in these easement programs far out-paces available funding. This Plan, therefore, recommends active lobbying to study and secure additional sources and mechanisms of funding for farmland easement programs. Additionally, it must be recognized that deed-restricted farmland will be of limited value in preserving commercial agriculture if farming cannot remain profitable. Though largely outside the scope of this Plan, we also endorse vigorous support for farm profitability enhancement projects through such avenues as the Orange and Ulster County Agricultural and Farmland Protection Boards (AFPB's).

For both profitability support and easement purchase, we believe that Watershed residents will generally be supportive. The citizen survey conducted through this planning process, described elsewhere in the Plan, ranked "loss of family farms" and "expansion of housing developments into rural areas" as major concerns. Although this was an informal survey, it lends credence to the suggestion that the public will support such efforts. Further evidence is provided by recent public referendums in at least three Watershed Towns (Warwick, Goshen and New Paltz) that established locally generated funds to purchase farmland easements.

Preservation of a viable farmland base, in combination with other non-farm protected open space, should be considered a crucial and necessary element of a healthy Wallkill Watershed.

3. Impervious Surfaces Analysis
The importance of impervious cover to watershed planning is described earlier in this Plan. There are many potential approaches to such mapping – ranging from direct measurement from aerial photography to more generalized estimations derived by applying various coefficients to land use data such as Property Class Codes assigned by local taxing authorities. After extensive study and consideration, Orange County Water Authority and Plan partners decided to use a methodology for impervious cover calculation that is based on extent of roads in the given sub-watershed.

Through literature review, consultation with other experienced GIS users such as Rockland County government, and in-house testing, it was determined that a reliable relationship existed between linear feet of roads in any given spatial region (calculable by GIS tools) and percent impervious cover.[1] Using this relationship, OCWA technicians calculated % imperviousness for over 200 sub-watersheds and for major sub-basins. (Map 6)

Results

Map 6 presents the results of the impervious surface analysis for the Wallkill basin. Table 1 summarizes these findings by major sub-basins within the Wallkill. The 'Overall Planning Approach' section of this Plan describes the rationale for measuring imperviousness as part of the watershed planning process. In summary, it notes that watershed planning as it relates to imperviousness should be done at a sub-watershed level equating to approximately 10 square miles, and that impacts to receiving streams tend to become apparent when imperviousness reaches 10%. It also notes that when imperviousness is lower (below 5%), water quality degradation is likely caused by factors other than imperviousness. Watershed areas exceeding 10% imperviousness are depicted in red on Map 6. Areas in the 5 to 10% range are shown in yellow, areas below 5% are green.

An interesting sidebar to this issue is the relationship between impervious cover, feet of roads, and stream salinity (see, for example, Kaushal, et al in the September 20, 2005 PNAS). Work in Orange County by Kelly Nolan, Hudson Basin River Watch, described below in this Plan, also found a relationship between conductivity and macroinvertebrate community health.

While available resources limited the degree to which this impervious cover information could guide sub-watershed level planning, future efforts will benefit from its calculation as part of this planning effort.

[1] Beaumont, J. and O'Brien, D. 2005 Impervious Cover, Road Density, Land Use, and Population Density in Urban and Rural Areas in Orange County and Rockland County, New York. Orange County Water Authority.

4. Stream Corridor Study

Multiple studies have documented the relationship between streamside vegetation and stream health. In general, wider swaths of forest next to a stream are associated with higher water quality due to the capacity of natural vegetation to slow and filter water that flows on the ground surface. Streamside trees also help to shade the waterbody, thus lowering the water temperature, and create a more diverse stream habitat through the contribution of woody debris such as limbs and branches. Vegetated banks are also structurally more stable and thus less susceptible to erosion.

Because both stream corridor infringement and water quality problems have been well documented within the Watershed, this watershed planning effort included an inventory of land cover within 534 feet[2] of all 14 major tributaries within the Watershed and the Wallkill River itself. The data was created by visually interpreting 2004 aerial photography and defining the land as one of four major categories: Developed, Natural, Water, or Agriculture/Field. A summary of the resulting land cover information is included in Table 1.

The results of the study render useful comparisons between the major tributaries. For example, the Monhagen Brook, which flows through the City of Middletown, was found to have the highest proportion of developed land within the designated stream corridor, followed by the Tin Brook and the Mara Kill. This information suggests that these waterbodies should be priorities for streamside mitigation and restoration efforts. Conversely, the Swarte Kill has the highest percentage of natural land within its corridor, with the Klein Kill and the Dwaar Kill trailing slightly behind. These streams are therefore good candidates for stream corridor protection efforts that would maintain their ecological processes and integrity. Both the Quaker and Pochuck Creeks flow through the Black Dirt region, which led them to have the highest amount of agricultural land within the buffer area. These two streams should thus be priorities for restoration and mitigation efforts that

[2] Howard, T.G. (draft) 2004. Buffering natural communities for community persistence. September 6, 2004. NY Natural Heritage Program, Albany, NY.

seek to improve water quality while maintaining agricultural production.

Aside from assessing broad-scale trends for the Wallkill River and its major tributaries, this stream corridor study also initiated the process of identifying opportunities for future stream corridor protection, mitigation, and restoration projects. Since this component of the Planning project was entirely a remote sensing procedure with no on-the-ground verification of conditions, the resulting information and recommendations should be considered a screening of potential corridor opportunities, but by no means a complete list of possible protection/mitigation sites. (Map 7)

Potential sites for future work (i.e. potential project sites) were identified by reviewing the 2004 aerial photography in conjunction with the land cover information and, in some cases, the location of protected open space (e.g. parkland or land protected by a conservation easement). Potential project sites fell into one of seven categories. Provided below is a generic description of each category as well as typical protection/mitigation activities that might be appropriate for each. **To be clear, additional field inspection and interaction with the local community or site representatives would determine what, if any, further actions would be appropriate.** Implementation of this Plan would logically include expansion of this project.

A. Agricultural Lands – This category was used where substantial blocks of agricultural fields adjoined designated stream channels without the presence of a naturally vegetated buffer exceeding 20 or 30 feet in width. In general, agricultural lands are preferable to most urban land uses within stream corridors because of their ecological benefits (see Biodiversity section for more information). However, water quality can be impacted if certain agricultural uses occur too closely to streams. Ideally, a buffer of thirty feet or more is maintained between cropland and stream channels. While woody buffers offer more water quality and wildlife benefits than herbaceous buffers, they are often not compatible in agricultural settings when farmers wish to maximize their use of productive streamside soils. In certain agricultural settings, however, wider and more diverse buffers are possible.

Potential project options - In many cases, cost-sharing is available for farmland operators to install a wide variety of stream protection practices including: establishing grass buffers or tree/shrub buffers, livestock exclusion fencing, alternative watering facilities, protected stream crossings, wetland enhancement projects, wildlife plantings and related measures. Some programs, such as the Conservation Reserve Program (CRP) and the Wetland Reserve Program (WRP) also offer annual rental payments for properly protected riparian lands.

B. Agricultural Lands – Black Dirt –A primary issue in this area is streambank erosion (see Ag Issues section of this Plan) because of easily eroded soils. Very narrow natural buffers, or the absence of any buffer, exacerbate this dilemma and were common in the Black Dirt region because, understandably, farmers wish to maximize their use of the productive Black Dirt soils. In some cases, owing primarily to low position in the landscape (flood-prone) and/or poor soils, lands next to these waterways are already in forested or successional growth.

Potential project options - All of the cost-share options described above for Agricultural Lands are available for Black Dirt lands, although a shorter list of practices is suitable in this special setting. Efforts are already underway to fund and design streambank stabilization measures in this region (see Agricultural Recommendations section of the Plan). Additionally, planners can explore options for expanding protection/ mitigation measures beyond the stream-bank in conjunction with bank repairs.

C. Mitigation - Golf Courses – A number of golf courses are either bordered or traversed by streams in the Corridor study area and, in some cases, fairways or other intensively managed areas extend into the stream corridor. The level of management often associated with golf course turf has the potential to have negative water quality impacts through pesticide, herbicide, and fertilizer applications.

Potential project options – Though cost-share/funding options are generally more limited for non-agricultural lands than for farmland, many of the same protection/restoration measures can be employed. These include: managed naturally-vegetated buffers, Integrated Pest Management (IPM) and Nutrient Management. Audubon International offers a program called the Audubon Cooperative Sanctuary Program that helps to enhance the valuable natural areas that golf courses can provide and minimize potentially harmful impacts of golf operations. The SWCDs and Cornell Cooperative Extensions in both counties provide technical assistance to local golf courses on water quality measures.

D. Mitigation - Stormwater Retrofit – Any reach of the Corridor study areas where extensive red zones (developed lands) were mapped would be a potential site to further investigate the need and feasibility of stormwater retrofits, especially where the development was built before current stormwater regulations were in place. Buffers of varying width often exist between the buildings/parking lots and stream channel.

Potential project options - In many cases, funding constraints and other logistical issues will limit options. Nevertheless, where sufficient will and creativity are applied, some communities have successfully installed such measures. Typical practice choices for these areas include higher cost, manufactured products such as water quality inlets (oil/grit separators) and hydrodynamic structures (eg. Stormceptor) that take up limited space, and built-on-site practices such as bioretention basins and water quality swales. See such technical documents as the *NY State Stormwater Design Manual* for more information on these practices.

E. Restoration/Mitigation - Commercial/ Industrial Sites - These sites are few in number but usually include large buildings, associated parking, and often outdoor storage of equipment within the stream corridor, leaving natural buffers of varying width. Most, if not all, of these facilities were built before modern stormwater management regulations were in place.

Potential project options These facilities could be ideal locations for construction of stormwater retrofits, which provide some level of stormwater quality treatment for older urban areas (see stormwater section of this Plan). As well, existing streamside buffers and land uses could be evaluated, and additional protection possibilities could be presented to site managers. Possible recommendations include: plantings, flow control practices (ie. level spreaders), and land management changes (ie. less mowing).

F. Conservation – This designation was used for stream corridor areas where extensive forest/natural cover was discerned in association with the existence of already protected or municipally-owned lands or significant biological resources.

Potential project options - Based upon the interest of relevant landowners, these could be focus areas for future land protection efforts.

G. Educational – This designation was used for stream corridor areas that appeared to be good locations for watershed and/or stream corridor public education activities to be undertaken because land alongside the stream is owned by a school, municipality or another appropriate public or nonprofit entity. Some sites were assigned the label of Restoration/Educational if the site appeared to be in need of restoration and met the above criteria.

Potential project options - Activities/practices likely to be appropriate in these settings included educational kiosks, community planting projects, and stormwater management demonstration projects. These sites may also be appropriate for interpretive walks, with landowner permission.

(NOTE: Some Wallkill Watershed sites where similar measures have already been done or are in progress include: Benedict Farm Park and Riverfront Park [Town of Montgomery] – Community riparian restoration on Muddy Kill; Maple Street Park [Village of Walden] – stormwater management demonstration project; Town of New Paltz riparian restoration; and Twin Islands Fishing Area [Town of Montgomery] – educational kiosk.)

5. Agriculture - Black Dirt Region

Where the Wallkill enters New York in the southwest corner of Orange County, it passes through an unusual geologic region known locally as the Black Dirt. Encompassing some 16,000 acres, this area is an ancient, post glacial lake bed that has filled in over time with vegetation. This decomposed vegetation is the main constituent of the Black Dirt soils, which are in many places over twenty feet deep. Largely because of its lack of rocks and uniform texture and topography, these soils have proved to be very productive for agricultural use – especially for high-value vegetable crops.

However, a high level of management is required to realize their potential. In their natural condition, these soils have a high water table that must be lowered for crop production purposes. This is most commonly accomplished by closely spaced (~100 feet) open drainage ditches. Land between the ditches is crowned to enhance surface drainage toward the ditches. These 'field' ditches are connected to larger collector ditches that connect either to the Wallkill directly or to tributary streams such as the Pochuck, Rutgers Creek and Quaker Creek.

Figure 3: Black Dirt fields are in intimate association with the surface water via the drainage ditch network.

Flooding must also be controlled in order to allow agricultural production. Historically, a small and very meandering channel carried the flow of the Wallkill through this nearly flat region, with large storm events overwhelming the channel and flooding the adjacent land. Over the last several hundred years, the Wallkill's main stem and its tributaries in this region have been enlarged, and in some cases straightened, to reduce flooding and improve drainage for agricultural production. For example, Figure 2 shows the 'natural' course of the Wallkill through the Black Dirt Region and the 'Cheechunk Canal' through which the Wallkill was re-routed in the early 1900's.

Essentially this entire 16,000 acre region was designated as an **Agricultural Drainage District** by the State of New York in the late 1930's. Not only did this designation allow for the planning and construction of an ambitious network of drainage channels, it established **legally binding requirements for the maintenance of these channels.** The overall purpose of the District is to ensure that landowners within its boundaries have the drainage and flood protection necessary to allow for agricultural production.

As mentioned previously, the Black Dirt Region of Orange County was treated as a separate study area in this Plan due to its unique, and in many ways homogeneous characteristics.

6. Agriculture – Horse Farms

According to the New York Census of Agriculture, Orange County is third only to Dutchess and Erie Counties in number of horses at 2800 (USDA, National Agricultural Statistics

Service, 2002). One of the largest livestock operations in Ulster County is a horse breeding farm right along the Dwaar Kill, which has a rolling average of 500 horses year round. We believe the scope of this agricultural sector to be underestimated in this region of the state, since there are a burgeoning number of small recreational horse owners – who may not be reflected in the agricultural census numbers. A major initiative of this planning project was to better assess the status and needs of the horse industry in the watershed.

7. Other Agricultural Uses

Beyond Black Dirt and horse farms, a wide variety of agricultural enterprises occur in the Wallkill Valley. Historically, dairy farming has been the mainstay of agriculture in the Valley. The rocky, silty-textured glacial till soils that dominate the Watershed landscape have limited suitability for many types of agriculture such as vegetable production, but are well-suited to the hay, field corn and pasture needs of the typical dairy farm. While dairy farms have declined drastically in the last 25 years, they are still responsible for keeping significant Watershed acreage in agricultural use. Since dairy farmers commonly rent additional acreage beyond their home farms to supply the crop needs for their herds, we estimate that 60 dairy farms in the NY portion of the Watershed operate land tracts totaling some 15,000 acres.

In areas of the Watershed with ample deposits of lighter textured glacial outwash and alluvial soils, more diverse and intensive agricultural uses are common, including some fairly large commercial vegetable operations. These vegetable operations are most commonly located directly on the main stem of the Wallkill River and its tributaries. This holds especially true as the Wallkill River flows north and the tillable land narrows between the Shawangunk Mountains and Hudson Highlands. There are two large operations (Watchtower Farms and NYS Correctional Facility, Town of Shawangunk) which together control more than 2000 acres of field crops in the watershed. Orchards and vineyards occur on both till and outwash soils, benefiting from the air drainage afforded by sloping topography.

Various specialty or 'niche' operations also occur in the Watershed, such as Community Supported Agriculture (CSAs), nurseries, alpacas and meat goats. These types of operations hold the potential to contribute significantly to the agriculture industry, but currently are thought to manage only limited acreage. The interested reader may wish to refer to the Orange County Agricultural Economic Development Plan, available from the Planning Department's section of the Orange County Government website (co.orange.ny.us) or the Lower Hudson-Long Island RC&D website (http://www.nyrcd.org/LowerHudson/index.htm) for more detail on the agriculture industry. (Map 8)

Biological Resources

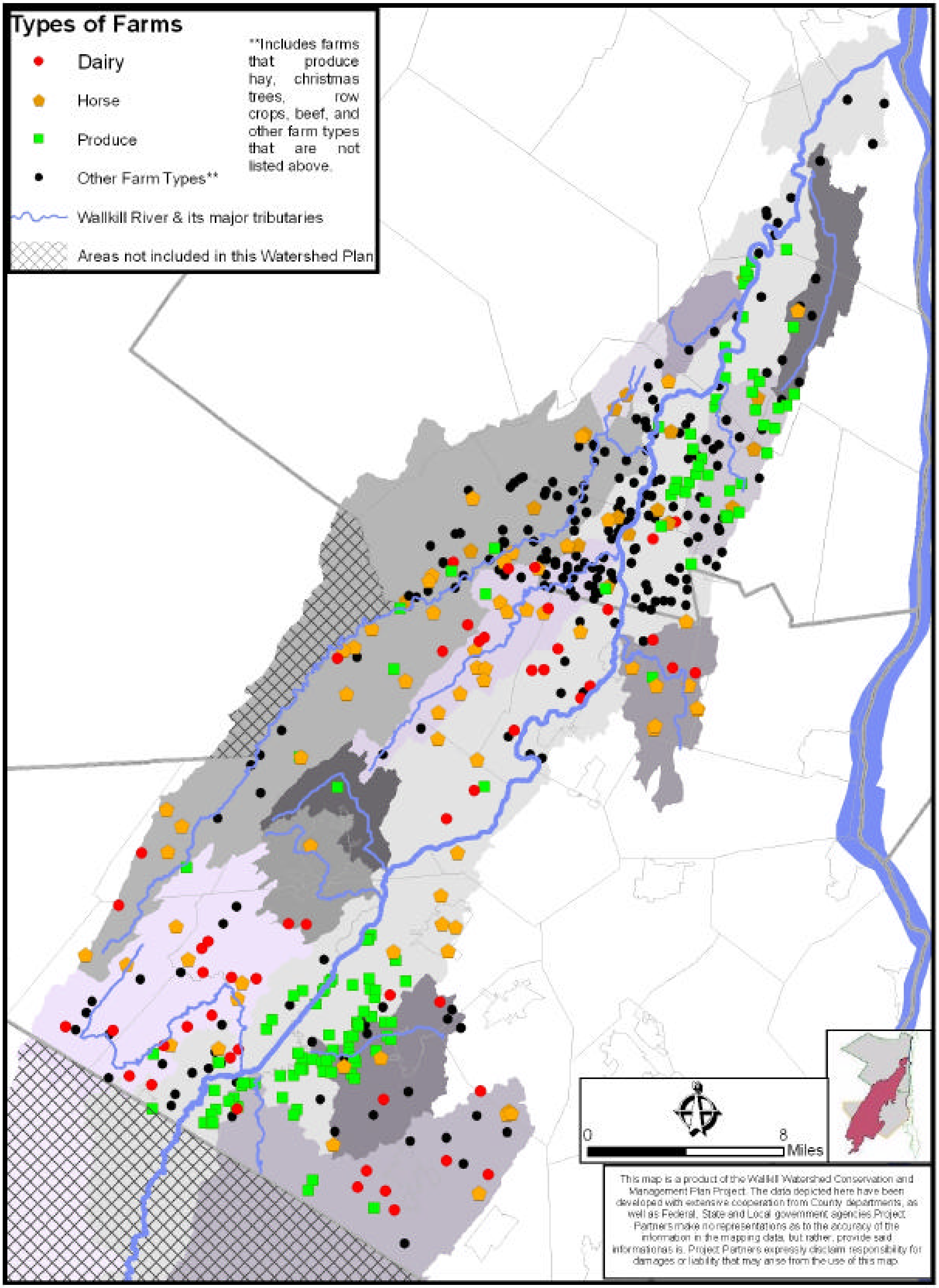
Watershed plans are an ideal opportunity to consider conservation of biological resources. The plants, animals, and habitats—or biodiversity—of the Wallkill Watershed are a significant part of the region's character and natural infrastructure. Forests, wetlands, and riparian areas are not only important wildlife habitats, but are also crucial for regulating the quality and quantity of water for the Watershed's streams and drinking water aquifers. Activities that protect biodiversity also protect water resources.

1. Biological Values of the Watershed

Analysis of the Watershed demonstrated that the biological diversity of the Wallkill Watershed is largely a legacy of its agricultural uses, past and present. Therefore, many of the watershed's important plants and animals are those dependent on early successional habitats, such as meadows and shrubby old fields. Some of the most biologically important habitats within the Watershed are:

Meadows, Pastures and Hayfields – These habitats, which are rapidly vanishing in New York, are important grassland bird habitat. They often contain wet areas supporting wetland plants and animals. Important species include bobolink; henslow's sparrow; eastern meadowlark; Baltimore, black dash, and Dion skipper butterflies; dragonflies; damselflies; ribbon snakes; spotted turtles; bog turtles; wildflowers; and rare sedges.

Shrubby Old Fields – The Watershed contains a higher number of shrubland breeding bird species



Map 8: Farm Locations. Please note that this map is a work in progress. Ulster County has completed more farm location mapping than Orange County.

compared to other regions, creating a greater responsibility for maintaining these populations. They are typically found in conjunction with agricultural land uses. Important species include Leonard's skipper; cobweb skipper; Aphrodite fritillary; yellow warbler; yellow-throated vireo; warbling vireo; and blue-winged warbler. Box turtles also utilize shrubby old fields. As their populations are declining in New York State, this resource should be given additional conservation attention.

Forests – Though largely fragmented by roads and urban areas, the Watershed includes substantial tracts of intact forest, the largest being on the Shawangunk Ridge. Forested land positively affects water quality by filtering water and stabilizing soils, and streamside trees help to shade and cool surface water. Many animal species require large, unspoiled forest and thus have become increasingly rare as the Watershed is developed. Smaller forest blocks of just 200 acres are significant to wildlife, particularly woodland birds such as scarlet tanager, wood thrush, and red-eyed vireo.

Wetlands – Wetlands are exceptionally important because of the myriad of services they provide to natural and human communities. These include habitat, groundwater recharge, water storage and flood mitigation, open space, and others. They also serve as transitional zones between land environments and water bodies. They house a unique assemblage of species. Wetlands are integral to healthy watershed function. They store and clean water and provide essential habitats. Stream-associated wetlands are important for riparian biodiversity. Notable wetland types in the Watershed include Atlantic white cedar swamp and the largely unprotected vernal pools (or seasonal woodland pools). Some of the most sensitive wetland animals found in the Watershed include the spotted turtle, bog turtle, blue-spotted salamander, Jefferson salamander, and northern cricket frog.

Streams - Stream corridors are one of the most diverse and extensive portions of the Watershed landscape. High quality stream habitat usually requires a patchwork of riffles, pools, and woody debris to maximize aquatic habitat diversity and maintain sufficient oxygen levels for aquatic life. Healthy stream corridors have naturally vegetated buffers and are undisturbed by development immediately adjacent to the channel. In addition to fish, stream channels are used by a number of species, including salamanders, turtles, mussels, and insects such as damselflies and dragonflies. Bats prefer to forage over stream channels and some birds nest almost exclusively near water. Sensitive species found within stream corridors of the Wallkill include brook trout, wood turtle, cerulean warbler, longtail salamander, rare plants, and rare freshwater mussels.

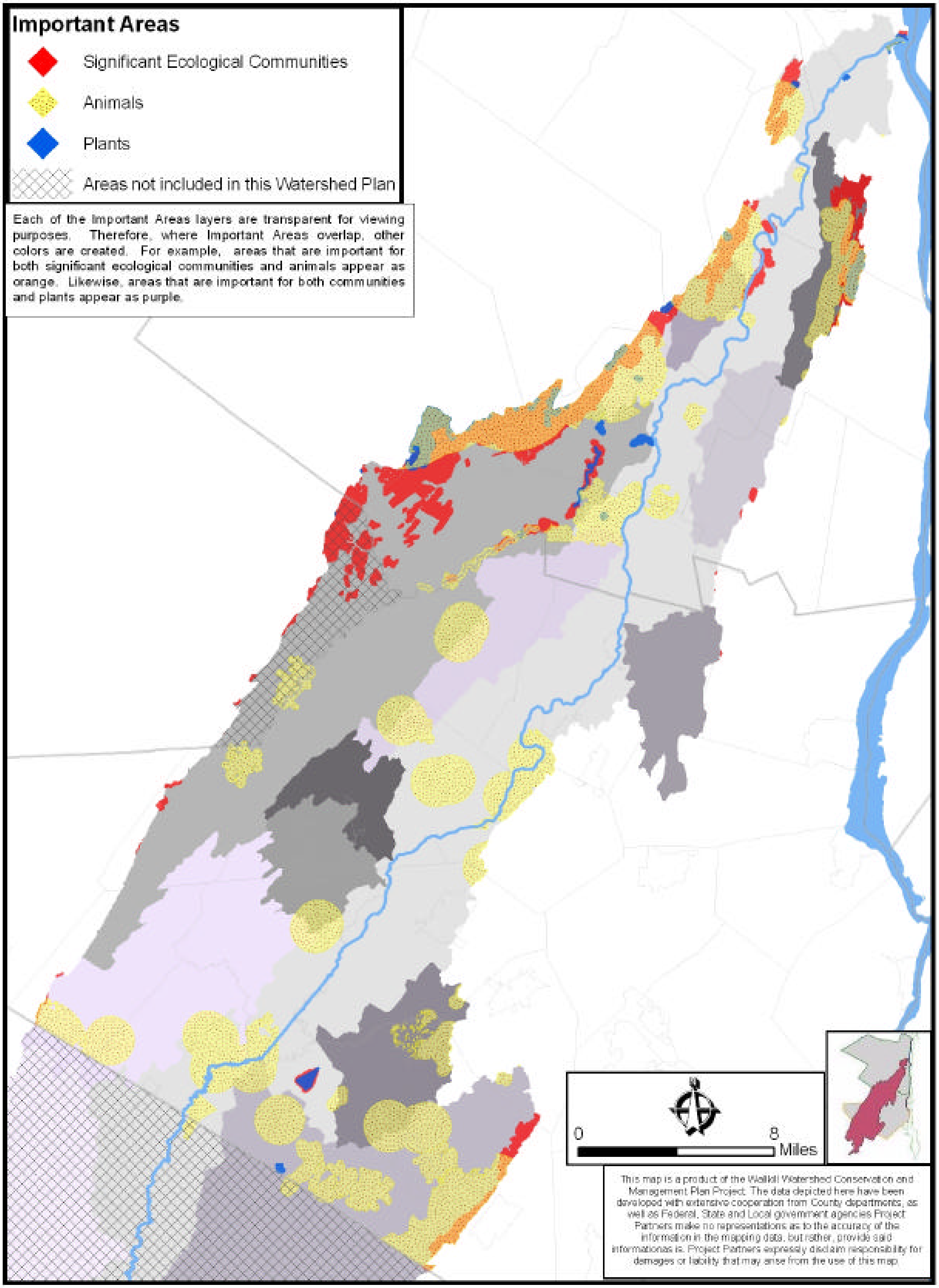
2. Subwatershed Analysis

Comparing the biological landscapes of the Wallkill River Watershed's subwatersheds helps to identify broad needs and impairments, as well as prioritize regions for restoration and protection. The following section outlines the known biological values of each subwatershed.

The New York State Department of Environmental Conservation's (DEC) Hudson River Estuary Program has partnered with the New York Natural Heritage Program to create maps that show areas important to the health of rare animals, rare plants, and significant ecosystems in the Hudson Valley. These maps, known as Important Areas maps, were developed to assist local land use decision makers in their planning for the protection of biological resources and will soon be available for all municipalities within the Wallkill River Watershed. Map 9 shows the Important Area data available for the Watershed, divided by subwatershed. The colored areas represent regions that are essential to the health of known locations of rare animals, rare plants, and significant ecosystems documented by the New York Natural Heritage Program.

Because Important Areas indicate where significant biological resources may be found, guidance in local planning and project review is strongly encouraged. Knowing where your Important Areas are is just one step in gathering biological information for your town's natural resource inventory, comprehensive plan, open space plan, or watershed plan. This map is useful as a general guide to areas within the Watershed that are known to be biologically valuable and should thus be prioritized for further biological research and/or protection.

The Natural Heritage Program's biological data-



Map 9: Biologically Important Areas

base was used in combination with the NYS Breeding Bird Atlas, NYS Amphibian and Reptile Atlas, and land use/land cover data to render the following descriptions of the major biological features of each subwatershed of the Wallkill River. The codes in parentheses following some species names indicate rarity: (sc) is a state species of special concern, (st) is a state threatened species, (se) is a state endangered species, (ft) is a federally threatened species, and (fe) is a federally endangered species.

Dwaar Kill

° *Habitats:*

A 67-acre red maple-hardwood and shrub swamp and another 367-acre partially forested wetland run along the Dwaar Kill. The Dwaar Kill's agricultural matrix of active crop fields, old fields, pasture, hay land, shrubland, and young forest co-exists with stands of hardwood forest, creating a diverse landscape.

° *Species of Concern:*

Wood turtle (sc), bog turtle (ft), red-shouldered hawk (sc), black-billed cuckoo, brown thrasher, willow flycatcher, scarlet tanager, wood thrush, red-eyed vireo, bobolink and Eastern meadowlark. Possible species of concern include Indiana bat (fe), Black rat snake, Eastern hognose snake (sc), Northern black racer, Northern red salamander, longtail salamander (sc), spotted turtle (sc).

Tin Brook

° *Habitats:*

Many stream-associated wetlands. Large wetland complex totaling over 200 acres form the headwaters of the largest tributary to the Tin Brook. Wetland encompassing over 325 acres within Stewart State Forest. Vernal pool complex at Stewart.

° *Species of Concern:*

Eastern box turtle, spotted turtle, wood turtle; blue-spotted salamander (sc), four-toed salamander, gray treefrog, Jefferson's salamander (sc), marbled salamander (sc), Northern dusky salamander, spotted salamander; Indiana bat (fe) roost trees and foraging area.

Monhagen Brook

° *Habitats:*

Two large wetlands (greater than 100 acres) are fragmented by rail and roads. Presence of spotted salamanders indicates vernal pools.

° *Species of Concern:*

Wood turtle (sc); amphibian concentration area; Upland sandpiper (st); Indiana bat (fe) roost trees and foraging area.

Masonic Creek

° *Habitats:*

Large wetlands (over 50 acres) are fragmented by roads and rail.

° *Species of Concern:*

Wood turtle (sc); Jefferson's salamander (sc); Red shouldered hawk (sc); Indiana Bat (fe) roost trees and foraging area.

Pochuck Creek

° *Habitats:*

Nearly intact 1165 acre Class I wetland in the eastern portion of the Watershed. The Wildlife Conservation Society has identified high quality habitat throughout this watershed in its Southern Wallkill Biodiversity Plan. Significant wetland communities: Inland Atlantic White Cedar Swamp (11 acres), Rich shrub fen (3 acres), Rich Graminoid fen (2 acres, 1.5 acre), Spruce –fir swamp (43 acres) Significant upland communities (all found on Bellvale mountain): Appalachian Oak-hickory forest (1565 acres), Hemlock – Northern Hardwood forest (570 acres), Chestnut-Oak Forest (981 acres).

° *Species of Concern:*

Bog turtle (ft), Eastern box turtle (sc), Eastern hognose snake (sc), ribbon snake, spotted turtle (sc), timber rattlesnake (st) wood turtle (sc); blue-spotted salamander (sc), chorus frog, four-toed salamander, Northern Dusky Salamander, Jefferson salamander complex, longtail salamander (sc), spotted salamander, wood frog; cerulean warbler (sc), Cooper's hawk (sc), red-headed woodpecker (sc), red-shouldered hawk (sc), sharp-shinned hawk (sc); Indiana bat (fe) roost trees and foraging area; Atlantic white cedar tree, blue tipped dancer damselfly; see also Southern Wallkill Biodiversity Plan (Miller et al, 2005).

Quaker Creek

° *Habitats:*

The Wildlife Conservation Society has identified high quality habitat throughout this watershed in its Southern Wallkill Biodiversity Plan.

° *Species of Concern:*

Eastern box turtle (sc), five-lined skink, spotted turtle (sc); longtail salamander (sc), Northern Cricket Frog (se), wood frog; Upland sandpiper (st); Indiana bat (fe) roost trees and foraging area; falcate orangetip butterfly; See also Southern Wallkill Biodiversity Plan (Miller et al, 2005).

Rutgers Creek

° *Habitats:*

Mt. Hope has 390 acre wetland. Vernal pools are scattered throughout subwatershed, which also has many stream-associated wetlands. There is a matrix of active crop fields, old fields, pasture, hay land, shrubland, and successional habitats that coexist with stands of hardwood forest, creating a diverse landscape.

° *Species of Concern*:

Bog turtle (st), Eastern Box turtle (sc), spotted turtle (sc), timber rattlesnake (st), wood turtle (sc); Amphibian concentration area, Jefferson's salamander (sc), Jefferson's salamander complex, marbled salamander (sc), northern dusky salamander, wood frog, spotted salamander; cerulean warbler (sc), Cooper's hawk (sc), Indiana bat (fe) roost trees and foraging area.

Shawangunk Kill

° *Habitats:*

Large forest areas on the Shawangunk Ridge: vernal pools, Chestnut-oak forest, Hemlock-northern hardwood forest, pitch-pine oak heath rocky summit, acidic talus slope woodland. See also maps of conservation targets from the Shawangunk Ridge Biodiversity Partnership. The Shawangunk Kill is the only stream where we have documentation of a high quality stream biodiversity. Significant natural communities found there are confined river, and floodplain forest.

° *Species of Concern:*

Black rat snake, Eastern box turtle (sc), Northern black racer, spotted turtle (sc), wood turtle (sc), timber rattlesnake (st); four toed salamander, Jefferson's salamander (sc), gray treefrog, Northern red salamander, spotted salamander, wood frog; Acadian flycatcher, American kestrel, American redstart, barred owl, black throated green warbler, Eastern towhee, Eastern wood-pewee, field sparrow, least flycatcher, Louisiana waterthrush, ovenbird, spotted sandpiper, veery, Northern goshawk, red-shouldered hawk (sc), scarlet tanager, worm-eating warbler; brook floater mussel, brook snaketail dragonfly, Rapids clubtail dragonfly, beakgrass, Davis' sedge.

Mara Kill

° *Habitats:*

390 acre wetland in the Town of Gardiner, vernal pools.

° *Species of Concern:*

Bog turtle (st), Eastern Box turtle (sc), spotted turtle (sc), timber rattlesnake (st), wood turtle (sc); Amphibian concentration area, Jefferson's salamander (sc), Jefferson's salamander complex, marbled salamander (sc), northern dusky salamander, wood frog, spotted salamander; cerulean warbler (sc), Cooper's hawk (sc), Indiana bat (fe) roost trees and foraging area.

Swarte Kill

° *Habitats:*

Exceptional habitat for northern cricket frog (se) within NYS; large 1546-acre Class 1 regulated wetland complex and 421-acre Class 2 regulated wetland along the Swarte Kill; 206-acre red maple-hardwood swamp (Grand Pond) and marshes on tributary to the Swarte Kill; 52-acre lake and marsh complex (Auchmoody Pond); other 50-70 acre wetlands; vernal pools; mature, undisturbed hemlock-northern hardwood forest, Appalachian oak-hickory and beech-maple mesic forests on Shaupeneak Mountain extending south.

° *Species of Concern:*

Northern cricket frog (se), Jefferson salamander (sc), four-toed salamander, worm-eating warbler, Louisiana waterthrush, black-throated green warbler; black-billed cuckoo, northern flicker, Eastern wood pewee, wood thrush, yellow-throated vireo, blue-gray gnatcatcher, black-and-white warbler, cerulean warbler (sc), scarlet tanager, rose-breasted grosbeak, red-shouldered hawk (sc); large twayblade (st).

Platte Kill

° *Habitats:*

Small part of Red maple hardwood swamp that extends from Town of Plattekill to Town of Newburgh.

° *Species of Concern:*

Spotted turtle (sc), Northern cricket frog (se).

Klein Kill

° *Habitats:*

Chestnut Oak Forest, vernal pools.

° *Species of Concern:*

Timber rattlesnake (st), black rat snake, five lined skink, Eastern box turtle (sc), Northern copperhead, spotted turtle (sc), Northern black racer; Jefferson's salamander (sc), spotted salamander, wood frog.

Wallkill Direct Drainage (Orange)

° *Habitats:*

Highland Lakes State Park has Appalachian oak hickory forest, oak-tulip tree forest, Hemlock-Northern hardwood forest, successional southern hardwoods, successional old field, successional shrubland, red maple-hardwood swamp, vernal pools, shallow emergent marsh, shrub swamp, rocky headwater stream. The Southern Wallkill Biodiversity Plan identifies high quality habitat in the portions of this watershed within the towns of Goshen and Warwick (Miller et al., 2005).

° *Species of Concern:*

Eastern Box turtle (sc), Eastern Hognosed snake (sc), spotted turtle (sc), wood turtle (sc); blue spotted salamander (sc), gray treefrog, N. dusky salamander, N. red salamander, spotted salamander, wood frog; American bittern, Cerulean warbler (sc), Cooper's hawk (sc), Grasshopper sparrow (sc), least bittern (st), Northern harrier (st), red-headed woodpecker (sc), red-shouldered hawk, short-eared owl (se), Up-land sandpiper (st); Indiana bat (fe) roost trees and foraging areas; blue-tipped dancer, cobra clubtail dragonfly, midland clubtail dragonfly, spine-crowned clubtail dragonfly; see also Southern Wallkill Biodiversity Plan (Miller et al, 2005).

Wallkill Direct Drainage (Ulster)

° *Habitats:*

Floodplain forest remnants on Wallkill River, Shawangunk Ridge: vernal pools, chestnut oak forest, high quality grassland bird habitat.

° *Species of Concern:*

Bog turtle (st), Eastern box turtle (sc), spotted turtle (sc), timber rattlesnake (st), wood turtle (sc), gray treefrog, spotted salamander, wood frog, American kestrel, American redstart, American woodcock, bald eagle (ft), Baltimore oriole, blue-winged warbler, bobolink, brown thrasher, Eastern meadowlark, Eastern towhee, Eastern wood-pewee, field sparrow, Northern harrier (st), ovenbird, prairie warbler, savannah sparrow, scarlet tanager, sedge wren (st), short eared owl (se), upland sandpiper (st), willow flycatcher, wood thrush; rare plant species on Shawangunk ridge.

Water Resources

Water resources in the Wallkill River Watershed include surface water in streams, lakes, and wetlands, and groundwater. Groundwater and surface water resources, while they may appear to be separate and distinct, are really interconnected and influence each other both in terms of quantity and quality. Groundwater aquifers, whether in sand and gravel formations or in the fractures and cracks in bedrock, are recharged by the downward flow of precipitation from the surface. Surface water bodies including streams and wetlands, conversely, are also supplied by groundwater in some cases. A significant portion of the dry weather flow in smaller streams, for example, originates from groundwater that flows laterally and upward into streams, which is known as base flow. Developing a complete perspective on protecting and managing water resources, therefore, requires knowledge of the interactions between groundwater and surface water bodies in the Watershed and consideration of how these interactions may be impacted by changes in land use, withdrawal of water, and other activities. In many areas, existing information about these interactions is not adequate to enable development of detailed protection plans for groundwater, streams and wetlands and one recommendation is for more research and monitoring to fill these gaps. (See Water Supply, Quantity and Allocation section for more information.)

A detailed analysis of existing information about water resources and drinking water supplies was beyond the scope of this management plan. Some of the studies and data available include completed and/or ongoing studies by the Orange County Water Authority of groundwater, municipal water supply systems, and of surface water quality in streams; data available from the County's Department of Health; studies by the US Geological Survey, NYS DEC, and other agencies; studies and reports done for individual municipalities; and data included in environmental impact statements or other documents for proposed development projects. Below are summaries of several research, monitoring and regulatory programs relevant to water resources planning and protection in the watershed.

1. Priority Waterbodies List

The Priority Waterbodies List (PWL), published and maintained by the NYSDEC, provides summaries of water quality conditions for a great number of lakes, streams and rivers in New York. The initial inclusion of the Wallkill and several of its tributaries on the PWL is described briefly in the introduction to this Plan. While some waterbodies on the original list were removed due to inadequate documentation, the Wallkill and several of its tributaries have remained on the List through several updates. (Map 1) Better documentation of water quality conditions has been added over this period. To some extent, the often turbid appearance of the Wallkill, especially in the Black Dirt Region, has caused public concern about water quality. This is reflected by the PWL's listing of aesthetics as being stressed. It is unclear, however, how much of this turbid appearance is a result of human influences and how much is a natural condition owing to the

Beyond aesthetics, though, work done in 1997 by Dr. Simon Litten of the DEC detected the presence of DDT residues in the Wallkill, starting around the NJ line, at levels above those found in other Hudson Valley rivers. This work is summarized in the PWL.

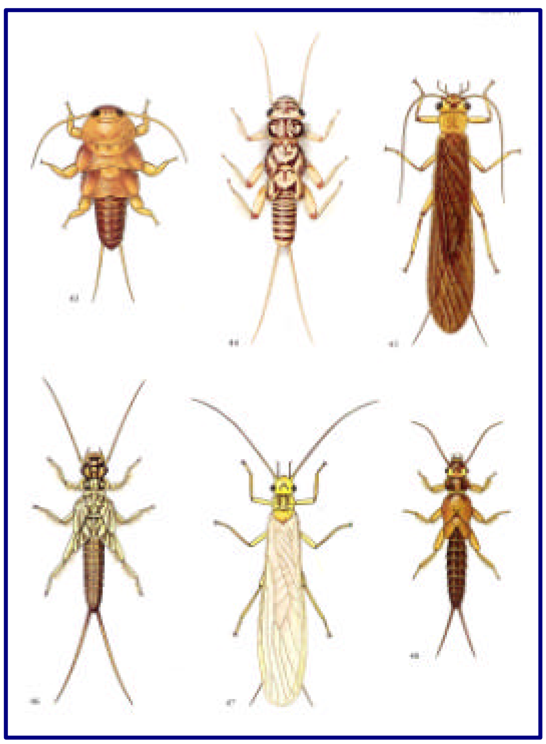


Figure 4: Stoneflies suggest good water quality

2. Macroinvertebrates as Indicators of Water Quality

How much information is there about existing water quality and trends over time? A detailed picture of water quality in streams in the Watershed is emerging from studies using macroinvertebrates as indicators of water quality.

Benthic macroinvertebrates are small aquatic insects, crustaceans, worms, and other animals that live in the bed (or benthos) of streams. There are many species of macroinvertebrates and their tolerance to pollution varies greatly. Because these species cannot move around much the way fish can, and because they live in one location for weeks or months, they are impacted by the overall water quality conditions at that site during their lifespan. In contrast to taking a single water sample, which only reflects water quality at a single point in time, macroinvertebrate sampling provides a cumulative view of water quality at each sampling site and thus provides a very cost-effective and reliable way to assess overall water quality. When a diverse assortment of species, including sensitive species, is found in a controlled sampling and analysis procedure, this indicates that the water quality at that site is high,

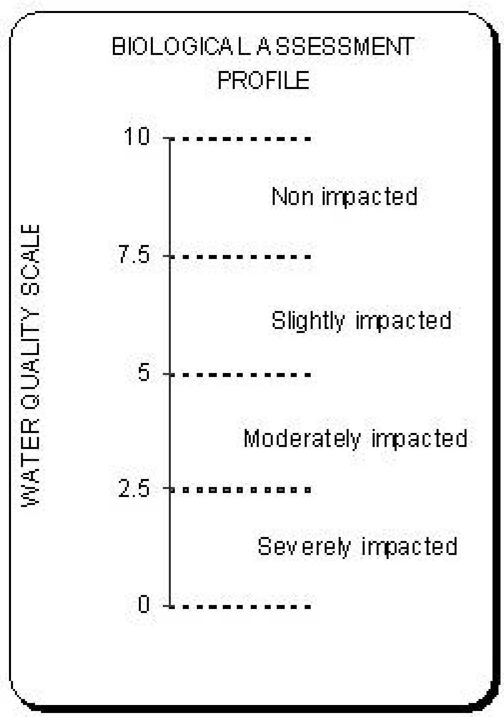


Figure 5: BAP Scale

whereas when only a few pollution-tolerant species are present water quality is assessed as low. Where problems are found, more research can be focused on those specific areas. The NYS DEC has refined this method for streams in New York to enable measuring water quality on a scale of 0-10, called the Biological Assessment Profile (BAP), where 10 is the best water quality. (Fig, 5)

A study by Hudsonia in 1994, titled "*Environmental Quality of the Wallkill River* in *Orange County, NY*", concluded that the macroinvertebrate community was "...under considerable habitat and pollution stress" (see Appendix B). Macroinvertebrate samples have been collected by NYS DEC's Stream Biomonitoring Unit (SBU) at a number of sites in the Wallkill River Watershed including the main stem and tributaries. The findings of this work, based on sampling beginning in 1994, are summarized in a 30-Year Trends report for the state, and for the Wallkill main stem it concludes that "most of the impact in the river is due to agricultural nonpoint source nutrient enrichment." It also notes that water quality has improved since earlier studies in 1972 and attributes the likely cause of this improvement to wastewater treatment upgrades to the Middletown, Wallkill, Montgomery and Walden treatment plants from 1985-1989. A three-year sampling program using the same methods, currently being implemented by the OC Water Authority, has found evidence, however, that municipal wastewater discharges may still be causing significant water quality impacts in certain locations. (Map 10)

When considering the NYS DEC SBU data, and the data from Orange County discussed below, it's important to remember that the terms used have a very specific meaning. In particular, the DEC's term "slightly impacted" can be misleading if not considered in context. The DEC's protocol scores water quality on a scale from 0-10, with 10 being the highest and best. The slightly impacted category includes scores from 5.1 – 7.4, so even sites where water quality is only marginally better than 5.0, which is halfway down the scale from best to worst, will be termed "slightly impacted." It's important, therefore, to look at the numerical BAP score for each site to better understand its actual water quality. Figure 6 depicts the 2005 BAP scores for six sites on the Wallkill River main stem in Orange County.

Figure 6 depicts the Biological Assessment Profile scores for six water quality monitoring sites in the main stem of the Wallkill River in Orange County, NY. Macroinvertebrate samples were collected in July 2005. The monitoring sites included a site just downstream of the New Jersey state line (site 463), several other sites in the center of Orange County, and one site just upstream of the Ulster County boundary (site 538) that indicated severe water quality impacts. Follow up monitoring is being conducted in 2006. The BAP score combines four metrics ((EPT, SR, HBI, and PMA/SD) that measure various characteristics of the macroinvertebrate community structure to assess overall water quality. For more information on these metrics and the methodology used, see the NY State Dept. of Environmental Conservation's *2002 Quality Assurance Work Plan for Biological Stream Monitoring in New York State* or contact the Orange County Water Authority.

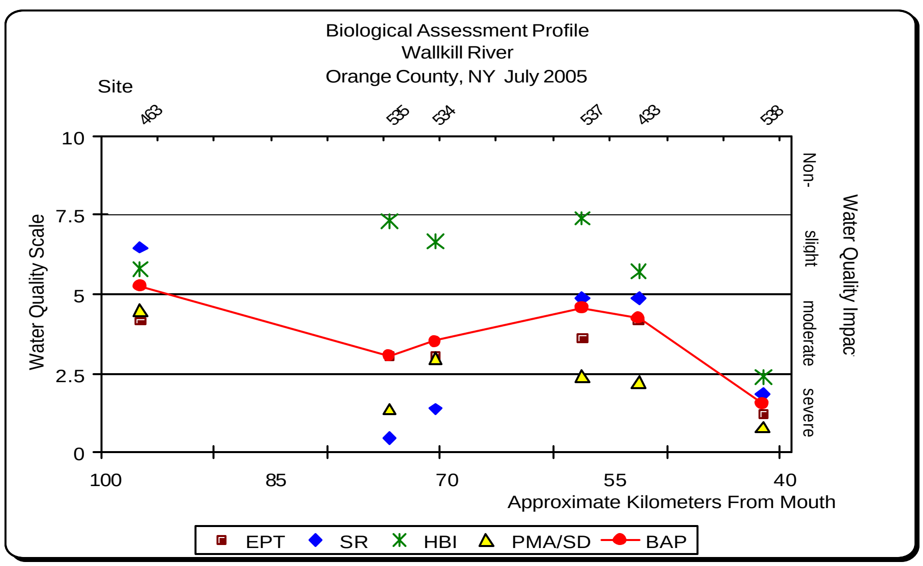


Figure 6: Biological Assessment Profile (BAP) scores
Source: Orange County Water Authority

The Orange County Water Authority's ongoing water quality survey is providing more detailed information than ever before. Field work and analysis for this Water Quality Biomonitoring Project is being conducted by Hudson Basin River Watch, and this project is using the same methodology developed by NYS DEC and approved by US EPA so the results are comparable to the State's data. Over 60 samples were collected in 2004, 2005, and 2006 in the Wallkill basin in Orange County. Data for 2004 and 2005 is summarized and briefly discussed in this section; 2006 data analysis will be completed by spring of 2007. Of those sites that showed water quality impacts, the most common sources of impact indicated by the Impact Source Determination (ISD) method were non point source nutrient enrichment, but the ISD indicates that sewage is the primary problem at a number of sites indicating moderate or severe impacts. The NYS DEC 30 Year Trends report notes that many wastewater treatment plants built or upgraded in the 1970s and 1980s are now aging and suggests that older wastewater infrastructure "functioning beyond capacity or at reduced levels of efficiency" is the cause of water quality impact at some sites across NY State.

Notably, in 2005, one site in the Wallkill River just south of the Ulster County border indicated severely impacted water quality (BAP score 1.56). While the specific cause(s) for this impairment are not yet known, the ISD measured at this site strongly indicates that sewage is a primary cause, and follow-up monitoring during 2006 is underway at this site and others nearby.

In Ulster County, the NYS DEC has sampled a number of sites in the Wallkill River and its tributaries. Most of these sites were assessed as non-impacted. A site on the Dwaar Kill, a tributary of the Shawangunk Kill in Ulster County, was assessed as slightly impacted in 2002. (Note: There are two Dwaar Kills – the other one begins in Orange County and joins the Wallkill River in just north of the hamlet of Wallkill. In 2006-2007, the Hudson River Estuary Program is sponsoring a Watershed Assessment project for several basins, also being conducted by Hudson Basin River Watch in collaboration with local watershed groups and other stakeholders, that includes macroinvertebrate sampling for 23 sites in the Ulster County portion of the Wallkill River Watershed. This project will provide updated assessments for several sites previously sampled by NYS DEC and assessments for a number of new sites as well.

A compilation of recent biomonitoring data for both Orange and Ulster counties, including data from NYS DEC and the Orange County Water Authority, provides an overall perspective on water quality in the watershed that is sobering. The pie chart below illustrates that during 2002-2005 in the Wallkill and some of its tributaries, only 11% of the sites were non-impacted (ie. BAP of 7.5 or higher) and more than a third were either moderately or severely impacted (BAP of 5.0 or lower). It is important to note that most of this data is from sites in Orange County because far

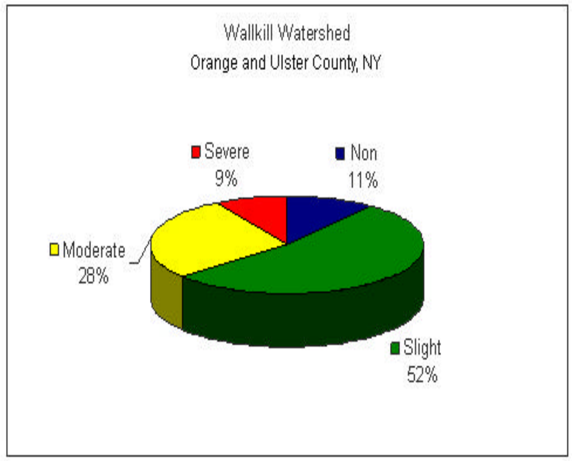


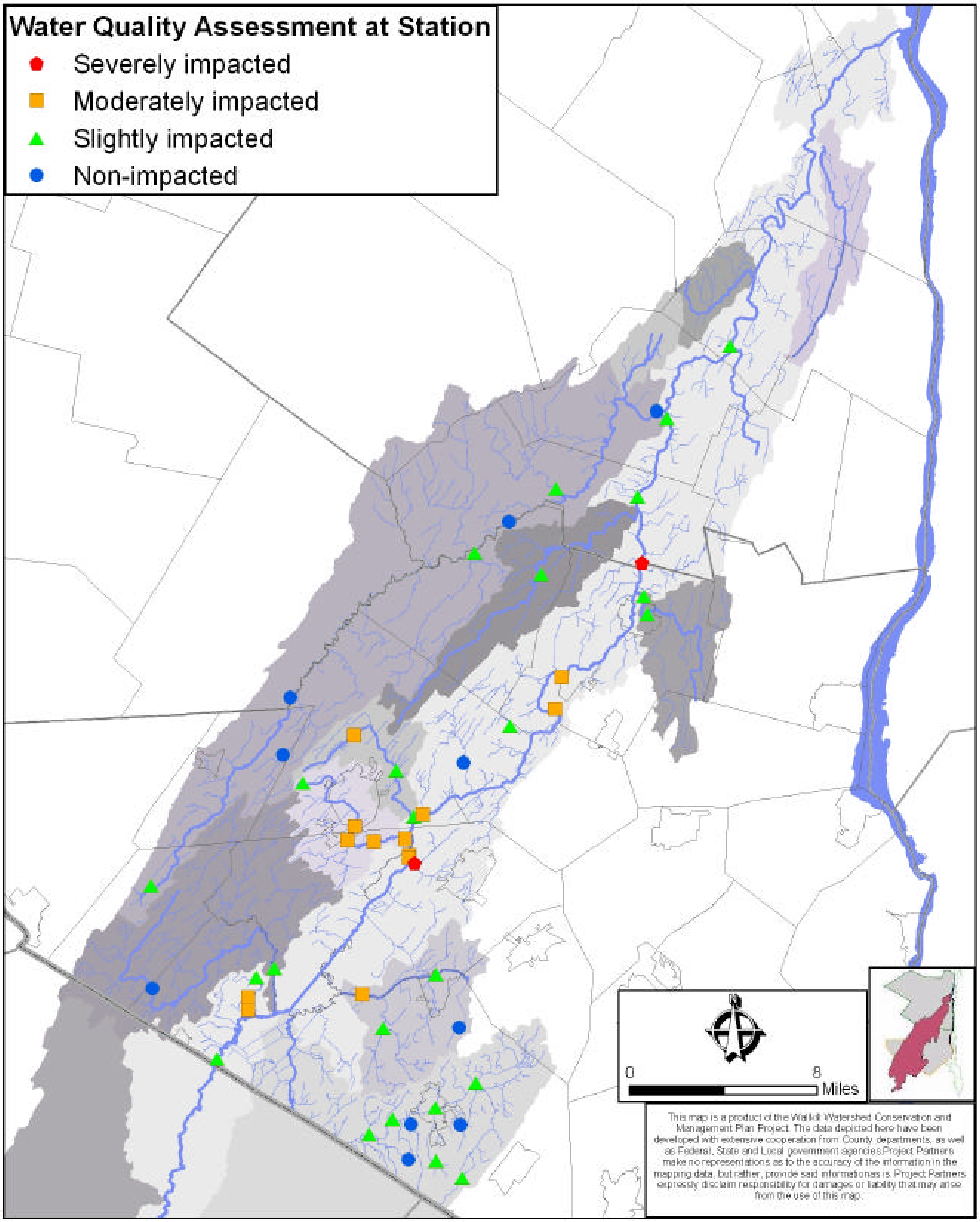
Figure 7: This chart illustrates the distribution of stream biomonitoring assessments for sites in Orange and Ulster counties sampled from 2002-2005. Most of the data used for this chart is from Orange County. See discussion above for more details about interpreting biomonitoring data.

more data is available for that area. (Figure 7)

3. Chemical Data

The Hudsonia study did include a chemistry component, but it was limited to single grab samples at each site. The NYS-DEC SBU and K. Nolan also collected limited chemistry data during their biomonitoring studies.

Research by US Geological Survey staff has found elevated levels of arsenic in the Wallkill River's bottom sediments and its water at sites in New Jersey. These conditions apparently originated from historical zinc mining activity at the Sterling Hill and Franklin mines in Franklin, NJ, both of which are now closed (there are



Map 10: Stream Biomonitoring Sites

museums on both sites). At times, the arsenic concentration in the river's water has slightly exceeded New Jersey's standard for drinking water, which is 5 micrograms/liter, as measured at a monitoring site south of Unionville. Zinc concentrations in sediments also were elevated. Some of the data collected in this research has been published in USGS annual reports for 2004 and 2005. Several articles have been submitted to scientific journals for publication, and a summary report will be published by USGS in late 2006. Contact for more information: Julia Barringer, US Geological Survey, jbarring@usgs.gov or 609-771- 3960.

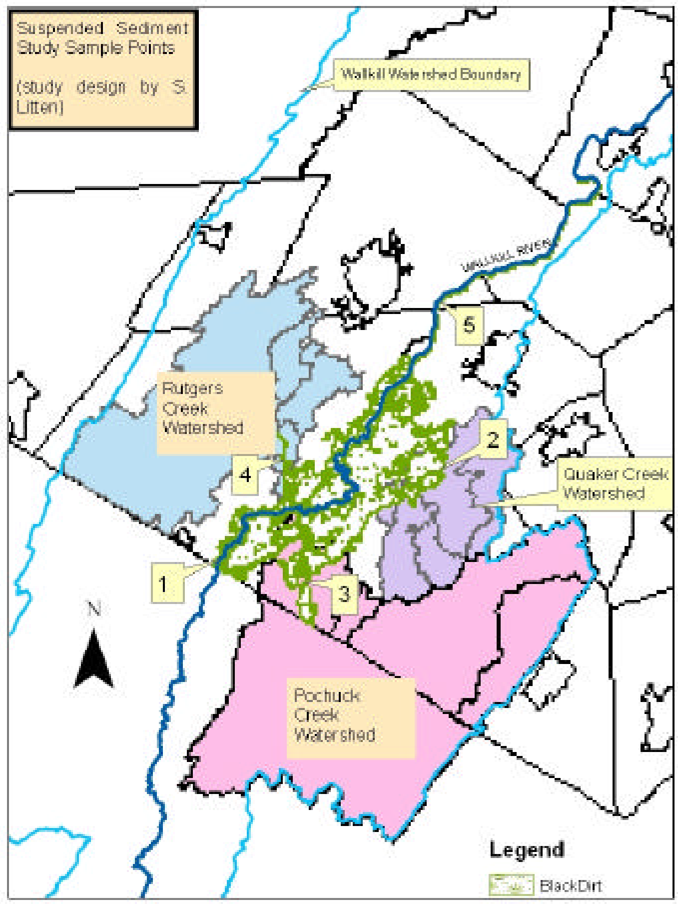
"In 1997 NYSDEC conducted a monitoring effort on Hudson River tributaries as part of the Contamination Assessment and Reduction Project (CARP) to evaluate potential sources of toxic chemicals to the Hudson and New York Harbor. Results from this monitoring found the Wallkill to have the highest concentrations of DDT (by a factor of 10) and dieldrin of all tribs tested. Follow-up monitoring indicate (sic) the DDT source is located in the 'black dirt'area (see Wallkill River segment 1306-0017). The study concludes that while the impact of this source on the Hudson is unclear, it does affect the entire length of the Wallkill. (Toxics Organics Survey: Hudson, Wallkill and Hackensack Rivers – DRAFT, Litten et al, DEC/DOW, BWAR, October 1999)." (*The 1999 Lower Hudson River Basin Waterbody Inventory and Priority Waterbodies List, NYSDEC, June, 2000, pp 127-128)*

We believe that there are other chemical monitoring data in existence for the Wallkill, but they were not readily available. Our conclusion is that a more formal and accessible program of chemistry sampling and evaluation should be pursued in order to draw reliable conclusions about the conditions of the Wallkill in this respect.

4. Suspended Sediment Study

Partially as a follow up to Dr. Litten's 1997 DDT study, and also because of general elevated concern about sediment in the River, the Wallkill River Task Force (WRTF) and OCSWCD partnered with NYSDEC to undertake a Suspended Sediment Study of the Wallkill and several of its tributaries in the Black Dirt Region. One of the main purposes of this study was to assess whether sediment loads in the Wallkill were coming disproportionately from one or more areas of the watershed. An additional goal was to determine if volunteers could contribute in a significant way to a formal water quality study.

Unlike biological assessments, which offer flexibility in terms of when samples can be selected[2], suspended sediment analysis requires 'event-based sampling' since the bulk of a river's sediment load is associated with runoff events. The fieldwork for this study took place primarily in 2004 and 2005.



Map 11: Suspended sediment study sampling sites

In summary, the study concluded that suspended sediment in the main channel of the Wallkill was not coming disproportionately from the upland In summary, the study concluded that suspended sediment in the main channel of the Wallkill was

[2] DEC SBU protocols require sampling to take place from July-September, but within this time frame sampling can occur at any time.

not coming disproportionately from the upland portions of major tributaries (Pochuck, Rutgers, & Quaker). The main researcher postulated, at the December 2004 meeting of the Project Steering Committee, that the banks of the River itself and the banks of major drainage channels within the study area were the major contributors. (See Black Dirt section for more on this issue and how it impacts recommended actions of the Plan).

It is worth noting that all involved with the study agreed that the volunteer component of the study worked extremely well. Despite being required to visit sampling sites (Map 11) on short notice during often inclement weather, volunteer samplers (4 out of 5 of which were Black Dirt farmers) performed their duties accurately and reliably. The success of the effort can also be attributed largely to the diligence of OCSWCD's Kris Breitenfeld, who coordinated the sampling locally.

5. Water Supply, Quantity and Allocation Issues

Water for human use in the Wallkill basin is obtained from private wells and municipal supplies. Municipal systems in Orange County are supplied by reservoirs (which serve the City of Middletown and the villages of Florida, Warwick, and Goshen) and by municipal wells. Municipal wells are located both in sand and gravel aquifers, which tend to be relatively shallow and can provide high yields, and in bedrock formations, which are generally deeper. Some of these wells are located close to the Wallkill River and water levels and water quality are directly affected by the River. While water consumption from the municipal systems has not increased significantly in most cases over the past 10-15 years, Orange County is currently working with a number of communities, including Crawford, Goshen, Middletown, Wawayanda and Wallkill, to study the potential for new drinking water supply projects. These projects will potentially lead to increased withdrawals of water from the Wallkill River, some of its tributaries, and/or from groundwater aquifers. Some farmers will also take water for irrigation.

In Ulster County, New Paltz's upland reservoirs are an auxiliary source of supply for the Village of New Paltz and Town of New Paltz water district. The contributing watersheds of these surface supplies lie within the Wallkill Watershed and serve 6000 customers in an emergency capacity. The hamlet of Wallkill relies on municipal wells located on the eastern edge of the Town of Shawangunk. This area is recharged by a pitted outwash plain extending from Wallkill south into Orange County. The majority of the residents of this area rely on individual wells drilled into bedrock or driven into unconsolidated aquifers. The average depth of these wells in the unconsolidated aquifers is 73' and yield an average of 93 gallons per minute (gpm). When, however, a bedrock well is required, the depth increased to 200' and the yields dropped to 33 gpm. The Water Supply Study 1989, prepared by Stearns and Wheler, evaluated existing and long range needs of the county and recommended system improvements and consolidations to satisfy those needs. It is projected that at the current rate of growth, all of the municipalities will experience a water deficit. The only exception to this is New Paltz, which has access to water from the NYC-DEP Aqueduct System.

Water-Related Recreation

When people are able to enjoy a water resource through recreational opportunities such as swimming, boating, or fishing, they are more likely to be concerned about the health and welfare of that resource. Even hiking along a river or viewing a water body from a park can create a feeling of ownership that can lead to greater public stewardship of the waterway. The Wallkill River has long suffered from a low public profile as a recreational resource, due to many factors. Only recently have riverside parks and river access points become a focus for communities along the Wallkill, but today there are many points where the public can enjoy the River (Map 12).

Public access points to the Wallkill River in New York, from south to north, consist of:

1. Wallkill River National Wildlife Refuge (Warwick) – The 5,100-acre Refuge is mainly in New Jersey, but its New York acreage includes a riverfront parcel with interpretive signage, benches and a boat launch.
2. Orange County Land Trust's Hamptonburgh Preserve (Hamptonburgh) – A nature preserve consisting of forests,

fields, and wetlands, with an emerging trail system. Presently, there is no designated access point to the River.

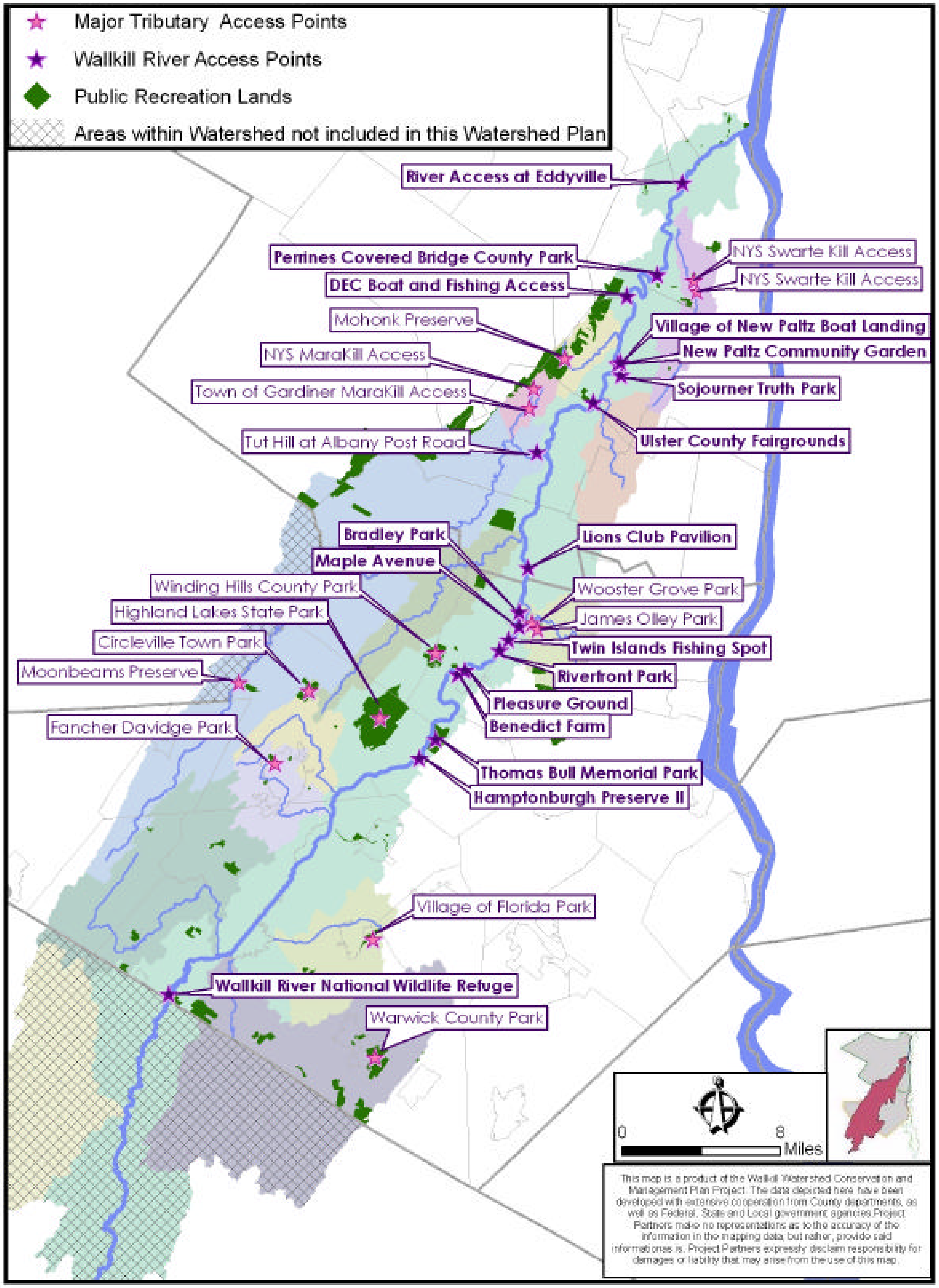
3. Thomas Bull Memorial Park/Orange County Park (Hamptonburgh) – Orange County owns 1.6 miles of forested Wallkill River frontage within this popular park. Although no designated access point to the River currently exists, a boat launch will be installed in late 2006 or 2007.
4. Benedict Farm (Montgomery)– A Town Park that boasts 3,500 feet of continuous frontage to the River. The Park has a boat launch, with plans for active recreation facilities.
5. Pleasure Ground Park (Village of Montgomery) – A forested park with a pavilion and boat launch on the River, with ball fields and interweaving pedestrian trails.
6. Riverfront Park (Montgomery) – A mid-sized park whose principal feature is its prime access to the Wallkill River. The Park has a picnic grove on the waterfront.
7. Twin Islands Fishing Spot (Montgomery)- A small linear park on the Wallkill River, popular for fishing.
8. Maple Street Park (Walden) – This small park at the foot of Maple and Pine Street in the Village of Walden is available for cartop boat launching.
9. Bradley Park – This active recreation park in the Village of Walden has ballfields and almost 1500 feet of Wallkill River frontage[3], but no current designated access point to the River.
10. Lions Club Pavilion (Shawangunk) – A small parcel with a picnic pavilion and fishing access.
11. Ulster County Fairgrounds (New Paltz) – A DEC-sponsored cartop boat luanch and fishing area, which also houses the Ulster County Fairgrounds.
12. Village of New Paltz – Privately-owned, access by permission.
13. Village of New Paltz Community Garden – A quarter-mile riparian greenway along the Wallkill River, which features a riparian buffer, community gardens and the Historic Huguenot settlement.
14. +DEC Boat and Fishing Access (Rosendale) – A small parcel with a cartop boat launch.
15. Perrines Covered Bridge County Park (Rosendale) – Has the oldest covered bridge in New York State. The bridge was built in 1835 and is listed on National Historic Register. The Park also has scenic view and fishing access.
16. DEC River Access at Eddyville – Within the Town of Ulster, this spot provides fishing access and has a boat lanch with a gravel ramp to accommodate trailers.

Shooting the Rapids, near Pine Island, NY.

Although there are many public spaces where people may enjoy the River, substantial geographic areas are void of such opportunities. Large stretches of Wallkill River's shoreline remain in private ownership, thus inaccessible to the general public. In Orange County, the residents of Minisink, Goshen, Wawayanda, and Wallkill currently have no access to the Wallkill River. The prevalence of active agriculture operations in the Black Dirt region of Orange County may impede the establishment of public parks or access points on the banks of the Wallkill River within some of these towns, but opportunities should neverthless be explored.

Public stewardship of the Wallkill River could be heightened if more opportunities for public enjoyment were made available, especially in those geographic areas that are void of access points.

[3] Some of this frontage includes land used by the Village of Walden's wastewater treatment plant and therefore may not be suitable for public recreation.



Map 12: Public Access Points

At present, the public has five opportunities to enjoy the major tributaries of the Wallkill River. The Orange County Land Trust's Moonbeams Preserve provides public access to the Shawangunk Kill, which is stocked with trout by the DEC. The Village of Walden's Wooster Grove Park is enveloped by the Tin Brook and provides an opportunity for Village residents to wade and fish in the Brook. The NYS DEC provides multiple access points to major tributaries in Ulster County: one on the Mara Kill and two on the Swarte Kill. These areas are typically for fishing and for launching cartop boats. The Town of Gardiner also has an access point to the Mara Kill and the Mohonk Preserve has a small access point on the Klein Kill.

Other water-related recreation opportunities within the Watershed include public parks with lakes and ponds that the public can appreciate through fishing, boating, or swimming. The towns of Minisink, Goshen, and Wawayanda, unfortunately, have no opportunities for the public to enjoy water-related recreation. While these towns may have small tributaries flowing through some of their public parks, such natural features may or may not be promoted and used as a public resource. It is therefore important that land with access to water within these geographic areas be prioritized for future parkland acquisitions.

Wastewater Management

Wastewater discharges in the Wallkill watershed include individual onsite systems (commonly referred to as septic systems) and municipal collection and treatment plants (Map 13 depicts areas served by municipal wastewater systems.)

Larger municipal discharges in Orange County include systems owned by Middletown, Town of Wallkill, Town of Montgomery, Town of Crawford (serving Pine Bush), and villages of Florida, Warwick, Goshen, Montgomery, and Walden. There are also other smaller systems, some of which are privately owned and operated. In Ulster County, municipal systems serve the hamlet of Wallkill and two prisons in the Town of Shawangunk, part of the Town of Gardiner, and the Village of New Paltz. Several smaller privately owned systems serve the Watchtower farm in the Town of Shawangunk and the Maple Ridge Bruderhof in Esopus. The Town of Rosendale has a municipal system that discharges to the Rondout Creek downstream of the confluence with the Wallkill.

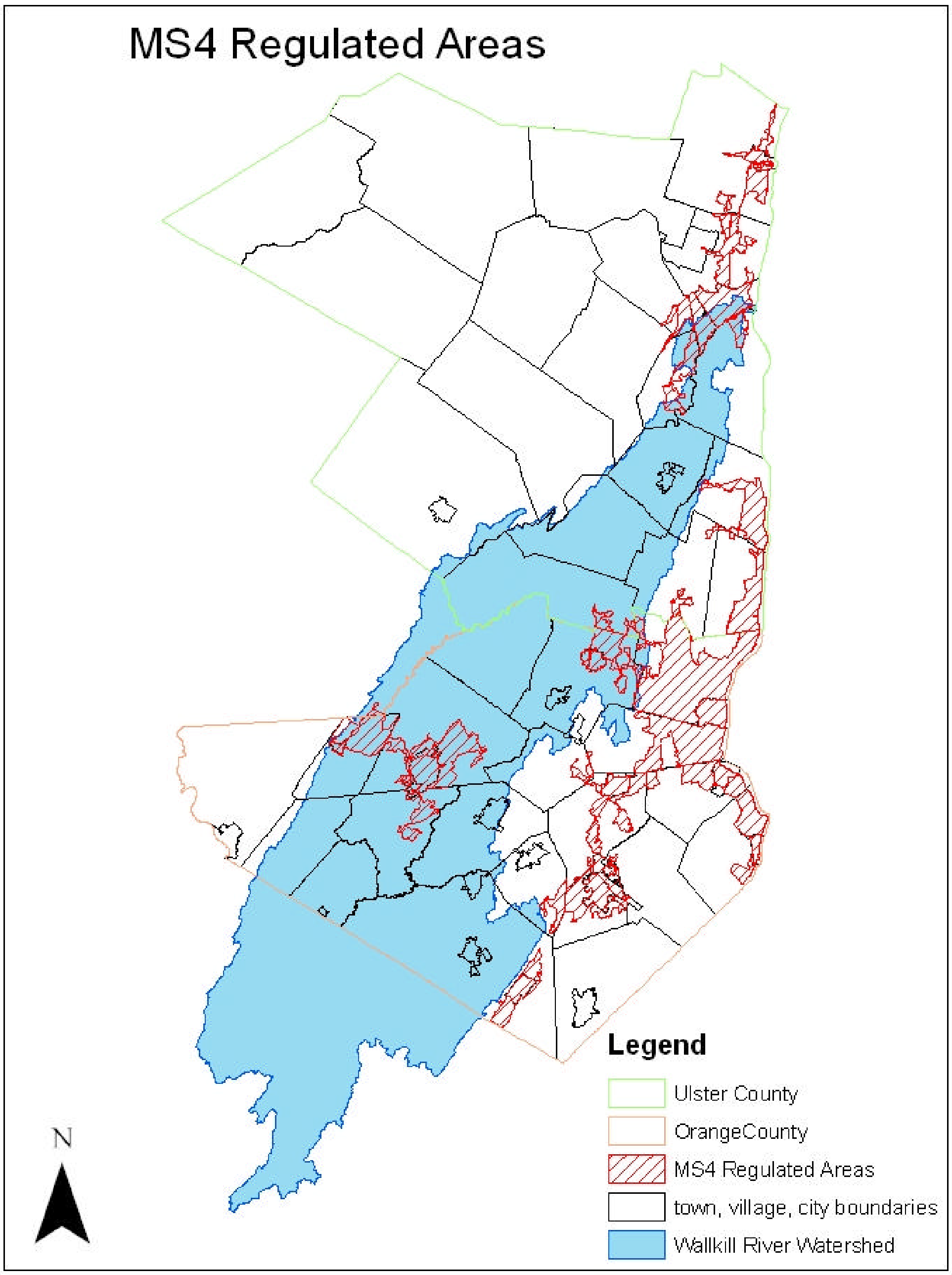
All of these systems discharge to the Wallkill River or to tributaries of the Wallkill. Outside of these communities, with the exception of some small community systems, all wastewater is managed using individual onsite systems that discharge to subsurface absorption fields.

Depending on their daily flow, wastewater discharges are regulated either by each county's Department of Health for smaller systems or by the NY State Department of Environmental Conservation. Regulations governing municipal systems generally require regular inspections, monitoring and reporting to ensure that treated wastewater meets certain standards in the discharge permit. For individual onsite systems, however, there is no state requirement for any regular inspection, monitoring, or maintenance activities. It is up to individual property owners to conduct inspections, pump septic tanks and take other steps to ensure that systems are operating properly. More information on wastewater management issues can be found in the Watershed Issues section.

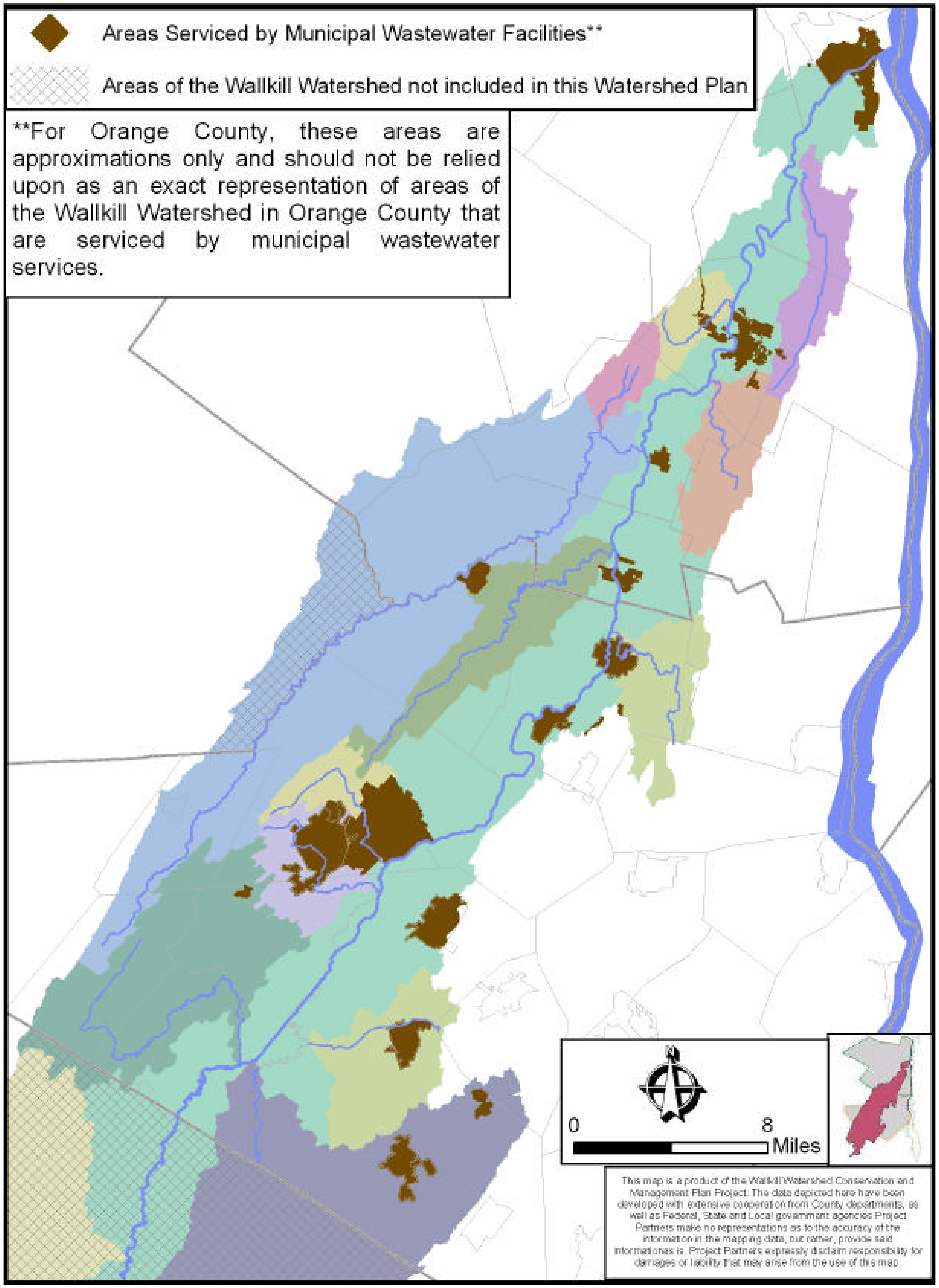
Stormwater Management

The original focus of many water quality programs growing out of the 1972 Clean Water Act was wastewater treatment for municipal and industrial discharges, which are termed point sources because they emanate from a pipe. More recently, a whole array of contaminants known together as non-point source pollution have been recognized as a major cause of impairment to many waterbodies. It's estimated that non-point source pollution now comprises somewhere between 50-90% of the total pollution load in many water bodies. These pollutants include silt and sediment, fertilizer, pesticides, automotive fluids, road salt, pet waste, septic effluent, and others. These materials are carried to streams and lakes in rainwater and snow melt when it runs off the land.

Current water quality programs, therefore, now include a major focus on reducing non-point source pollution and managing stormwater. These programs include education for property owners and other audiences and regulations. One new set of regulations known as the Phase II stormwater requirements include permit requirements for operators of construction sites involving disturbance of 1 acre or more of soil, and separately for municipalities and other owners of stormwater systems known as Municipal Separate Storm Sewer Systems, or MS4s (these are designated based on population size and density). These requirements are designed to prevent pollution, capture and treat stormwater runoff from construction sites, implement permanent stormwater management practices (like retention ponds and/or other treatment systems) for development projects over 5 acres, and locate and eliminate certain existing sources of pollution reaching stormwater systems (known as illicit discharges.) There are 17 **(**12 in Orange County and 5 in Ulster County) designated MS4 municipalities that are at least partially located in the NY State portion of the Wallkill watershed. (Map 14) For more information on these regulations and programs, visit the NYS DEC's website: www.dec.state.ny.us



Map 14: Regulated MS4 Areas (Orange and Ulster Counties Only)



Map 13: Areas Serviced by Municipal Wastewater Facilities

III. WATERSHED ISSUES

Citizen Survey

Early in the Management Plan development, the Project Steering Committee (PSC) decided that they wanted to formulate a survey that assessed people's attitudes, knowledge of, and important issues relating to the Wallkill River and its watershed. Several other management plans reviewed by the PSC had done so, and it was deemed to be a useful process for our project. The education sub-committee of the PSC developed a survey form, which was distributed to the full PSC for review and input.

The method of distribution of the survey was an additional topic of discussion. Given the generally low return rate that can be expected from mailed surveys, the PSC decided that a large mass mailing was not a good use of Project resources. Therefore, it was decided that PSC members would individually make efforts to distribute the surveys at various events such as county fairs, farm markets, street festivals, chance meetings, etc. Using this approach, **230** citizen surveys were completed.

An example of the Citizen Survey form, and a summary of the survey results are presented in Appendix C. Though it is not surprising that land development was cited more than any other as a watershed concern, the degree to which this concern outweighed the others is noteworthy. **73** respondents listed land development as their top watershed concern, the next highest concern was litter and debris dumping with **48** respondents listing it as their top concern. Similarly, **112** respondents ranked "expansion of housing development into rural areas" as a "serious problem", while only **10** indicated that this was "not a problem". The next highest ranked "serious problem" was "loss of family farms" (**107** survey respondents). Only **11** of **230** respondents ranked loss of family farms as "not a problem".

It is not the intent of this Plan to suggest that land development be stopped. Despite these survey results, Plan writers realize that this would be an unrealistic and undesirable recommendation. However, we do feel the results lend increased emphasis to and support for other recommendations in the Plan, such as accelerated adoption of smart growth/low impact development techniques, farmland/open space preservation programs, regional planning approaches, and related measures that more effectively control the myriad negative impacts of unbridled (sub)urban development.

Agricultural Issues

1. Black Dirt Region

The high productivity of the muck soils in the Black Dirt Region has led farmers to convert – through methods such as channelizing natural waterways and creating ditches to drain fields – most of the Region from swamp to some of the most productive agricultural land in the area. The high degree of land alteration that has occurred in this Region, however, has been accompanied by many challenges. Natural resource management concerns in this Region are, in many respects, unlike the remainder of the Watershed. The intent of this Plan, as it relates to the Black Dirt Region, will be to promote continued agricultural production while mitigating any associated natural resource impacts to the greatest extent feasible.

In nearby mineral soil areas of the Watershed, farms are inexorably being replaced by homes and related urban development. One might assume that Black Dirt farms were much more secure due to their poor suitability for urban development. However, despite the lack of high land speculation pressures, the economics of farming the Black Dirt is by no means without challenges. Over the past two years, nearly 1,000 acres have been voluntarily removed from production by Black Dirt landowners for a period of ten to fifteen years. Entered into USDA's Conservation Reserve Enhancement Program (CREP), these lands will be maintained in grass/legume cover while the landowner receives an annual rental payment from USDA. There are laudable benefits associated with such land conservation programs, but the extent of acreage removed from crop production raises serious concerns about the economics of farming in the Region.

Farmers that have varied from the traditional practice of raising one primary crop (onions) to more diversified operations such as fresh market vegetable crops have, in general, done very well financially. However, these fresh market crops carry their own set of production and marketing challenges.

These inter-related, and often complex, issues require that natural resource management recommendations take into account their impact not only on natural resources but on all aspects of Black Dirt farming. While economic development is beyond the scope of this Plan, we believe that maintaining a healthy agricultural industry is a desirable goal for the Watershed. To the extent possible, profitability should be pursued in concert with conservation.

° **Flooding**

While channels can be enlarged and straightened to accommodate a larger flow of water, the gradient of the land through which the channels pass cannot be significantly changed. Therefore, a large enough storm will overwhelm even these improved channels. In addition, development in the upper reaches of the Wallkill Watershed sends ever-increasing quantities of water through the Region. These impacts are, in theory, mitigated by modern stormwater management practices. However, while peak runoff rates may be controlled by retention/detention ponds on new development sites, new impervious areas inevitably increase the **volume** of water entering the Wallkill surface water network. Most stormwater management plans do not address these increased volume issues. In addition, imperfect construction and maintenance of stormwater facilities and variable enforcement of stormwater management regulations still allow for potential increases in peak flows.

° **Soil Erosion**

When drained for agricultural production, organic soils become more subject to wind and water erosion. They also tend to oxidize and become diminished in volume as a result of the exposure of the organic material to an aerobic environment. Black dirt areas are generally deemed to be poorly suited for urban development due to their flood hazard and the instability of the soil for structural purposes.

A wide range of practices has been developed to address erosion on agricultural land, but many of them do not lend themselves to the unique black dirt setting. For example, Conservation Tillage has been, perhaps, the most widely used and enthusiastically embraced conservation practice in recent years. The key principle of this practice involves maintaining protective residue on the soil surface throughout the year. This is normally accomplished by reducing the use of conventional tillage implements that bury surface residues. This practice is well suited to commodity crops such as corn, soybeans and small grains, but is much more difficult to implement with small-seed vegetable crops that require a meticulously prepared seedbed. Many other soil conservation practices,

Erosion in the Black Dirt Region occurs when bare soil, dry weather and wind combine.

for example diversion ditches, terrace systems and tree windbreaks, would not be compatible with the regular system of drainage ditches employed on the Black Dirt.

Traditionally, the most common soil conservation practice on the black dirt has been winter cover crop. A number of small grains, including oats and barley, are utilized. It is planted as soon as possible after the crop is harvested, and ideally maintained until spring field operations commence. Within the last twenty or so years, a practice known as spring cover crop has gained widespread use. Barley is sown before onions are planted, and allowed to come up along with the onion seedlings. While still small and manageable, the barley is killed with a light dosage of a grass-specific herbicide. This practice provides soil erosion control, while protecting the small, delicate onion seedlings from the abrasive action of wind-born soil particles. Winter cover crop application rates vary from year-to-year, but probably average around 50% of black dirt acreage. Spring cover crop is utilized on nearly 100% of fields planted to onions.

Within the last ten years, a practice known as ditch bank seeding has emerged. Up until this time, the banks of the regularly spaced drainage ditches were most often maintained in a vegetation-free condition. A small number of growers began experimenting with the use of a fine-fescue grass mixture for stabilization of the tops and sides of the ditches. This practice holds enormous potential to control erosion and sedimentation in the unique black dirt setting. This is largely because, in addition to stabilizing the actual bank of the ditch, the seeding tends to create a small tuft, or 'berm', of grass at the edge of the field. Soil which moves from the crowned growing bed tends to be trapped by this berm – preventing its entry to the ditch network. There are still a number of management issues with this practice that will require continued attention and experimentation. Currently, approximately 30% of Black Dirt cropland is protected with the ditch bank seeding practice.

Black dirt ditch banks well protected by vigorous sod.

° **Subsidence**

Due to the organic nature of Black Dirt soil, once the water table is lowered for agricultural production it becomes subject to oxidation. This process, combined with other losses such as erosion, causes the surface of the soil to subside at a low, though insidious rate. Careful soil management can slow the long-term subsidence rate.

° **Streambank Erosion**

According to NYSDEC's Priority Waterbodies List (PWL), silt/sediment is the primary pollutant in the Wallkill. Common sources of excess sediment include cropland, urban construction sites, and streambank erosion. Although all of these sources are a factor in the Wallkill Watershed, quantification of the relative contribution of each source was beyond the scope of this Plan.[4]

However, research performed recently and presented in greater detail separately as part of this Plan suggests that streambank erosion is a major source of the sediment load in the Wallkill.

John Gebhards pounds in rebar to allow monitoring of bank erosion, while Kelly Dobbins records site data.

This finding is corroborated by surveys of the Wallkill undertaken by the WRTF and OCSWCD (Appendix D). These surveys were limited to the reach of the River from Oil City Road (near the NY/NJ border) to Pine Island Turnpike. While some significant streambank erosion sites may be present on other reaches of the River, they were not evaluated.

Controlling streambank erosion can take many forms ranging from 'hard' engineering such as durable channels or rip-rap, to 'natural channel design' - including 'geomorphic' approaches. While both approaches can be expensive, there are pre-design expenses associated with the geomorphic approach – required to characterize

[4] See Construction Site Assessment section of Plan that provides a generalized evaluation of construction site activity (and associated sediment generation) in the Watershed.

the stream type and appropriate channel design – that increase the cost of this methodology.

Application of a natural channel design approach to this reach of the Wallkill would seem likely to be a highly challenging proposition given the unique nature of the setting geologically, the amount of drainage manipulation, and the intense agricultural land use. In lieu of the resources and support for such an approach, a more intermediate approach is currently being pursued.

In the mid-eighties, the US Army Corps of Engineers undertook a clearing and snagging project on the Black Dirt section of the Wallkill that included the reach described above. At this time, a number of bank segments were stabilized with rock. A small number of sites received the

Small rock at the toe of the bank has proven effective on this reach of the Wallkill

more 'traditional' rip-rap' approach – with large rock extending up most of the river bank. A greater number of sites were stabilized with much smaller rock placed only at the 'toe' (bottom) of the bank. This less aggressive approach appears to be very effective as the rocks have stayed in place and the banks above them are stable.

Projects of this nature will require trained engineer involvement, and will involve custom designs based on the individual characteristics of each site. This Plan recommends that the less aggressive approach be utilized to the greatest extent possible. On sites where extensive erosion has already occurred, considerable bank shaping and sloping is expected to be necessary. With employment of appropriate sloping and vegetative stabilization for upper banks, it is hoped that the small rock toe stabilization will provide adequate protection without resorting to full-scale bank armoring.

OCSWCD and the Wallkill Valley Drainage Improvement Association (WVDIA) have been studying this issue for many years and have sought support and financial resources for dealing with it from multiple sources. A maintenance agreement for this section of the River, which was required as a condition of the Corps project, is in place to maintain basic channel capacity and flood control functions. The agreement is funded by the four benefiting towns (Warwick, Wawayanda, Minisink and Goshen) and the County of Orange. It generally does not allow for capital improvements such as the bank stabilization measures described above. The Corps has been contacted to determine if they can revisit the Project area to better address bank erosion concerns as well as more general agricultural water management concerns.

In October of 2005, OCSWCD submitted a proposal to the New York State Agricultural Nonpoint Source Abatement and Control Program. The proposal included several bank stabilization projects in this eroding section of the Wallkill. Funding for this proposal has been approved, and the streambank projects are in the design phase. It is hoped that these projects will provide a foundation for continued stabilization of this section of the River. Not only will these projects help to maintain agricultural drainage functions, they will address one of the primary sources of pollutants to the River.

Similarly in Ulster County, soil erosion due to streambank degradation is a significant concern. Establishment of riparian buffers along the Wallkill River and its tributaries is a high priority in the Ulster SWCD annual plan of operations. The SWCD, in conjunction with the New Paltz Environmental Commission, has established a greenway along the Wallkill River to provide habitat diversification, streambank stabilization, and provide a buffer for runoff into the Wallkill River. This is a three year project of assessing the effectiveness of different native species in a buffer setting.

A considerable amount of acreage devoted to sweet corn grown in Ulster County is found within the Wallkill River Watershed. There is also a significant amount of grain corn grown within the areas primarily devoted to sweet corn. From these land uses, there is notable soil erosion and nutrient runoff from many areas. There was also an increase of nine percent between 1997 and 2002 for acreage that received commercial fertilizer, lime and soil conditioners.

Undercutting of the toe eventually results in huge sections of River bank collapsing into the channel.

During wet periods, many crop fields in low-lying areas are water saturated and are in need of drainage. This further exacerbates erosion and nutrient runoff. This affects farms, home owners and municipal officials. The sediment in streams impairs fish habitat and carries pollutants into streams, degrading water quality. It also becomes an economic issue when excess sedimentation drives up operational costs of municipalities. This can lead to additional taxation, which is a major operational constraint for many farmers. Many identified problem areas can often be mitigated through the introduction of riparian buffers and other field borders. Protection of stream banks from erosion with riparian plantings and structural reinforcement is a high priority in Ulster County.

2. Ulster County – Agricultural Environmental Management Program

Agriculture has long been identified as a contributor to non point source pollution. In an effort to address this issue nationwide, the United States Environmental Protection Agency (EPA), has asked each state to come up with a plan for compliance. The two state agencies charged with preparing New York State's response are the NYSDEC and the State Department of Agriculture and Markets. These two agencies approached their other conservation partners to enlist their expertise in preparing a plan. These partners include, but are not limited to: the New York State Soil and Water Conservation Committee (NYSSWCC), the USDA-NRCS, and Cornell Cooperative Extension (CCE).

The conclusions made, and the approach developed by this collaboration was that the best results could be attained via a program that would be based upon voluntary participation. This program was named Agricultural Environmental Management, or AEM. It was also decided that the bulk of the program would be coordinated and administered at the local County field office level, primarily by the County SWCDs, USDA-NRCS, and CCE. Each County was charged with developing a five year Strategic Plan for the period of 2005-2010. The developed plans were to be implemented on a prioritized watershed basis.

The Ulster County AEM Strategy Team identified the Wallkill/Rondout Planning Unit as its highest priority watershed as it is the largest in Ulster County, and has the most agricultural operations. This watershed is also experiencing serious development pressures, particularly in southern Ulster County. There has been a substantial increase in the number of new homes and other developments. This has considerably reduced the overall amount of vegetative cover and open space. Lack of sufficient riparian buffer, reduced forest cover, an increased amount of impervious area, along with poorly drained, flood prone soils in many areas, adversely impact the quality of surface water, ground water recharge and contribute to wetland degradation.

The increasing trend toward urbanization is often in conflict with traditional agricultural activity, and often in competition for available natural resources. The Ulster County SWCD, USDA-NRCS and CCE are working with the agricultural community to assess and identify any situations that may adversely impact the quality of surface water runoff and ground water recharge, and to minimize any impact that agricultural operations may have within this watershed.

For example, the horse farm industry is rapidly growing in Ulster County and has been identified as one of the groups that will be a part of its AEM Strategy, which will assess the status and environmental needs of horse farm owners within the watershed. The Ulster County AEM team has already begun the process of extrapolating the results of the Horse Farm Survey that was carried out during the development of this plan. This effort is described in greater detail below. Survey respondents are now being engaged in the AEM process. Tier I and II will build upon the preliminary data gathered from the Horse Farm Surveys, and identify operational components in need of planning and ultimately corrective implementation, such as manure disposal and composting that are also described below.

3. Horse Farm Issues

A perceived issue at the beginning of this project was a need for better management of the manure generated by horses. While dairy farmers generally grow ample acreages of feed crops to which their manure can be safely applied as a soil amendment, horse farms, in general, do not manage extensive crop acreages and were thought to often lack adequate land resources and farming equipment suitable for manure application.

Chip Watson, a horse owner and chairperson of the New York State Horse Council and the Orange County chapter of the Mid-Hudson Horse Council, joined the Project Steering Committee early on, and worked closely with Project staff to formulate a plan to reach horse owners, and assess their current management and needs.

A short survey form was developed (Appendix E) and distributed through numerous avenues. Towards this end, a noteworthy partnership was established with Nutrena Feeds, a major supplier of horse feed. Nutrena agreed to send our survey mailing to all the customers in the watershed- a total of 631 surveys. In addition, as an incentive to complete the survey, horse owners were offered a free bag of feed. Although the response to this mailing was not overwhelming, Project staff were very pleased with the willingness of Nutrena to work with us on this project, and the establishment of a partnership with the private business community. The survey was also promoted on 'Horse Talk", a local radio show which Ms. Watson co-hosts, and at other educational events, such as a composting seminar at Cornell Cooperative Extension in 2004.

To date, 104 surveys have been completed and returned, reflecting 2049 horses. See Appendix E for a summary of the horse surveys. These surveys by no means provide a complete picture of the extent of land managed by horse operations or horse numbers in the watershed, as we had originally hoped to do. However, they did prove to be very useful in assessing issues of importance to horse owners.

- **Technical Assistance to Horse Owners**

One of the issues this survey documented was the need by horse owners for agronomic and engineering technical assistance. This was no surprise to Project staff - it is common knowledge to conservation planners that confining large animals often results in sloppy and muddy conditions which, depending on site characteristics, can sometimes lead to water quality concerns. Solutions usually involve structural engineering practices. In addition, with land resources limited and horses often stocked in pastures at higher than recommended rates, the need for pasture management/agronomic advice was also not an unexpected finding. SWCD, USDA and CCE staff have assisted horse owners with these needs, but only to a limited extent as a consequence of staffing constraints. More 'traditional' agriculture, such as dairy and vegetable farms, has received most of the available technical and financial assistance.

- **Manure Management**

The horse farm issue that Project staff were particularly interested in was that of manure management – what horse owners were doing with their manure. As can be seen in the compilation of survey responses, approaches are quite varied. In many cases, horse owners have found creative and/or environmentally sensitive ways to utilize the manure generated by their horses.

However, 63.5% of survey respondents indicated an interest in a 'regional horse manure management project, such as a regional composting facility'. Horse manure readily composts, and could be put to favorable use both on commercial agricultural lands and in the home landscape setting in cases where horse owners do not have adequate land resources – which seems to be a fairly common scenario in this watershed. The key to making such an idea work lies in exploring the economic and logistical issues associated with transporting the horse manure from its points of generation to planned composting facilities.

This issue has been explored at some length by Project staff. Since the economics of moving the material long distances clearly was a factor, especially given current fuel prices, the idea of somewhat smaller 'satellite' composting areas has been explored and is thought to be feasible. Some potential users of compost, such as vegetable farmers and landscapers, were interviewed and some indicated a preliminary interest in receiving and composting horse manure – especially if financial assistance were available for construction of the composting area. Many horse

Composting in a greenhouse structure.

owners, likewise, would be happy to give away their manure, even pay a reasonable fee for the service. In fact, some horse owners are currently paying haulers to cart away their manure. The destination of this carted manure is not entirely clear, but is thought in many cases to be a sanitary landfill – an unfortunate use of limited landfill space for a material that could be an asset in the right situation.

We have even canvassed commercial haulers to assess their potential participation in a regional horse manure management project, and at least one indicated a willingness to work with us on reduced-rate hauling from horse farms to composting areas. The attractiveness of this option is that carts would be delivered and picked up by the hauler – no special or expensive loading equipment would need to be maintained by the horse owner. Alternatively, landscapers or other owners of small scale dump equipment might be contracted to pick up horse manure. This option could be especially attractive where the horse owner already has a loader tractor that could be made available to the contractor.

It is worth noting in this context that the Black Dirt soils, described above, provide a potentially huge sink for usage of horse manure. Although this idea has not been discussed at length with black dirt owners, it is well recognized that the black dirt resource diminishes over time as a result of oxidation and related mechanisms of loss. Replacement of organic matter via horse manure could partially offset these losses. Horse manure is inherently more dry and stable than dairy manure, when composted even more so. These characteristics would tend to lessen concerns associated with placement of animal manure in the black dirt setting with its intimate surface water association.

4. Other Agricultural Issues

One of the primary resource concerns with the silty-textured, often strongly sloping soils that dominate the Wallkill Valley is soil erosion from surface runoff. The Erosion and Sediment Inventory Study prepared by the Soil Conservation Service in 1975 (updated 1985) documented average soil erosion rates on cropland in the Upper Wallkill watershed at 10.5 tons/acre/year. The soil loss limit that is considered to be tolerable on these soils is 3 tons/acre/year. Not only do excessive erosion rates compromise the long-term productivity of the land resource, they contribute to degraded water quality when eroded soil and associated pollutants find their way to streams, lakes or other water resources.

There are additional potential water quality impacts associated with livestock farms resulting from improper management of barnyard facilities, manure and feed storage. Animal holding areas typically experience high levels of animal and tractor traffic, and manure deposition. In addition, farmsteads may discharge wastewater (for example from milking centers) and store feeds that produce tainted runoff. Animal manures spread on fields using proper management practices improve soil tilth and fertility; however, poor spreading practices can result in water quality degradation.

In general, the above concerns are decreasing in the Watershed as commercial livestock operations go out of business and associated cropland areas go out of agricultural use. As noted elsewhere in this Plan, there are ample and important reasons for trying to preserve agriculture. Hopefully, existing and future efforts to maintain a viable agricultural industry will be successful, and resources will continue to made available for agencies such as Soil and Water Conservation Districts and USDA NRCS to assist these remaining farms in addressing soil quality and runoff control measures.

Education

The importance of education efforts – for municipal officials, builders, engineers and others – in effecting improved watershed protection is mentioned in several sections of this Plan. An area of education often neglected, though, is that of youth education. It can be argued that instilling natural resource stewardship values in young people is an effective, if not essential, component of watershed protection. Yet financial resources available to support such efforts can be very difficult to secure. Orange County SWCD has found this to be one of the most challenging program areas to fund.

Despite these challenges, Orange County has to be considered a leader in terms of youth conservation education efforts. Currently, a full-time staff person at OCSWCD devotes most of her time to youth conservation education (focused largely on the formal school setting), and two contract educators from the Orange County Water Authority conduct complementary programming. Many other organizations deliver conservation education programming, though the availability of these programs often seems to depend on the vagaries of annual budget decisions.

As our young people grow up and become decision makers in their communities, we are convinced that locally oriented lessons they experienced will stay with them and influence their adult behavior.

Challenges to Biodiversity

Major impacts that humans have had on the watershed's biological diversity can be outlined as:

° **Degradation of Habitat**
Few, if any, habitats in the Wallkill Watershed are unaffected by the presence of humans. We eliminate natural cover such as trees or shrubs to make way for buildings, pavement, or non-native plant life, while polluting or disturbing other habitats that we don't remove. Even areas that are out of direct human reach are still vulnerable to acid precipitation, groundwater pollution, and the effects of human-induced global warming.

° **Creation of a Fragmented Landscape**
Construction of roads, canals, railroads, airports, drainage ditches, dams, power lines and fences; a dramatic rise in the rate of housing construction and tree removal, notably in the last few decades; and increases in the average residential lot size (which spreads the impacts across more area) all slice the natural landscape into smaller, less valuable tracts of land. Fragmentation reduces the ability of individual animals to move from one place to another and can lead to habitat isolation. Wildlife populations in isolated fragments are stressed more readily than populations with more land area, food, water, and habitat. Fragmentation and isolation seriously threaten biological diversity and the functioning of natural systems.[5]

° **Wetland Degradation and Loss**
Though wetlands serve many valuable functions, they are frequently assaulted through contamination, isolation (from adjacent habitats), drainage, filling, or other destruction. A historic example is the Black Dirt Region in southern Orange County, which was originally a vast Atlantic white cedar swamp. It was cleared and drained for agricultural uses due to its fertile muck soils. Today, there are only a handful of Atlantic white cedar swamps in the County. This natural community is extremely rare elsewhere in New York State as well.

° **Channelization of Wallkill River**
In the 1940s, the Army Corps of Engineers created an alternate route for the Wallkill's channel, digging a straighter, deeper channel in order to move water downstream faster and

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[5] Soulé, M. 1991. Land use planning and wildlife maintenance: Guidelines for conserving wildlife in an urban landscape. Journal of the American Planning Assoc. 57(3):313-323. Forman, R. 1995. Land Mosaics: The Ecology of Landscape and Regions. Cambridge University Press, Cambridge.

alleviate much of the frequent flooding the Wallkill triggered. Unfortunately, this channelization has reduced species diversity and impaired water quality in the River. Channelization directly removes fish, invertebrate, amphibian and reptile habitat. In addition, it aggravates stream sedimentation that smothers habitat. Today, fish species are minimal and a high percentage of those present are not native to the River. In 1936, there were 48 species of fish in the River; in the early 1990s, only 16 species were found and at number totals just one quarter of the total fish population that was present in 1936. As well, water levels and biological diversity of wetlands flanking the river have also decreased, because the channelization has separated them from the water flow.

° **Modifications to Riparian Zone**
The greatest threat to stream biodiversity may be the total clearing of riparian vegetation for residential or commercial development. Forested areas along streams have many crucial functions. They act as wildlife refuges; provide shading and woody debris important to the stream ecosystem; mitigate flood damage; help protect the stream bank from erosion; and filter out pollutants from upland runoff.

° **Creation of Impervious Surface**
Construction of buildings and the paving of the ground not only displace species by eliminating habitat, but increase impervious surfaces that directly impact water quality and local species distribution.

Water Quality Degradation

Some symptoms of impaired water quality for fish and wildlife include:

° **Sedimentation** is excess suspended sediments in surface water caused by soil erosion along stream banks or in upland areas of the watershed. It can smother the nests of fish, salamanders, and invertebrates eaten by predatory fish such as trout.

° **Excess nutrients** in surface water results from sewage outfalls into streams as well as from land uses that involve fertilizers. Too many nutrients (mainly nitrogen and phosphorous) cause algal blooms that lead to **low dissolved oxygen levels**, often killing large populations of fish and other aquatic life.

° **Temperature increases** result from deforestation along stream banks, eliminating shade, and increasing warm surface water runoff into streams. Warming of water changes the species composition within streams.

° **Toxic substances** have the potential to accumulate in the tissues of animals and cause harmful effects. Though little is known about toxins in the watershed, potent chemicals continue to be discovered throughout the area. DDT and PCBs have already been documented within the Wallkill River, while substances such as dioxin, polycyclic aromatic hydrocarbons (PAHs), prescription and over-the-counter drugs, brominated diphenyl ethers (BDEs), and other endocrine disruptors all have the potential to be harmful and require more study to determine their effects on wildlife.

° **Stormwater contaminants** arrive in many streams through storm drains that empty runoff from streets and parking lots. Myriad pollutants, liquid and solid, in this water impair the health of streams and stream banks.

° **Dam construction** – Of all of the dams that were installed along the rivers and streams to produce hydropower for mills, scores of them were never demolished. Presently, there are four major dams in the watershed, located at Montgomery, Walden, Wallkill and Rifton, which are still used to generate hydroelectric power for industrial and other users. Dams impede migration of fish and other aquatic species. They increase water temperature, lower the amount of oxygen dissolved in the water, decrease water flow, and ultimately change the aquatic environment. (Appendix F)

Wetlands Degradation

There are thousands of acres of mapped wetlands in the Wallkill Watershed. In addition, many thousand more acres that have not been mapped could be expected to meet federal wetland criteria based on soil and vegetation if watershed-wide mapping were to be done. As an example, new development sites of any substantial size commonly contain federal jurisdictional wetlands once they are studied by a qualified wetlands delineator. A full discussion of wetland regulations is beyond the scope of this Plan, but it is noted that wetland regulation takes place at the federal, state and, in some cases, local levels. This system is by no means fool-proof at eliminating wetland losses – multiple small areas are filled or otherwise destroyed under exemptions and permits and, undoubtedly, illegal operations remove additional acreage. Nevertheless, it can be argued that **wetland quality** may be more of issue in the Watershed than **wetland losses**. A great many of our present wetlands are dominated by non-native and invasive species – most notably Purple loosestrife, Phragmites and Reed Canary Grass.

In some cases, the watershed has actually **gained** wetlands as farms have gone out of business and wet fields that were formally drained by the farm operator revert to wetland conditions. Typically, though, these areas would be colonized by the species mentioned above as opposed to the plant communities that comprised the wetland before human intervention. Although some reputable authors have suggested that these species are not as valueless as commonly believed (see, for example, writings by Eric Kiviat in "*News from Hudsonia*", Volume 14, Number 2, 1999), we believe that historically natural wetlands in this region supported more diverse plant communities, and that such communities were more beneficial to a wider variety of wildlife.

In fact, the NYSDEC ranks their wetlands into three classes, and domination by non-natives such as Purple loosestrife would normally give a wetland the lowest (Class III) level of protection.

It should also be noted that runoff from (sub)urban development threatens to further degrade existing wetlands, especially where no local regulations exist to provide for buffers between wetlands and site improvements.

Stormwater Management

The Orange County - southern Ulster County area is currently one of the fastest growing regions in New York State. With a population that is inexorably increasing, and with the Rte.17/I-84/I-87 'Golden Triangle' road network continuing to foster commercial growth, erosion and sediment control, and stormwater management, have to be considered leading water quality concerns in the Wallkill Watershed.

Technical reviews on behalf of local governments focused on erosion and sediment control and stormwater management have been available through the SWCD since the building boom of the 70's and 80's. However, these reviews occurred only at the request of local government, and only a small fraction of development projects received SWCD review. A far higher percentage of project proposals receive water quality-related review by private consultants representing the local municipalities, but the success of this system in protecting water resources is much in question. Casual observation of construction sites by local technical staff has, for many years, suggested that very little knowledgeable attention was being paid to erosion and sediment control. (Witness, for example, the common construction site benchmark of the silt fence – as often as not 'flapping in the breeze' while silt flows underneath, or, improperly installed up-and-down the hill – concentrating runoff and **causing** erosion rather than controlling it.). More recently, largely as a result of funding made available through NYSDEC which supports SWCD technical staff, scores of in-depth construction site reviews in the Watershed have reinforced earlier casual observations. Some sites have poorly designed erosion and sediment control plans on paper, while others have fairly good ones. In both cases, though, results in the field have been quite dismal. Site contractors either pay limited attention to the site's erosion control plan, or lack the knowledge and training to install and maintain the practices described in it.

Uncontrolled urban erosion.

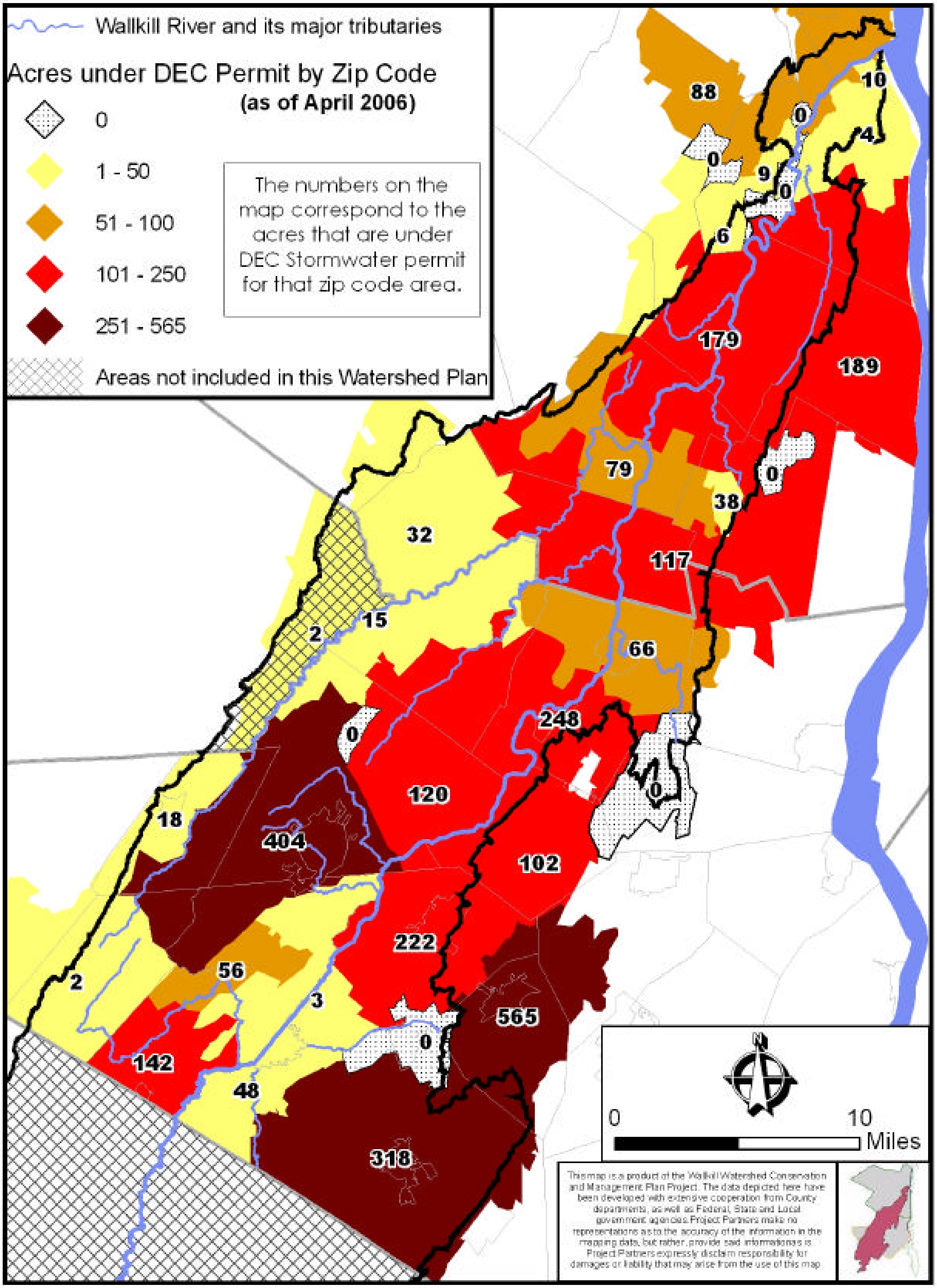
While the erosion and siltation associated with urban construction activities are primarily limited to the active construction phase when large areas tend to be disturbed and unprotected with vegetation, the impacts can be severe. For example, the *New York Standards and Specifications for Erosion and Sediment Control* offers sample calculations for a typical NY construction site where the erosion rate during the active construction phase is over 100 tons per acre per year (page A.2). For comparison purposes, erosion from a forested or grassy area would be expected to be less than 1 ton per acre per year. Where water resources such as streams are associated with the construction sites, there is high potential for movement of soil and related pollutants to enter and degrade the aquatic system.

The suggestion that urban pollutants are impacting water resources in the Wallkill Watershed is corroborated by NYS DEC's Priority Waterbodies List. The Wallkill River, and a number of its tributaries, are listed in this document. Silt/sediment is cited as a primary pollutant (of the Upper Wallkill), and urban runoff is cited as a suspected source. So far as we know, no research has been conducted to assess the portion of the Wallkill's sediment load that originates from (sub)urban as opposed to other sources. But given the documented high rates of erosion from construction sites, the rapid pace of development in the Watershed, and the questionable effectiveness of erosion and sediment control efforts on these sites as alluded to above, targeting urban sources must be considered a prudent management goal. See page 31 of this Plan for a summary of the suspended sediment study that was undertaken on the Wallkill in 2004/2005.

In an effort to gain a slightly greater understanding of urban erosion threats and where they are most concentrated in the Watershed, an investigation was made using construction permit data from the NYSDEC. For convenience of GIS analysis, the map (Map 15) is organized by zip code areas (note that some areas outside the Watershed boundary are included in this study area). The map shows which zip code areas have the highest acreage under construction as reported in NYS's stormwater phase II general permit database. While calculation of tons of sediment generated was not possible, this procedure at least provides a general measure of construction activity. Given the potentially huge per acre erosion rates from urban construction sites, as described earlier in this Plan, this evaluation underscores the need for accelerated urban erosion and sediment control efforts.

It is well recognized that, even after urban development projects have completed construction and stabilized bare soils, water quality threats continue. These impacts will not be elaborated here since they are well described already in many publications (see, for example, the *New York State Stormwater Management Design Manual*), but include both **quantity** (eg. flooding, streambank erosion), and **quality** (eg. eutrophication, bacteria) issues.

Construction phase **and** post-development water quality concerns are regulated in NYS by the Stormwater Phase II program mentioned above, but regulation does not automatically mean adequate protection of water resources. As of 4/06, there were approximately **222** (Orange County) active construction permits in the zip code areas intersecting the Watershed. (All sites disturbing more than 1 acre are required to gain coverage under this general permit. Given this low threshold and the relative newness of the regulation, it is thought that many additional construction sites are operating without having gained coverage under the permit program; therefore are not reflected in these numbers). Despite accelerated efforts of NYSDEC and SWCD's, technical staffing is currently far inadequate to allow for comprehensive oversight of this program. It is worth noting that the construction permit includes, for most sites, a requirement that weekly inspections be done by a 'qualified professional'. Unfortunately, despite enormous costs associated with these weekly inspections, it can be argued that these required inspections are of limited usefulness in improving water protection efforts. The reasons for this lack of effectiveness are as described above, combined with the fact that the consulting engineering firms performing the inspections have limited authority/influence to enforce their inspection recommendations. As with site operators/ developers, education is also an issue with some private inspectors. While the regulation states that the inspections will be done by a 'qualified professional' (or a technician working under



Map 15: NYSDEC Construction Permits

proper supervision), the qualifying titles (eg., professional engineer, landscape architect) do not assure that the qualifying individual commands a thorough understanding of the art and science of erosion control and stormwater management.

This parking lot borders and drains into a tributary of the Wallkill.

Current Post-construction Water Quality Treatment Criteria

An additional stormwater management concern is the degree of pollutant reduction (or increase?) that can be expected from new developments. New York State's *Stormwater Management Design Manual* establishes the minimum requirements that must be met on new developments. For projects required to provide post-construction stormwater management (generally, those that disturb more than five acres), a list of "acceptable stormwater management practices" is provided. Use of one of these practices is "…presumed to meet water quality requirements set forth in (the) manual..." (Page 5-1). While practices on this list are expected to provide 80% removal of Total Suspended Solids, they are only expected to be capable of 40% removal of Total Phosphorus. The removal rate for other 'dissolved' pollutants (as opposed to those attached to settleable solids) can be expected to be in a similar range. Since a significant portion of typical urban pollutants are dissolved, and since the land cover and land use changes associated with new development tend to significantly increase pollutant loading relative to the pre-development condition, the efficacy of this approach to addressing stormwater impacts from new development comes into question. While the Manual does encourage the use of auxiliary practices to improve overall pollutant removal efficiency, they are not required; therefore little incentive is provided for water quality protection efforts beyond the employment of one of the "acceptable practices".

Outdated Stormwater Systems

An additional urban issue, often overlooked, is the contribution of older urban areas to water quality stresses. While current governmental guidance encourages officials in urban areas to consider improved management measures for existing developed areas, such measures are not required. Such a requirement would be a near unfathomable economic burden and engineering challenge. Nevertheless, as financial concerns and logistical issues allow, stormwater *retrofits* are being pursued and further opportunities for them should be thoroughly studied, especially in urban areas which drain to stressed water bodies.

Water Supply, Quantity and Allocation Issues

In addition to demand for additional water supplies created by new development, several other factors may influence the future availability of water and affect streamflow, groundwater levels, and the hydrology of wetlands in the watershed. One key factor will be how much new impervious surface cover, which will affect groundwater recharge capacity, is created as the watershed is developed. Others include the extent to which water conservation measures are implemented in new and existing development, and whether wastewater treatment systems are designed to recharge groundwater or include other wastewater reuse options. Several groundwater studies in the region have found that use of central sewers can potentially lead to depletion of ground water supplies because water is effectively exported out of the local watershed. When combined with increased impervious surface cover, this effect could potentially lead to lowered groundwater levels, reduced baseflow to streams, and adverse impacts on wetland hydrology.

Another major factor that may cause significant changes to the watershed's hydrology is climate change, which is predicted to cause changes in the pattern of precipitation including less frequent but more intense storms. While the total volume of precipitation may not change significantly, and there is significant uncertainty about these issues, these predicted changes could lead to higher volumes of surface runoff and reduced groundwater recharge. As the watershed continues to experience population growth and development, the combined issues of increased consumption of water, new impervious surfaces, and possible changes in precipitation patterns will potentially result in water shortages. These trends will also potentially lead to conflicts between competing uses and demands for water. For example, if water supply systems are expanded, this may lead to lower streamflows and/or groundwater levels as water is withdrawn from streams and/or wells. This will potentially affect streamflow in the Wallkill River and its tributaries. Pumping of municipal wells located near to the Wallkill River, which are closely connected to the river, would have a direct effect on water levels. As noted above, decisions about whether to use centralized sewers or decentralized strategies for wastewater management also can affect groundwater levels and streamflow patterns. (Figure 8)

Information on stream flow, precipitation patterns, groundwater levels, and other basic data needed to consider water supply issues and trends are very patchy and incomplete. There is currently no monitoring station to collect and archive precipitation data in the Orange County portion of the Wallkill Watershed (data is reportedly collected at the Orange County Airport in Montgomery but is not retained or archived). There is no operating stream gauging station to measure stream flows in the Wallkill Watershed in New Jersey or in Orange County (an old station south of Unionville in NJ is no longer operating due to budget cuts). There is one gauging station on the Wallkill River in Ulster County at Gardiner. Few, if any, municipal wells have equipment to measure groundwater levels.

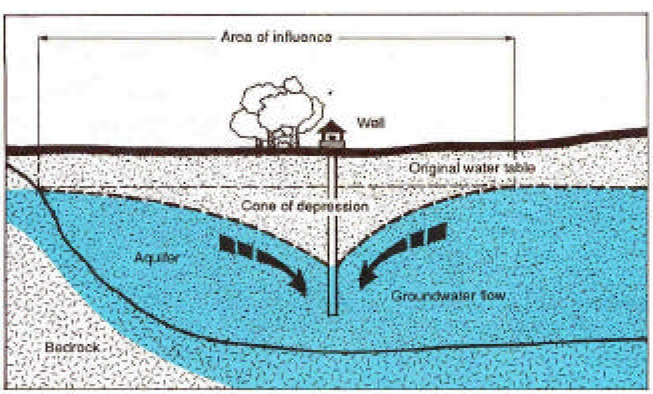


Figure 8: Groundwater being pumped into a well lowers the water table near the well. Diagram from Bulletin No. 1 "What Is Groundwater?" Lyle S. Raymond, Jr., NYS Water Resources Institute, Center for Environmental Research, Cornell University.

Increased funding and other resources are needed to address these data gaps. Some of these measures may be implemented at a local or county level, but some will likely require state or Federal funding.

<u>Quality of Existing Wastewater Infrastructure</u>

State regulations require a discharge permit for any wastewater system discharging 1,000 gallons per day (GPD) or more to the soil (such as onsite or small community systems using soil absorption fields). This permit is called a State Pollutant Discharge Elimination System, or SPDES, permit. A SPDES permit is also required for direct discharges to a stream or river of any size. Onsite systems discharging to the soil smaller than 1,000 GPD are regulated by separate regulations- the NY State Sanitary Code, part 75A.

Information about existing treatment systems with a SPDES permit is available from the state and Federal governments.

Beginning in 1972 and ending c. 1990 large Federal grants were available for wastewater infrastructure, and many of the existing municipal sewer systems and treatment plants in the watershed were constructed or upgraded between the 1970's and 1980's. Since 1990, almost all available funding is in the form of loans from the State Revolving Fund and grants are generally not available in most cases. Wastewater infrastructure, like all technology, has a limited lifespan before it must be replaced. Some of the sewer systems and treatment plants constructed 20-30 years ago are or will soon be reaching their estimated life span. As they age their function can decline and it is believed that the quality of discharges may begin to decrease unless and until major improvements are made. As a result, large new capital investments are likely to be necessary in coming years.

Another well-known issue that affects the quality of wastewater discharges and the ability of infrastructure to protect water quality is known as infiltration and inflow, or I&I. This results when rainwater at the surface or underground leaks into sewers and manholes. In larger storms, this can lead to large volumes of stormwater flowing to wastewater treatment plants, sometimes causing overflows of untreated sewage when the flow exceeds the plant's capacity.

Another problem that receives less attention is the reverse – when wastewater leaks out of sewers through leaky joints or cracks. This can lead to discharges of raw (untreated) wastewater to groundwater. These problems are generally hard to measure so their extent is not well documented, but it stands to reason that water will flow through cracks and leaky joints in either direction. Finally, centralized sewers may cause another problem – localized lowering of the water table because the trenches in which sewers are installed act as large French drains.

While these problems are generally known to exist throughout NY and the US, the specific locations and extent of such problems in the Wallkill watershed is not well-documented. The Village of New Paltz recognizes this condition exists with their infrastructure and is researching the remediation and funding required to address this situation.

One preliminary analysis of the larger SPDES discharges to the Wallkill River in Orange County was conducted recently by the Wallkill River Task Force. This study, based only on data available from routine reports submitted by the municipal permitees, found that several municipal systems are apparently very often in violation of their discharge permits for various parameters. This analysis, and other scientific and anecdotal information suggesting that wastewater discharges may be causing significant water quality problems, indicate the need for more detailed research on these questions.

In any case, it's quite clear that there is a major gap between existing resources and funding needed to upgrade existing wastewater infrastructure, let alone build new systems. This is true nationwide, and NY alone needs about $20 billion for wastewater system upgrades over the next 20 years, the largest funding shortfall of any state.

Individual onsite (septic) treatment systems, as noted above, are permitted by the Departments of Health (DOH) in most counties in NY State, including Orange and Ulster. The regulations focus on system siting and design and there are certain differences between the two counties. In general, though, unlike larger treatment systems, there are no regulations requiring ongoing monitoring, inspection, or maintenance of onsite systems. It is up to property owners to decide whether and how often to have septic tanks inspected and pumped out. Nationally, 10-20% of septic systems are estimated to be failing at any given time, but this is based on very incomplete data and may not be reliable. Anecdotal reports suggest that even today, septic systems are being installed and/or operated improperly in the Wallkill Watershed and other parts of NY State. In any case, there is general agreement that more training is needed for installers and inspectors, and the NY State Onsite Training Network, based at SUNY Delhi, is a partnership of NYS DEC and other organizations that provides training workshops around the state to address this need. The US EPA and NYS DEC are also encouraging local municipalities to develop management programs for onsite systems.

The NYS DEC and SUNY-Delhi co-sponsor a statewide training program, called the Onsite Training Network, intended to improve the quality of onsite wastewater system siting, design, inspection and management. Workshops are held around NY State and can be arranged at the request of local governments or other organizations. Information about this program is available online at:
http://www.delhi.edu/corporateservices/otn_wastewater_programs.asp, or at 800-96-DELHI.

Natural Resources Management in a Home Rule System

New York is a 'Home Rule' state, a factor that impacts the delivery of environmental protection programs as much or more than it does other public policy. This is evidenced perhaps most in the role of local planning boards.

While developers are obligated to comply with both federal and state regulations in the areas of, for example, wetlands protection, transportation issues, and sewer and water, the local planning board holds enormous influence over the nature and specific characteristics of Site/Subdivision plans that come before the municipality. Admittedly, the rules/guidelines under which the planning board operates may have been designed by another municipal entity such as the Town Board. In any event, the potential impact in terms of successful natural resource protection programming, of an effective partnership with local municipal government cannot be overstated. For example, wetland and watercourse protection beyond the minimum protections offered by state and federal regulations is most commonly and effectively done by local law or ordinance. Local government employees can obviously keep much closer tabs on activities in their own jurisdiction than federal or state employees with often wide-ranging geographic areas of responsibility. Other innovative [but not mandatory] land use principles such as Low Impact Development, which hold tremendous potential to mitigate the negative impacts of (sub)urbanization on natural systems, can best be brought into the mainstream by local governments.

To understand how municipalities compared to one another in terms of local regulations, the Planning Departments from Ulster and Orange Counties completed a review of municipal plans and codes. Both Orange and Ulster County Planning Departments examined the master plans, zoning codes, subdivision regulations, and other relevant municipal land use documents for all municipalities within the Watershed during this planning process. The intent of this study was both to develop an inventory of existing municipal land use goals and regulations, as well as to determine if any generalizations could be made in regards to local environmental regulations within the Watershed. Appendix G contains the spreadsheet developed by the two Planning Departments.

A primary finding of the research was a widespread disconnect between master plans and the local codes and regulations that were meant to implement the visions within the master plans. Master plans were nearly unanimous in their support for maintaining rural character and protecting natural features, while activities within the municipality (development and construction activities, for example) did not support the stated vision.

There are myriad explanations and reasons for this trend - which was not a surprising find - and there are indeed many courses of action that could be taken to improve this scenario. The development of focused advisory councils, such as conservation advisory councils (CACs), could potentially help to make this connection if those councils were both comprehensive in their inventories of natural and cultural resources, as well as effective at protecting these resources through their advisory role to the municipal boards and officials.

Other key findings include:

- A lack of adequate protections for wetlands, watercourses and steep slopes
- A higher proportion of Ulster County communities have a council committed to environmental or natural resource protection as compared to Orange County communities
- Few communities required that sensitive or unbuildable environmental areas be subtracted from net area during calculation of lot number during the subdivision process
- Orange County communities are more likely than Ulster County communities to utilize overlay zones as methods of protecting natural resources

IV. RECOMMENDATIONS AND IMPLEMENTATION STRATEGY

Black Dirt Region

1. Soil Conservation

Continued promotion and support for black dirt soil conservation measures, especially winter cover crop and ditch bank seeding, is necessary. In addition to financial support for implementing these practices, resources are needed to support staff to work with growers on practice adoption, address technical issues, develop new practice approaches and perform related administrative functions.

2. Streambank Stabilization

Given the clear identification of sediment as a priority pollutant in the Wallkill, and the contribution of streambank erosion to this problem, we recommend efforts **to identify potential stream corridor restoration and streambank stabilization sites, and to conduct additional planning on promising sites.**

Stabilization of already-failing bank sections as well as a continued maintenance program is expected to be a long-term effort. Staff will be needed to manage all technical, regulatory and administrative matters. Identification of additional funding sources will be important since work of this nature, even if full-bank rip-rap is not undertaken, will involve considerable expense. Combining funding from multiple sources will most likely be necessary to make the projects feasible. The exact approach taken to stabilize the River banks may undergo adjustment as projects are completed and evaluated, but this issue clearly needs continued attention and resources in order to address documented water quality conditions.

Starting new projects and meeting the involved stakeholders inevitably leads to ideas for additional projects. As feasible, new staff would allow for consideration of more extensive stream corridor restoration projects as investigations are undertaken for identified bank stabilization projects.

3. Flood Control

The importance of effective flood measures to continued agricultural use of the Black Dirt is discussed in the Issues section of this Plan. While the planning and procurement of improved flood control measures is largely beyond the scope of the Plan, we do advocate for such initiatives. There are conflicting opinions regarding human activities in flood-prone areas. For example, while new development in floodplains is widely recognized to be undesirable, what should be done about existing commercial, residential or agricultural development in these areas is a more complex issue. The values of having agriculture in the watershed landscape are discussed at some length in this Plan, as is the high productivity of the Black Dirt soils. Therefore, **this Plan supports continued efforts to implement flood control measures for protection of the Black Dirt agricultural lands.**

In 2005, the Orange County SWCD requested that the USDA NRCS investigate the feasibility of a Public Law 566 flood control project for the Black Dirt. This investigation is still in the early stages. In addition, the Army Corps of Engineers, who undertook a clearing and snagging project on the Black Dirt section of the Wallkill in the mid-eighties, has been asked by local growers and legislators to evaluate which current programs under their purview could be accessed to address Black Dirt flooding, drainage and soil stabilization issues. Ideally, the various federal agencies with program responsibilities in these areas would coordinate and combine their efforts. Continued strong lobbying by local growers and officials will undoubtedly be necessary, given the limited staffing and other priorities these agencies are facing.

Horse Farms

Recent investigations indicate that there are over 600 horse owners in the Watershed. While many of these are smaller, 'backyard'-type operations, the sheer number of owners argues for more attention to this issue. In addition, there are approximately 100 'commercial' horse operations in the watershed – many of them concentrated along the main stem of the Wallkill.

1. Coordinate Regional Manure Composting System

We recommend efforts to coordinate and foster partnerships between horse owners and potential composters by various means including meetings, mailings, web postings and direct farmer/horse owner contacts. We would also provide technical assistance on manure holding/transfer facilities, composting methods and manure utilization. We would also explore opportunities for equipment borrowing and demonstration projects – for example, compost turners, and promote the use of composted manure in the ever-growing home landscape setting as a beneficial use, as well as in the commercial agriculture setting. This outreach and partnership initiative will also be aimed at commercial landscapers who may play a role in the collection, composting and beneficial use of manure. An initial short term (2 year) goal would be to establish three composting facilities that receive manure from neighboring horse owners.

2. Identify Habitat Enhancement Opportunities

The outreach and dialogue with horse owners will also include discussions about habitat enhancement methods that are compatible with horse farming, with an initial short term goal of identifying 25 owners interested in participating in habitat enhancement projects on their land. Longer term goals would include seeking funding for these projects and implementing them.

Other Agriculture

Similar to the Black Dirt Region, erosion is an ongoing resource concern throughout the Watershed. In addition, animal agriculture beyond horse farms (for example, dairy, dairy replacement, beef and miscellaneous other livestock) maintains a respectable position, and demands attention to associated water quality concerns. **This Plan recommends maintaining strong levels of staff support from SWCD's, USDA-NRCS and Cornell Cooperative Extension to ensure that all interested farmers receive technical support and access to funding opportunities for erosion control, water quality protection, and related natural resource management projects.**

Ulster AEM

Through the Tiered AEM approach, both watershed enhancement opportunities and prospective partnerships will be identified, which can facilitate overall improvement in water and environmental quality. Through the application of the County AEM Strategies, both restoration (C-corrective) and protective (P-preventative) actions will be defined on each agricultural operation which include but are not necessarily limited to: 1) Evaluating the potential for increased participation in USDA Farm Bill, NYS Ag Non Point Source Water Quality Grants, and other available programs for conservation. (C); 2) Work with the Ulster County Agricultural and Farmland Protection Board and the local citizens working groups to update the Farmland Protection Plan for Ulster County, which can identify new issues and opportunities. (P); 3) Inventory and identify critical wetland and buffer areas in the vicinity of agricultural operations. (C); 4) Provide additional outreach and education to agricultural producers and the community (and groups such as Citizens Advisory Committees) on watershed stewardship issues. (P); 5) Implement USDA Farm Bill, NYS Ag Non Point Source Water Quality Grants and other available conservation programs. (C); and 6) Participate with local municipal boards in updating town master and open space plans, (P).

Among the long term goals that will hopefully be derived as a result of actively implementing the County AEM strategies would be the following:

1. Promote Vegetative Cover and Riparian Buffers

Establish and enhance vegetative cover, and riparian buffers in identified areas that will reduce cropland erosion, overall loss in forest and vegetative cover, and streambank erosion.

2. Address non point source runoff attributed to agricultural activity.

3. Education and Outreach

Strive to improve community relations between agricultural producers and new arrivals from urban areas through education and outreach, as needed.

Education

The greatest cost of a viable youth conservation education program is associated with staffing. The continuation of these programs should not depend on grants or other soft, unreliable funding streams. Conservation Educators should be considered essential staff for local conservation agencies. School budget issues, by and large, make it very difficult for schools to pay for conservation educators to come in to the classrooms. Therefore, we believe it is incumbent on conservation agencies to secure funding support for these programs. Achieving success will likely require creative funding efforts, combining both locally generated base funding and continued pursuit of grants and other opportunities. We hope, and recommend that, governments and other funding agencies maintain a commitment to youth conservation education programs such as that demonstrated by Orange County.

The Town of Montgomery and the Wallkill River Task Force have proposed the development of a Wallkill River Watershed Interpretive Center at the Benedict Farm Park, a town-owned site on the banks of the Wallkill River that is being developed for recreational and educational uses. This site is centrally located in the northern part of Orange County, accessible to people in Ulster County, and includes several existing buildings as well as ample open space that can house interpretive trails, indoor exhibits, workshops and meetings, and other educational programs. The development of this Interpretive Center, which could potentially also house a small office for organizations working on watershed issues, would provide a good centerpiece and foundation for ongoing implementation of watershed projects and programs and is recommended as an action item in this Plan. The site can also include demonstration projects for low impact development stormwater practices and other strategies needed to protect water quality, habitat and open space, and can be used for training workshops for local officials, engineers, planners, and other audiences.

Stream Buffers/Riparian Corridors

1. Protect Valuable Intact and Restore Degraded Riparian Corridors

We recommend that all municipalities within the Watershed adopt regulations to protect riparian areas from encroachment. We advocate for a tiered approach to stream protection and adoption of all or selected elements of the Stream Buffer Model Ordinance that is referenced in Appendix I to this Plan. The tiered approach in the Model Ordinance has three buffer zones; regulations are stricter for zones closer to the stream. Streams with certain features, such as being a high order stream or being bordered by steep slopes, are given protections supplemental to the standard zone protections.

We urge the completion of further investigation and study of the projects sites shown on Map 7 to determine which sites are appropriate for future work.

2. Outreach to Municipalities on Stream Buffers

Local Planning Boards have authority to regulate streamside activities through the subdivision and site plan review process, but their power is constrained by the content of both the local master plan and the local zoning code. Project partners should work cooperatively to educate municipalities on both the values of stream corridors as well as the tools they can use to protect these resources.

Stormwater Management

1. Increase Erosion Control Compliance at Construction Sites

As noted already, current regulations require that an erosion control plan, prepared by a qualified professional, be prepared and implemented at every construction site disturbing more than one acre. Also noted is the observed poor performance of, or lack of, erosion and sediment control measures at the majority of sites visited by erosion control specialists from the SWCD. In many cases, though, once deficiencies are explained to site contractors, significant improvements are observed in subsequent site visits. We therefore believe that providing more staff for site visits would result in major improvements to overall construction site erosion and sediment control efforts and, consequently, to water quality protection. We believe that vast improvements can be expected by expansion of current initiatives such as the cooperative NYSDEC-

SWCD arrangement whereby non-regulatory SWCD staff visit sites as an alternative to visits from State inspectors. Non-regulatory stature often facilitates SWCD staff efforts to establish a good working relationship with site representatives. Nevertheless, a close working relationship between SWCD, NYSDEC **and** local municipal (e.g. Town, Village, and City) officials is considered essential in order for SWCD construction site inspections efforts to be successful.

It should be noted that some site operators are not responsive to non-regulatory efforts to improve erosion and sediment control measures. Therefore, continued education about – and enforcement of – existing stormwater runoff regulations will be necessary to fully address erosion control compliance issues. As municipalities adopt local laws to comply with Stormwater Phase II regulations, local inspection and enforcement activities will, assumedly, become more commonplace and effective. However, not all Watershed municipalities are required to adopt these measures (see map 14 of regulated MS4 areas), leaving a potentially large gap in compliance efforts. Plus, even regulated municipalities will need technical and related assistance to achieve compliance goals.

The Plan recommends that expanded staffing be sought, primarily at Soil and Water Conservation District offices, to assist with construction site erosion and sediment control compliance programs, and to generally assist communities with improving erosion and sediment control and stormwater management programs.

2. Stormwater Retrofit Planning

As noted, current Stormwater Phase II regulations require stormwater controls on new development, but do not require treatment of runoff from existing urban areas. Given the extensive urban areas in our Watershed that were in place before current regulations went into effect, we **recommend that a stormwater retrofit opportunity survey** be a priority action for all municipalities in the Watershed. Since technical and financial resources will almost certainly be limited for such an initiative, we recommend that this survey focus on sites with amenable features (ie, room for more affordable, above-ground facilities; publicly owned land or a cooperative private landowner). The Orange County MS4 Cooperation Project, funded by NYSDEC and currently underway, will conduct a preliminary retrofit survey, but only in MS4 regulated areas. Ulster County is in the process of further developing an intermunicipal agreement pertaining to shared services between some of its MS4 municipalities as well. Similar opportunities need to be explored in non-MS4 areas in both counties. Plus, site identification is only the first step. Considerable time and effort is required to build community support, secure necessary funding, and undertake technical investigations. **We propose that this Plan include a component designed to pick up where the MS4 Cooperation Project left off.** This will require devotion of staff time and related resources to fostering further planning of potential retrofit sites identified through the MS4 Cooperation Project, and to similarly assisting non-MS4 communities.

Impervious Surfaces Analysis

As more detailed watershed planning occurs in the future on the major sub-basins within the Wallkill, said planning should pay special attention to the Map 6 ‘red zones’ to ensure that planning efforts in these areas address imperviousness concerns. And while efforts to minimize the creation of new impervious areas should be promoted throughout the Watershed, planning in areas of lower imperviousness should thoroughly examine threats originating from agriculture, streambanks and other sources not related to impervious cover.

The Plan recommends that the future percent impervious cover be studied through a build out analysis of the Watershed.

Biological Resources

1. Protect Stream-associated Wetlands

Stream-associated wetlands are especially important natural areas to protect due to their intimate relationship with the water quality and biodiversity of the stream. Practices that would benefit both water quality and streamside wildlife include:

- maintaining natural flows and flooding regimes,
- leaving buffers around wetlands to prevent water contamination, and

° minimizing disturbance and development within riparian zones.

The Plan recommends that existing mature and/or wide forest buffers be considered for conservation easement, as they are particularly valuable for wildlife.

2. Promote Biological Research within the Watershed

While some subwatersheds have a substantial amount of biological data available, other subwatersheds have had very few surveys conducted within their bounds. While all subwatersheds could benefit from further research, we recommend that those subwatersheds with the least amount of information be prioritized for future biological research. These include:

- Tin Brook
- Dwaar Kill
- Masonic Creek
- Monhagen Brook

3. Protect Important Habitats

The most biologically important habitats within the Watershed were outlined in the Biological Resources section of this Plan. Protecting these areas from encroachment, degradation, and destruction will help to ensure that the biological health and diversity within the Watershed is enjoyed by future generations. Protection can occur via conservation easement, purchase by a conservation organization, local regulation, incentive programs, and beneficial development and land management practices.

In addition to land protection, the following land management actions are beneficial to biological diversity:

?? directing development away from sensitive and large, intact habitats,

?? maintaining early successional (grassland and shrubland) habitats,

?? encouraging mowing and haying schedules that avoid disruption of grassland bird breeding,

° implementing water management practices that maintain the hydrology of vernal pools and other wetlands, and

° implementing forestry practices that maintain woodland buffers around vernal pools. Woodland buffers around vernal pools and other wetlands are needed for specialized frogs and salamanders to complete their life cycles.

4. Create or Maintain Buffers Around Water Resources

Buffering these habitats is an essential step in protecting their functionality, health and quality, as well as the plants and animals that utilize them. Buffers preserve transition zones between land and waterbodies. Protecting and maintaining this connectivity is especially important to those species requiring both habitats during their life histories.

5. Reduce Fragmentation and Maintain Habitat Connectivity

Maintaining connectivity between similar habitat types within the watershed is important since transportation networks and other impervious surfaces commonly bisect otherwise contiguous habitats. This fragmentation often creates habitat islands within the landscape. Isolation and habitat degradation eventually lead to population decline, especially for those species characterized as having low motility, high sensitivity to habitat edge, or requiring large tracts of habitat for their survival. One way of enabling the persistence of species over time is by protecting large tracts of contiguous land while restoring connectivity in fragmented landscapes through the utilization of land use buffers and migration corridors.

6. Educate Landowners and Land Use Decision makers

Natural resource protection measures must occur over time and at multiple spatial scales. One method of ensuring such protection is by reaching out to landowners and land use decision makers. These two groups play a crucial role in deciding how land is managed within the watershed. Tailoring technical assistance and outreach programs to their particular needs promotes best management practices and better understanding of conservation issues and needs. In addition, cost sharing and collaboration commonly result as conservation goals are selected and as management plans are implemented.

Wetlands Degradation

We would like to see a more formal evaluation/compilation of the quality and health of existing wetlands in the watershed. Some of this information may be available from NYSDEC and/or other sources. Some additional fieldwork will likely also be needed to complete such an evaluation.

In addition, **we recommend a program to identify candidate wetland areas for improvement projects.** There are numerous existing government programs that include wetland improvement as eligible projects, including but not limited to the USDA's Wetland Reserve Program (WRP) and Wildlife Habitat Incentive Program (WHIP) and US Fish and Wildlife's Partners for Wildlife program. However, utilization of these programs in the watershed is limited by the attention existing staff can devote to promoting these programs due to other workload demands. We believe that, with adequate outreach and dedicated attention, many more WRP, WHIP and other wetland-benefiting projects could be developed and implemented in the Watershed.

Improvement projects could take many forms, but some examples are water table manipulation, biological controls (eg. release of loosestrife-eating beetles), other forms of non-native/invasive plant control, plantings of selected desirable species, or even controlled grazing to provide improved conditions for certain desired species such as bog turtles.

Wetland losses must continue to be controlled via existing regulatory and educational efforts. In addition, though, **we believe that accelerated efforts to identify, plan and implement wetland improvement projects should be considered a necessary component to a comprehensive watershed conservation plan.**

Targeted Assistance to Municipalities

There are 30 towns, villages and cities in the New York portion of the Wallkill Watershed. Local municipal boards play a crucial role in land use planning and can therefore have a major impact on addressing many of the priority watershed issues identified by the Watershed Project Steering Committee such as wetland protection, open space, biodiversity, stream protection, riparian buffers, sprawl and stormwater runoff. While the MS4 Cooperation Project mentioned elsewhere in this Plan will help to address some of these issues, biodiversity, wetland and stream protection are largely beyond the scope of the Phase II Stormwater Regulations.

1. Provide Technical Assistance to Municipalities on Natural Resource Protection

Promoting higher levels of natural resource protection via proactive local programs is a goal identified in the Management Plan. **We propose to provide targeted technical support to all receptive municipalities in the watershed** directed at fostering such local efforts, which may include new local ordinances, or incentive-based programs such as Purchase of Development Rights or riparian buffer establishment where participants may receive financial or other incentives for participation. For example, in Ulster County, as mentioned above, there is already collaboration ongoing between the Village of New Paltz, the Soil and Water Conservation District, and USDA-NRCS which has resulted in the establishment of, and on-going maintenance of a riparian buffer system along the Wallkill River that is approximately one quarter of a mile in length. This effort is now in its second year.

2. Coordinate Local Conservation Advisory Councils (CACs)

CACs exist in four of the 20 municipalities in the Orange County portion of the Watershed and in seven Ulster County municipalities. **We propose to form a loose affiliation between the existing CAC's** where applicable to enhance exchange of ideas, promote the formation of additional CAC's, and identify implementation projects similar to the above mentioned riparian buffer system established in the Village of New Paltz. Since CAC's typically have limited resources, we propose to provide networking, training and related support to CAC's. Ideas such as sample watercourse/wetland protection local laws, low impact development approaches, and stream-front landowner riparian improvement projects will be shared and highlighted, through a targeted newsletter aimed at – and contributed to by – CAC's.

Where no potential seems to exist for CAC formation, we will work directly with the appropriate municipal body to promote the same goals. This initiative will also include initial outreach to other potential partners for ideas. This would include, but not be limited to, landscaping contractors, garden centers, garden clubs, growers of landscaping plants, and others who can be involved in educating landowners and other decision-makers about landscape management practices that can protect water quality and biodiversity.

Low Impact Development (LID) and Better Site Design (BSD)

The issues section of this Plan raises concerns with current New York State technical requirements for water quality treatment. Beyond water quality, concerns exist regarding other impacts of new development such as loss of open space and wildlife habitat, and other, less easily defined 'quality of life' considerations. LID (low impact development) and BSD (better site design) describe conceptual approaches to site design that attempt to minimize these potentially adverse impacts. Full discussion of these concepts is beyond the scope of this Plan, but plugging either term into an internet search engine will yield copious references and examples. A related term is 'stormwater treatment trains', which denotes routing stormwater runoff through multiple treatment practices, thereby offsetting the reduced pollutant removal efficiency of single-practice treatment, and providing insurance against poor performance of a single practice as a result of lack of maintenance or other reasons.

The NYSDEC is currently working on a guidance document dealing with LID/BSD related concepts and how they can be employed within the framework of current stormwater management regulations.

This Plan encourages local municipalities to fully explore opportunities to incorporate principles such as LID, BSD and stormwater treatment trains into the site plan approval process, and supports increasing local agency technical support to municipalities to provide education and assistance on these approaches.

Increase Water-Related Recreational Opportunities

Access to the Wallkill River:

We recommend that those municipalities with no current access to the Wallkill River establish at least one public access point in order to increase public awareness and stewardship of the River. These municipalities include:

1. Town of Minisink
2. Town of Wawayanda
3. Town of Goshen
4. Town of Wallkill
5. Town of Gardiner
6. City of Kingston

Access to Major Tributaries

Few major tributaries of the Wallkill River enjoy public usage due to scarce public lands along their banks. **We recommend that the following tributaries, which have no current public access point, be prioritized for future public access:**

1. Rutgers Creek
2. Pochuck Creek
3. Quaker Creek
4. Monhagen Creek
5. Masonic Creek
6. Platte Kill

Access to All Water-related Recreation Opportunities

We recommend that water-related recreation opportunities, including access to lakes and ponds, be created in those municipalities without any such access. These municipalities include:

1. Town of Minisink
2. Town of Wawayanda
3. Town of Goshen

Research and Monitoring

As discussed in the Plan, existing data on basic questions such as precipitation, stream flow, and groundwater levels is very patchy and incomplete in the Wallkill Watershed. The number of USGS stream gauging stations in the watershed and elsewhere has declined. Funding for basic monitoring of these and other parameters, including ambient water quality monitoring, is not sufficient.

Water Supply

Decisions about water supply planning, including development of new municipal and private water supply systems, are generally made incrementally by individual municipalities and developers. Since the Orange County Water Loop project was abandoned in the early 1990's due to high cost and apparent lack of demand, there had not been any major intermunicipal water projects until

Orange County Executive Edward Diana convened the ongoing Mid-County committee to consider water supply and other infrastructure options. The Orange County Water Authority will also potentially be developing the county's first Water Master Plan during 2007. These plans and projects should consider watershed hydrology, including the long-term sustainability of existing and proposed water supply sources and ways of designing new development and new water supply projects to maximize groundwater recharge using low impact development/better site design practices. New water supply projects should prioritize protecting streamflow, maintaining pre-development hydrology, and protecting water quality in surface and groundwater resources. Water conservation measures can be used in new development to reduce the need for additional water supplies. Water reuse and efficiency measures can be considered, including strategies currently being developed by NYS DEC, NYS DOH and other agencies under a state law adopted in 2005.

At the state level, according to available information, it seems that there is insufficient attention being paid to the sustainability of water resources, particularly groundwater. The existing permitting system does not include real consideration of the cumulative impacts of multiple groundwater withdrawals on a regional basis. Existing permitting processes and policies also do not include provisions to protect in-stream flows that may be reduced or altered by increased impervious surfaces, diversions, groundwater withdrawals, etc. These issues should be addressed either at the local, county or state level, but this is probably best done at a regional or state level, at least in the near term, because local municipalities are not currently organized to work on an intermunicipal level to address these kinds of challenging issues.

Protecting Streamflow, Groundwater, and Wetlands

As discussed in various sections of this Plan and in other recommendations, land use and land cover changes caused by development can lead to dramatic changes in watershed hydrology. Open space conservation strategies including purchase of development rights, clustering, transfer of development rights, and local laws to protect aquifer recharge areas, stream buffers, wetlands and other resources should be used to protect sensitive areas that are needed to maintain in-stream flows and recharge groundwater. For individual development projects, low impact development/better site design (LID) practices should be used as much as possible to support these goals. Unless and until state regulations are adopted to address gaps in existing wetlands and stream protection laws, local laws are needed to protect smaller wetlands and riparian buffers. Providing training, model ordinances and other tools for local government to support local protection measures for these resources are high priority action items in this Plan. Demonstration projects incorporating these ideas and issues into new development will also be useful to broaden awareness and acceptance among engineers, developers and planning officials. Technical assistance, funding, and education about why and how existing local ordinances and design standards should be revised to allow LID practices is also a priority.

Wastewater Management

Much of the existing wastewater infrastructure in the Wallkill Watershed is nearing the end of its design lifespan and requires upgrades or replacement. Some of this work is currently being done but it is almost certain that for the next 3-5 years and potentially beyond, the funding needed to fully implement needed upgrades will not be available from state or Federal sources. Local officials, therefore, are faced with the hard choices involved in funding very expensive projects in their municipal budgets. At the same time, a number of municipal wastewater systems are implementing sewer line extension projects that will lead to increased flows to treatment plants, and private developers are proposing small (package) treatment plants for individual projects. Many such small systems, especially when privately owned and operated, have historically had a poor track record in terms of their operations, maintenance, and performance. For all of these upgrades, expansions, and new treatment systems, more attention should be given to addressing the full life-cycle costs and environmental impacts before plans are finalized. Decentralized strategies for managing wastewater **that are properly designed and effectively managed** can potentially provide better performance, lower costs to the end users, and better protection of water resources than larger centralized systems. Decentralized wastewater strategies that maximize the potential for groundwater recharge and nutrient removal using soil-based discharges should be strongly considered whenever new infrastructure is planned. Even in urbanized areas with existing centralized sewer systems, decentralized technology for new or existing development can be used to mitigate excessive flows that cause overflows during wet weather. Stormwater catchment systems and repairs to leaking sewer lines should both be priorities to address wet weather overflows (which cause release of partially treated sewage) where they exist in the Wallkill watershed. At the state and Federal level, increased funding to repair existing infrastructure is a high priority. At the state level, revised regulations and policies can help enable full consideration of decentralized wastewater strategies. The current development of water reuse and efficiency regulations by NYSDEC and other agencies will potentially be a useful step in this direction. For individual onsite systems, better training and oversight is needed to ensure that systems are properly sited, designed, installed, inspected and maintained. Local municipalities, especially in sensitive watershed areas, should consider local laws and/or other programs to require regular pumpout, maintenance and inspection of private onsite systems. Municipalities should also consider formation of management districts for onsite and small community/decentralized systems to provide municipal oversight.

Local Planning and Regulations

1. We recommend increased use of overlay zones within municipal zoning codes as a method of protecting natural resources. Overlay zones are an appropriate approach to natural resources protection due to their flexibility in following natural boundaries and their relative simplicity to understand and implement.

2. We recommend the use of incentive zoning as a way to make natural resource protections more palatable and widespread. Incentives could include density bonuses during the subdivision review process, a waiving of certain fees (such as recreation fees during the subdivision review process), and a decrease in the amount of time taken to secure a municipal approval.

3. We recommend the creation of a county-wide environmental management council (EMC) for Orange County. The regulatory review pointed out how CACs, by that or some other name, were more abundant in Ulster County than in Orange and we feel that a county-wide EMC could advocate for, organize, and coordinate municipal conservation advisory councils (CACs) in Orange County. An EMC would also have a unique position to tackle politically-sensitive environmental issues of County-wide concern. (It is noted that, in lieu of an Orange County EMC, the OCSWCD has proposed a project to provide staff assistance and coordination services to CAC's. The Orange County Planning Department anticipates devoting accelerated staff resources to this area as well.)

4. We recommend the adoption of the NYS Model Law for Sediment and Erosion and Stormwater by all municipalities. There should be a clear responsible party within each municipality, such as a building inspector, to ensure that the regulations are being enforced. Additional study will be needed to determine how best to achieve the necessary program oversight given the already large scope of responsibilities maintained by local building officials. A clear penalty schedule would also help to ensure compliance, with a clear benchmark for the issuance of a stop work order. A 'level playing field' for developers and their consultants is a concern that has been raised by the local engineering community, and wide adoption of the NYS model law would help to achieve such a situation from town to town.

5. We recommend municipal protection of wetlands and watercourses. State and national laws should be supplemented by local ordinances that establish buffers for or otherwise protect these surface water resources from degradation.

6. We recommend increased protections for steep slopes. Most important is prohibition of development on steep slopes, especially those in excess of 25%. Also critical is the subtraction of steep areas when a calculation of net area is done during the subdivision review process.

7. We recommend that municipalities require that all nonbuildable areas be subtracted from the calculation of net area during the subdivision review process. Nonbuildable areas should at least include steep slopes, wetlands, hydric soils, and floodplains. Other potential subtractions could include rare species habitats, a wellhead protection area, and buffers of waterbodies & wetlands.

V. CONCLUSION

Not only is the Wallkill Watershed large, it is extremely diverse – ranging from the unique Black Dirt farming region to the orchards of New Paltz, suburban landscapes dotted with high-value homes, and highly urban cityscapes like Middletown and Kingston. Crafting a management plan that thoroughly addresses the myriad special issues and needs encompassed by these diverse settings would be a challenge, indeed, even with a generous supporting budget. The funding constraints with which this project was faced are described in some detail in the preceding sections.

Despite these constraints, Plan writers worked vigorously to add innovative and useful elements to the Plan. The stream corridor study, conceived by Kelly Dobbins of the Orange County Planning Department, combined advanced remote sensing and GIS techniques with local knowledge of land use to produce a extensive list of potential future water quality and habitat improvement projects. Skillful and diligent efforts by technicians at the Orange County Water Authority and others produced a detailed map of % imperviousness in the Watershed. The importance of this parameter is now common knowledge amongst all watershed protection professionals. The collective knowledge and experience of Soil and Water Conservation District and USDA/NRCS staff regarding farm operations in their respective counties allowed for in-depth treatment of agricultural issues and needs.

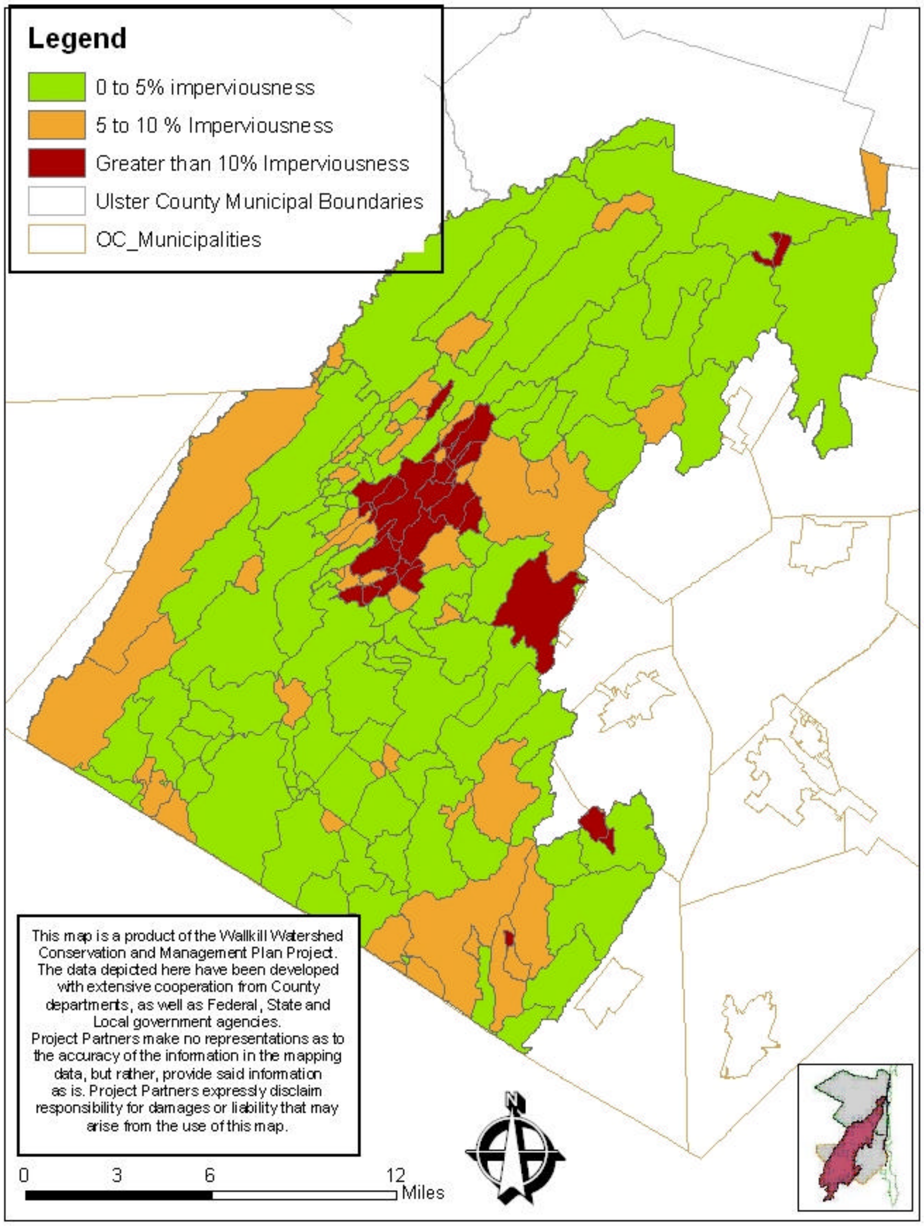
Ideally, funding and qualified staff will be available to both expand on important topics given limited treatment in this Plan, and to conduct more detailed planning in the sub-basins of the Wallkill using the imperviousness, biodiversity and related data in this Plan as a starting point. Even in lieu of more detailed planning efforts, though, an emphasis of this Plan was to produce recommendations that could lead directly to actions that will protect and improve the Watershed. We believe this goal was achieved in the Recommendations section of the Plan. In fact, an implementation project funded by the Hudson River Estuary Program is expected to follow closely on the heels of the completion of this Plan. This Plan will not be a success if other recommended action items, beyond those included in the HREP implementation grant project, are not embraced and pursued by Wallkill Watershed communities.

A final issue that deserves reinforcement is the importance of **dedicated staff** to the level of accomplishments that can be expected of any project of this scope. Many of the agencies and groups partner to this Plan are committing, and will continue to commit, staff resources to watershed protection efforts. We firmly believe, though, a watershed of this size demands a full-time coordinator to orchestrate partner agency activities, garner public support, seek and secure funding, and generally advocate for the River and its watershed. **Seeking support for, and securing, such a position is a major recommendation of this Plan.**

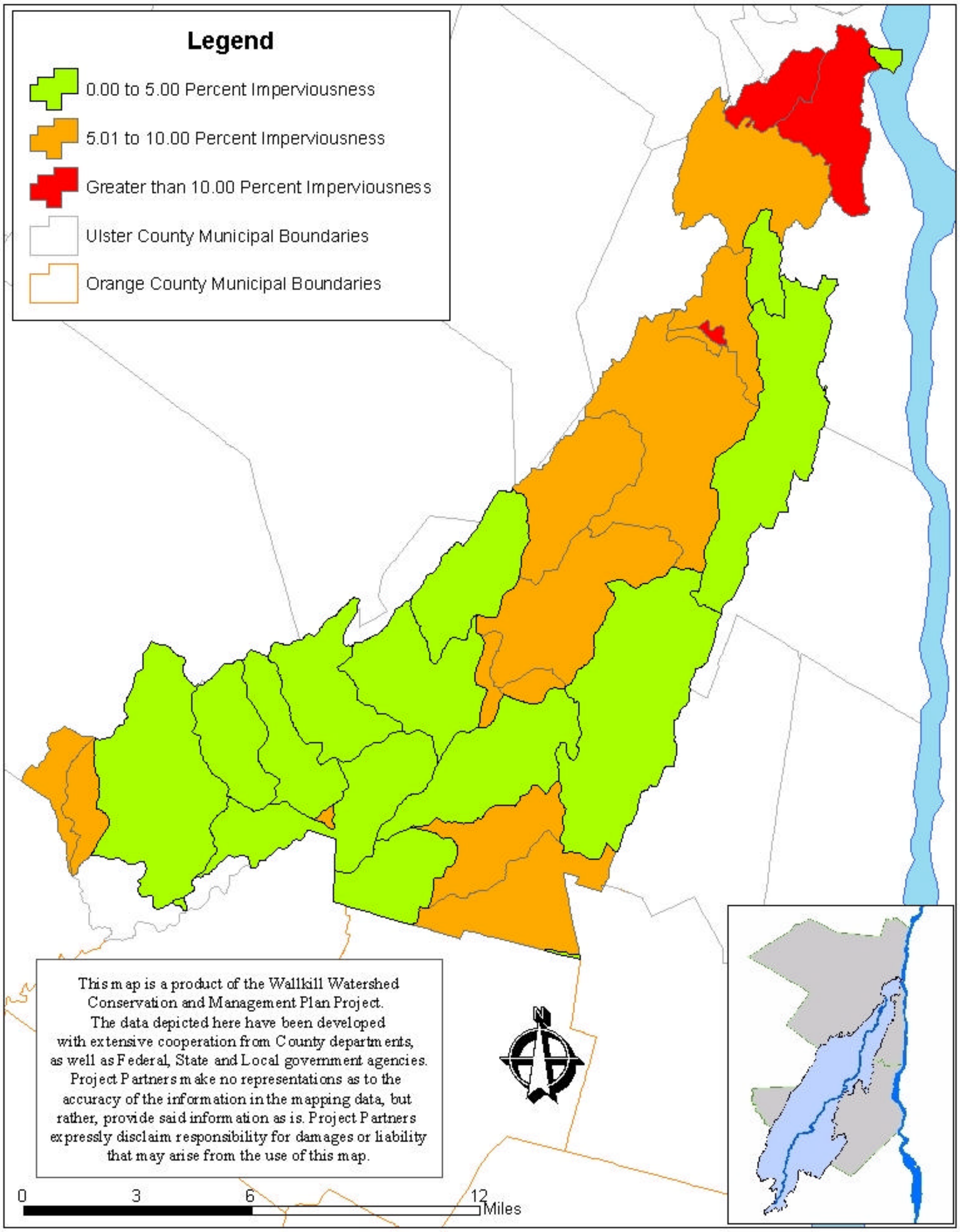
The Wallkill Watershed is fortunate to have a large number of dedicated and knowledgeable people working to balance human needs and interests with environmental stewardship. We hope this Plan in some small way fosters these efforts.

LIST OF ACRONYMS

ACOE	Army Corps of Engineers
AEM	Agricultural Environmental Management
AFPB	Agricultural and Farmland Protection Board
BSD	Better Site Design
CAC	Conservation Advisory Council
CCE	Cornell Cooperative Extension
CREP	Conservation Reserve Enhancement Program (USDA)
CRP	Conservation Reserve Program (USDA)
CS	Community Service (a property class code)
CSA	Community-Supported Agriculture
CWP	Center for Watershed Protection
DEC/NYS DEC	New York State Department of Environmental Conservation
DOH	Department of Health
EMC	Environmental Management Council
EPA/US EPA	United States Environmental Protection Agency
EPT	Ephemeroptera Plectoptera Tricoptera
GIS	Geographic Information System
GPD	Gallons Per Day
HBI	Hilsenhoff Biotic Index
HREP	Hudson River Estuary Program (NYS DEC)
IPM	Integrated Pest Management
ISD	Impact Source Determination
LHCCD	Lower Hudson Coalition of Conservation Districts
LID	Low Impact Development
MS4	Municipal Separate Storm Sewer Systems
NRCS	Natural Resources Conservation Service
NYC-DEP	New York City's Department of Environmental Protection
NYSSWCC	New York State Soil and Water Conservation Committee
OCWA	Orange County Water Authority
PCC	Property Class Code
PMA/SD	Percent Model Affinity/Species Dominance
PSC	Project Steering Committee-Wallkill River Watershed Conservation & Management Plan
PWL	Priority Waterbodies List
RC&D	Resource, Conservation & Development Council
SBU	Stream Biomonitoring Unit of the NYS DEC
SCS	Soil Conservation Service (USDA)
SPDES	State Pollutant Discharge Elimination System
SR	Species Richness
SUNY	State University of New York
SWCD	Soil & Water Conservation District (OC- Orange County UC- Ulster County)
USDA	United States Department of Agriculture
USGS	United States Geological Survey
WHIP	Wildlife Habitat Incentive Program (USDA)
WQCC	Water Quality Coordinating Committee
WRP	Wetland Reserve Program (USDA)
WRTF	Wallkill River Task Force
WVDIA	Wallkill Valley Drainage Improvement Association



Map 6a – Imperviousness by Subwatershed – Orange County



Map 6b – Imperviousness by Subwatershed – Ulster County

APPENDIX K

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