Operation and Maintenance Manual

Volume I of III
Operation and Maintenance Manual and Appendices

Gratwick-Riverside Park Site
North Tonawanda, New York

9 November 2022

→ The Power of Commitment

CERTIFICATION STATEMENT

I, Richard J. Snyder, certify that I am currently a NYS registered professional engineer and that this Site Management Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER-10 Technical Guidance for Site Investigation and Remediation (DER-10).

Richard J. Snyder, P.E

November 9, 2022
DATE

Contents

Figure index

Table index

Appendices

Glossary

City	City of North Tonawanda
GRP	Gratwick-Riverside Park
GWS	Groundwater Withdrawal System
HASP	Health and Safety Plan
HDPE	High Density Polyethylene
NTU	Nephelometric Turbidity Unit
NYSDEC	New York State Department of Environmental Conservation
O&M	Operation and Maintenance
POTW	Publicly Owned Treatment Works
PPE	Personal Protective Equipment
PPs	Performing Parties
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
RA	Remedial Action
River	Niagara River
ROD	Record of Decision
SVOC	Semi-Volatile Organic Compound
TAL	Target Analyte List
TCL	Target Compound List
VOC	Volatile Organic Compound

1. Introduction

This report provides the Operation and Maintenance (O&M) Manual for the Gratwick-Riverside Park (GRP) Site located in North Tonawanda, New York. The purpose of this O&M Manual is to provide the detailed operation, maintenance, and monitoring requirements for the various components of the Remedial Action (RA) that was completed at the Site between June 1999 and November 2001. This O&M Manual has been prepared to fulfill the requirements of the Order on Consent (Paragraph VII.C) dated May 16, 1996.

This O&M Manual was originally prepared by updating the draft O&M Plan included as Appendix C in the Final (100%) Design Report dated December 1998 and approved by the New York State Department of Environmental Conservation (NYSDEC) on February 12, 1999 to reflect the conditions of the constructed remedy and to provide additional operation and maintenance information and requirements for the installed components of the RA. It is noted that NYSDEC approval for the O&M Manual was given on April 20, 2005. This O&M Manual was revised in January 2004, May 2009, and June 2014 and has been revised again to reflect modifications in previous annual reports and approved by NYSDEC. The O&M Manual presented in this document was prepared for the GRP Site Performing Parties (PPs).

1.1 Scope of the O&M Manual

The purpose of this O&M Manual is to detail the operation, maintenance, and monitoring requirements for the RA. This report is organized as follows:

- Section 1.0 Introduction
- Section 2.0 Site Description
- Section 3.0 Selected Remedial Action
- Section 4.0 Monitoring, Testing, and Records
- Section 5.0 Operation of Site Systems
- Section 6.0 Site Maintenance
- Section 7.0 Reports
- Section 8.0 Community Relations Plan
- Section 9.0 Notifications to City of North Tonawanda
- Section 10.0 Site Contacts
- Section 11.0 Health and Safety Plan
- Section 12.0 Records
- Section 13.0 Emergency Contingency Plan
- Section 14.0 Record Drawings

1.2 Revisions to the O&M Manual

This O&M Manual presents the details of the operation, maintenance, and monitoring requirements of the RA components representative of the constructed RA.

All revisions or amendments to the O&M Manual must be submitted to and approved by the NYSDEC before the revisions or amendments can be implemented other than for minor revisions or amendments to optimize the operation of the system.

2. Site Description

The GRP Site is located along the Tonawanda Channel of the Niagara River (River) in the City of North Tonawanda (City), New York, and comprises an area of approximately 53 acres. The Site is bordered by River Road to the north, a private marina to the east, the River to the south, and a private residential area to the west. The Site location is shown on Figure 2.1 and the Site layout and topographic conditions, as constructed during the RA, are shown on Figure 2.2.

The Site is owned by the City and was transferred to the City in 2002. The entire Site is an active public park with a boat launch, walking paths, restored wetlands at the river edge, and a natural reforestation area at the southeast end of the Site.

2.1 Site History

Little information is available regarding Site usage prior to about 1957. Aerial photographs indicate that the bulk of land development/expansion occurred as a result of waste disposal activities from 1938 to 1968. Documented waste disposal activities occurred from 1962 to 1968. Both municipal and industrial wastes were disposed of during that 6-year period. Burning of wastes on Site was reportedly a common practice in the 1960s. Wastes were covered at intervals with incinerator ash, road construction debris, and molding sand. Characteristics of waste components known or suspected to have been present in materials disposed at the Site include general refuse, phenolic resins, phenolic molding compounds, waste oil distillation residues and grease, molding sand, incinerator ash, slag, and laboratory chemicals. The landfill was closed in 1968 and was subsequently graded, covered, and grassed. The Site was opened as a park by the City in 1969.

3. Selected Remedial Action

The RA selected by the NYSDEC for the Site is presented in the Record of Decision (ROD), which was issued in February 1991. The ROD was amended in December 1998.

Based upon discussions with the NYSDEC subsequent to issuance of the ROD, the PPs submitted a Scope of Work for the Remedial Design, appended to the Order on Consent (effective date May 16, 1996), which describes the agreed upon RA for the Site including on-Site containment, groundwater withdrawal and discharge to the City Public Owned Treatment Works (POTW) for treatment, groundwater monitoring, and shoreline erosion protection. The ROD for the Site was amended in December 1998 to include the River sediment remediation component.

The major components of the Site remedy covered by this O&M Manual are:

1. Permeable Site cap
2. Barrier wall/groundwater withdrawal system
3. Sloped bank shoreline stabilization, River sediment remediation and enhancements along the River shoreline
4. A surface water management system

3.1 Permeable Site Cap

The permeable Site cap was placed over the Site to prevent erosion of landfill materials and eliminate direct human or wildlife contact with the landfill materials while allowing rainwater to infiltrate and percolate through the fill. The infiltration will flush chemicals from the fill for collection by the groundwater withdrawal system (GWS). The permeable Site cap covers the entire Site. The permeable Site cap consists of the following layers, in descending order:

1. Vegetative cover
2. 6-inch topsoil layer (topsoil)

3. 12-inch compacted fill layer (common soil)
4. Geotextile demarcation layer
5. Grading fill

All soils used in the cap placed above the demarcation layer were tested for Target Compound List/Target Analyte List (TCL/TAL) parameters prior to placement. The final Site cap layers are described in the following subsections.

A cross-section of the final Site cap and a plan view of the capped area are presented on Figure 3.1.

3.1.1 Grading Fill

A combination of an existing soil stockpile on Site and excess excavated material generated during RA construction activities were used to establish the pre-cap ground surface elevations.

3.1.2 Geotextile Demarcation Layer

A single layer of 4 ounce/square yard geotextile fabric was placed on the grading fill to provide a visual separation between the grading fill and the overlying compacted soil layer.

3.1.3 Compacted SOIL Layer

A 12-inch compacted soil layer was placed on top of the demarcation layer. The compacted soil layer was installed to reduce erosion of the landfilled materials and to prevent direct human contact with on-Site soils having elevated chemical presence.

Imported clean soil, free of materials containing roots or organic matter, contaminants, and debris, was used in the compacted soil layer. The maximum aggregate diameter for the compacted fill layer soil was 4 inches.

3.1.4 Topsoil

A 6-inch thick topsoil layer was placed over the compacted soil layer to support the vegetative cover. The soil material consists of 6 inches of tilled, uncompacted soil containing organic matter, reasonably free of unsuitable material. Unsuitable material included roots, rocks or lumps with a diameter greater than 1 inch, debris, weeds, vegetation, seeds of noxious weeds, and toxic materials.

3.1.5 Vegetative Layer

The vegetative layer was developed on the surface of the cap. The vegetative layer is essential for maintaining the cap's long-term effectiveness. The vegetation serves to:

1. Stabilize the soil against erosion due to runoff and wind
2. Maximize evapotranspiration of soil moisture
3. Increase the aesthetic value of the cap

The turf seed mixture, seed mixture SM1, was placed in the grassed open/recreational area and consists of Creeping Red Fescue Grass (72 pounds/acre), Tall Fescue (32 pounds/acre), Kentucky Blue Grass (40 pounds/acre), and Perennial Ryegrass (32 pounds/acre). The natural revegetation seed mixture, seed mixture SM2, was placed over the natural revegetation area and consists of Waldorf Chewings Fescue (90 pounds/acre), Hard Fescue (45 pounds/acre), White Clover (15 pounds/acre), and Native Wildflower (4 pounds/acre). Late Succession Tree seedlings were planted to expedite the reforestation of the area.

The SM1 vegetative layer in the grassed open/recreational area will be maintained by appropriate mowing consistent with its use for recreation. The areas covered with the SM2 vegetative layer are not to be mowed. The locations of application for each type of seed is presented on Figure 3.2.

3.1.6 Access Roads, Parking Areas, and Pathways

A paved access road was constructed through the Site to facilitate access by maintenance vehicles and for use by the public. The access roads, parking areas, and pedestrian pathway (paved and unpaved) alignments are shown on Figure 3.2.

3.2 Barrier Wall/Groundwater Withdrawal System

The barrier wall/GWS is designed to hydraulically isolate the Site from the River. The GWS consists of approximately 5,300 feet of collection drain, 17 collection drain access manholes/wet wells, pumps, forcemain piping, electrical conduit, a control building, and a metering chamber. The barrier wall consists of a soil bentonite backfill barrier installed using slurry excavation methods.

The barrier wall/GWS is planned to remain as an operating unit until such time as the groundwater quality from beneath the Site exceeds the New York State groundwater/surface water criteria.

Once these criteria are met, the City will be able to request that the operating components of the barrier wall/GWS be shut down. This request will have to be submitted to and approved by the NYSDEC prior to termination of the operating systems.

3.2.1 Groundwater Withdrawal System (GWS)

The collection drain consists of an 8-inch diameter perforated high density polyethylene (HDPE) collection pipe (Series 601) in an infiltration trench filled with coarse granular material. The perforated HDPE collection pipe conforms to the following specifications:

– pipe stiffness at 5 percent deflection: 24 psi (minimum)
– Pipe stiffness at 10 percent deflection: 19 psi (minimum)
– Elongation: 10 percent (maximum)

The coarse granular material consists of clean, hard, durable particles of natural aggregate with an in-place minimum hydraulic conductivity of $1x\ 10^{-2}$ cm/s and conforms to the following grade requirements:

Sieve Size	Percent Passing by Weight
1/2-inch	100
1/4-inch	90 - 100
1/8-inch	0 - 15

The alignment is shown on Figure 3.3. Typical cross-sections are shown on Figure 3.4.

3.2.2 GWS Manholes

The GWS is comprised of 17 manholes located at relatively evenly spaced points along the alignment as shown on Figure 3.3. Five of the manholes are oversized (8 feet diameter versus 4 feet diameter) to serve as GWS pumping locations (i.e., wet wells). Pumps were installed in three of the wet wells (i.e., MH3, MH9, and MH15). Should monitoring indicate the need for additional pumping stations, one or both of the additional wet wells (i.e., MH6 and MH12) can be used. All manholes/wet wells are constructed of precast concrete. The wet wells have a sump that extends a minimum of 4 feet below the collection pipe invert. All manholes are equipped with covers and polyethylene ladder rungs for maintenance access. The wet wells are equipped with hinged access hatches to allow for removal and repair of pumps. Typical manhole and wet well details are shown on Figure 3.5.

3.2.3 Pumps, Forcemains, and Miscellaneous Plumbing

The forcemain is located within the GWS trench. The forcemain location in relation to the GWS trench is shown on Figure 3.4. One pump was installed in each of the three wet wells. A spare pump is kept in storage to minimize any downtime due to pump failure/problems or should pumping from one of the other two wet wells be needed.

Forcemains were constructed using HDPE pipe (DR 17.0). Check valves used in the forcemain are Red Valve, duckbill style, Series 39. Gate valves used in the forcemain are Walworth cast iron gate valves, Series 40C. Ball valves used in the forcemain system are Watts Regulator Series B-6000, threaded and fully ported. A 3/4-inch ball valve was installed at the meter building to be used as a sample port. A 4-inch diameter flow meter (Endress and Hauser 33F Series magnetic flow meter) was installed in the meter building. Each in-line device (i.e., pump, meter, valve) was fitted with unions or flanges to simplify removal for maintenance purposes.

3.2.4 Conduits and Wiring

The wet well pumps are connected to a control building by power, control and instrumentation cables. Underground cables are of direct bury construction. The cable is located within the GWS trench as shown in the cross-section on Figure 3.4.

Brightly colored, plastic, magnetic warning tape was installed above the conduit. The tape is bright red and is detectable by a metal detector at a depth of 3 feet.

3.2.5 Control Building

The wet well pump controls are located in the control building adjacent to Pump Station No. 2. The structure is a Kistner Concrete Easi-Set precast concrete building and is 10 feet by 12 feet in size.

3.2.6 Meter Building

An effluent monitoring station for monitoring the forcemain effluent quality and total and instantaneous flows through the forcemain is contained in the meter building located near the south end of the Site.

The structure is a Kistner Concrete Easi-Set precast concrete building and is 10 feet by 12 feet in size.

3.2.7 Barrier Wall

A barrier wall, which will significantly reduce groundwater flow from the Site to the River, was installed along the River between the River and the GWS alignment. The barrier wall is a 36-inch thick soil/bentonite barrier wall, keyed a minimum of 24 inches into the underlying confining layer of clay (confining unit). The soil/bentonite barrier wall creates a continuous barrier to groundwater migration from the Site to the River and to River water migration from the River to the GWS. The barrier wall alignment is shown on Figure 3.3 and typical cross-sections are shown on Figure 3.4.

3.3 Sloped Bank Shoreline Stabilization, River Sediment Remediation, and River Enhancements

The design objectives for the sloped bank shoreline stabilization, River sediment remediation, and River enhancements were as follows:

1. Make the existing and proposed land usage, including water access, and landscaping compatible
2. Cover existing sediments adjacent to the Site to prevent migration downstream and prevent direct contact with them
3. Minimize to the extent practical the encroachment of the revised shoreline bank into the River

3.3.1 Sloped Bank Shoreline Stabilization System

The sloped bank shoreline stabilization system consisted of the following components in descending order:

1. Vegetative cover Type SM3 supplemented with Cornus species vegetation on the slope and Salix nigra species at the top of the slope
2. 3-inch topsoil layer on top of the gabions
3. 6-inch gabion mattress (rock filled) on top of the common soil
4. Compacted common soil

Cross-sections of the sloped bank shoreline stabilization system are shown on Figure 3.7.

After the sloped bank stabilization components were installed, the topsoil was fine graded and a mixture of hydroseeding (seed mixture SM3) and Cornus and Salix nigra species vegetation was planted. The seed mixture SM3 consists of Creeping Red Fescue (80 pounds/acre), Chewings Fescue (32 pounds/acre), Canada Bluegrass (32 pounds/acre), and White Clover (16 pounds/acre). The area covered with the SM3 vegetative layer is not to be mowed. A planting layout is presented on Figure 3.2.

3.3.2 River Sediment Remediation and Enhancements

The River sediment remediation and enhancement systems are closely interconnected and are tied into the sloped bank shoreline stabilization system. The design objective of the River remediation was to cover existing sediments adjacent to the Site to prevent their migration downstream and to prevent direct contact with them. The objective of the enhancements was to provide approximately 5 acres of new wetlands habitat that did not exist at the Site prior to RA construction. Conceptually the NYSDEC and the PPs agreed to the following River remediation/enhancement components:

A. In Areas Where Competent Slag Was Not Present in River, with Barrier Islets Constructed:
    1) Five barrier islets located approximately 40 to 80 feet from shore and 10 to 20 feet inshore from the steep drop-off (enhancement component).
    2) Inlet boulders at the upstream entrance between the barrier islets and shore (enhancement component).
    3) Geotextile overlying the existing sediments from the toe of the sloped bank stabilization and continuing up the shoreward wall of the barrier islets (remediation component). Prior to geotextile placement, large pieces of debris in this area were removed and placed on the Site.
    4) 12-inch hydric soil cover overlying the geotextile between the barrier islets and the toe of the sloped bank stabilization (remediation component).
    5) Emergent wetland planting in hydric soils (enhancement component).
B. In Areas Where Competent Slag Was Not Present in the River, and no Barrier Islets Constructed:
    1) geotextile overlying the existing sediments (remediation component). Prior to geotextile placement, large pieces of debris in this area were removed and placed on the Site.
    2) 6-inch hydric soil layer overlying the geotextile (remediation component).
    3) 9-inch gabion mat, rock filled, on top of wetland soil (remediation component).

The geotextiles and soil/gabion mat layers were extended out from the shoreline a distance equal to approximately the inner edge of the corresponding upstream and downstream barrier islets.

C. In Areas Where Competent Slag Was Present in River, and no Barrier Islets Constructed (Sta. 37+00 to 46+50):
    1) no River remediation/enhancement components were constructed in the River. These locations are subject to inspection to observe the slow rate at which the competent slag is breaking up.

The barrier islets were comprised of large (18 to 24-inch) angular stone (riprap). Angular stone is more stable (i.e., less likely to roll) than rounded stone and thus will be more protective against ice forces.

Typical cross-sections are shown on Figure 3.7.

4. Monitoring, Testing, and Records

4.1 Monitoring Plan

Regular monitoring at the Site, including specific sample collection, sample analyses, and reporting tasks must be completed in order to ensure the integrity and evaluate the performance of the Site remedial components and to meet monitoring requirements. Regular monitoring will be required for the following Site media:

– Groundwater
– GWS effluent

Surface water monitoring ceased in 2009 as approved by NYSDEC on February 23, 2009.

4.1.1 Groundwater Monitoring

A groundwater monitoring program has been developed to monitor the effectiveness of the barrier wall/GWS. The objective of this monitoring program is to provide data for demonstrating the effectiveness of the hydraulic containment, collection, and extraction of Site-related groundwater.

The groundwater monitoring program consists of hydraulic monitoring and groundwater quality monitoring. The data collected will be used to evaluate the performance of the barrier wall/GWS and to determine the necessity for implementing contingency measures. The data will also be used to determine at what time operation of the GWS may cease (subject to NYSDEC approval).

4.1.1.1 Monitoring Well Network

Several monitoring wells have been installed to monitor the performance of the remedy. In addition, the outlets in the River for the three storm sewers traversing the Site have been marked and surveyed to monitor River water levels (see Table 4.5). These monitoring locations have been incorporated into a hydraulic and groundwater quality monitoring program described in the following subsections. The wells, manholes, wet wells, and the storm sewer outfalls that comprise the monitoring network are presented on Figure 4.1.

The well network and the storm sewer outfalls will be evaluated annually to assess whether each location provides useful information and to revise the network, as required.

4.1.1.2 Hydraulic Monitoring

Hydraulic monitoring consists of the collection of water levels in monitoring wells, manholes, and River water levels at the storm sewer outfalls to determine groundwater elevations and subsequently groundwater vertical and horizontal gradients. Water levels will be monitored to ensure the following:

1. The achievement and maintenance of an inward gradient from the River toward the GWS
2. The achievement of an upward gradient from the fill/alluvium layer beneath the GWS

The water levels in four GWS manholes (MH2, MH6, MH8, MH12) and in the River will be monitored to confirm that an inward gradient exists. The water levels in five GWS manholes (MH3, MH8, MH11, MH14, MH15) and in four monitoring wells (MW-6, MW-7, MW-8, MW-9) installed near the GWS alignment in the materials directly overlying the confining unit will be monitored to confirm that an upward gradient exists. Water levels in an additional eight monitoring wells (OGC wells) and two manholes (MH9, MH16) are also monitored.

Hydraulic monitoring locations are presented on Figure 4.1 and are listed in Table 4.1. Groundwater elevations are monitored at a monthly frequency. In addition to groundwater elevations, pH measurements are obtained concurrently

during the monthly event from the monitoring wells and manholes listed in Table 4.1. The pH is measured in the field via a grab sample collected from the dedicate Teflon bailer at each location.

The monitoring frequency after the initial 2-year period will be based on the 2-year results, and will be approved by the NYSDEC.

4.1.1.3 Groundwater Quality Monitoring

Groundwater quality monitoring consists of the collection of water samples from on-Site overburden monitoring wells (OGC1 through OGC8 and MW-6 through MW-9) and the analysis of these samples to determine the concentrations of chemicals in the groundwater. The purpose of the groundwater quality monitoring program is to monitor the anticipated improvement in the quality of the overburden groundwater:

1. Between the barrier wall and the River (OGC1 through OGC8)
2. In the fill/alluvium beneath the GWS (MW-6 through MW-9)

Groundwater quality monitoring locations are presented on Figure 4.1 and are listed in Table 4.2. As approved by the NYSDEC on October 9, 2018, the current sampling frequency is as follows:

Annual	Once every 2 Years (Even Years)
MW-6	MW-7
MW-8	OGC-1
MW-9	OGC-2
OGC-3	OGC-4
OGC-6	OGC-5
OGC-7	OGC-8

Groundwater quality monitoring will include field measurements of pH, conductivity, temperature, and turbidity, and laboratory analysis of samples. Laboratory analysis will include the compounds and analytes specified in Table 4.2. Groundwater sampling activities will be conducted in accordance with the Quality Assurance Project Plan (QAPP). The QAPP is presented in Appendix A.

Groundwater quality also will be monitored at the GWS effluent sampling location as shown on Figure 4.1. Effluent samples collected as described in Section 4.1.2 will be analyzed and evaluated to determine the quality of the groundwater being discharged from the GWS to the City's POTW.

4.1.1.4 Groundwater Monitoring Contingency Plan

The groundwater monitoring program will monitor the performance of the GWS and the barrier wall with respect to their design criteria and requirements. If the systems are not performing as designed or required, considering the time needed to substantially attain steady-state conditions, contingency actions will be required. Detailed plans outlining contingency actions will be submitted to the NYSDEC for review and approval prior to implementation.

The pumping rates will be set based upon the water levels in the wet wells and wet well water levels will be maintained within the specified limits.

If outward gradient is observed, the following contingency actions will taken:

1. Remeasure the water levels as soon as practical to confirm an outward gradient exists.
2. Check if it is a short-term temporary event due to unusual River conditions (e.g., low river levels due to extreme winds).

If an outward gradient is confirmed and it is not due to an unusual River condition:

1. Determine if it is a local event (i.e., specific to one area of the Site) or a Site-wide event
2. Check the pump operation; repair/replace pump as necessary, including cleaning the pump per Section 6.2.2.6
3. Check the pumping rates and adjust them to the extent practical, if necessary
4. Check for blockages in the collection pipe and/or forcemain and address as indicated in Section 6.2.2.2 and 6.2.2.4, respectively
5. Monitor the response to implementation of an corrective measures once complete

4.1.2 Effluent Monitoring Program

Groundwater from the GWS will be discharged to the POTW without pretreatment. The monitoring station, which is located at the south end of the Site as shown on Figure 3.3, will allow both the effluent water quality and the volume of effluent to be verified by the City.

Effluent sampling will be performed on a semi-annual basis as specified in the City of North Tonawanda Industrial Wastewater Discharge Permit (see Appendix B - Wastewater Discharge Permit). The Permit also requires continuous discharge flow monitoring. Laboratory analysis will include the compounds specified in Table 4.3. A 24-hour composite sample will be collected for semi-volatile compounds, metals, and wet chemistry parameters. Three grab samples will be collected for volatile compounds at 8-hour intervals and the measured concentrations will be averaged to give a 24-hour concentration.

4.2 Sampling Plan

The following subsections detail the required procedures for sampling groundwater and GWS effluent. Procedures and protocols outlined in this section will be performed in conjunction with those presented in the Health and Safety Plan (HASP) presented as Appendix C and the QAPP presented as Appendix A. Forms referenced within the following subsections are included as Appendix D.

4.2.1 General Sampling Protocols

Employ the following protocols during all sampling throughout this program:

1. Clean all sampling instruments and equipment in accordance with the protocols presented in Section 4.2.8 prior to sampling at each location.
2. Use a new pair of disposable nitrile gloves at each sampling location. Undertake additional glove changes as conditions warrant.
3. Handle all sampling-generated wastes such as personnel protective equipment (PPE), in accordance with Section 4.2.7.
4. Ice all samples collected for off-Site chemical analysis in laboratory supplied coolers after collection and labeling. Fill any remaining space within the coolers with packing material to cushion the sample containers. Seal each cooler with a transportation security seal containing the sampler's initials, then seal the cooler with packing tape. Preserve and label samples in accordance with Section 4.2.5 and pack and ship sample coolers in accordance with Section 4.2.6.
5. All samples must be delivered to the off-Site laboratory by commercial courier or sampling personnel, within 24 to 48 hours from the day of collection.
6. Samples will remain under the control of the sampling personnel until relinquished to the laboratory or commercial courier under chain-of-custody protocols (see QAPP).
7. Always return undelivered samples to locked storage at the end of each day. Samples must not be stored overnight in areas other than a secured storage area. Sampling containers must not be stored in enclosures containing equipment which use any form of fuel or volatile petroleum-based product.

Complete the following tasks before conducting any sampling activities:

1. Review the HASP, the QAPP, and the procedures for the sampling that will be performed.
2. Make proper arrangements with the laboratory with regard to sample containers and the sampling date. Review Quality Assurance (QA)/Quality Control (QC) requirements.
3. Assemble equipment and supplies using the appropriate checklists (see Appendix D - Standard Forms).

Additional protocols specific to each sampling method are presented in the following subsections.

4.2.2 Monitoring Well Purging

Use the following procedures to purge monitoring wells prior to sampling.

1. Complete the "Groundwater Sampling Equipment and Supply Checklist" (Form 1) before purging commences and complete the purging section of the "Groundwater Sampling • Completion Checklist" (Form 2) as the work progresses. Table 4.4 provides well details needed to determine purging requirements.
2. All personnel involved in purging or sampling must wear PPE as specified in the HASP.
3. Inspect the well. Determine if the cap and lock are secure or if they have been tampered with. If the well is unlocked, replace the lock. Note any cracks in the protective casing and/or surface seal as well as any subsidence in the vicinity of the well. Complete the "Well Inspection Summary" form (Form 3). Note the results of the inspection even if the well is in perfect condition.
4. Measure the water level in the well to ±0.01 feet prior to purging and the depth to the bottom of the well (at least once per year). Compare these results to previous water level measurements to ensure that the correct well is being purged for sampling. Record the water level.
5. The objective of purging is to extract a sufficient volume of water prior to sampling to ensure that the sample is representative of the actual groundwater conditions.
   Remove a minimum of three well volumes of water when possible. (A 2-inch diameter well contains 0.16 gallons of water per foot of casing below the water level and a 4-inch diameter well contains 0.65 gallons of water per foot of casing below the water level). After each well volume is removed, collect and field analyze a purge water sample for temperature, pH, conductivity, and turbidity. Calibrate field instruments as described in the QAPP prior to analysis. Record all readings. Continue purging until a maximum of five well volumes have been removed or until three consecutive, consistent readings of conductivity, temperature, and pH are obtained and the turbidity is less than 50 Nephelometric Turbidity Units (NTU). Conductivity, temperature, and pH readings are consistent if conductivity and temperature readings are within 10 percent of the average value or pH readings are within ±1 pH unit of the average value. If the above criteria have not been met after the maximum five well volumes have been removed, the well will be sampled. Record the number of well volumes that were required to purge the well.
6. If recharge is insufficient to conduct the purging protocols described in Step 5 above, the well will be bailed to dryness once on each of three consecutive days prior to sampling.
7. All monitoring wells have a dedicated bailer in each well which are used for purging. Although not anticipated for use, other acceptable equipment for water extraction during purging includes peristaltic pumps, bladder pumps, Waterra™ pumps, centrifugal, and submersible pumps.
8. Clean all water extraction equipment and field instruments (including the water level measuring device) prior to use at each new location in accordance with the protocols presented in Section 4.2.8.
9. Collect and store all purge waters for later disposal as described in Section 4.2.7.
10. Complete the "Groundwater Sampling • Well Purging Information Form" (Form 4).

4.2.3 Monitoring Well Sampling

Following well purging, carry out sampling of the monitoring well according to the following protocols:

1. Collect samples as soon after purging as possible.

2. Complete the sampling section of the "Groundwater Sampling • Completion Checklist" (Form 2) as sampling progresses.
3. Use a new pair of disposable nitrile gloves for sampling each well. Undertake additional glove changes as conditions warrant.
4. Collect samples from the monitoring well using the dedicated Teflon bottom filling bailer attached to a rope. Although not anticipated for use, samples may be collected using a suitable sample pump or stainless-steel bailer. Suitable sampling pumps include peristaltic pumps (for the semi-volatiles) and bladder pumps. If peristaltic pumps are used, collect the volatile portion using a bottom loading bailer prior to collection of the sample portion for the remaining parameters.
5. Prior to use at each new sampling location, clean the bailer or pump as specified in Section 4.2.8.
6. Collect a sufficient volume of groundwater for chemical analysis. Collect samples for VOC analyses first, then collect the samples for SVOC analyses. Collect all required QA/QC samples as described in the QAPP.
7. Label sample containers in accordance with Section 4.2.5. Maintain a daily log of electronic field record to record all groundwater samples and sampling events.
8. Clean all non-dedicated field equipment and instruments at the conclusion of sampling in accordance with the protocols presented in Section 4.2.8.
9. Complete the "Groundwater Sampling • Sample Collection Data Sheet" (Form 5).

4.2.4 Effluent Sampling

Perform GWS effluent sampling as described in Section 4.1.2 according to the following protocols:

1. Complete the "Effluent Sampling Equipment and Supply Checklist" (Form 10) before sampling and complete the "Effluent Sampling • Completion Checklist" (Form 11) as the work progresses.
2. Use a new pair of disposable nitrile gloves for sampling the effluent. Undertake additional glove changes as conditions warrant.
3. Collect samples from the sampling port in the metering chamber. Allow the effluent to discharge into a container for 10 seconds prior to sampling to ensure that a representative sample is collected.
4. Collect a sample in a pre-cleaned unpreserved bottle and measure the pH, temperature, conductivity, and turbidity of the water. Calibrate field instruments as described in the QAPP prior to analysis. Record all readings.
5. Prior to use, clean all field instruments as specified in Section 4.2.8.
6. Collect a sufficient volume of groundwater effluent for chemical analysis. Collect all required QA/QC samples as described in the QAPP.
7. Label sample containers as described in Section 4.2.5. Maintain a hard-cover, bound field book to record all effluent samples and sampling events.
8. Clean all field instruments at the conclusion of sampling in accordance with the protocols presented in Section 4.2.8.
9. Complete the "Effluent Sampling • Field Information Form" (Form 12) and the "Effluent Sampling • Sample Collection Data Sheet" (Form 13).

4.2.5 Sample Containers, Preservation, and Labels

Required sample containers, sample preservation methods, and maximum sample holding times are summarized in the QAPP.

Sample containers must be prepared using washing procedures that meet or exceed the requirements specified in the QAPP. Sample containers must be shipped to the Site in sealed containers from a single lot of prepared bottles.

Label sample containers with a unique sample identification number [which will include the project number 7987, the sampler's initials, the date, and a unique number (e.g., WG-7987-042822-KM-001)], the date and time, the parameters to be analyzed, and the sampler's initials.

4.2.6 Packing and Shipping

Prepare sample containers for shipment as follows:

1. Wipe containers to remove all debris/water using paper towels. Dispose paper towels with other contaminated materials.
2. Place clear, wide packing tape over sample labels for protection.

Adhere to the following guidelines when packing the samples for shipment:

1. Plan time to pack the samples. Proper packing and manifesting takes time.
2. Always opt for more coolers and padding rather than crowd samples.
3. Do not bulk pack. Each sample must be individually padded.
4. Large glass containers (1 liter and up) require much more space between containers.
5. Do not rely on ice for padding because it reduces in volume when it melts.
6. When using ice as a cooling media, always double bag the ice in Zip-Lock™ or equivalent bags and remove as much air as possible from the bags prior to sealing.
7. Double-check to ensure all trip blanks have been included as specified in the QAPP.
8. Enclose the Chain-of-Custody form in a sealed Zip-Lock™ or equivalent bag.
9. Ensure custody seals (two, minimum) are placed on each cooler. For coolers with hinged lids, place both seals on the opening edge of the lid. For coolers with "free" lids, place seals on opposite corners of the lid. Place clear tape over the custody seals. Wrap clear tape around the cooler to ensure the lid will not come off during shipping.
10. Ensure that all "Hazardous Material" stickers/markings have been removed from the coolers before being used.

Samples must be shipped by overnight courier or hand-delivered by the sampling personnel. A great many shipping problems can be avoided by adhering to the following protocols:

1. Prior to the start of the field sampling, contact the carrier to determine if pick-ups can be made at the field site location. If pick-ups at the field site can be made, determine the "no-later-than" time for having the shipment ready.
2. If no pick-up is available at the Site, determine the nearest pick-up or drop-off location. Again, determine the "no-later-than" time for each location.
3. Allow sufficient time not only for packaging but also for delivery of samples, if this becomes necessary. Driving at high rates of speed in order to make the drop time is not allowed.
4. Sample shipments must not be left at unsecured or questionable drop locations (i.e., if the cooler will not fit in a remote drop box, do not leave the cooler unattended next to the drop box).
5. Some overnight carriers do not provide "overnight" shipment to/from some locations. Do not assume, call the carrier in advance before the start of the field work.
6. Maintain copies of all shipment manifests in the field file.

4.2.7 Handling of Materials Generated During Sampling Activities

Containerize PPE and sampling refuse (i.e., paper towels, used tin foil) generated during the sampling activities in clear plastic bags and dispose at a sanitary landfill.

Collect all groundwater and GWS effluent extracted during monitoring activities and discharge that component not submitted for chemical analysis to the GWS.

4.2.8 Equipment Cleaning Protocols

Clean all non-dedicated equipment used for the collection of samples for chemical analysis including bailers and pumps according to the following protocol:

– Wash and scrub with low-phosphate detergent
– Rinse with tap water
– Rinse thoroughly with deionized demonstrated-analyte-free water supplied by the lab
– Air dry
– Wrap in aluminum foil

Dedicated sampling equipment which is left in the well will either be precleaned by the manufacturer or cleaned prior to its first use. Dedicated equipment will not require cleaning between sampling rounds unless the equipment becomes unsafe to handle. It is noted that currently a dedicated bailer is stored within each monitoring well and no cleaning fluids are being generated.

Tap water may be used from any municipal water treatment system. The use of an untreated potable water supply is not an acceptable substitute. If organics samples are not being taken, the solvent rinse may be omitted.

Place all cleaned equipment on clean polyethylene sheeting or aluminum foil in order to avoid contacting a contaminated surface before use.

Before use and between each well, clean the water level measuring device, pH meter, conductivity meter, thermometer, and turbidity meter (nephlometer) by rinsing with detergent solution followed by a deionized water rinse.

Treat/dispose the water washes using the procedures presented in Section 4.2.7.

4.3 Analytical Program

The Analytical Program is detailed in the QAPP and includes analytical schedules and methods, laboratory QC samples, reporting and deliverables, special analytical protocols, laboratory audits, and data audits.

4.4 Hydraulic Monitoring Procedures

The following subsection details the required procedures for measuring water levels for hydraulic monitoring. Procedures and protocols outlined in this subsection will be performed in conjunction with those presented in the HASP.

Complete the following tasks before conducting any water level measurement activities:

1. Review the HASP.
2. Assemble equipment and supplies using the "Water Level Measurement Equipment and Supply Checklist" (Form 14) (see Appendix D - Standard Forms).
3. Complete the "Water Level Measurement Equipment and Supply Checklist" (Form 14) before measuring water levels and complete the "Water Level Measurement • Completion Checklist" (Form 15) as the work progresses.
4. All personnel involved in water level monitoring activities must PPE as specified in the HASP.
5. Collect water levels over as short a period of time as possible. Note observations of significant weather changes during the period of water level measurements. Note recent rainfall events.

Use the following procedures to measure water levels at all wells, manholes, and wet wells:

1. Inspect the well, manhole, or wet well. Determine if the cap/cover and lock are secure or if they have been tampered with. If the well, manhole, or wet well is unlocked, replace the lock. Note any cracks in the protective casing and/or surface seal of the well or damage to the manhole/wet well covers as well as any subsidence in the

vicinity of the well, manhole, or wet well. Complete the "Well Inspection Summary" (Form 3). Note the results of the inspection even if the well, manhole, or wet well is in perfect condition.

2. Ensure that the well, manhole, or wet well to be measured has been correctly identified and located. Determine the reference point for the well (i.e., top of casing), manhole, or wet well.
3. Use a new pair of disposable nitrile gloves for each monitoring location. Undertake additional glove changes as conditions warrant.
4. Measure the water level in the well, manhole, or wet well to ±0.01 feet. Compare these results to previous water level measurements to ensure the correct well, manhole, or wet well is being monitored. Record the water level. Note the presence of any immiscible liquids in the well, manhole, or wet well and any unusual odors.
5. Clean the water level measuring device prior to use at each new location and at the end of all water level measurements in accordance with the protocols presented in Section 4.2.8.
6. Complete the "Water Level Record" (Form 16).

4.5 Evaluation of Monitoring Results

Upon receipt of groundwater and effluent quality data, analytical results will be evaluated to determine if the data are acceptable for use in the respective monitoring programs. All data deemed to be acceptable, including QA/QC results, will be entered into a computer database. Raw data packages resulting from groundwater monitoring will be sent to the NYSDEC following independent QA review within 30 days of receipt (if requested). The data will be designated as approved or not approved for evaluating the various RA systems at the Site after review by the NYSDEC.

Raw data packages resulting from effluent monitoring will be sent to the City and/or NYSDEC for QA review within 30 days of receipt (if requested). The data will be designated as approved or not approved for evaluating the performance of the GWS after review by the City and/or NYSDEC.

The procedures for evaluating analytical data resulting from Site monitoring activities are detailed in the QAPP.

The computer database will provide the required listing and summary tables of analyses, including a separate listing of QA/QC results. The simplified data will be used to determine the presence of Site-related chemicals in off-Site surface water and Site groundwater. As additional data are generated, graphic representations of concentrations versus time will be prepared to demonstrate temporal variations in groundwater and effluent chemical concentrations.

Hydraulic data will be converted to elevations and entered into a computer database. The water level data will be listed in tabular form for each round of data collected.

The evaluation of the hydraulic and water quality data will be used to determine if corrective contingency measures are required and when the system operations can be terminated.

4.6 Records

All field notes, field books, and completed standard forms will be stored on Site in the control building and scanned monthly and saved electronically (e.g., as Adobe® Acrobat® files) at GHD's Niagara Falls office. A copy of all chains of custody and analytical results will also be stored at the POTW.

5. Operation of Site Systems

5.1 Wet Weather Operating Procedures

The following procedures will be used to prevent the discharge of untreated groundwater from the Gratwick-Riverside Park Site by the City POTW during a wet weather bypass event at the POTW.

The POTW Raw Sewage Wet Well receives flow from the 42-inch River Road (East Avenue) Interceptor Sewer and the 24-inch Retention Basin dewatering line. The Site groundwater discharges into the 42-inch River Road Interceptor Sewer.

Four pumps equating to 24 mgd capacity are used to pump the raw sewage from the Raw Sewage Wet Well to the Grit Chambers. If the level of the Raw Sewage Wet Well exceeds a level of 560', it overflows through a sluice gate in the inlet structure and through a 36" line to the Storm Pumping Station.

In order to prevent the Site groundwater from mingling with overflow from the Raw Sewage Wet Well under high flow conditions, the following operational strategies will be used.

1. During a bypass event of the raw sewage wet well, the POTW Superintendent, who would control both the POTW bypass and the Site GWS, would stop pumping of the GWS. Pumping would be restarted by the POTW staff when the bypass event stops.
2. During a bypass event, the Site soils will be used as the storage location for groundwater. The Site materials will have been partially dewatered by the operation of the GWS. In addition, the Site soils located between the depressed groundwater level and the top of the barrier wall will absorb the groundwater flowing onto the Site. These materials have the capacity to store the groundwater flowing onto the Site for 25 days. This time period is far greater than historic bypass events that have occurred at the POTW. The 25-day time period was calculated using the maximum groundwater collection rate of 230 gpm presented in Appendix A of the report entitled "Preliminary (30%) Design Report" dated November 1996. The 230 gpm includes inflow of upgradient groundwater, infiltration of precipitation through the cap and migration of river water through the barrier wall along the Niagara River. Bypass events typically occur only once or twice per year and last for a few hours (maximum 10 hours in the last few years). Thus, the 25-day time period of storage greatly exceeds every historical bypass event that has every occurred at the POTW.
3. Groundwater levels will be monitored twice daily by POTW staff during a wet weather bypass event at the manhole locations listed in Table 4.1.
4. In the highly unlikely event that the holding capability of the landfill is exceeded, the POTW Staff will execute the following Raw Sewage Wet Well Strategy that will prevent the introduction of Site groundwater to any overflow through the 36" line to the Storm Pumping Station. This will be achieved by maintaining the Raw Sewage Wet Well level below the 560' level to prevent overflow. No pumping will take place from the Storm Pumping Station to the Raw Sewage Wet Well by directing all flows from the Storm pumping Station to the Retention Basin only. Furthermore, the valve controlling the 24-inch Retention Basin Dewatering line will be closed. This will result in all flow entering the Raw Sewage Wet Well to be processed through all treatment units ensuring Site groundwater treatment.
5. A log will be maintained at the POTW to document date, time, conditions, etc. of each event and indicate duration of shut down along with contacts at the POTW.

6. Site Maintenance

Site maintenance requirements will include routine Site inspections, scheduled preventative maintenance, unscheduled maintenance in response to inspection reports or component failures, and record keeping for maintenance activities. Perform all system inspection and maintenance activities in strict accordance with the HASP.

6.1 Site Inspections

6.1.1 Inspection Schedule

Table 6.1 presents an outline of the inspection and preventative maintenance schedule for the final Site cap and the barrier wall/GWS. This schedule will be revised as more experience with the particular maintenance requirements of the Site systems is gained.

Perform required maintenance as identified by the monthly inspections as soon as possible following identification.

6.1.2 Monthly Inspections

Inspect the Site on a monthly basis. These inspections will ensure that the remedial components are functioning effectively as designed following construction. Give particular attention to the following system components:

Final Site Cap

– Access roads
– Surface structures
– Vegetated soil cover
– Ditches and culverts
– General surface conditions

Groundwater Withdrawal System

– Access manholes
– Pumping location(s) manholes
– Pumps
– Flow monitoring devices

Sloped Bank Shoreline Stabilization

– Slope stability
– Vegetation
– Sewer outfalls (erosion of underlying materials)
– Embankment shrubs and shoreline trees
– Riprap located at toe of slope
– general surface conditions

River Sediment Remediation and Enhancements

– Barrier islets
– Wetlands vegetation
– Gabion mats, specifically at sewer outfalls
– General condition of the shallow vegetated waters

The inspections will include an overall Site inspection along all access roads and pathways. In areas which are inaccessible by vehicle, perform inspections on foot.

The monthly inspection of the GWS will include visual observation of all manholes to ensure that they are secure. Inspect the surface of the Site cap to ensure that the integrity of the cap is being maintained, including signs of damage due to loss of vegetation, settlement, erosion, and burrowing by animals. Inspect the River shoreline for damage due to loss of vegetation, erosion, and sloughing, burrowing by animals, and inspect the barrier islets for

damage due to erosion. Inspect the vegetated shallow waters along the River shoreline for signs of damage due to loss of vegetation and changes in water budget (i.e., water depth and/or availability).

Record the monthly inspections on the Monthly Inspection Log (Form 17). A copy of each monthly log to the NYSDEC on an annual basis (see Section 7.1). Keep all original logs on file at the POTW in the pre-treatment file section.

6.2 Maintenance

Maintenance is required when inspections reveal a problem with one of the systems or when system components malfunction. Should inspections reveal that non-emergency maintenance or response is required, complete the work as soon as practicable in order to eliminate further damage and the need for emergency repairs. If a situation requires immediate action, initiate emergency remedial actions immediately. Notify NYSDEC of all emergency actions. All replacement equipment must be of equal or better quality than the original components and when possible, should be the same make and model as the original. All replacement materials must meet or exceed the RA construction specifications. A summary of potential problems that will require maintenance and the appropriate corrective actions is summarized in Table 6.2.

The HASP will be reviewed before conducting any maintenance activities. All personnel performing maintenance activities must wear protective clothing and perform any necessary air monitoring as specified in the HASP.

Any imported soil required for maintenance activities will meet the criteria for use specified in DER-10. Sampling for Per- and Polyfluoroalkyl Substances (PFAS) will follow NYSDEC Sampling, Analysis, and Assessment of PFAS Guidelines.

Any excavation required to conduct maintenance activities that may encounter impacted materials will be conducted under a community air monitoring plan (CAMP) as specified in DER-10, which follows NYSDOH procedures.

The need for maintenance of the various components of the remedy will be determined after the construction is completed based on Site conditions and the initial inspection. Maintenance items include, but are not limited to, the following remedy components:

Final Site Cap

1. Fertilizing and restoring the Site vegetative cover and removing/cutting weeds or bushes.
2. Maintenance of trees and bushes and replacement of dead trees and bushes.
3. Repairing Site access roads and pathways.
4. Repairing damage caused by burrowing wildlife, presence of deep-rooted weeds, or other vegetation.
5. Repairing or replacing signs.
6. Cleaning ditches and culverts.

Barrier Wall/GWS

1. Cleaning manholes, wet wells, and the GWS collection tile (as required).
2. Securing and repairing manhole and wet wells access covers.
3. Repairing and maintaining the control building.
4. Repairing the barrier wall.

Sloped Bank Shoreline Stabilization, River Sediment Remediation and Enhancement

1. Fertilizing and restoring the vegetative cover along the shoreline and removing/cutting weeds.
2. Repairing damage to shoreline stabilization components caused by erosion or sloughing.
3. Repairing damage to barrier islets caused by erosion.
4. Restoring emergent wetland vegetation and control and removal of undesirable vegetation.
5. Inspecting and replacing dead shoreline trees and shrubs.

Submit a Work Plan to NYSDEC for approval, prior to the commencement of any major maintenance or remedial works at the Site.

6.2.1 Site Cap

The purpose of the Site cap is to prevent erosion of landfill materials and eliminate direct human and wildlife contact with the landfill materials. The layers of the cap work together to achieve these goals; therefore, each one of the layers is necessary for the Site cap system to function effectively. When a problem is detected with the cap, correct it as soon as feasible.

6.2.1.1 Vegetative Cover

Visible indications of problems which may occur with the vegetative cover include bare areas, dead or dying vegetation, and growth of weeds. When inspection reveals bare areas or dead or dying vegetation, perform the following actions as soon as feasible to correct the problem:

1. Till the topsoil.
2. Re-seed and mulch.

Remove all tall weeds at least annually.

6.2.1.2 Topsoil and Common Soil Layers

Visible indications of problems which may occur with the common soil and topsoil layers include washout and erosion, settlement, standing water, and animal holes or burrows.

If the cap has been damaged by erosion or a washout has occurred, perform the following actions to correct the problem:

1. Recover the washed out soil.
2. Backfill with recovered soil and additional soil to the original common soil layer design thickness.
3. Place a 6-inch thick layer of topsoil over the common soil layer.
4. Check the final elevation to ensure adequate drainage.
5. Seed/mulch.

Correct settlement and standing water, if necessary, by either regrading or by placing additional topsoil in the low areas.

Correct animal holes or burrows by performing the following actions:

1. Capture and remove the rodents.
2. Replace the compacted fill and topsoil layers to the original design thickness.
3. Seed/mulch.

6.2.1.3 Access Roads and Pathways

Visible indications of problems which may occur with Site access roads and pathways include potholes, puddles, washed out surface soils, and obstructions. When a puddle or pothole is detected, take the following actions as soon as feasible:

1. Backfill with new gravel to original sub-base grade
2. Patch with asphalt as necessary

If the road surface is washed out, take the following actions as soon as feasible:

1. Recover washed out gravel

2. Use recovered gravel to backfill the eroded areas to the original grade
3. Use new gravel to supplement the recovered material as necessary
4. Patch with asphalt as necessary
5. If practical, adjust ground surface grades to reduce occurrences of future washouts

If the access road is obstructed by an object, take the following actions as soon as possible:

1. Remove the obstruction
2. Disposal off Site

6.2.2 Barrier Wall/Groundwater Withdrawal System (GWS)

The purpose of the barrier wall/GWS is to eliminate groundwater flow from on Site to the River, and to reduce the concentration of chemicals in on-Site groundwater. All of the barrier wall/GWS components work together to achieve these goals; therefore, each component is necessary for the system to function effectively. When a problem is detected with the barrier wall/GWS, correct it as soon as possible.

6.2.2.1 Barrier Wall

Visible indications of problems which may occur with the barrier wall include excessive flow in the collection pipe and excessive settlement along the alignment of the barrier wall. Take the following actions if the extra flow and/or settlement is determined to be unacceptable as soon as possible:

1. Determine the section of barrier wall requiring repair
2. Excavate the barrier wall
3. Reconstruct the barrier wall to the original construction specifications
4. Reconstruct the excavated cap to the original lines and grades

6.2.2.2 Groundwater Collection Pipe

A visible indication of problems which may occur with the collection pipe is an increase in water level in some parts of the GWS and a decrease in discharge flow. This indicates that the collection pipe may be blocked and groundwater flow is restricted. Take the following actions as soon as possible:

1. inspect pipe to determine reason for restricted flow
2. pressure flush the pipe sections that are plugged or excavate and replace section of pipe that may have collapsed or separated
3. vacuum sediments and debris from all manholes

Use pressures in the range of 500 to 1,000 psi to avoid damaging the collection pipe and/or bedding. Contain the materials removed and dispose at an approved off-Site location.

6.2.2.3 Manholes/Wet Wells

Visible indications of problems which may occur with manholes/wet wells include cracks which allow water to infiltrate, damaged or missing covers, and loose or broken ladder rungs or safety platforms.

If water is leaking through cracks on the inside of a manhole parge the cracks with cement grout. If a cover is damaged or missing, replace it. If a ladder rung or safety platform is loose, use cement mortar to re-affix the loose rung or safety platform support to the inside of the manhole or wet well. If a ladder rung or safety platform is broken, replace or fix it.

6.2.2.4 Forcemain

A visible indication of problems which may occur with the forcemain is a decrease in discharge flow. This indicates that the forcemain may be blocked or leaking.

If the forcemain is blocked or flow is restricted, take the following actions as soon as possible as required:

1. Shut down the GWS
2. Drain the section of forcemain that is blocked
3. Clean the forcemain section as described below
4. Vacuum sediments and debris from manholes
5. Check continuity of forcemain
6. Restart the GWS

Based on forcemain cleaning conducted in 2020 and reported in the “Operation and Monitoring Report, June 2020 to May 2021”, dated August 2, 2021. The procedure for future cleaning of the forcemain will as follows:

– Muriatic acid will be added to each pump station in a controlled manner while the pumps are running
– Acid will be added to achieve a 5 percent solution. The amount of acid required to achieve the 5 percent solution will be determined based on the volume of the forcemain and the pumping rate in each pump station prior to the cleaning
– Once the required volume of the solution has been pumped into the forcemain (based on calculated forcemain volume and current pumping rates), the pumps will be shut down and the solution allowed to sit in the forcemain for approximately one hour, after which, the pumps will be turned back to flush the solution from the forcemain.

Routine cleaning of the forcemains may also completed in the future in order to prevent buildup in the pipe from occurring to the degree that it affects the ability of the GWS from achieving inward gradients. The frequency of the routine cleaning will be determined based on review of monitoring results since the 2020 cleaning and set in future Operation and Monitoring Reports.

If the forcemain is leaking, take the following actions as soon as possible:

1. shut down the GWS
2. drain the section of forcemain that is leaking
3. excavate the forcemain
4. reconstruct the forcemain to the original construction specifications
5. reconstruct the excavated portions of the GWS and cap to the original lines and grades

6.2.2.5 Electrical and Control Systems

Electrical control systems provide control of the operation of the groundwater extraction system. Included in the electrical control systems are the security alarm system, data logger, an automatic telephone dialer, and magnetic flow meter. Under normal operating conditions, the electrical control systems will require minimal maintenance. Descriptions of these control systems are as follows.

Security System

The security system is a DEMCO Vista-10SE. The operating manual for the security system is in Volume III. Troubleshooting instructions are included in Appendix E of this O&M Manual.

Automatic Telephone Dialer (Auto Dialer)

The auto dialer is a Microtel Series 1000. The auto dialer is mounted in the control building and is programmed to notify operations personnel at the City POTW when an alarm condition occurs with the GWS. The operating manual for the auto dialer is included in Volume III of this O&M Manual.

Auto dialer maintenance is limited to the system battery, fuses, and the internal clock. Maintenance and troubleshooting instructions are included as Appendix F of this O&M Manual.

Data Logger

The data logger is an Eurotherm Chessell Model 4100G graphic recorder. The data logger is installed in the meter building and records the flow rate of groundwater discharge to the City of North Tonawanda sanitary sewer. The operating manual for the data logger is included in Volume III of this O&M Manual.

The only regular maintenance required is changing of the battery every three years. Battery replacement procedures are included in Appendix G of this O&M Manual. Also included in Appendix G is a listing of error messages and possible causes.

Magnetic Flow Meter

The magnetic flow meter is a Promag 33F electromagnetic flow-measuring device, which is installed in the meter building. The magnetic flow meter measures the volume of groundwater being pumped from the GWS to the City of North Tonawanda sanitary sewer system.

No special maintenance is required for this magnetic flow meter.

The operating manual for the magnetic flow meter is included in Volume II of this O&M Manual. Troubleshooting instructions are included as Appendix H.

6.2.2.6 Pumps

Pumps were installed in three of the wet wells of the GWS. These wet wells are wet well 1 (MH3), wet well 3 (MH9), and wet well 5 (MH15). The pumps are Flyght Model C-3085, 4 horsepower, 3 phase, 460 volt submersible pumps. The pumps are mounted on a guide rail system, which allows for removal of the pumps without sending personnel to the bottom of the wet well.

Pump controls are located in the control building. Each pump has a separate control system, including level floats and control panels. Pump float controls for all three wet wells were set at the design elevations as follows:

Float Settling	**Elevation (ft)(AMSL)**
High Alarm	563.0
Pump start	561.0
Pump off	556.5
Low alarm	556.0

The only pump maintenance required on a regular basis is inspection of the pump twice a year and a shop overhaul on a yearly basis. The pumps can be removed and cleaned with 50:50 muriatic acid/water solution on an as needed basis if necessary. The manuals for the Flyght submersible pumps are included in Volume II of this O&M Manual.

6.2.3 Sloped Bank Shoreline Stabilization

The purpose of the sloped bank stabilization is to prevent erosion of shoreline materials into the River and eliminate direct human and wildlife contact with the shoreline materials. The layers of the sloped bank stabilization work together to achieve these goals; therefore, each one of the layers is necessary for the sloped bank stabilization to function effectively. When a problem is detected, correct it as soon as feasible.

6.2.3.1 Slope Stability

Visible indications of problems which may occur include erosion and sloughing. When inspection reveals erosion or sloughing, perform the following actions as soon as feasible:

1. Determine cause for erosion/sloughing

2. Design and implement corrective action to prevent reoccurrence

6.2.3.2 Vegetative Cover

See Section 6.2.1.1.

6.2.3.3 Topsoil and Compacted Soil Layers

See Section 6.2.1.2.

6.2.3.4 River Enhancement

When a problem is detected with the river enhancement components correct it as soon as feasible.

If a barrier islet or gabion mat has been damaged by erosion, retrieve and replace eroded riprap pieces, if feasible. If eroded material is not reachable (i.e., washed downstream) import similar material and place to required elevations. Repair any damaged gabion mats.

Flotsam, jetsam, and debris which accumulate in the enhancement area and threaten to retard the development of the habitat should be removed.

Visible indications of problems which may occur with the wetlands vegetation include dead or dying vegetation and growth of invasive plant species. When inspections reveal dead or dying vegetation or the presence of invasive plant species, perform the following actions as soon as feasible to correct the problem:

1. Remove all invasive plant species (i.e., phragmites) by hand
2. Replant with desirable species

If the wetlands have become damaged by erosion or washout, perform the following actions to correct the problem:

1. Recover the washed-out soil
2. Backfill with recovered soil and additional soil to the original ground elevation (this may be below the water surface)
3. replant with desirable species

If the wetlands become clogged with sediment, perform the following actions to correct the problem:

1. Excavate the sediment to the original ground elevation (this may be below the water surface) if approved by the NYSDEC
2. Replant with desirable species
3. Remove some inlet boulders (with NYSDEC concurrence) to increase River flow through the created wetland

6.2.4 Other Site Systems

Other Site systems include signage and surface water drainage ditches, culverts, and manholes. When a problem is detected with these systems, correct it as soon as feasible.

6.2.4.1 Signs

Visible indications of problems which may occur with signs include missing or damaged signs. If warning signs are damaged or missing, replace them as soon as possible.

6.2.4.2 Surface Water Drainage Ditches, Culverts, and Manholes

Visible indications of problems which may occur with the Site drainage ditches, culverts, and manholes include bare areas, dead or dying vegetation, erosion and the accumulation of obstructions or debris. When inspection reveals bare areas or dead or dying vegetation, perform the following actions to correct the problem:

1. Till the topsoil
2. Re-seed and mulch
3. Cover drainage ditch with erosion control mat

When the inspection reveals obstructions or debris (e.g., sediment in the manholes), remove any obstructions or debris accumulated.

6.3 Disposal of Used Material and Waste

Disposable PPE generated during groundwater and river water monitoring and sampling will be placed in plastic garbage bags and disposed with sanitary waste. Material and waste containing Site-related chemicals will be containerized and temporarily staged at a secured area within the POTW. Clearly label each container. When a sufficient quantity of containers have been accumulated, ship them to a licensed off-Site disposal facility in accordance with all applicable Federal and New York State Regulations.

6.4 Maintenance Records

A record of all maintenance performed at the Site will be kept at the on-Site control building. The record will include a description of the work performed, who it was performed by, and comments which may arise. Form 18 provides a maintenance record log for this purpose.

6.5 Remedial Works

Should inspections reveal that non-emergency maintenance or response is required, it will be completed as soon as practical in order to preclude further damage and the need for emergency repairs. Should a situation exist requiring immediate action, on-Site personnel must initiate emergency or remedial response actions. Notify NYSDEC of any emergency actions.

Should remedial action, both emergency or non-emergency, require excavation into the Site cap or barrier wall, notify NYSDEC prior to commencing the work.

7. Reports

7.1 Operation and Monitoring Report/Periodic Review Report

An Operation and Monitoring Report/PRR will be submitted to the Department annually. The report will be prepared in general accordance with NYSDEC's DER-10 and submitted by the date established each year by NYSDEC. Media sampling results will also be incorporated into the Periodic Review Report. The report will include:

– Identification, assessment and certification of all ECs/ICs required by the remedy for the site.
– Results of the required Site inspections.
– Applicable site inspection forms during the reporting period in the NYSDEC approved electronic format.

- Identification of any wastes generated during the reporting period, along with waste characterization data, manifests, and disposal documentation.
- A summary of any discharge monitoring data and/or information generated during the reporting period, with comments and conclusions.
- Data summary tables and graphical representations of groundwater contaminants of concern, which include a listing of all compounds analyzed. These will include a presentation of past data as part of an evaluation of contaminant concentration trends.
- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted in digital format as determined by the NYSDEC. Currently, data is supplied electronically and submitted to the NYSDEC EQuISTM database in accordance with the requirements found at this link: http://www.dec.ny.gov/chemical/62440.html.
- A site evaluation, which includes the following:
    - The compliance of the remedy with the requirements of the site specific ROD and Order on Consent
    - The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications
    - Any new conclusions or observations regarding site contamination based on inspections or data generated by the Monitoring and Sampling Plan for the media being monitored
    - Recommendations regarding any necessary changes to the remedy and/or Monitoring and Sampling Plan
    - Trends in contaminant levels in the affected media will be evaluated to determine if the remedy continues to be effective in achieving remedial goals
    - The overall performance and effectiveness of the remedy.

7.2 Certification of Institutional and Engineering Controls

Following the last inspection of the reporting period, a qualified environmental professional or Professional Engineer licensed to practice in New York State will review the Periodic Review Report and sign the IC/EC form.

The Periodic Review Report will be submitted, in electronic format, to the NYSDEC Regional 9 office. The Periodic Review Report will only be submitted in hard copy format if requested.

8. Community Relations Plan

A Community Relations Plan has been developed by NYSDEC and support will be provided by the City as requested.

9. Notifications to City of North Tonawanda

Notifications of anomalies in the visual inspections, discharge volumes and/or groundwater levels will to be provided to the City of North Tonawanda Public Works Engineering and Wastewater Treatment Department within a week of measurement of the anomaly to allow for timely maintenance.

10. Site Contacts

The following individuals are the main contacts for the Site:

NYSDEC PM - Megan Kuczka

Phone: (716) 851-7220

Email: Megan.Kuczka@dec.ny.gov

NYSDOH PM – Sarita Wagh

Phone: (518) 402-7860

Email: Sarita.Wagh@health.ny.gov

City of North Tonawanda – Chelsea Spahr, PE

Phone: (716) 695-8565

Email: CSpahr@northtonawanda.org

City of North Tonawanda Consultant – GHD, John Pentilchuk

Phone: (519) 340-4313

Email: john.pentilchuk@ghd.com

11. Health and Safety Plan

The Health and Safety Plan (HASP) has been developed for the performance of O&M activities. This HASP is included as Appendix C of this O&M Manual.

12. Records

All records resulting from O&M activities will be stored on Site in the control building and will be available for inspection by NYSDEC personnel after a written request has been received by the City.

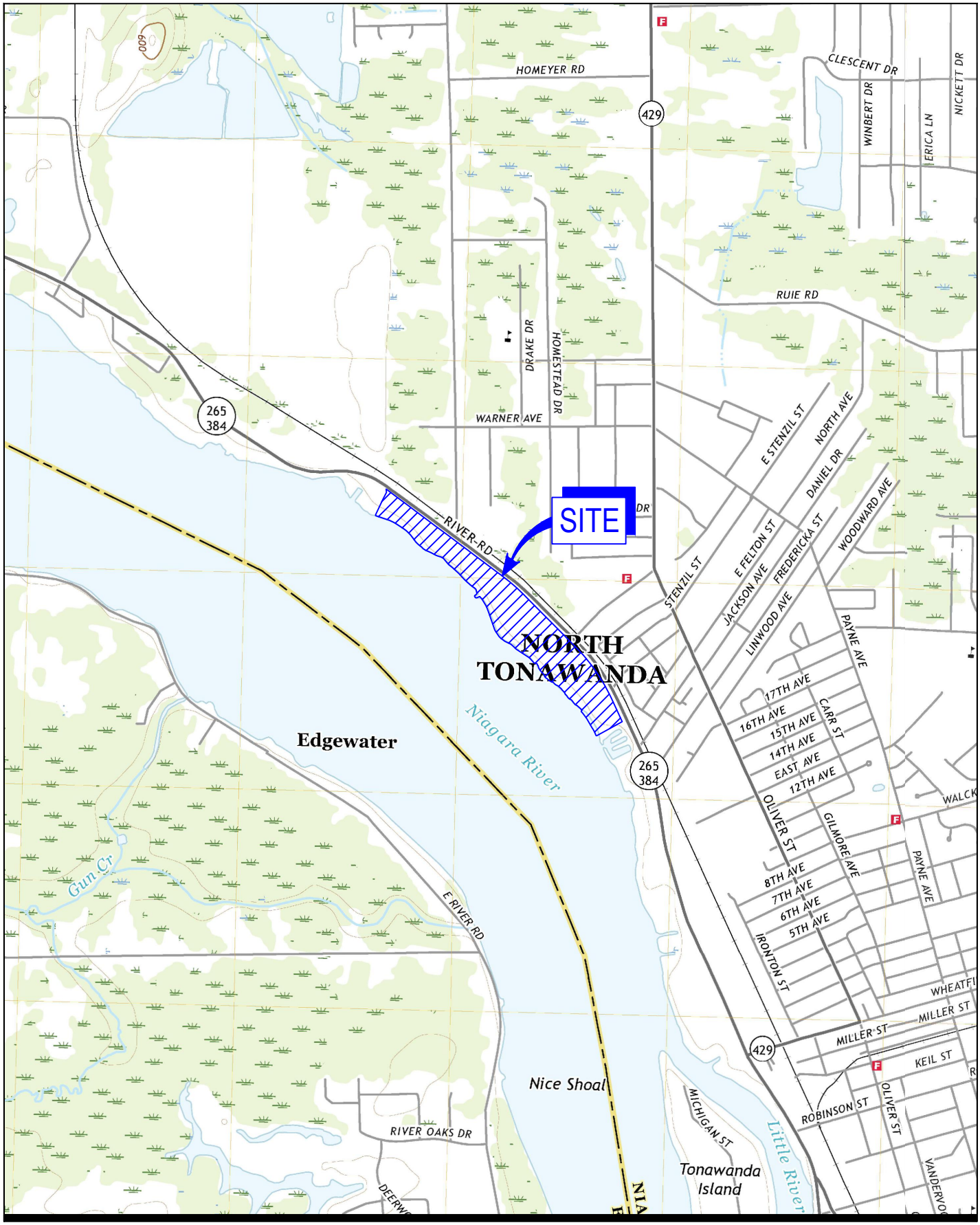
13. Emergency Contingency Plan

The Emergency Contingency Plan, including contingency actions for emergency spill response, fire/explosion, personal injury and toxic exposures, public notification, and emergency telephone numbers is detailed in the HASP (see Appendix C).

14. Record Drawings

Record drawings were provided under separate cover with the Remedial Action Construction Implementation report dated June 2002.

Figures



0 1000 2000 ft

1" = 2000 ft

N

GHD

GRATWICK - RIVERSIDE PARK SITE
NORTH TONAWANDA, NEW YORK
CONSTRUCTED REMEDIAL ACTION - O&M MANUAL

Project No. **7987**
Date **September 2022**

SITE LOCATION

FIGURE 2.1

Filename: \\ghdnet\ghd\CA\Waterloo\Projects\662\007987\Digital_Design\ACAD\Figures\RPT024\007987-GHD-00-00-RPT-EN-D101_WA-024.dwg
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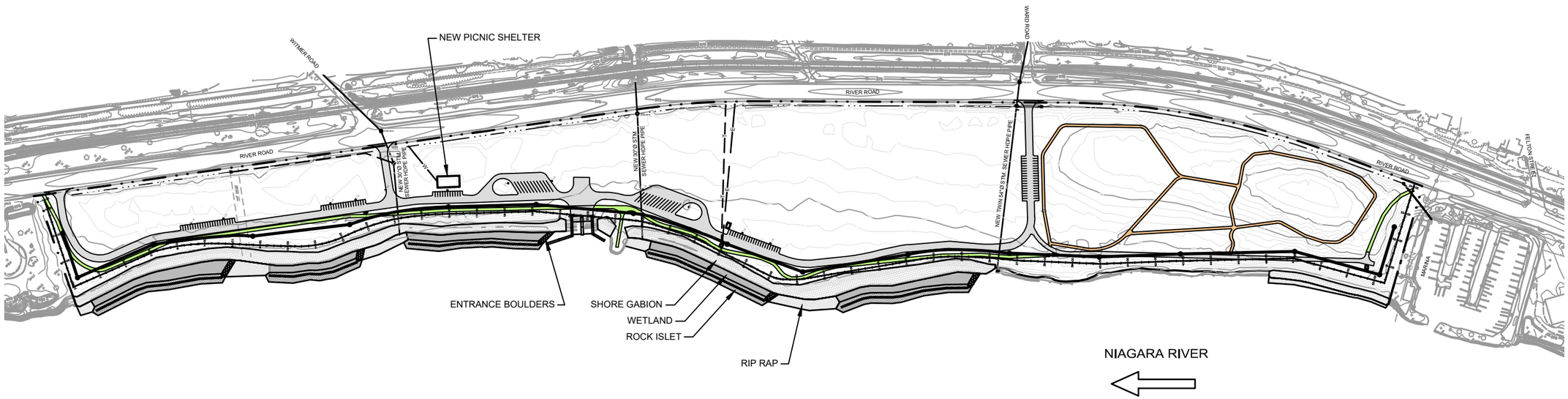
TONAWANDA EAST, NY, 2019;
TONAWANDA WEST, NY, 2019.



LEGEND

- POTABLE WATER SUPPLY LINE
- UNDERGROUND TELEPHONE LINE
- UNDERGROUND ELECTRICAL SERVICE
- BARRIER WALL
- GROUNDWATER COLLECTION SYSTEM

0 200 400 ft

1" = 400 ft

GHD

GRATWICK - RIVERSIDE PARK SITE
NORTH TONAWANDA, NEW YORK
CONSTRUCTED REMEDIAL ACTION - O&M MANUAL

Project No. **7987**
Date **September 2022**

SITE LAYOUT

FIGURE 2.2

Filename: \\ghdnet\ghd\CA\Waterloo\Projects\662\007987\Digital_Design\ACAD\Figures\RPT024\007987-GHD-00-00-RPT-EN-D102_WA-024.dwg
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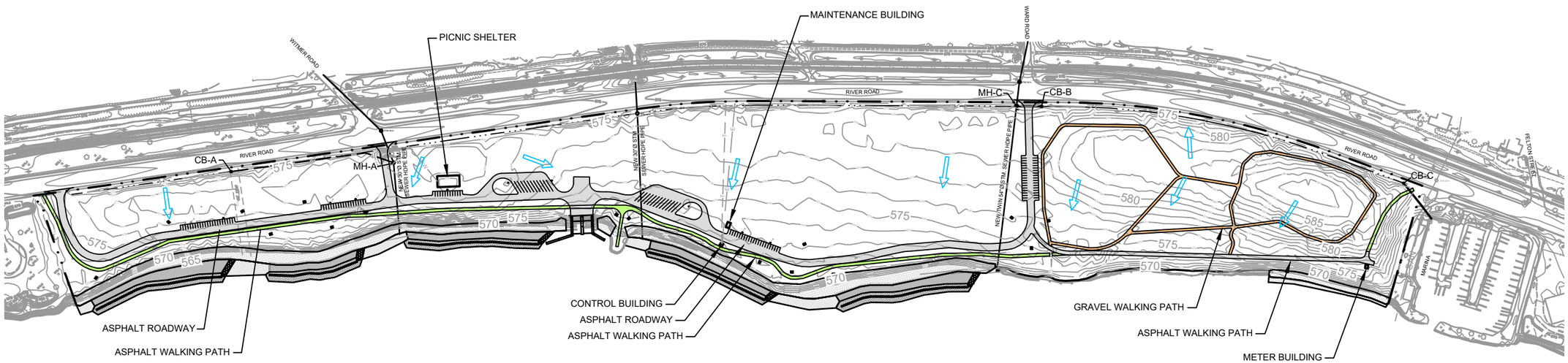

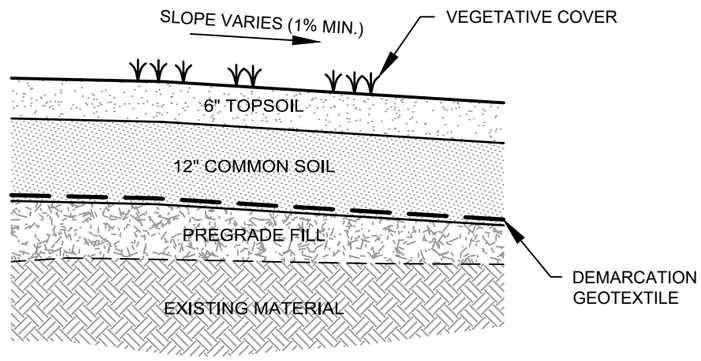

TYPICAL PERMEABLE SOIL CAP

LEGEND

- 577 — CAP CONTOURS
- SURFACE WATER FLOW DIRECTION
- PICNIC TABLE SLABS

0 200 400 ft

1" = 400 ft

GHD

GRATWICK - RIVERSIDE PARK SITE
NORTH TONAWANDA, NEW YORK
CONSTRUCTED REMEDIAL ACTION - O&M MANUAL

PERMEABLE SITE CAP SYSTEM

Project No. **7987**
Date **September 2022**

FIGURE 3.1

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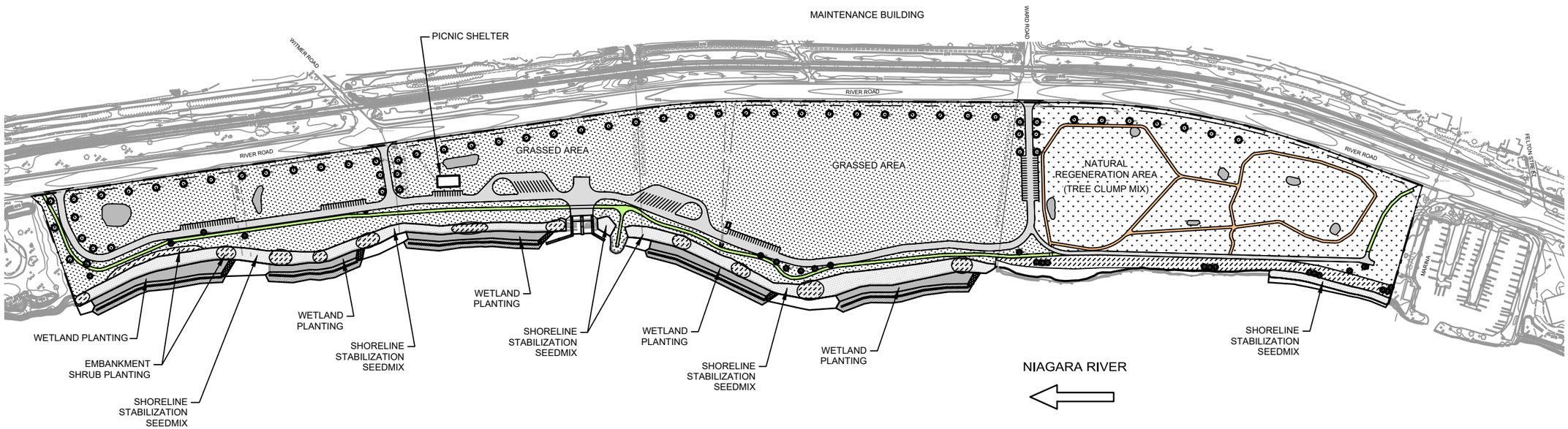

LEGEND

- TREE
- TREE CLUMP
- EMBANKMENT SHRUB PLANTING AREA

0 200 400 ft

1" = 400 ft

GHD

GRATWICK - RIVERSIDE PARK SITE
NORTH TONAWANDA, NEW YORK
CONSTRUCTED REMEDIAL ACTION - O&M MANUAL

PLANTING PLAN/SITE ACCESS ROADS

Project No. **7987**
Date **September 2022**

FIGURE 3.2

Filename: \\ghdnet\ghd\CA\Waterloo\Projects\662\007987\Digital_Design\ACAD\Figures\RPT024\007987-GHD-00-00-RPT-EN-D104_WA-024.dwg
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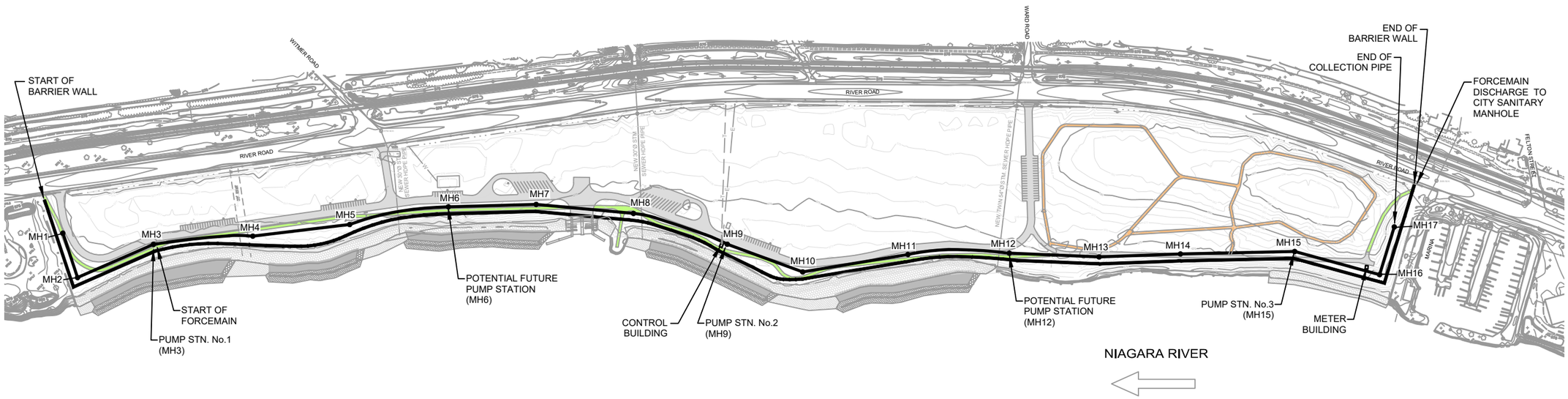

LEGEND

BARRIER WALL

MH11

GROUNDWATER COLLECTION SYSTEM

0 200 400 ft

1" = 400 ft

GHD

GRATWICK - RIVERSIDE PARK SITE
NORTH TONAWANDA, NEW YORK
CONSTRUCTED REMEDIAL ACTION - O&M MANUAL

BARRIER WALL/GROUNDWATER WITHDRAWAL SYSTEM

Project No. **7987**
Date **September 2022**

FIGURE 3.3

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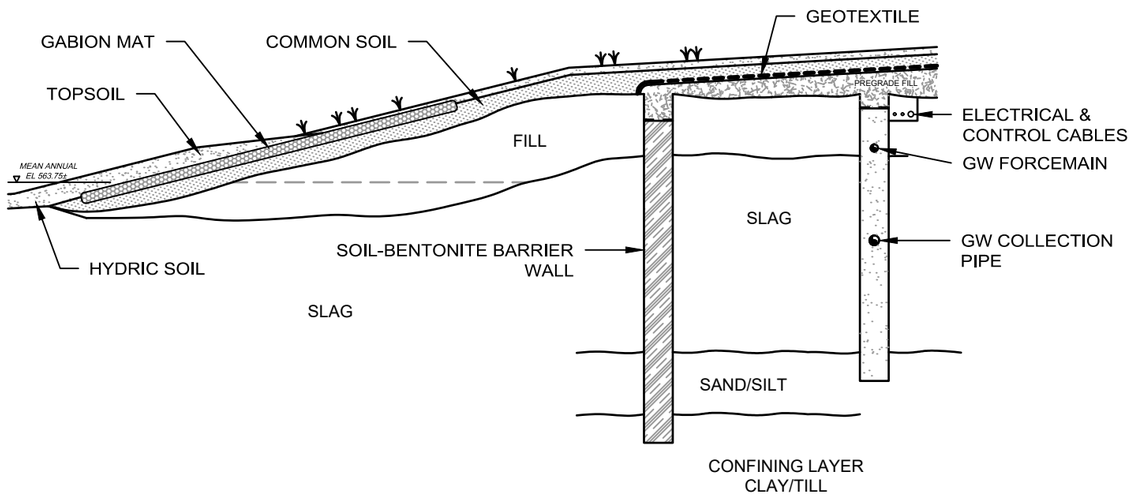
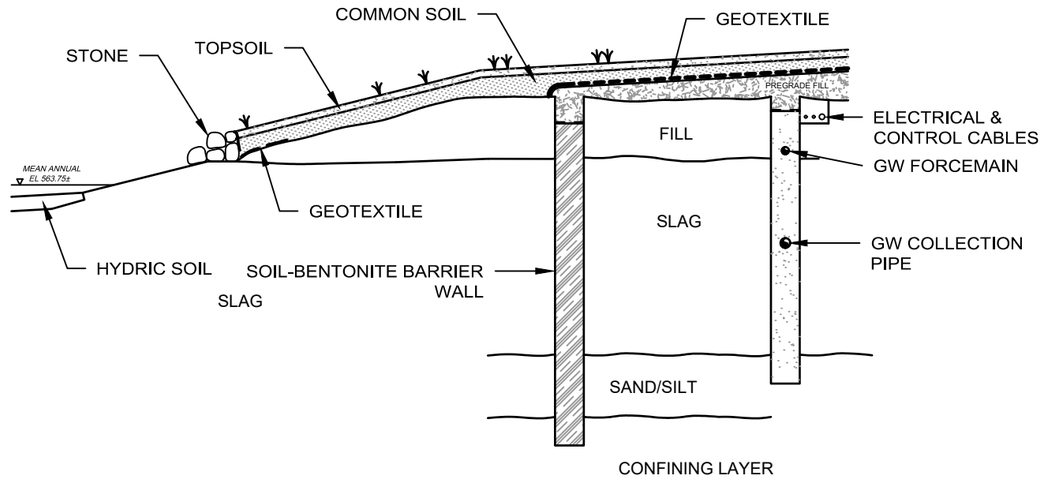


TYPICAL BARRIER SYSTEM
WITHOUT COMPETENT SLAG



TYPICAL BARRIER SYSTEM
WITH COMPETENT SLAG

GHD

GRATWICK - RIVERSIDE PARK SITE
NORTH TONAWANDA, NEW YORK
CONSTRUCTED REMEDIAL ACTION - O&M MANUAL

BARRIER WALL/GROUNDWATER
WITHDRAWAL SYSTEM
CROSS-SECTIONS

Project No. **7987**
Date **September 2022**

FIGURE 3.4

Filename: \\ghdnet\ghd\CA\Waterloo\Projects\662\007987\Digital_Design\ACAD\Figures\RPT024\007987-GHD-00-00-RPT-EN-D106_WA-024.dwg
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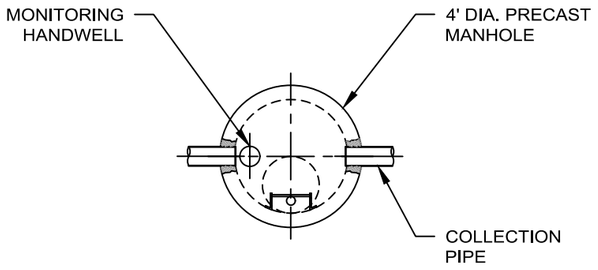
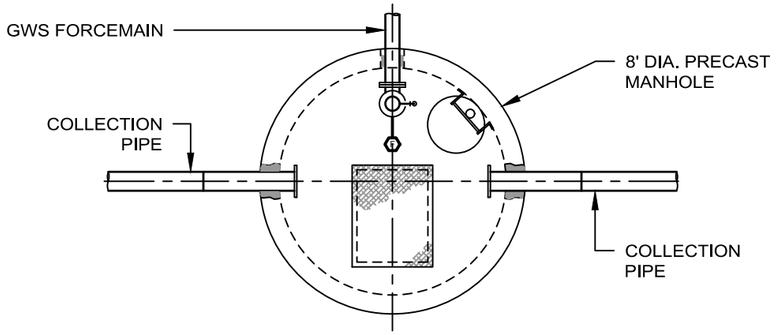


PLAN



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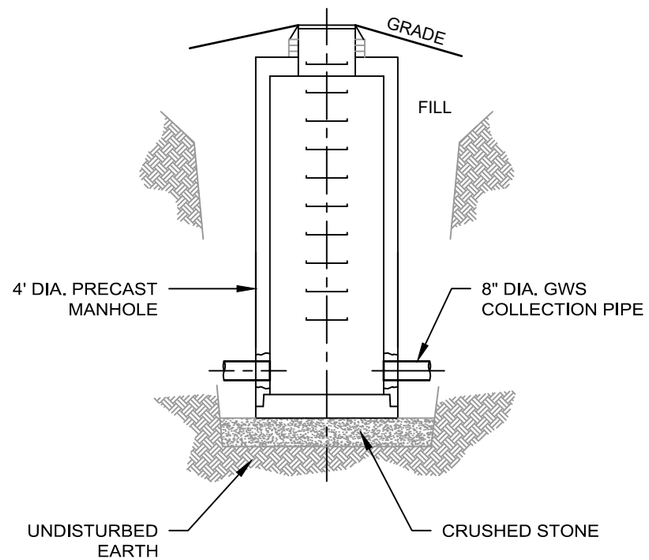
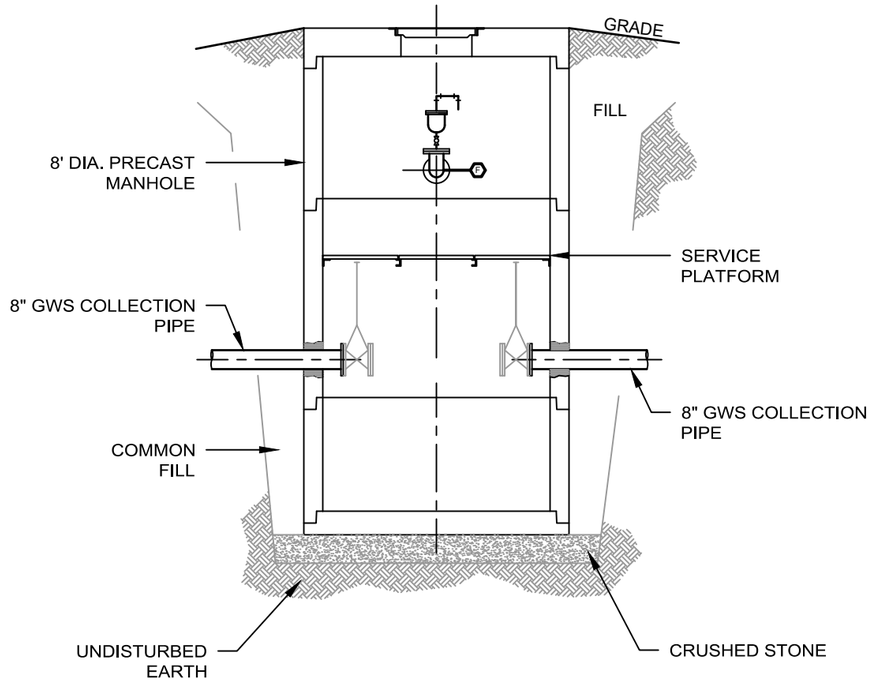


ELEVATION

MANHOLE



ELEVATION

WET WELL

GRATWICK - RIVERSIDE PARK SITE
NORTH TONAWANDA, NEW YORK
CONSTRUCTED REMEDIAL ACTION - O&M MANUAL

TYPICAL MANHOLE AND WET WELL DETAILS

Project No. **7987**
Date **September 2022**

FIGURE 3.5

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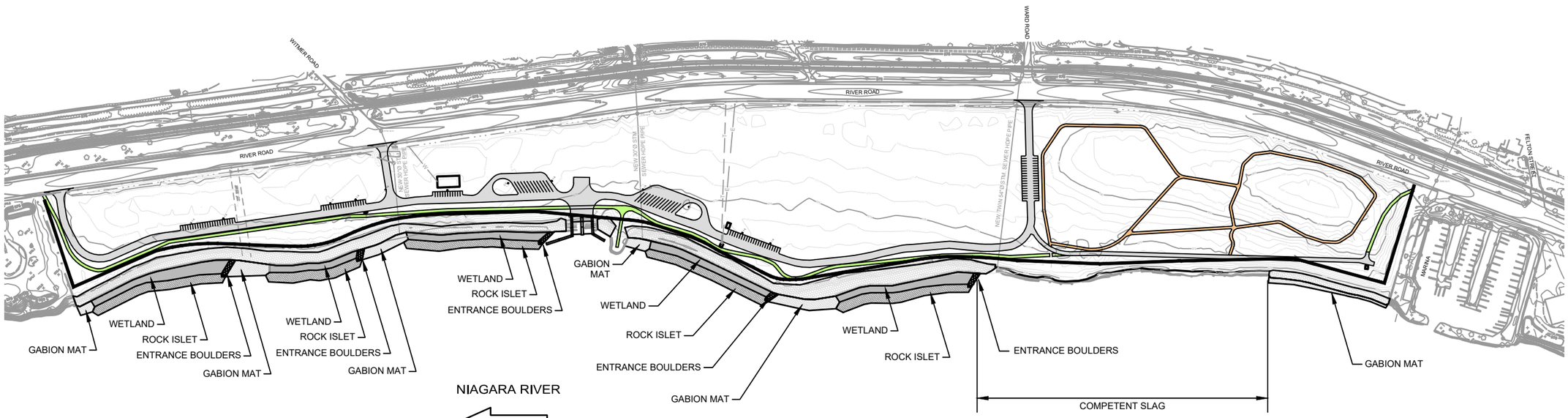

LEGEND

BARRIER WALL

0 200 400 ft

1" = 400 ft

GHD

GRATWICK - RIVERSIDE PARK SITE
NORTH TONAWANDA, NEW YORK
CONSTRUCTED REMEDIAL ACTION - O&M MANUAL

SHORELINE PROTECTION/SEDIMENT REMEDIATION

Project No. **7987**
Date **September 2022**

FIGURE 3.6

Filename: \\ghdnetghd\CA\Waterloo\Projects\662\007987\Digital_Design\ACAD\Figures\RPT024\007987-GHD-00-00-RPT-EN-D108_WA-024.dwg
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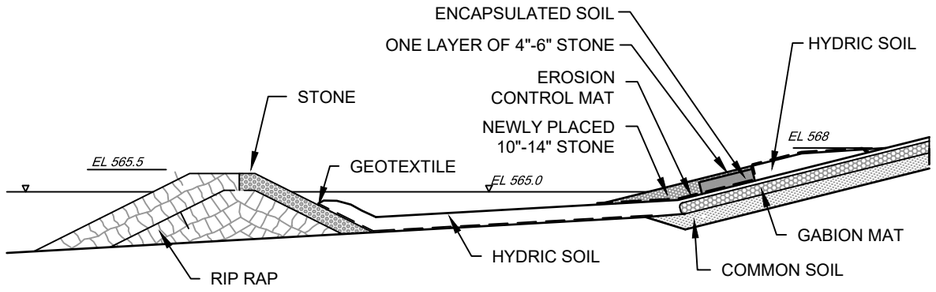
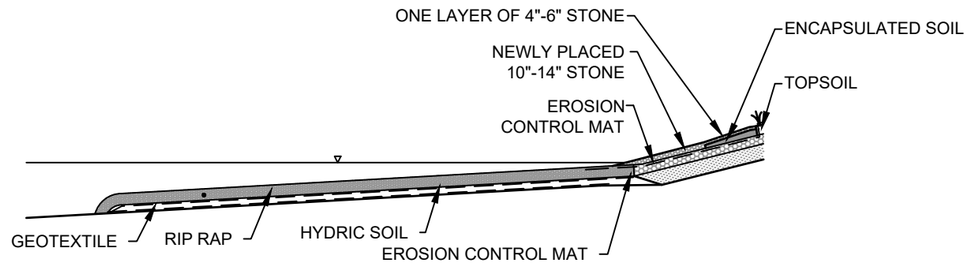
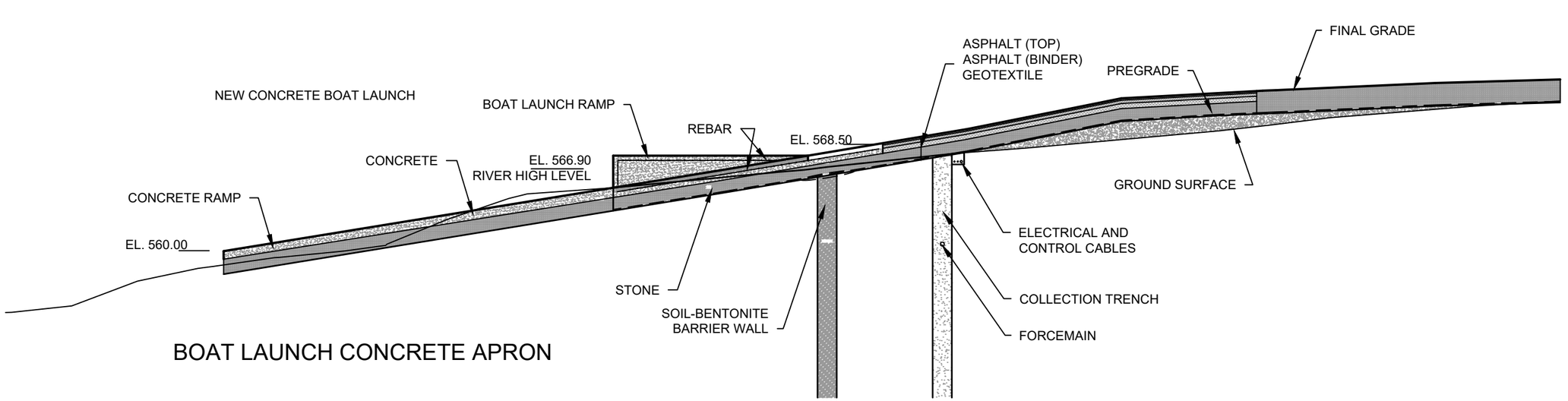


WETLAND AND ROCK ISLET SECTION



GABION MAT SECTION



BOAT LAUNCH CONCRETE APRON

GHD

GRATWICK - RIVERSIDE PARK SITE
NORTH TONAWANDA, NEW YORK
CONSTRUCTED REMEDIAL ACTION - O&M MANUAL

SHORELINE PROTECTION SEDIMENT REMEDIATION CROSS SECTION

Project No. **7987**
Date **September 2022**

FIGURE 3.7

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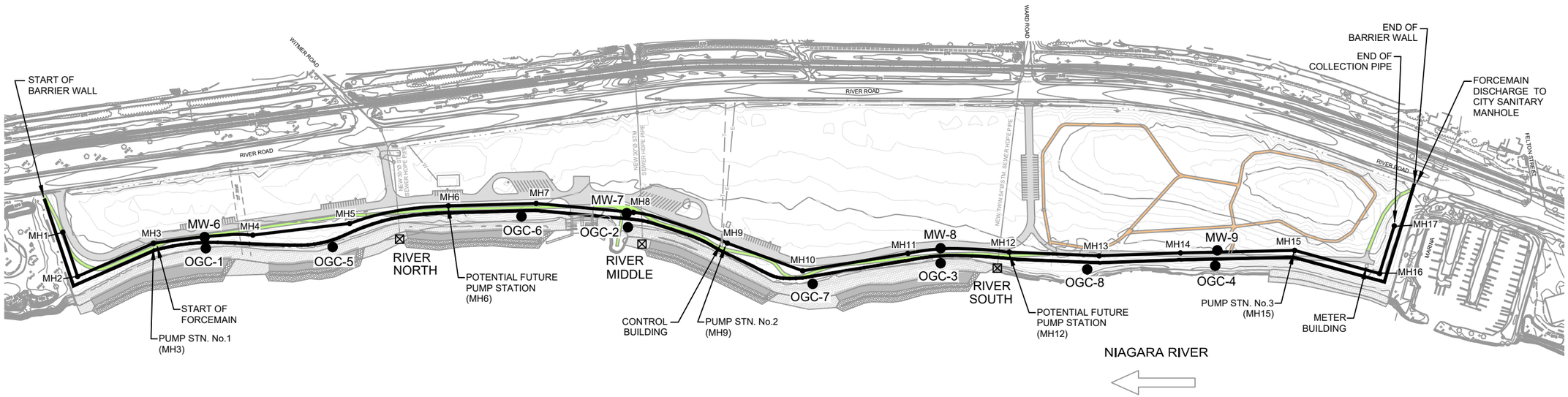

LEGEND

- BARRIER WALL
- MH11 — GROUNDWATER COLLECTION SYSTEM
- ● OGC-1 / MW-1 — MONITORING WELL LOCATION
- ⊠ RIVER SOUTH — SURFACE WATER MONITORING LOCATION

0 200 400 ft

1" = 400 ft

GHD

GRATWICK - RIVERSIDE PARK SITE
NORTH TONAWANDA, NEW YORK
CONSTRUCTED REMEDIAL ACTION - O&M MANUAL

MONITORING NETWORK

Project No. **7987**
Date **September 2022**

FIGURE 4.1

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Tables

Table 4.1

Groundwater Hydraulic Monitoring Locations
Operation and Maintenance Manual
Gratwick-Riverside Park Site
North Tonawanda, New York

Inward Hydraulic Gradient Monitoring Locations

Inner (1)	Outer
MH2	Niagara River North (Downstream)
MH6	Niagara River North (Downstream)
MH8	Niagara River Middle
MH12	Niagara River South (Upstream)

Upward Hydraulic Gradient Monitoring Locations

Inner (1)	Lower
MH3	MW-6
MH8	MW-7
MH11	MW-8
MH14/MH15 (2)	MW-9

ADDITIONAL HYDRAULIC MONITORING LOCATIONS

MH9	MH16
OGC-1	OGC-5
OGC-2	OGC-6
OGC-3	OGC-7
OGC-4	OGC-8

Frequency

- Monthly

Note:

(1) These manholes will be monitored twice daily by POTW staff during a wet weather bypass event pursuant to Section 5.0.
(2) Distance weighted averages of water levels used (MH14 - two thirds and MH15 - one third)

Table 4.2

Groundwater Sampling Summary
Operation and Maintenance Manual
Gratwick-Riverside Park Site
North Tonawanda, New York

Locations

OGC1	MW-6
OGC2	MW-7
OGC3	MW-8
OGC4	MW-9
OGC5	OGC6
OGC7	OGC8

Frequency

Annual - MW-6, MW-8, MW-9, OGC-3, OGC-6, OGC-7
Every Two Years (Even Years) - MW-7, OGC-1, OGC-2, OGC-4, OGC-5, OGC-8

Parameters

Volatiles

Acetone
Benzene
2-Butanone
Chlorobenzene
1,1-Dichloroethane
trans-1,2-Dichloroethene
Ethylbenzene
Methylene Chloride
Tetrachloroethene
Toluene
Trichloroethene
Vinyl Chloride
Xylenes (Total)

Semi-Volatiles

1,2-Dichlorobenzene
1,4-Dichlorobenzene
2,4-Dimethylphenol
2-Methylphenol
4-Methylphenol
Naphthalene
Di-n-octylphthalate
Phenol

Table 4.3

Effluent Sampling Summary
Operation and Maintenance Manual
Gratwick-Riverside Park Site
North Tonawanda, New York

Locations

effluent monitoring station at Site discharge point

Frequency

• Semi-annual (as dictated by the City of North Tonawanda Industrial Wastewater Discharge Permit)

Parameters

Volatiles

Acetone
Benzene
2-Butanone
Chlorobenzene
1,1-Dichloroethane
1,2-Dichloroethane
trans-1,2-Dichloroethene
Ethylbenzene
Methylene Chloride
Styrene
Tetrachloroethene
Toluene
1,1,1-Trichloroethane
Trichloroethene
Vinyl Chloride
Xylenes (Total)

Semi-Volatiles

1,4-Dichlorobenzene
1,2-Dichlorobenzene
2,4-Dimethylphenol
2-Methylphenol
4-Methylphenol
Naphthalene
Di-n-octylphthalate
Phenols (4AAP)

Inorganics

Mercury

Wet Chemistry

Chloride
Cyanide
NH3
NO3
pH
Phosphorous
Sulfate
Sulfide

Table 4.4

Well Installation Details
Operation and Maintenance Manual
Gratwick Riverside Prk Site
North Tonawanda, New York

Well I.D. No.	Location Easting	Location Northing	Monitoring Point Elevation (ft amsl)	Depth of Borehold (ft BGS)	Top of Sand Pack (ft amsl)	Top of Screen (ft amsl)	Bottom of Screen (ft amsl)	Bottom of Sand Pack (ft amsl)
OGC1	1062808.00	1113853.65	575.01	17.17	567.01	565.84	555.84	554.84
OGC2	1063973.09	1112790.03	574.08	27.17	566.08	554.08	544.08	543.91
OGC3	1064663.82	1111926.97	573.35	24.0	565.35	556.35	546.35	546.35
OGC4	1065332.90	1111232.39	574.66	18.25	566.66	563.41	553.41	553.41
OGC5	1063079.15	1113568.22	573.82	14.58	567.24	566.24	556.24	556.24
OGC6	1063668.66	1113137.59	576.65	23.58	568.65	561.07	551.07	550.07
OGC7	1064248.93	1112211.59	572.49	22.5	564.49	556.99	546.99	546.99
OGC8	1065017.32	1111515.66	574.01	22.5	566.01	558.51	548.51	548.51
MW6	1062844.00	1113837.49	575.40	17.0	563.40	565.90	555.90	555.4
MW7	1063987.36	1112802.21	575.57	28.33	567.65	554.32	544.32	544.32
MW8	1064677.09	1111939.12	574.37	24.0	566.37	557.37	547.37	547.37
MW9	1065351.81	1111251.53	576.23	22.33	568.23	562.04	552.04	552.04
MW2SA	1063471.75	1113970.14	579.03	18.50	571.37	567.87	557.87	557.87
Storm sewers								
River North (Downstream)			566.80					
River Middle			566.48					
River South (Upstream)			568.46					

Table 6.1

Monthly Inspection and Preventative Maintenance
Operation and Maintenance Manual
Gratwick-Riverside Park Site
North Tonawanda, New York

	Item	Inspect For
1.	**Barrier Wall/Groundwater Withdrawal System**	
	Manholes/Wet Wells	- cover on securely - condition of cover - condition of inside of manhole - flow unrestricted, manhole free of obstructions - depth of sediment in manhole
	Pumps	- operating properly, check manufacturer's inspection requirements
2.	**Site Cap**	
	Vegetated Soil Cover	- erosion, bare areas, washouts, leachate seeps, length of vegetation, dead/dying vegetation
	Access Roads	- erosion, obstructions, potholes, puddles, debris
	Surface Structures	- integrity of structures (roofs, walls), door hinges oiled, paint when needed
	General Surface Conditions	- integrity of cap, erosion, washouts, burrowing by animals
	Drainage Ditches	- sediment build-up, erosion, condition of erosion protection, obstructions, dead/dying vegetation
	Culverts/Manholes	- sediment build-up, erosion, condition of erosion protection, obstructions, debris
3.	**Sloped Bank Shoreline Stabilization/ River Enhancements**	
	Vegetation	- dead or dying vegetation, bare areas, length of vegetation, invasive species, presence of flotsam, jetsam, and debris
	Shoreline	- erosion, condition of erosion protection, sloughing, burrowing by animals, condition of riprap/gabion mattresses, movement of riprap within gabion mattresses
	Barrier Islets/ Gabion Mats	- erosion
	Wetland Soils	- erosion
	Sewer Outfalls	- erosion or damage to underlying materials
	Competent Slag	- erosion

Table 6.2

Potential Problems and Appropriate Correctrive Actions
Operation and Maintenance Manual
Gratwick-Riverside Park Site
North Tonawanda, New York

Areas of Concern	Potential Problem	Action
Barrier Wall/Groundwater Collection System		
Barrier Wall	Leakage through/settlement of barrier wall. Excessive flow in collection pipe.	Determine section of barrier wall requiring repair. Excavate and reconstruct barrier wall to original construction specifications.
Groundwater Withdrawal Pipe/Forcemain	Blockage in pipe. Will restrict groundwater flow. Water level may not be maintained at desired elevations.	Pressure flush pipe sections that are plugged. Vacuum sediments and debris from manholes and wet wells. Clean forcemain section as described below: - Add muriatic acid to each pump station in a controlled manner while the pumps are running - Add to achieve a 5 percent solution. The amount of acid required to achieve the 5 percent solution will be determined based on the volume of the forcemain and the pumping rate in each pump station prior to the cleaning - Once the required volume of the solution has been pumped into the forcemain (based on calculated forcemain volume and current pumping rates), the pumps will be shut down and the solution allowed to sit in the forcemain for approximately one hour, after which, the pumps will be turned back to flush the solution from the forcemain
Final Site Cap		
Vegetated Soil Cover	Washout and erosion of vegetation, topsoil, or compacted fill. Typically on steep slopes.	Take immediate action to prevent further erosion and to protect exposed refuse. Recover washed out soil. This material may be used to restore the eroded area. Backfill with additional soil to original cover design thickness. Re-seed. If seeding slopes, erosion control mat is recommended.
	Bare areas.	Loosen and till topsoil. Re-seed and mulch as necessary. Perform restoration as soon as feasible.
	Settlement of original cover. Standing water. Dry bare areas.	Assess size of settlement and potential impact to drainage. Till topsoil and grade. Add additional topsoil if necessary. Check final elevation to ensure adequate drainage. Re-seed and mulch. Regrading of topsoil should be sufficient to correct minor ponding. Additional soil may be required for significant ponding.
	Dead/dying vegetation (potential for erosion).	Till topsoil and re-seed and mulch. Replace dead trees/shrubs.
	Weeds. Deterioration of desired vegetation. Potential penetration through cover if left unattended.	Remove all tall weeds. Re-seed as required. Perform annually as a minimum.
	Animal holes/burrows. Safety hazard. Potential for soil cover erosion.	Capture and remove rodents. Replace cap layers as required in specifications. Seed and mulch.

Table 6.2

Potential Problems and Appropriate Correctrive Actions
Operation and Maintenance Manual
Gratwick-Riverside Park Site
North Tonawanda, New York

Areas of Concern	Potential Problem	Action
Final Site Cap (continued)		
Access Roads and Pathways	Potholes or puddles (potential safety hazard).	Backfill with gravel to original grade. Patch with asphalt to match existing grades.
	Washed out surface.	Recover washed out gravel. Use recovered gravel to restore the eroded area. Backfill to original grade. Use additional gravel as necessary. Patch with asphalt as necessary. If practical, revise ground surface to reduce reccurrence of washout.
	Obstructions and debris (safety hazard).	Remove obstruction as soon as possible. Place in secure area pending off-Site disposal.
Sloped Bank Shoreline Stabilization/River Enhancements		
Vegetated Soil Cover	Washout and erosion of vegetation, topsoil, or compacted fill. Typically on steep slopes.	Take immediate action to prevent further erosion. Recover washed out soil. This material may be used to restore the eroded area. Backfill with additional soil to original cover design thickness. Re-seed. If seeding slopes, erosion control mat is recommended.
	Bare areas.	Loosen and till topsoil. Re-seed and mulch as necessary. Perform restoration as soon as feasible.
	Dead/dying vegetation (potential for erosion).	Till topsoil, re-seed and mulch. Replace dead trees/shrubs.
	Weeds. Deterioration of desired vegetation. Potential penetration through cover if left unattended.	Remove all tall weeds. Re-seed as required. Perform annually as a minimum.
	Animal holes/burrows. Safety hazard. Potential for soil cover erosion.	Capture and remove rodents. Replace cap layers as required in specifications. Seed and mulch.
Shoreline and Sewer Outfalls	Erosion of gabion mattress, underlying soil, competent slag, or barrier wall. Sloughing of materials into River.	Take immediate action to prevent further erosion and to protect exposed refuse. Recover washed out soil. This material may be used to restore the eroded area. Repair damaged HDPE barrier wall and/or gabion mattress. Backfill with additional soil to original cover design thickness. Re-seed. Cover slopes with jute mat to prevent erosion.
Barrier Islets/ Gabion Mats	Erosion of rip rap/movement of riprap within gabion mats.	Take immediate action to prevent further erosion. Recover washed out rip rap to the extent possible. Restore eroded area with recovered rip rap. Relocation of riprap within the gabion mats. Use additional stone as necessary to match design grades.

Table 6.2

Potential Problems and Appropriate Correctrive Actions
Operation and Maintenance Manual
Gratwick-Riverside Park Site
North Tonawanda, New York

Areas of Concern	Potential Problem	Action
Other Site Systems		
Signs	Tampering or theft.	Repair or replace signs.
Surface Water Drainage Ditches/Swales, Culverts, and Manholes	Sod drying out. Obstructions or debris.	Irrigate dry areas. Remove obstructions or debris which may affect flow.
	Sediment or obstruction in ditch, swale, culvert, or manhole. Smothering and/or killing of sod and interruption of normal surface water flow pattern.	Remove sediment and stockpile as topsoil for future repairs. Replace sod or re-seed and mulch if damaged. Erosion control mat is recommended. Remove obstruction/debris.
Other Unforeseen Problems		Record problem on Inspection Log. Notify Project Manager for appropriate action.

Appendices

Appendix A

Quality Assurance Project Plan (QAPP)

Quality Assurance Project Plan

Operation and Maintenance (O&M) Program Gratwick Riverside Park – North Tonawanda, New York

City of North Tonawanda

16 September 2022

→ The Power of Commitment

Contents

Contents

Table index

Attachments

1. Introduction

This Quality Assurance Project Plan (QAPP) is Site-specific and has been prepared for the Operation and Maintenance (O&M) Program at the Gratwick-Riverside Park Site (Site) located in North Tonawanda, New York. It has been prepared in accordance with the United States Environmental Protection Agency's (USEPA's) document entitled, "US EPA Region 2 Guidance for the Development of Quality Assurance Project Plans for Environmental Monitoring Project", Revision 1, USEPA Region 2, dated April 12, 2004. Prior to deviation from the protocols outlined herein, the New York State Department of Environmental Conservation (NYSDEC) Project Manager for the O&M Program will be notified.

The objectives of this QAPP are to provide sufficiently thorough and concise descriptions of the measures to be applied during the O&M Program such that the data generated will be of a known and acceptable level of precision and accuracy. This QAPP provides comprehensive information regarding the project personnel responsibilities, and sets forth specific procedures to be used during sampling of relevant environmental matrices and analyses of data.

The following QA topics are addressed in this QAPP:

i) Data quality objectives (DQOs) for measurement of data, including precision, accuracy, completeness, representativeness, and comparability
ii) Project organization and responsibility
iii) Sampling procedures
iv) Sample custody
v) Analytical procedures
vi) Calibration procedures, references, and frequency
vii) internal QC checks and frequency
viii) QA performance audits, system audits, and frequency
ix) QA reports to management
x) Preventative maintenance procedures and scheduling
xi) Specific procedures to be used to routinely assess data precision, representativeness, comparability, accuracy, and completeness
xii) Data validation
xiii) Corrective action

2. Project Description

2.1 General

This QAPP provides QA/QC criteria for work efforts associated with groundwater sampling and Groundwater Withdrawal System (GWS) effluent sampling as described in the O&M Manual. Methods for sample analysis have been selected to evaluate the performance of the Site remedial components and to meet monitoring requirements.

2.2 Site History and Background

A detailed summary of the Site history and background is presented in the O&M Manual (Section 2.0).

2.3 Project Description

The O&M Program for the Site will involve the collection and analysis of groundwater, GWS effluent, and River surface water samples during O&M monitoring activities to determine if the Site remedial components are performing as required. Sample collection will be performed in accordance with the O&M Manual and the Health and Safety Plan (HASP) [Attachment C of the O&M Manual].

3. Project Organization and Responsibility

The O&M activities will be conducted by the City of North Tonawanda (City) and various subcontractors. The project management structure for QA/QC activities associated with the O&M program is discussed below along with a brief description of the duties of the key personnel.

Project Manager (Chelsea Spahr)

– Provides overall project management/oversight
– Evaluates monitoring results
– Coordinates communications between NYSDEC, City, and O&M Contractor(s)
– Prepares monitoring reports
– Designs significant contingency measures
– Ensures adequate resources are committed by O&M Contractor(s)/City to properly manage O&M activities
– Has 5 years or more of related experience

O&M Project Manager (Joe Aiello)

– Provides O&M project management/oversight
– Evaluates monitoring results
– Ensures adequate resources are committed by O&M Contractor(s)/City to properly manage O&M activities
– Has 5 years or more of related experience

O&M Contractor's Project Manager (John Pentilchuk)

– Has overall responsibility for the performance of all O&M activities involving the O&M Contractor
– Ensures adequate resources are committed by the O&M Contractor to perform required activities
– Has 5 years or more of related experience

QA/QC Officer - Analytical and Field Activities (Varies)

– Oversees and reviews laboratory activities
– Determines laboratory data corrective action
– Performs analytical data validation and assessment
– Reviews laboratory QA/QC
– Assists in preparation and review of final report
– Provides technical representation for field and analytical activities
– Provides field management of sample collection and field QA/QC

Laboratory - Project Manager, Analytical Contractor

– Ensures resources of laboratory are available on an as-required basis
– Coordinates laboratory analyses

- Supervises laboratory's in-house chain of custody
- Schedules analyses of samples
- Oversees review of data
- Oversees preparation of analytical reports
- Approves final analytical reports

Laboratory - Quality Assurance/Quality Control Officer, Analytical Contractor

- Overviews laboratory QA/QC
- Overviews QA/QC documentation
- Conducts detailed data review
- Decides laboratory corrective actions, if required
- Provides technical representation for laboratory QA/QC procedures

Laboratory - Sample Custodian - Analytical Contractor

- Receives and inspects the sample containers
- Records the condition of the sample containers
- Signs appropriate documents
- Verifies chain of custody and their correctness
- Notifies laboratory Project Manager and laboratory QA/QC Control Officer of sample receipt and inspection
- Assigns a unique laboratory identification number correlated to the field sample identification number, and enters each into the sample receiving log
- Initiates transfer of samples to the appropriate lab sections with assistance from the laboratory project manager
- Controls and monitors access to and storage of samples and extracts

The analytical laboratory chosen to perform the analyses will be certified by the New York State Department of Health (NYSDOH) through the environmental laboratory approval program for the appropriate categories of analysis.

4. Quality Assurance Objectives for Measurement Data

The overall QA objective is to develop and implement procedures for sample collection and analyses which will provide data with an acceptable level of accuracy, and precision.

Quality assurance measures for this project will begin with sample containers. Sample containers will be purchased from a USEPA-certified manufacturer and will be precleaned (I-Chem Series 200 or equivalent).

The purpose of this Section is to define the QA goals required to meet the DQOs of the project. QA goals for accuracy, precision, and sensitivity of analyses; and completeness, representativeness, and comparability of measurement data are established in the following sections.

The sampling and analysis program is summarized in Table A4.1.

4.1 Laboratory Quality Assurance

4.1.1 Accuracy, Precision and Sensitivity of Analyses

The fundamental QA objective with respect to the accuracy, precision, and sensitivity of analytical data is to achieve the QC acceptance criteria of each analytical protocol. Analytical methods and targeted detection limits have been specified to meet the objectives of each sampling activity as follows:

– For the groundwater GWS effluent sample analyses, the detection limits specified in the NYSDEC Division of Water's Technical and Operational Guidance Series (TOGS) will be used. Detection limits for those parameters not included in the TOGS will be per the analytical methods.

A summary of the targeted detection limits is provided in Tables A4.2a and A4.2b. It should be noted that these limits are targeted detection limits only; lower detection limits, if achieved by the laboratory, will be substituted for the targeted detection limits in the final analytical report.

The method accuracy (percent recovery) for water samples will be determined by spiking selected samples (matrix spikes) with all spiking compounds specified in the analytical methods. Accuracy will be reported as the percent recovery of the spiking compound(s) and will compare with the criteria given in the appropriate methods, as identified in Section 8..

The method(s) precision (reproducibility between duplicate analyses) will be determined from the duplicate analysis of matrix spike samples for organic parameters and duplicate sample analyses for inorganic parameters. Precision will be reported as RPDs between duplicate analyses; acceptance criteria will be as specified in the appropriate methods identified in Section 8..

4.1.2 Completeness, Representativeness, and Comparability

A completeness requirement of 90 percent will be targeted for the O&M Program (see Section 13.1.3 for definition of completeness).

The quantity of samples to be collected has been determined in an effort to effectively represent the population being studied.

Analytical methods used for this program are similar to those used for previous programs to assure comparability of the data. All standards used by the laboratory will be traceable to reliable sources.

4.1.3 Field Measurement Quality Assurance

Measurement data will be generated during field activities. These activities include, but are not limited to, the following:

– Documenting time and weather conditions;
– Determining pH, specific conductivity, turbidity, and temperature of water samples;
– Observation of sample appearance and other conditions; and
– Measuring groundwater elevations in wells.

The general QA objective for measurement data is to obtain reproducible and comparable measurements to a degree of accuracy consistent with the use of standardized procedures.

5. Sampling Procedures

The sampling procedures for the samples are presented in Section 4 of the O&M Manual. The sample container, preservative, shipping, and packaging requirements are identified in Table A5.1.

6. Sample Custody and Control Document

The following documentation procedures will be used during sampling and analysis to provide Chain-of-Custody control during transfer of samples from collection through storage. Recordkeeping documentation will include use of the following:

– Field logs (paper forms or electronic records) to document sampling activities in the field
– Labels to identify individual samples
– Chain-of-Custody forms to document analyses to be performed
– Laboratory sample custody log book

6.1 Field Logs

In the field, the sampler will record the following information in the field forms or electronically for each sample collected:

– Project number
– Sample matrix
– Name of sampler
– Sample source
– Time and date
– Pertinent data (i.e., depth, water surface elevation, pumping method)
– Analysis to be conducted
– Sampling device (i.e. bailer)
– Appearance of each sample (i.e., color, turbidity, evidence of soil staining)
– Preservative added, if any
– Number of sample bottles collected
– Analyses performed in the field (temperature, pH, specific conductance, turbidity)
– Pertinent weather data

Each field log book page will be signed by the sampler.

A unique sample numbering system will be used to identify each collected sample. This system will provide a tracking number to allow retrieval and cross-referencing of sample information. The sample numbering system to be used is described as follows:

Example:		WG-7987-092322 - AA-XXX where:
WG	-	Designates sample type, (WG-Groundwater, E-GWS Effluent)
092322	-	Date of collection (mm,dd,yy)
AA	-	Sampler initials
XXX	-	Unique sample number

QC samples will also be numbered with a unique sample number, with the exception of matrix spike and matrix spike duplicates.

6.2 Chain of Custody Records

Chain-of-Custody forms will be completed for all samples collected during O&M activities.

A Chain-of-Custody form will be completed to document the transfer of sample containers. Attachment A presents a typical Chain-of-Custody form. Custody seals will be placed around each cooler. The cooler will then be sealed with packing tape. Sample container labels will include sample number, place of collection, and date and time of collection. All samples will be refrigerated using wet ice at 0-6°C and delivered to the analytical laboratory within 24 to 48 hours of collection. All samples will be delivered to the laboratory by commercial courier or hand delivered by the sampling personnel. All samples will be stored at 0-6°C at the laboratory.

The Chain-of-Custody forms completed at the time of sampling, will contain, but not be limited to, the sample number, date and time of sampling, and the name of the sampler. The Chain-of-Custody forms will be signed, timed, and dated by the sampler when transferring the samples.

Each sample cooler being shipped to the laboratory will contain a Chain-of-Custody form. The Chain-of-Custody form will be distributed to the receiving laboratory and the QA/QC Officer. The shipper will maintain a copy while the for the receiving laboratory will be enclosed in a waterproof envelope within the cooler with the samples. The sample number of each sample shipped will be recorded on the sheet. The cooler will then be sealed properly for shipment. The laboratory will maintain one copy for their records. A copy will be returned to the QA/QC Officer upon receipt of the samples by the laboratory and included with the data deliverables package.

Upon receipt of the cooler at the laboratory, the shipping cooler and the custody seal will be inspected by the designated sample custodian. The condition of the cooler and the custody seal will be noted on the Chain-of-Custody forms by the sample custodian. The sample custodian will record the temperature of one sample (or temperature blank) from each cooler and the temperature will be noted on the Chain-of-Custody forms. If the shipping cooler seal is intact, the sample containers will be accepted for analyses. The sample custodian will document the date and time of receipt of the container, and sign the form.

If damage or discrepancies are noticed (including sample temperature exceedences), they will be recorded in the remarks column of the record sheet, dated and signed. Any damage or discrepancies will be reported to the lab supervisor who will inform the lab manager and the QA/QC Officer before samples are processed.

6.3 Sample Documentation in the Laboratory

Each sample or group of samples shipped to the laboratory for analysis will be given a unique identification number. The laboratory Sample Custodian will record the client name, number of samples, and date of receipt of samples in the Sample Control Log. Samples removed from storage for analyses will be documented in the Sample Control Log.

The laboratory will be responsible for maintaining analytical logs and laboratory data as well as a sample (on hand) inventory for submittal to the QA/QC Officer on an "as-requested" basis. Raw laboratory data produced from the analysis of samples submitted for this program will be inventoried and maintained by the laboratory for a period of 5 years at which time the QA/QC Officer will advise the laboratory regarding the need for additional storage.

6.4 Storage of Samples

After the Sample Custodian has completed the Chain-of-Custody forms and the incoming sample log, the Chain-of-Custody forms will be checked to ensure that all samples are stored in the appropriate locations. All samples will be stored within an access controlled custody room and will be maintained at 0-6°C until all analytical work is complete.

6.5 Sample Documentation

Evidentiary files for the entire project shall be inventoried and maintained by the QA/QC Officer and shall consist of the following:

– Project-related plans
– Project log books

- Field data records
- Sample identification documents
- Chain-of-Custody forms
- Report notes, calculations, etc.
- Lab data, etc.
- References, copies of pertinent literature
- Miscellaneous - photos, maps, drawings, etc.
- Copies of all final reports pertaining to the project

The evidentiary file materials shall be the responsibility of the O&M Project Manager with respect to maintenance and document removal.

7. Calibration Procedures and Frequency

Calibration of instrumentation is required to ensure that the analytical system is operating correctly and functioning at the proper sensitivity to meet established reporting limits. Each instrument is calibrated with standard solutions appropriate to the type of instrument and the linear range established for the analytical method. The frequency of calibration and the concentration of calibration standards is determined by the manufacturers guidelines, the analytical method, or the requirements of special contracts.

A bound notebook will be kept with each instrument requiring calibration in which will be recorded activities associated with QA monitoring and repairs program. These records will be checked during periodic equipment review and internal and external QA/QC audits.

7.1 Gas Chromatography/Mass Spectrometry (GS/MS)

It is necessary to establish that a given GC/MS meets the standard mass spectral abundance criteria prior to initiating any ongoing data collection. This is accomplished through the analyses of tuning compounds as specified in the analytical methods.

Calibration of the GC/MS system will be performed daily at the beginning of the day or after each 12 hours of instrument operating time. All method-specified calibration criteria must be met prior to sample analyses. All calibrations must be performed using either average response factors or first-order linear regression (with a correlation coefficient requirement of $\geq$0.995). Higher order fits will not be allowed.

7.2 Gas Chromatography

Quantitation for samples that are analyzed by GC with element selective detectors shall be performed by external standard calibration. Standards containing the compounds of interest will be analyzed at a minimum of three concentrations to establish the linear range of the detector. Single point calibration will be performed at the beginning of each day and after every tenth injection. The response factors from the single point calibration will be checked against the average response factors from multi-level calibration. If deviations in response factors are greater than those allowed by the analytical method protocols, then system recalibration will be performed. Alternatively, fresh calibration standards will be prepared and analyzed to verify instrument calibration.

All method-specified calibration criteria must be met prior to sample analyses. All calibrations must be performed using either average response factors or first-order linear regression (with a correlation coefficient requirement of $\geq$0.995). Higher order fits will not be allowed.

7.3 Instrumentation for Inorganic Analyses

All method-specified calibration procedures will be performed and acceptance criteria will be met prior to sample analyses. Standard curves derived from data consisting of a minimum of four concentrations (one calibration point may be the reagent blank) will be prepared for each inorganic analyte. Calibration curves consisting of four or more points will be performed using a first-order linear regression with a correlation coefficient requirement of 0.995.

The standard curve will be used with each subsequent analysis provided the standard curve is verified by using at least one reagent blank and one standard at a level normally encountered or expected in such samples. If the results of the verification are not within ±10 percent of the original curve, a new standard will be prepared and analyzed. If the results of the second verification are not within ±10 percent of the original standard curve, the analysis will be stopped, and the analyst will reject any data obtained after the last acceptable verification standard. A reference standard will be used to determine if the discrepancy is with the standard or with the instrument. Once the cause is identified, a new calibration curve will be performed before sample analyses can continue.

7.4 Field Instrumentation

Field equipment used during this investigation will be calibrated both prior to and following the day's surveys in accordance with the manufacturer's instructions. The equipment will also be operated in accordance with the manufacturer's instructions. Records of calibrations of field equipment will be recorded on the field forms.

8. Analytical Procedures

All samples collected for laboratory chemical analyses will be analyzed for the parameters listed in Tables A4.2a and A4.2b, using the methods cited in Table A4.1. These methods have been selected to meet the DQOs for each sampling activity. All reporting and deliverables for this RD include analytical results for the investigative samples, method blanks, blank spikes, duplicates, matrix spike/matrix spike duplicate samples, and all pertinent QA/QC information required by the analytical methods (see Section 9.2).

All sample results will be calculated using external standards with the exception of the samples analyzed by GC/MS; these methods employ the use of internal standards for analyte quantitation. The specific procedures for target analyte quantitation are detailed in the appropriate analytical methods. Non-target analytes detected during GC/MS analyses will be quantitated using the nearest internal standard response, assuming a relative response factor of one.

Targeted method detection limits will be consistent with those presented in Tables A4.2a and A4.2b. When matrix interferences are noted during sample analysis, actions will be taken by the laboratory to try to achieve the specified detection limits. Samples will not be diluted by more than a factor of five to reduce matrix effects. (Samples may be diluted to a greater extent if analytes of concern generate responses in excess of the linear response of the instrument.) The laboratory will re-extract, resonicate, and/or use any of the cleanup techniques presented in the analytical methods to eliminate matrix interferences. In such cases, the laboratory QA/QC Officer will assure that the laboratory demonstrates good analytical practices and that such practices are documented in order to achieve the specified detection limits.

9. Data Reduction, Validation, Assessment and Reporting

9.1 General

The contract laboratory will perform analytical data reduction and validation in-house under the direction of the laboratory QA/QC Control Officer. The laboratory's QA/QC Control Officer will be responsible for assessing data quality and advising of any data which were rated "preliminary" or "unacceptable" or other qualifications based on the QC criteria outlined in the relevant methods, which would caution the data user of possible unreliability. Data reduction, validation, and reporting by the laboratory will be conducted as detailed in the following:

- Raw data produced and checked by the responsible analysts is turned over for independent review by another analyst
- The area supervisor reviews the data for attainment of quality control criteria presented in the referenced analytical methods
- Upon completion of all reviews and acceptance of the raw data by the laboratory operations manager, a computerized report will be generated and sent to the laboratory QA/QC Control Officer
- The laboratory QA/QC Control Officer will complete a thorough inspection of all reports
- The laboratory QA/QC Control Officer and area supervisor will decide whether any sample re-analysis is required
- Upon acceptance of the preliminary reports by the laboratory QA/QC Control Officer, final reports will be generated and signed by the laboratory Project Manager

Validation of the analytical data will be performed by the QA/QC Control Officer for analytical activities and for field activities. The data validation will be performed in accordance with the following documents: "National Functional Guidelines for Organic Superfund Methods Data Review", EPA 540-R-20-005, November 2020; and "National Functional Guidelines for Inorganic Superfund Methods Data Review", EPA 542-R-20-006, November 2020. Data analyzed using methods not covered in these documents will be validated using the general principles used in these documents, and the analytical requirements specified in the methods.

Assessment of analytical and in-house data will include checks on data consistency by looking for comparability of duplicate analyses, comparability to previous data from the same sampling location (if available), adherence to accuracy and precision control criteria detailed in this QAPP and anomalously high or low parameter values. The results of these data validations will be reported to the project manager and the contract laboratory, noting any discrepancies and their effect upon acceptability of the data. Additionally, the results of these data validations will be included in the applicable reports to NYSDEC.

Raw data from field measurements and sample collection activities that are used in project reports will be appropriately identified and appended to the report. Where data have been reduced or summarized, the method of reduction will be documented in the report. Field data will be audited for anomalously high or low values that may appear to be inconsistent with other data.

9.2 Laboratory Reporting, Data Presentation, and Final Report

Reporting and deliverables shall include, but not be limited to, all items listed in Table A9.1.

All sample data and corresponding QA/QC data as specified in the analytical methods, shall be maintained accessible to the City and/or the O&M Contractor either in hard copy or electronic files.

The laboratory will submit an electronic copy of the final analytical report and an electronic data deliverable within 10 business days of receipt of the final samples from the remedial design activities.

9.3 Document Control System

A document control system ensures that all documents are accounted for when the project is complete. The City will assign a project number to the O&M program. This number will appear on sample identification tags, log books, data sheets, control charts, project memos and analytical reports, document control logs, corrective action forms and logs, QA plans, and other project analytical records.

9.4 QC Checkpoints and Data Flow

The following specific QC check points will be common to all GC and GC/MS analyses. They are presented with the decision points:

Chemist - Bench Level Checks

- Systems check: sensitivity, linearity and reproducibility within specified limits
- Duplicate analyses within control limits
- Surrogate spike results within control limits
- Calculation/data reduction checks: calculations cross-checked; any discrepancies between forms and results evident, results tabulated sequentially on the correct forms.

Supervisor

- Systems operating within limits
- Data transcription correct
- Data complete
- Data acceptable

Sample Control

- Samples returned to sample control following analysis

QA/QC Manager

- QA objectives met
- QC checks are completed
- Final data and report package is complete.

10. Internal Quality Control Checks and Frequency

10.1 QC for Field Measurements

Quality control procedures for field measurements will be limited to checking the reproducibility of the measurement in the field by obtaining multiple readings and by calibrating the instruments (where appropriate).

Quality control of field sampling will involve collecting field duplicates, trip blanks, and rinsate blanks (where appropriate) in accordance with the applicable procedures described in Section 4.1.

10.2 QC for Laboratory Analysis

Specific procedures related to internal laboratory QC samples are described in the following subsections.

10.2.1 Reagent Blanks

A reagent blank will be analyzed by the laboratory at a frequency of one blank per analytical batch. The reagent blank, an aliquot of analyte-free water or solvent, will be carried through the entire analytical procedure.

10.2.2 Matrix Spike/Matrix Spike Duplicate (MS/MSD) /Duplicate Analysis

An MS/MSD sample will be analyzed for organic parameters and a duplicate and matrix spike will be analyzed for inorganic parameters at a minimum frequency of one per analytical batch. Acceptable criteria and analytes that will be used for matrix spikes are identified in the appropriate methods (see Section 8). Percent spike recoveries will be used to evaluate analytical accuracy while percent relative standard deviation or the relative percent difference (RPD) between duplicate analyses will be used to assess analytical precision.

10.2.3 Surrogate Analyses

Surrogates are organic compounds which are similar to the analytes of interest, but which are not normally found in environmental samples. Surrogates are added to samples to monitor the effect of the matrix on the accuracy of the analysis. Every blank, standard and environmental sample analyzed by GC or GC/MS, including MS/MSD samples, will be spiked with surrogate compounds prior to sample preparation.

The compounds that will be used as surrogates and the levels of recommended spiking are specified in the methods. Surrogate spike recoveries must fall within the laboratory control limits as specified in the methods. If surrogate recoveries are excessively low (<10 percent), the laboratory will contact the O&M Project Manager for further instructions. Dilution of samples to bring the analyte concentration into the linear range of calibration may dilute the surrogates out of the quantification limit. Reanalysis of these samples is not required. Assessment of analytical quality in these cases will be based on the MS/MSD sample analysis results.

10.3 QC for Sampling Protocol

To assess the quality of data resulting from the field sampling program, field duplicate and field blank samples will be taken and submitted to the analytical laboratory as samples.

10.3.1 Trip Blanks and Field (Rinse) Blanks

Trip blanks and field blanks will be used during the sampling programs to detect contamination introduced through sample collection procedures and equipment, external field conditions, sample transport, sample container preparation, sample storage, and/or the analytical process.

Trip blanks for Volatile Organic Compounds (VOCs) will be prepared by the laboratory at the same time and location as the containers for a particular sampling event. Trip blanks will accompany these containers to and from that event, but are at no time opened or exposed. Trip blanks shall be included with each cooler containing water samples for VOC analysis.

Field (rinse) blanks will only be collected if non-dedicated sampling equipment or dedicated sampling equipment which is not precleaned by the supplier is used. The rinse blank will be obtained by pouring demonstrated analyte field water over and/or through a decontaminated sampling device and directing the water stream directly into the appropriate sample container(s). A rinse blank will be collected at a frequency of once per day of sample collection. Table A4.1 shows no rinse blanks are currently needed because each well has dedicated precleaned bailers.

10.3.2 Field Duplicate Samples

Field duplicate samples will be collected and used to assess the aggregate precision of sampling techniques and laboratory analysis. For every 20 investigative samples, a field duplicate sample will be collected using standard sampling procedures. This duplicate will be packed and shipped to the laboratory for analysis.

11. Performance and System Audits

11.1 Laboratory

For the purpose of external evaluation, performance evaluation check samples are analyzed periodically by the laboratory. Internally, the evaluation of data from these samples is done on a continuing basis over the duration of a given project.

The QA/QC Officer may carry out performance and/or systems audits to ensure that data of known and defensible quality are consistently produced during this program.

Systems audits are qualitative evaluations of all components of field and laboratory quality control measurement systems. They determine if the measurement systems are being used appropriately. The audits may be carried out before all systems are operational, during the program, or after completion of the program. Such audits typically involve a comparison of the activities given in the QAPP described herein, with activities actually scheduled or performed. A special type of systems audit is the data management audit. This audit addresses only data collection and management activities.

The performance audit is a quantitative evaluation of the measurement systems used for a monitoring program. It requires testing the measurement systems with samples of known composition or behavior to quantitatively evaluate precision and accuracy. A performance audit may be carried out by or under the auspices of the QA/QC Officer without the knowledge of the analyst during each sampling event for this program.

It should be noted, however, that any additional external QA audits will only be performed if deemed necessary.

12. Preventive Maintenance

12.1 Laboratory Preventive Maintenance

This section applies to both field and laboratory equipment. Specific preventive maintenance procedures for field equipment will be consistent with the manufacturer's guidelines. Specific preventive maintenance protocols for laboratory equipment will be consistent with the contract laboratory's standard operating procedures.

All analytical instruments to be used in this project will be serviced by laboratory personnel at regularly scheduled intervals in accordance with the manufacturers' recommendations. Instruments may also be serviced at other times due to failure. Requisite servicing beyond the abilities of laboratory personnel will be performed by the equipment manufacturer or their designated representative.

Routine maintenance of the GC/MS instruments will be performed as per manufacturers' recommendations. The GC/MS Operations Manager is responsible for the preventive maintenance of the GC/MS instruments.

13. Specific Route Deliveries Used to Assess Data Precision, Accuracy and Completeness

13.1 QA Measurement Quality Indicators

13.1.1 Precision

Precision will be assessed by comparing the analytical results between duplicate spike analyses. Precision as percent relative difference will be calculated as follows for values significantly greater than the associated detection limit:

$$\text{Precision} = \left| \frac{(D2 - D1)}{D1 + D2/2} \right| \times 100$$

D1 = matrix spike recovery

D2 = matrix spike duplicate spike recovery

For results near the associated detection limits, precision will be assessed based on the following criteria:

Precision = original result – duplicate result <CRDL

13.1.2 Accuracy

Accuracy will be assessed by comparing a set of analytical results to the accepted or "true" values that would be expected. In general, MS/MSD and check sample recoveries will be used to assess accuracy. Accuracy as percent recovery will be calculated as follows:

$$\text{Accuracy} = \frac{A-B}{C} \times 100$$

A = The analyte determined experimentally from the spike sample

B = The background level determined by a separate analysis of the unspiked sample

C = The amount of spike added

13.1.3 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared with the amount that was expected to be obtained under normal conditions.

To be considered complete, the data set must contain all QC check analyses verifying precision and accuracy for the analytical protocol. In addition, all data are reviewed in terms of stated goals in order to determine if the database is sufficient.

When possible, the percent completeness for each set of samples will be calculated as follows:

$$\text{Completeness} = \left| \frac{\text{valid data obtained}}{\text{total data planned}} \right| \times 100 \text{ percent}$$

13.1.4 Outliers

Procedures discussed previously will be followed for documenting deviations. In the event that a result deviates significantly from method established control limits, this deviation will be noted and its effect on the quality of the remaining data assessed and documented.

14. Corrective Action

The need for corrective action may be identified by system or performance audits or by standard QC procedures. The essential steps in the corrective actions system will be:

– Checking the predetermined limits for data acceptability beyond which corrective action is required
– Identifying and defining problems
– Assigning responsibility for investigating the problem
– Investigating and determining the cause of the problem
– Determination of a corrective action to eliminate the problem (this may include reanalysis or resampling and analyses)
– Assigning and accepting responsibility for implementing the corrective action
– Implementing the corrective action and evaluating the effectiveness
– Verifying that the corrective action has eliminated the problem
– Documenting the corrective action taken

For each measurement system, the laboratory QA/QC Control Officer will be responsible for initiating the corrective action and the laboratory supervisor will be responsible for implementing the corrective action.

15. Quality Assurance Reports

Final reports will contain a discussion on QA/QC summarizing the quality of the data collected and/or used as appropriate for each phase of the project. The project coordinator, who has responsibility for these summaries, will rely on written reports/memoranda documenting the data assessment activities, performance and systems audits and footnotes identifying qualifications to the data, it any.

Each summary of sampling activities will include a tabulation of the data including:

– Field blank and field duplicate sample results
– maps showing well locations
– an explanation of any sampling conditions or quality assurance problems and their effect on data quality

QA reports will be prepared by the QA/QC Officer following receipt of all analytical data. These reports will include discussions of the following and their effects on the quality of the data reported:

– Sample holding times
– Laboratory/reagent blank data
– Surrogate spike, matrix spike, and matrix spike duplicate data
– Field QA/QC data
– Pertinent instrument performance per method protocols
– Audit results

In addition, the QA reports will summarize all QA problems, and give a general assessment of QA results versus control criteria for such parameters as accuracy, precision, etc.

The QA reports will be submitted to NYSDEC with data packages.

Table A4.1

Sampling and Analysis Summary
O&M Activities
Gratwick-Riverside Park Site
North Tonawanda, New York

Sampling Activity	Sample Matrix	Analytical Parameters	Analytical Method	Investigative Samples [4]	Field Duplicates	Field Blanks	Trip Blanks	MS/MSD/Dup
Groundwater Sampling	Groundwater	SSPL Volatiles	8260 [1]	12	1	0	1	1/1/0
		SSPL Semi-volatiles	8270 [1]	12	1	0	0	1/1/0
GWS Effluent Sampling	Groundwater	SSPL Volatiles	624.1[2]	1	1	0	1	1/1/0
		SSPL Semi-Volatiles	625.1[2]	1	1	0	0	1/1/0
		Mercury	245.1[2]	1	1	0	0	1/0/1
		Cyanide	335.4[2]	1	1	0	0	1/0/1
		pH	150.2[2]	1	1	0	0	0/1/0
		Phosphorus, Total	365[2]	1	1	0	0	1/0/1
		Chloride	300.0[2]	1	1	0	0	1/0/1
		Ammonia	350.1[2]	1	1	0	0	1/0/1
		Nitrate	353.2[2]	1	1	0	0	1/0/1
		Sulfate	375.2[2]	1	1	0	0	1/0/1
		Sulfide	SM 4500S2 F[3]	1	1	0	0	1/0/1
		Phenol, total	420.1[2]	1	1	0	0	1/0/1

Notes:

[1] - Methods referenced from "Test Methods for Solid Waste Physical/Chemical Methods", SW-846, 3rd Edition 1986 (with revisions)
[2] - Methods referenced from: Clean Water Act Methods Update Rule for the Analysis of Effluent, July 2021
[3] - Standard methods reference
[4] - 6 samples odd years, 12 samples even years
Dup - Duplicate
MS - Matrix Spike
MSD - Matrix Spike Duplicate
SSPL - Site-Specific Parameter List

Table A4.2a

Target Quantitation Limits - Effluent
O&M Activities
Gratwick-Riverside Park Site
North Tonawanda, New York

	CAS Number	Effluent Quantitation Limits Water (µg/L)
Volatiles (EPA 624.1)		
Vinyl chloride	75-01-4	0.3
Methylene chloride	75-09-2	5
Acetone	67-64-1	10
1,1-Dichloroethane	75-35-3	5
trans-1,2-Dichloroethylene	540-59-0	5
1,4-Dichlorobenzene	106-46-7	3
1,2-Dichlorobenzene	95-50-1	3
1,2-Dichloroethane	107-06-2	0.6
2-Butanone	78-93-3	10
1,1,1-Trichloroethane	71-55-6	5
Trichloroethene	79-01-6	0.7
Benzene	71-43-2	0.7
Tetrachloroethene	127-18-4	5
Toluene	108-88-3	5
Chlorobenzene	108-90-7	5
Ethyl benzene	100-41-4	5
Styrene	100-42-5	5
Total Xylenes	1330-20-7	5

	CAS Number	Effluent Quantitation Limits Water (µg/L)
Semi-Volatiles (EPA 625)		
2-Methylphenol	95-48-7	10
4-Methylphenol	106-44-5	10
2,4-Dimethylphenol	105-67-9	10
Napthalene	91-20-3	10
Di-n-octyl phthalate	117-84-0	10

		Effluent Quantitation Limits Water (µg/L)
Metals		
Mercury	7439-97-6	0.2

Table A4.2a

Target Quantitation Limits - Effluent
O&M Activities
Gratwick-Riverside Park Site
North Tonawanda, New York

	CAS Number	Effluent Quantitation Limits
		Water (mg/L)
Inorganics		
Ammonia	7664-41-7	0.05
Phosphorus, total	7723-14-0	0.01
Chloride	16887-00-6	0.0
Cyanide	57-12-5	0.005
Nitrate	14797-55-8	0.10
Sulfate	14808-79-8	1.0
Sulfide	18496-25-8	0.10
Phenolics, Total Recoverable	--	0.001

Table A4.2b

Target Quantitation Limits - Groundwater
O&M Activities
Gratwick-Riverside Park Site
North Tonawanda, New York

	CAS Number	Groundwater Quantitation Limits [1] Water (µg/L)
Volatiles (EPA 624)		
Vinyl chloride	75-01-4	2
Methylene chloride	75-09-2	5
Acetone	67-64-1	10
1,1-Dichloroethane	75-35-3	5
trans-1,2-Dichloroethylene	540-59-0	5
1,4-Dichlorobenzene	106-46-7	3
1,2-Dichlorobenzene	95-50-1	3
2-Butanone	78-93-3	10
Trichloroethene	79-01-6	5
Benzene	71-43-2	0.70
Tetrachloroethene	127-18-4	5
Toluene	108-88-3	5
Chlorobenzene	108-90-7	5
Ethyl benzene	100-41-4	5
Total Xylenes	1330-20-7	5

	CAS Number	Groundwater Quantitation Limits Water (µg/L)
Semi-Volatiles (EPA 625)		
Phenol	108-95-2	1
2-Methylphenol	95-48-7	10
4-Methylphenol	106-44-5	10
2,4-Dimethylphenol	105-67-9	10
Napthalene	91-20-3	10
Di-n-octyl phthalate	117-84-0	10

Notes:

[1] - A sample volume of 25 mL may be necessary to achieve the targeted limits.

Table A5.1

Sample Container, Preservation, and Holding Time Periods
O&M Activities
Gratwick-Riverside Park Site
North Tonawanda, New York

Analyses	Sample Containers	Preservation	Maximum Holding Time	Notes
Water				
VOC	Four 40-mL teflon lined septum vials	Cool 4°C HCl to pH <2	14 days from collection to analyses	Fill completely, no air bubbles
SVOC	Two 1-liter amber glass bottles per analysis	Cool 4°C	7 days from collection to extraction 40 days from extraction to analysis	Fill to neck of bottles
Mercury	One 1-liter glass bottle	HNO3 to pH <2 Cool 4°C	28 days from collection to analysis	Fill to neck of bottle
Total Cyanide	One 500-mL plastic or glass bottle	NaOH to pH >12, Cool 4°C	14 days from collection to analysis	Fill to shoulder of bottle
Ammonia (as N)	One 1-liter plastic bottle	Cool 4°C, H2SO4, pH <2	28 days from collection to analysis	Fill to neck of bottle
Phosphorus, total	One 500-ml plastic bottle	Cool 4°C, H2SO4, pH <2	28 days from collection to analysis	Fill to neck of bottle
Chloride	One 500-ml plastic bottle	None	28 days from collection to analysis	Fill to neck of bottle
Nitrate	One 250-ml plastic bottle	Cool 4°C	48 hours from collection to analysis	Fill to neck of bottle
Sulfate	One 125-ml plastic bottle	Cool 4°C	28 days from collection to analysis	Fill to neck of bottle
Sulfide	One 1-liter plastic bottle	Cool 4°C NaOH, pH >9	7 days from collection to analysis	Fill to neck of bottle
Phenol	One 1-liter glass	Cool 4°C H_2SO_4, pH <2	28 days from collection to analysis	Fill to neck of bottle

Notes:

SVOC Semi-Volatile Organic Compound
VOC Volatile Organic Compound

Table A9.1

Laboratory Reporting Deliverables
O&M Activities
Gratwick-Riverside Park Site
North Tonawanda, New York'

A detailed report narrative should accompany each submission, summarizing the contents, results, and all relevant circumstances of the work.

A. Parameter Requested

B. Sample Number, Matrix
   - i) date collected
   - ii) date extracted
   - iii) date analyzed
   - iv) Chain of Custody report form, including confirmation of unbroken Chain of Custody

C. Results (including CLP-like summary forms and all associated raw data)
   - i) sample results
   - ii) duplicate
   - iii) blanks (a)
   - iv) spike; spike duplicate
   - v) surrogate recoveries
   - vi) instrument calibration data

D. Supporting QA/QC
   - i) methodology
   - ii) method detection limits
   - iii) percent solids

All sample data and its corresponding QA/QC data shall be maintained accessible to GHD either in hard copy or on magnetic tape or disc (computer data files).

Attachment A

Chain of Custody Form

CHAIN OF CUSTODY RECORD

Address: _____

Phone: _____ *Fax:* _____

COC NO.: _____

PAGE ___ *OF* ___

(See Reverse Side for Instructions)

Project No/ Phase/Task Code:	***Laboratory Name:***	***Lab Location:***	***SSOW ID:***
Project Name:	***Lab Contact:***		***Cooler No:***
Project Location:	***SAMPLE TYPE***	***ANALYSIS REQUESTED*** (See Back of COC for Definitions)	***Carrier:***
GHD Chemistry Contact:			***Airbill No:***
Sampler(s):			***Total # of Containers:***

Item	SAMPLE IDENTIFICATION (Containers for each sample may be combined on one line)	DATE (mm/dd//yy)	TIME (hh:mm)	Matrix Code (see back of COC)	Grab (G) or Comp (C)	Filtered (Y/N)												Total Containers/sample	MS/MSD Request	COMMENTS/ SPECIAL INSTRUCTIONS:
	PRESERVATION - (SEE BACK OF COC FOR ABBREVIATIONS)																			
1																				
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				
11																				
12																				

TAT Required in business days (use separate COCs for different TATs):

☐ 1 Day ☐ 2 Days ☐ 3 Days ☐ 1 Week ☐ 2 Week ☐ Other:

Notes/ Special Requirements:

RELINQUISHED BY	COMPANY	DATE	TIME	RECEIVED BY	COMPANY	DATE	TIME
1.				1.			
2.				2.			
3.				3.			

THE CHAIN OF CUSTODY IS A LEGAL DOCUMENT – ALL FIELDS MUST BE COMPLETED ACCURATELY

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→ The Power of Commitment

Appendix B

Wastewater Discharge Permit

CITY OF NORTH TONAWANDA
INDUSTRIAL WASTEWATER DISCHARGE PERMIT

Permit Number: 2628011

In accordance with the provisions of the Clean Water Act as amended, all terms and conditions set forth in this permit, the City of North Tonawanda Local Sewer Use Ordinance and any applicable Federal, State or local laws or regulations, authorization is hereby granted to: City of North Tonawanda
830 River Road
North Tonawanda, New York 14120

Site: **Gratwick Riverside Park**
River Road
North Tonawanda, New York 14120

Classified by S.I.C. Number(s): N/A

for the discharge of remedial action ground water into the City of North Tonawanda Sewerage System.

This permit is granted in accordance with an application filed on 05/01/96 in the offices of the Wastewater Treatment Plant Superintendent located at 830 River Road, and in conformity with specifications and other required data submitted in support of the above named application, all of which are filed with and considered part of this permit. This permit is also granted in accordance with discharge limitations and requirements, monitoring and reporting requirements, and all other conditions set forth in Parts I and II hereof.

Effective this 1st day of March, 2022

To expire the 28th day of February, 2025

_____

Jason Koepsell, Water Works Superintendent
Signed this 1st day of March, 2022

PART I. SPECIFIC CONDITIONS

A. DISCHARGE LIMITATIONS AND MONITORING REQUIREMENTS

During the period beginning the effective date of this permit and lasting until the expiration date, discharge from the permitted facility outfall(s) shall be limited and monitored by the permittee as specified below (Refer to attached map for sampling and monitoring sites).

Sample Point	Parameter	Discharge Limitations mg/l except pH Daily Max.	Sampling Period	Sampling Type
001	Total Flow		1 Sampling Day Monthly	continuous
	pH	Monitor Only	1 Sampling Day Monthly	grab
	Vinyl Chloride	Monitor Only	1 Sampling Day semi-annual	24 hr comp.
	Acetone	Monitor Only	1 Sampling Day semi-annual	24 hr comp.
	Methylene Chloride	Monitor Only	1 Sampling Day semi-annual	24 hr comp.
	1,1,1-Trichloroethane	Monitor Only	1 Sampling Day semi-annual	24 hr comp.
	1,1-Dichloroethane	Monitor Only	1 Sampling Day semi-annual	24 hr comp.
	1,2-Dichloroethane (total)	Monitor Only	1 Sampling Day semi-annual	24 hr comp.
	2-Butanone	Monitor Only	1 Sampling Day semi-annual	24 hr comp.
	Trichlorethene	Monitor Only	1 Sampling Day semi-annual	24 hr comp.
	Benzene	Monitor Only	1 Sampling Day semi-annual	24 hr comp.

Sample Point	Parameter	Discharge Limitations mg/l except pH Daily Max. Monthly Avg.	Sampling Period	Sampling Type
001	Tetrachloroethene	Monitor Only	1 Sampling Day semi-annual	24 hr comp.
	Toluene	Monitor Only	1 Sampling Day semi-annual	24 hr comp.
	Chlorobenzene	Monitor Only	1 Sampling Day semi-annual	24 hr comp.
	Ethylbenzene	Monitor Only	1 Sampling Day semi-annual	24 hr comp.
	Styrene	Monitor Only	1 Sampling Day semi-annual	24 hr comp.
	Xylenes (total)	Monitor Only	1 Sampling Day semi-annual	24 hr comp.
	Phenol (4AAP)	Monitor Only	1 Sampling Day semi-annual	24 hr comp.
	trans-1,2-Dichloroethene	Monitor Only	1 Sampling Day semi-annual	24 hr comp.
	1,4-Dichlorobenzene	Monitor Only	1 Sampling Day semi-annual	24 hr comp.
	1,2-Dichlorobenzene	Monitor Only	1 Sampling Day semi-annual	24 hr comp.
	2-Methylephenol	Monitor Only	1 Sampling Day semi-annual	24 hr comp.
	4-Methylephenol	Monitor Only	1 Sampling Day semi-annual	24 hr comp.
	2,4-Dimethylphenol	Monitor Only	1 Sampling Day semi-annual	24 hr comp.
	Di-n-octylphthalate	Monitor Only	1 Sampling Day semi-annual	24 hr comp.
	Napthalene	Monitor Only	1 Sampling Day semi-annual	24 hr comp.
	Cyanide	Monitor Only	1 Sampling Day semi-annual	24 hr comp.
	NH3	Monitor Only	1 Sampling Day semi-annual	grab
	Chloride	Monitor Only	1 Sampling Day semi-annual	24 hr comp.
001	NO3	Monitor Only	1 Sampling Day semi-annual	24 hr comp.

Sample Point	Parameter	Discharge Limitations mg/l except pH Daily Max. Monthly Avg.	Sampling Period	Sampling Type
	Phosphorous	Monitor Only	1 Sampling Day semi-annual	24 hr comp.
	Sulfate	Monitor Only	1 Sampling Day semi-annual	24 hr comp.
	Sulfide	Monitor Only	1 Sampling Day semi-annual	24 hr comp.
	Mercury EPA 245.1	Monitor Only	1 Sampling Day semi-annual	grab

*/- See Special requirements page for sub-note requirements.

DISCHARGE MONITORING AND REPORTING REQUIREMENTS

During the period beginning the effective date of this permit and lasting until the expiration date, discharge monitoring results shall be summarized and reported by the permittee no later than the days specified below.

Sample Point	Parameter	Initial Monitoring Report	Subsequent Monitoring Reports
001	Vinyl Chloride	January 31, 2007	Semi-annual for all
	Acetone	January 31, 2007	
	Carbon Disulfide	January 31, 2007	
	1,1-Dichloroethene	January 31, 2007	
	1,1-Dichloroethane	January 31, 2007	
	1,2-Dichloroethane (total)	January 31, 2007	
	2-Butanone	January 31, 2007	
	Trichlorethene	January 31, 2007	
	Benzene	January 31, 2007	
	Tetrachloroethene	January 31, 2007	
	Toluene	January 31, 2007	
	Chlorobenzene	January 31, 2007	
	Ethylbenzene	January 31, 2007	
	Styrene	January 31, 2007	
	Xylenes (total)	January 31, 2007	
001	Phenol	January 31, 2007	Semi-annual for all

Sample Point	Parameter	Initial Monitoring Report	Subsequent Monitoring Reports
	1,3-Dichlorobenzene	January 31, 2007	
	1,4-Dichlorobenzene	January 31, 2007	
	1,2-Dichlorobenzene	January 31, 2007	
	2-Methylephenol	January 31, 2007	
	4-Methylephenol	January 31, 2007	
	2,4-Dimethylphenol	January 31, 2007	
	1,2,4-Trichlorobenzene	January 31, 2007	
	Napthalene	January 31, 2007	
	2-Methylnaphthalene	January 31, 2007	
	n-Nitrosodidiphenylamine	January 31, 2007	
	Di-n-butylphthalate	January 31, 2007	

1) This permit is written for a duration of three (3) years. Upon renewal of this permit, all parameters will be re-evaluated to develop a parameter list based on chemical concentrations present in the extracted groundwater.

2) Fequency of monitoring is to be re-evaluated after each year. Sampling to be done semi-annual (Spring – Fall).

3) All monitoring reports (initial and subsequent), are to be received by the Superintendent, no later than thirty (30) days after receipt of validated data.

4) It is required that the Permittee have a Site Operations Manual available at all times. All emergency phone numbers must be listed in an appropriate place for easy access by operations personnel. All pumping operations shall be accomplished under no-bypass conditions. The Permittee is required to cease all pumping operations upon verbal request of the North Tonawanda Water/Wastewater Superintendent or his designee. Pumping operations shall not recommence until approval by the North Tonawanda Water/Wastewater Superintendent or his designee.

5) Analysts are required to use GC/MS method detection limits for most organics (if GC/MS is appropriate); GC/ECD for PCB's/Pesticides and GF method detection limits for metals (where GF is appropriate), as contained in attachment 5 of the NYSDEC TOGs 1.3.8 – New Discharges to Publicly Owned Treatment Works – dated 10/26/94.

Appendix C

Operation and Maintenance Health and Safety Plan (HASP)

Operation and Maintenance Health and Safety Plan (HASP) | Appendix C

City of North Tonawanda

19 October 2022

→ The Power of Commitment

Contents

Contents

Figure index

Table index

Attachments

1. Introduction

The Health and Safety Plan (HASP) presented herein describes the health and safety procedures and emergency response guidelines to be implemented for the long-term Operation and Maintenance (O&M) activities for the Remedial Action (RA) constructed at the Gratwick-Riverside Park Site (Site) located in North Tonawanda, New York. Figures 2.1 and 2.2 of the Operation and Maintenance Manual present the Site location and Site layout, respectively.

The scope of work completed during the RA activities is described in Section 3.0 of the O&M Manual. The list of on-Site project work activities to be completed during O&M activities includes the following:

i. Inspections and maintenance of completed RA components (i.e., storm sewers, shoreline stabilization, River sediment remediation, and groundwater withdrawal system)
ii. Water level measuring activities
iii. Groundwater and surface water monitoring and sampling;
iv. Decontamination activities
v. Vegetative cover maintenance (e.g., mowing, reseeding, dead bush/tree replacement)

Should the inspections and/or maintenance activities identify components of the constructed RA that require repairs and/or replacement, one or more of the following activities could also occur:

i. Mobilization and demobilization of labor, materials, and equipment to and from the Site
ii. Surveying activities
iii. Repair/replacement of barrier wall, groundwater withdrawal system, permeable soil cap, sloped bank shoreline stabilization, and Niagara River (River) sediment remediation and River enhancements
iv. Excavation of Site materials
v. Construction of park facilities (e.g., picnic shelter and access roads).

During a portion of these activities, personnel may come in contact with soils, sediments, groundwater, leachate, or waste materials which may contain hazardous waste or hazardous waste constituents. This HASP has been developed to minimize direct contact by Site personnel with materials potentially having chemical presence by ensuring:

i. That Site personnel are not adversely exposed to the compounds of concern
ii. That public health and the environment are not adversely impacted by materials with elevated chemical presence which may potentially migrate off Site during work activities at the Site
iii. Compliance with applicable governmental and non-governmental (American Conference of Governmental Industrial Hygienists [ACGIH]) regulations and guidelines. In particular, the amended rules of the Occupational Safety and Health Act (OSHA) for Subpart H of Part 1910 (Title 29 Code of Federal Regulations (CFR) Part 1910.120) will be implemented for all Site work; and
iv. Initiation of proper emergency response procedures to minimize the potential for any adverse impact to Site workers, the general public, or the environment.

For the purpose of this HASP, O&M activities performed on Site involving contact with materials with potentially elevated chemical presence will be considered contaminated operations requiring personal protective equipment (PPE). A detailed description of the PPE required is presented in Section 6.1.

The applicability of this HASP extends to all personnel who will be on Site participating in O&M activities, including State and Federal Agency personnel, contractors and subcontractors. Contractors who are contracted to conduct O&M work activities at the Site will also be required to prepare and implement a HASP for their Site personnel.

All O&M activities at the Site will be conducted in accordance with the provisions of each Contractor's approved Site-specific HASP. A copy of this HASP and employer-specific Standard Operating Procedures (SOPs) will be maintained on Site whenever O&M activities are in progress.

1.1 Project Organization

The O&M project will be organized as follows. The City of North Tonawanda's Project Manager will direct the project and various environmental contractors, which will conduct the O&M activities.

Site personnel will include an O&M Project Manager who will be responsible for ensuring that all O&M requirements will be met, including those related to Site health and safety. The O&M Project Manager will be primarily responsible for ensuring that the approved HASP is implemented and adhered to for the duration of the O&M activities.

The contractor(s) will provide an O&M Contractor's Project Manager who will direct the day-to-day activities of the ongoing work and an on-Site Health and a Safety Officer (HSO) who will be responsible for ensuring compliance with the Site-specific HASP. This may be the same person if so qualified.

2. Site Characterization and Potentially Hazardous Compounds

Previous Site investigations have detected the presence of chemicals on Site. Table C2.1 presents a list of the maximum concentrations of the compounds of concern in the Site BVM, sediments, and soils. The exposure routes and regulatory time weighted average (TWA) exposure levels for these compounds of concern are listed in Table C2.2. These levels are set to protect the health of workers.

3. Basis for Design

Regulations set forth by OSHA in Title 29, Code of Federal Regulations, Parts 1910 and 1926 (29 CFR 1910 and 1926) form the basis of this HASP. Emphasis is placed on Sections 1910.120 (Hazardous Waste Operations and Emergency Response), 1910 Subpart I (Personal Protective Equipment), and 1910 Subpart Z (Toxic and Hazardous Substances). In addition, current Threshold Limit Values (TLVs) formulated by the ACGIH have been considered in the development of the selection of PPE. Some of the specifications within this section are in addition to the OSHA regulations, and reflect the positions of the United States Environmental Protection Agency (USEPA), the National Institute for Occupational Safety and Health (NIOSH), and the United States Coast Guard (USCG) regarding safe operating procedures at hazardous waste sites.

The health and safety of the public and Site personnel and the protection of the environment will take precedence over cost and schedule considerations for all project work.

4. Responsibilities and Administration

An O&M Project Manager will be assigned to this project and will be responsible, along with the O&M Contractor's HSO, for all decisions regarding operations and work stoppage due to health and safety considerations. The O&M Contractor's HSO will be certified in First Aid, will have prior experience in working at hazardous waste sites, and will be audited by the O&M Contractor's Safety Professional, as necessary.

The on-Site HSO's responsibilities include the following:

i. Conduct the on-Site personnel safety indoctrination session in potential hazards, personal hygiene principles, confined space entry procedures, safety equipment usage, the Site's Hazard Communication Program, and emergency procedures
ii. Review and modify the HASP as more information becomes available or conditions warrant
iii. Issue a confined space entry permit, if required;
iv. Ensure that all on-Site personnel have obtained the required medical examination prior to arrival at the Site and have met the OSHA training requirements
v. Supervision and enforcement of safety equipment usage, including the required use of extra equipment if appropriate
vi. Supervision and inspection of equipment cleaning
vii. Supervision of decontamination activities, if required
viii. Maintain Exclusion Zone (EZ) and Contamination Reduction Zone (CRZ) work areas, if required
ix. Authority to suspend work activity due to unsafe working conditions
x. Coordination of emergency procedures
xi. Be responsible for performing air monitoring
xii. Be responsible for visitors at the Site. Visitors will not be allowed into any EZ or CRZ unless they have met the training and medical surveillance requirements in 29 CFR 1910.120 and have undergone the Site-specific indoctrination training session.

5. Worker Training and Education

Prior to commencing Site activities, a Health and Safety/Site Indoctrination Session will be presented. Attendance is mandatory for all personnel who will be or who are expected to be involved with O&M activities.

The training program will stress the importance that each attendee understands the basic principles of personnel protection and safety, be able to perform their assigned job tasks in a safe and environmentally responsible manner and be prepared to respond in an appropriate manner to any emergency which may arise. A brief history of the Site will be included and the various components of the O&M HASP will be presented followed by an opportunity to ask questions to ensure that each attendee understands the HASP. Personnel not successfully completing this training program will not be permitted to enter or work in potentially contaminated areas of the Site. Personnel successfully completing this training program shall sign an acknowledgment form, a copy of which is presented in Attachment C.I.

This training will be given in addition to the basic training required under OSHA and is not intended to meet the requirements of 29 CFR 1910.120. Prior to working in or entering an EZ environment (as defined in Section 6.0), all personnel will be required to provide documentation to the O&M Project Manager indicating successful completion of the training requirements of 29 CFR 1910.120.

6. Personal Protective Equipment (PPE)

This section of the HASP describes the requirements for PPE and the specific levels of protection required for each work task to be conducted at the Site during O&M activities. Basic PPE in all Site areas will consist of hard hats, safety glasses, and safety boots/shoes.

6.1 Protection Levels

Personnel will wear protective equipment when O&M activities involve potential exposure to chemicals from vapors, gases, or particulates that may be generated on Site or when direct contact with potentially hazardous substances may occur. Chemical resistant clothing protects the skin from contact with skin-destructive and absorbable chemicals. Respirators protect lungs, the gastrointestinal tract, and if a full-face respirator is worn, the eyes, against airborne toxicants. Respiratory protection levels will be based on the real-time air monitoring results and the action levels that are presented in Section 6.5.

Protection levels are selected based upon the following:

i. Measured concentrations of the Site chemicals and expected concentrations in the ambient atmosphere compared to allowable exposure levels (Table C2.2)
ii. Potential for exposure to chemicals in air, splashes of liquids, or other contact due to the nature of work tasks
iii. Site chemical toxicity, route of exposure, and chemical matrix.

The specific protection levels to be employed at the Site for each work task are listed in Table C6.1. All O&M activities conducted at the Site will require the use of one of the following levels of PPE.

Level B:

i. Supplied air respirator (Mine Safety and Health Administration (MSHA)/NIOSH approved). Respirators may be positive pressure-demand, self-contained breathing apparatus (SCBA) or positive pressure-demand airline respirator (with escape bottle for Immediate Danger to Life and Health (IDLH) or potential for IDLH atmosphere)
ii. Polycoated tyvek® or saranex® coveralls
iii. Steel toe work boots and disposable boot covers or rubber boots
iv. Disposable nitrile inner gloves
v. Outer nitrile work gloves
vi. Hearing protection as necessary
vii. Personal floatation device as necessary
viii. Hard hat

Level C:

i. Tyvek® coveralls (polycoated tyvek® when handling or working with liquids [e.g., decontamination])
ii. Steel toe work boots and disposable boot covers or rubber boots
iii. Disposable nitrile inner gloves
iv. Outer nitrile work gloves
v. Half-face or full-face air purifying respirator (APR), equipped with combination cartridges for organic vapors and particulates
vi. Hearing protection as necessary
vii. Personal floatation device as necessary
viii. Hard hat

Modified Level C:

i. Tyvek® coveralls (polycoated tyvek® when handling or working with liquids)
ii. Steel toe work boots
iii. Disposable nitrile inner gloves
iv. Outer nitrile work gloves
v. Safety glasses

vi. Splash shields as necessary
vii. Hearing protection as necessary
viii. Personal floatation device as necessary
ix. Hard hat

Level D:

i. Standard work uniform or coveralls
ii. Steel toe work boots
iii. Gloves as necessary
iv. Safety glasses
v. Splash shield as needed
vi. Hearing protection as necessary
vii. Personal floatation device as necessary
viii. Hard hat

The potential exists that confined space entry work may be necessary during various project activities (see Section 13). If it becomes necessary to enter a confined space, this work will be completed under a permit system which requires specific air monitoring to be completed. The use of Level B or supplied air respiratory equipment, along with any additional PPE, will be indicated on the Confined Space Entry Permit (Attachment C.V).

PPE will be maintained in a clean sanitary condition and ready for use. Disposable coveralls shall be discarded when torn and as an employee leaves the EZ. Hard hats shall be thoroughly cleaned after leaving the EZ. Respirators shall be cleaned after each day's use and cartridges discarded. Reusable PPE shall either be placed in plastic garbage bags and transported to the City Public Owned Treatment Works (POTW) for cleaning or cleaned on Site. The cleaning fluid will be discarded to the Ground Water System (GWS) for treatment. If repairs/replacement require an on-Site decontamination area, described in Section 9, a potable water supply for washing and cleaning PPE will be maintained adjacent to the decontamination area. Fresh potable water for drinking is available at the new Picnic Shelter.

6.2 Reassessment of Protection Levels

Protection levels provided by PPE selection shall be upgraded or downgraded based upon a change in Site conditions or the review of the results of air monitoring.

When a significant change occurs, the hazards should be reassessed. Some indicators of the need for reassessment are:

i. Commencement of a new work phase
ii. Change in job tasks during a work phase
iii. Change of season/weather
iv. When temperature extremes or individual medical considerations limit the effectiveness of PPE
v. Chemicals other than those expected to be encountered are identified
vi. Change in ambient levels of chemicals
vii. Change in work scope which effects the degree of contact with areas of potentially elevated chemical presence

All proposed changes to protection levels and PPE requirements will be reviewed and approved prior to their implementation by the HSO and the O&M Contractor's Safety Professional.

6.3 Duration of Work Tasks

The duration of O&M activities involving the usage of PPE will be established by the HSO or his designee based upon ambient temperature and weather conditions, the capacity of personnel to work in the designated level of PPE (heat stress and cold stress, see Section 12.3 Environmental Control), and limitations of the protective equipment (i.e., ensemble permeation rates, life expectancy of air-purifying respirator cartridges, etc.). As a minimum, rest breaks will be observed at the following intervals:

i. 5 minutes midway between shift startup and lunch
ii. 1/2 to 1 hour for lunch
iii. 15 minutes in the afternoon, between lunch and shift end

All rest breaks will be taken in a clean area (e.g., support zone) after full decontamination and PPE removal. Additional rest breaks will be observed, based upon the heat stress monitoring guidelines presented in Attachment C.II.

6.4 Limitations of Protective Clothing

PPE ensembles designated for use during O&M activities have been selected to provide protection against chemicals at known or anticipated concentrations in the soil and groundwater. However, no protective garment, glove, or boot is chemical-proof, nor will it afford protection against all chemical types. Permeation of a given chemical through PPE is a complex process governed by the chemical concentrations, environmental conditions, physical condition of the protection garment, and the resistance of a garment to a specific chemical; chemical permeation may continue even after the source of the chemical has been removed from the garment.

In order to obtain optimum usage from PPE, the following procedures are to be followed by all Site personnel using PPE:

i. When using disposable coveralls, don a clean, new garment after each rest break or at the beginning of each shift
ii. Inspect all clothing, gloves, and boots both prior to and during use for:
    a. Imperfect seams
    b. Non-uniform coatings
    c. Tears
    d. Poorly functioning closures
iii. Inspect reusable garments, boots, and gloves both prior to and during use for:
    a. Visible signs of chemical permeation,
    b. Swelling
    c. Discoloration
    d. Stiffness
    e. Brittleness
    f. Cracks
    g. Any sign of puncture
    h. Any sign of abrasion

Reusable gloves, boots, or coveralls exhibiting any of the characteristics listed above will be discarded. PPE used in areas known or suspected to exhibit elevated concentrations of chemicals will not be reused.

Additional PPE usage guidelines are as follows:

i. Ankles/wrists will be secured tightly with the use of duct tape

ii. Prescription eyewear used on Site shall be safety glasses equipped with side shields when full-face respirators are not required. Contact lenses shall not be used

iii. All EZ workers will have received training in the usage of full-face air purifying respirators and self-contained breathing apparatus which may be required in an emergency

iv. Steel toe leather footwear shall be covered with neoprene overboots prior to entering the EZ and immediately upon entering the CRZ

v. Safety footwear and hard hats are to be worn by Site personnel at all times

EZ personnel also carry certain responsibilities for their own health and safety, and are required to observe the following safe work practices:

i. Familiarize themselves with this HASP

ii. Use the "buddy system" when working in a contaminated operation

iii. Use the safety equipment in accordance with training received, labeling instructions and common sense

iv. Maintain safety equipment in good condition and proper working order

v. Refrain from activities that would create additional hazards (i.e., smoking, eating, etc., in restricted areas, leaning against dirty, contaminated surfaces)

vi. Smoking, eating, and drinking will be prohibited in the EZ and CRZ. These EZ and CRZ areas may change during the duration of the project to maintain adequate separation from the non-active work area(s). Designation of the EZ/CRZ will be the responsibility of the HSO

vii. Soiled disposable outerwear shall be removed and placed into a covered container prior to washing hands and face, eating, using lavatory facilities, or leaving the Site.

6.5 Respiratory Protection Program

Prior to arriving at the Site, all on-Site personnel who have the potential of contacting Site chemicals will have received training in the use of, and have been fit tested for a full-facepiece respirator. All on-Site personnel will be required to comply with their employer specific written respiratory protection program developed in accordance with OSHA 29 CFR 1910.134.

Respiratory protection may be required during some of the O&M activities. This is to ensure worker protection from particulates with potentially elevated chemical levels and volatile organic compounds (VOCs).

For activities where such exposure could occur, a photoionization detector (PID) will be used to determine if organic vapors are present. Activities where use of a PID is not required include:

– Grass cutting

– Visual inspections (other than those that require entry into a confined space)

– Shrub and tree replacement (unless the demarcation geotextile separating the existing Site materials from the Overlying imported materials is breached)

A background reading will be established prior to commencing work activities at each active work area.

Action levels to determine the level of respiratory protection necessary during O&M activities are based on the concentration of the Site chemicals measured within the breathing zone. The action levels and appropriate respiratory protection for these Site activities are as follows:

Sustained Organic Vapor Reading Above Background Within Worker Breathing Zone in Parts Per Million (ppm)	
0 or background	Full-face respirator available
1 - 5 ppm	Wear full-face respirator
>5 ppm	Must wear supplied air respiratory unless benzene is not Present/implement additional engineering controls

All efforts will be made to implement additional engineering controls to minimize the need to wear a supplied air respirator. If the ambient concentrations of organic vapors are due to identifiable substances, the level of respiratory protection may be altered by the HSO.

The appropriate air purifying respirator cartridge to be used at the O&M is a combination organic vapor particulate filter cartridge. The cartridge used must be of the same manufacturer as the respiratory face piece.

6.6 Site Control

Designated work areas will be set up as appropriate during the Site field activities, as required. The purpose of these procedures is to limit access to areas with potentially elevated chemical presence, and prevent the migration of potentially hazardous materials into adjacent clean areas. These areas are described in the following.

i. The Exclusion Zone (EZ) is the area immediately surrounding the active work area. Sufficient area will be provided for efficient movement of personnel and equipment as well as chemical control. Boundaries are modifiable depending on operational requirements. The HSO will be responsible for maintaining the boundaries of this area. Personnel entering this area are required to wear the PPE as defined previously. A wind direction indication device (i.e., flagging, windsock, etc.) will be mounted in the area of any EZ during Site activities.

All personnel (including visitors) entering the EZ or CRZ using respiratory protection must have successfully passed a qualitative respirator fit test in accordance with OSHA 29 CFR 1910.134. Documentation of fit testing is the responsibility of each employer.

In the event that unauthorized personnel enter the EZ, work will stop. Work will not resume until the unauthorized personnel have been removed from the EZ or have been moved to an acceptable on-Site area. A log of all visitors to the Site entering the EZ or CRZ will be maintained.

ii. The Contamination Reduction Zone (CRZ) will provide a location for removal of PPE which has contacted material with elevated chemical presence and final removal and decontamination of personnel and equipment. Supplemental safety equipment, such as fire extinguishers, portable eyewash, and extra quantities of PPE may be stored in this area. The order in which safety equipment is to be donned is as follows:

   a. Tyvek® suit
   b. Rubber boot
   c. Gloves
   d. Personal floatation if worn
   e. Respirator
   f. Hard hat.

   The following order applies when removing safety equipment:

   a. Wash off boots, personal floatation device if worn, and outer gloves prior to removal
   b. Tyvek® suit
   c. Hard hat

d. Respirator
e. Inner gloves.

iii. The Support Zone (SZ) is situated in clean areas where there is a minimal risk of encountering hazardous materials or conditions. PPE beyond standard construction safety equipment is therefore not required when performing O&M activities.

7. Activity Hazard/Risk Analysis

This section identifies the general hazards associated with specific O&M activities and presents the documented or potential health and safety hazards that exist at the Site. Every effort will be made to reduce or eliminate these hazards. Those which cannot be eliminated must be guarded against by use of engineering controls and/or PPE. Table C7.1 presents the anticipated hazards/risks and appropriate precautions.

In addition to the chemical hazards presented in Section 2 of this HASP, physical hazards including uneven terrain, steep slopes, slippery surfaces, potential confined spaces, the use of drilling and heavy construction equipment, potential drowning from working in and on the River, the use of decontamination equipment and potential heat and cold stress exist at the Site. It will be the responsibility of each on-Site O&M contractor and their personnel to identify the physical hazards posed by the various Site O&M activities and implement preventative and corrective action.

7.1 Chemical Exposure

Preventing exposure to toxic chemicals is a primary concern. Chemical substances can enter the unprotected body by inhalation, skin absorption, ingestion, or through a puncture wound (injection). A chemical can cause damage at the point of contact or can act systematically, causing a toxic effect at a part of the body distant from the point of initial contact.

Chemical exposures are generally divided into two categories: acute and chronic. Symptoms resulting from acute exposures usually occur during or shortly after exposure to a sufficiently high concentration of a chemical. The concentration required to produce such effects varies widely from chemical to chemical. The term "chronic exposure" generally refers to exposures to "low" concentrations of a contaminant over a long period of time. The "low" concentrations required to produce symptoms of chronic exposure depend upon the chemical, the duration of each exposure, and the number of exposures. For a given chemical, the symptoms of an acute exposure may be completely different from those resulting from chronic exposure.

For either chronic or acute exposure, the toxic effect may be temporary and reversible, or may be permanent (disability or death). Some chemicals may cause obvious symptoms such as burning, coughing, nausea, tearing eyes, or rashes. Other chemicals may cause health damage without any such warning signs (this is a particular concern for chronic exposures to low concentrations). Health effects such as cancer or respiratory disease may not become manifest for several years or decades after exposure. In addition, some toxic chemicals may be colorless and/or odorless, may dull the sense of smell, or may not produce any immediate or obvious physiological sensations. Thus, a worker's senses or feelings cannot be relied upon in all cases to warn of potential toxic exposure.

The effects of exposure not only depend on the chemical, its concentration, route of entry, and duration of exposure, but may also be influenced by personal factors such as the individual's smoking habits, alcohol consumption, medication use, nutrition, age, and sex.

An important exposure route of concern at the Site is inhalation. The lungs are extremely vulnerable to chemical agents. Even substances that do not directly affect the lungs may pass through lung tissue into the bloodstream, where they are transported to other vulnerable areas of the body. Some toxic chemicals present in the atmosphere may not be detected by human senses (i.e., they may be colorless, odorless, and their toxic effects may not produce any immediate symptoms). Respiratory protection is therefore extremely important if there is a possibility that the work

site atmosphere may contain such hazardous substances. Chemicals can also enter the respiratory tract through punctured eardrums. Where this is a hazard, individuals with punctured eardrums should be medically evaluated specifically to determine if such a condition would place them at an unacceptable risk and preclude their working at the task in question.

Direct contact of the skin and eyes by hazardous substances is another important route of exposure. Some chemicals directly injure the skin. Some pass through the skin into the bloodstream where they are transported to vulnerable organs. Skin absorption is enhanced by abrasions, cuts, heat, and moisture. The eye is particularly vulnerable because airborne chemicals can dissolve in its moist surface and be carried to the rest of the body through the bloodstream (capillaries are very close to the surface of the eye). Wearing protective equipment, not using contact lenses in chemical atmospheres (since they may trap chemicals against the eye surface), keeping hands away from the face, and minimizing contact with liquid and solid chemicals can help protect against skin and eye contact.

Although ingestion should be the least significant route of exposure at the Site, it is important to be aware of how this type of exposure can occur. Deliberate ingestion of chemicals is unlikely, however, personal habits such as chewing gum or tobacco, drinking, eating, smoking cigarettes, and applying cosmetics while performing certain O&M activities at the Site may provide a route of entry for chemicals.

The last primary route of chemical exposure is injection, whereby chemicals are introduced into the body through puncture wounds (i.e., by stepping or tripping and falling onto contaminated sharp objects). Wearing safety shoes, avoiding physical hazards, and taking common sense precautions are important protective measures against injection.

7.2 Noise

Exposure to noise over the OSHA action level can cause temporary impairment of hearing; prolonged and repeated exposure can cause permanent damage to hearing. The risk and severity of hearing loss increases with the intensity and duration of exposure to noise. In addition to damaging hearing, noise can impair voice communication, thereby increasing the risk of accidents on Site.

All personnel must wear hearing protection with a Noise Reduction Rating (NRR) of at least 20 when noise levels exceed 85 dBA. When it is difficult to hear a co-worker at normal conversation distance, the noise level is approaching or exceeding 85 dBA, and hearing protection is necessary. All Site personnel who may be exposed to noise must also receive baseline and annual audio grams and training as to the causes and prevention of hearing loss. Noise monitoring is discussed in Section 8.2.

Whenever possible, equipment that does not generate excessive noise levels will be selected for the O&M activities.

8. Site Monitoring

8.1 Air Monitoring

During the performance of O&M activities, periodic monitoring of particulate levels and organic vapor levels will be taken by the HSO, as required (e.g., exposure of Site materials beneath the demarcation geotextile). Additionally, oxygen and combustible gas levels will need to be taken if personnel enter into any confined space.

The following air monitoring instrumentation will be used for this purpose:

i. A photoionization detector
ii. A real-time digital particulate monitor (respirable fraction)
iii. A combination oxygen/combustible gas instrument.

All monitoring equipment will be calibrated on a daily basis when used in accordance with the manufacturer's guidelines, and such calibrations will be recorded in the Site daily log book. Results of all daily air monitoring also will be recorded in the Site daily log book and copies are to be given to the O&M Project Manager.

Air monitoring will be conducted hourly in the breathing zone of workers in the EZ or as deemed necessary by the HSO based on Site-specific conditions. Background measurements immediately upwind of the EZ will be taken before activities commence. Respiratory action levels for organic vapors and particulates are described in Sections 6.5 and 8.1.

Immediately upon identifying sustained elevated levels of organic vapors (greater than 50 parts per million (ppm) within the Work Zone, the air monitoring results will be reported to the O&M Project Manager and work activities will be shutdown. The HSO will determine the cause of the sustained elevated levels of organic vapors and alternate work methods or engineering controls will be implemented to rectify the release of elevated concentrations of organic vapors, or upgrade levels of PPE as required.

A personnel air monitoring program may be implemented for workers having the highest potential for exposure to chemicals present on Site. Samples would be collected during the startup of activities, at locations where personnel would face potential exposure, to verify the adequacy of personal protection and to document the actual exposure level to the selected chemicals of concern. Samples will be collected and analyzed for the presence of the compounds of concern as determined by the HSO. Appropriate NIOSH procedures and methods will be followed and all samples are to be sent to an American Industrial Hygiene Association (AIHA) accredited laboratory. Results of the air sampling program will be posted for personnel to review.

Monitoring for oxygen and combustible gas levels will be continuous according to the confined space entry permit if personnel have to enter into any confined space.

8.2 Community Air Monitoring Plan

The Community Air Monitoring Plan will be implemented if repairs and or replacement of RA components results in the exposure of Site materials beneath the demarcation geotextile.

Real-time air monitoring for volatile organic compounds and particulate levels will be performed by a technician at the perimeter of the EZ. Real-time air monitoring will be conducted during ground invasive activities and any other activity which may potentially create an airborne hazard.

Community air monitoring will be conducted in accordance with the following:

i. Volatile organic compounds will be monitored at the downwind perimeter of the EZ on a continuous basis. If total organic vapor levels exceed 5 ppm above background, work activities will be halted and monitoring continued under the provisions of the Vapor Emission Response Plan (Section 8.2.1). All monitoring readings will be recorded and available for the New York State Department of Environmental Conservation (NYSDEC) and New York State Department of Health (NYSDOH) to review.
ii. A fugitive dust suppression and particulate monitoring program will be conducted in accordance with the procedures presented in Section 8.2.4.

8.2.1 Vapor Emission Response Plan

If the ambient air concentration of organic vapors exceeds 5 ppm above background at the downwind perimeter of the EZ, activities will be halted and monitoring continued. If the organic vapor level decreases below 5 ppm above background, work activities can resume. If the organic vapor levels are greater than 5 ppm over background but less than 25 ppm over background at the downwind perimeter of the EZ, activities can resume provided:

i. The organic vapor level 200 feet downwind of the work area or half the distance to the nearest residential or commercial structure, whichever is less, is below 5 ppm over background
ii. Continuous air monitoring is continued

If the organic vapor level is above 25 ppm at the downwind perimeter of the EZ, activities will be shut down. When work shutdown occurs, downwind air monitoring as directed by the HSO will be implemented to ensure that vapor emission does not impact the nearest residential or commercial structure at levels exceeding those specified in Section 8.1.2 (Major Vapor Emission).

8.2.2 Major Vapor Emission

If any organic vapor levels greater than 5 ppm over background are identified 200 feet downwind from the work area or half the distance to the nearest residential or commercial property, whichever is less, all work activities must be halted.

If, following the cessation of work activities, or as a result of an emergency, organic levels persist above 5 ppm above background 200 feet downwind or half the distance to the nearest residential or commercial property from the work area, then the air quality will be monitored within 20 feet of the perimeter of the nearest residential or commercial structure (20-foot zone).

If efforts to abate the emission source are unsuccessful and if organic vapor levels are approaching 5 ppm above background and persist for more than 30 minutes in the 20-foot zone, then the Major Vapor Emission Response Plan (Section 8.1.3) will automatically be placed into effect. However, the Major Vapor Emission Response Plan will be immediately placed into effect if organic vapor levels are greater than 10 ppm above background.

8.2.3 Major Vapor Emission Response Plan

Upon activation, the following activities will be undertaken:

i. All emergency response contacts as listed in Section 14.2 will be notified.
ii. The local police authorities will immediately be contacted by the HSO and advised of the situation.
iii. Frequent air monitoring will be conducted at 30-minute intervals within the 20-foot zone. If two successive readings below action levels are measured, air monitoring may be halted or modified by the HSO.

8.2.4 Fugitive Dust Suppression and Particulate Monitoring Program

The following fugitive dust suppression and particulate monitoring program will be employed at the Site during ground invasive activities or during other activities which may potentially create an airborne hazard:

i. reasonable fugitive dust suppression techniques will be employed during all Site activities which may generate fugitive dust.
ii. particulate monitoring will be employed during ground invasive activities or activities which may generate fugitive dust.
iii. particulate monitoring will be performed using a real-time particulate monitor that is capable of monitoring particulate matter less than 10 microns in size. Particulate levels will be monitored at the downwind side of the EZ. Readings will be based on the 15-minute average concentrations.
iv. the particulate monitoring will be performed by a trained technician who fully understands the operation of the monitoring equipment and necessary calibration procedure. The technician will be responsible for keeping the air monitoring log book which will contain records of equipment calibration and all air monitoring readings.
v. the action level will be set at 150 micrograms per cubic meter ($\mu g/m^3$) based on a 15-minute average. If particulate levels are detected in excess of 150 $\mu g/m^3$ the upwind background level will be measured immediately using the same portable monitor. If the working site particulate measurement is greater than 100 $\mu g/m^3$ above the background level, additional dust suppression techniques will be implemented to reduce the generation of fugitive dust and corrective actions will be taken to protect Site personnel and reduce the potential for contaminant migration. Corrective measures may include increasing the level of personal protection and implementing additional dust suppression techniques. These may include:

a. Applying water on haul roads,
b. Wetting equipment and excavation faces,
c. Spraying water on buckets during excavation and dumping,
d. Hauling materials in tarped containers,
e. Restricting vehicle speed,
f. Immediately covering excavation areas or materials upon completion, and
g. Reducing the size and/or number of excavations.

vi. If dust is observed leaving the working site, additional dust suppression techniques will be employed.

vii. If the dust suppression techniques being utilized at the Site do not lower particulates to an acceptable level (below 150 $\mu g/m^3$) work will be suspended until appropriate corrective measures are approved to remedy the situation.

8.3 Noise Monitoring

Noise monitoring may be conducted as required. Hearing protection is mandatory for all employees in noise hazardous areas, such as around heavy equipment. As a general rule, sound levels that cause speech interference at normal conversation distance should require the use of hearing protection.

9. Decontamination Procedures

In general, everything that enters an EZ at this Site must either be decontaminated or properly discarded upon exit from the EZ. All personnel, including any NYSDEC and local officials, must enter and exit the EZ through the decontamination area. Prior to demobilization, potentially contaminated equipment will be decontaminated and inspected by the O&M Project Manager before it is moved into the clean zone.

The type of decontamination solution to be used is dependent on the type of chemical hazards. The decontamination solution for this Site is Alconox (soap) for equipment and for any reusable PPE. Safety Data Sheet (SDS) for Alconox and other products are maintained at the Site.

9.1 Equipment Decontamination Procedures

All equipment must be decontaminated within the CRZ or on a decontamination pad, if constructed, by a pressure washer upon exit from the EZ. Decontamination procedures shall include: knocking soil/mud from machines; water washing using a solution of water and Alconox; scraping and brushing to remove remaining soils and a final water rinse. Personnel shall wear Level C protection when decontaminating equipment. Runoff will be collected and placed into the GWS for treatment at the City POTW. Following decontamination and prior to equipment removal from the Site, the O&M Project Manager shall be responsible for ensuring that the equipment has been properly cleaned. This inspection shall be included in the Site logbook.

9.2 Personnel Decontamination Procedures

The following describes the procedures to be followed by all personnel when leaving the EZ.

Station 1: Equipment Drop

Deposit equipment used on Site (tools, sampling devices and monitoring instruments, radios, etc.) on plastic drop cloths. These items must be decontaminated or discarded as waste prior to removal from the EZ.

Station 2: Outer Boot and Outer Glove Wash and Rinse

Scrub outer boots, outer gloves and/or splash suit with decontamination solution or detergent wash. Rinse off using water.

Station 3: Outer Boot and Glove Removal

Remove outer boots and gloves. If outer boots are disposable, deposit in a covered container. If non-disposable, store in a clean dry place.

Station 4: Outer Garment Removal

Remove outer garments and deposit in a covered container. Decontaminate or dispose of splash suits as necessary.

Station 5: Respiratory Protection Removal

Remove hard hat and facepiece, and deposit on a clean surface. Air purifying respirator cartridges will be discarded as appropriate. Wash and rinse respirator at least daily. Wipe off and store respiratory gear in a clean, dry location.

Station 6: Inner Glove Removal

Remove inner gloves. Deposit in a covered container for disposal.

Station 7: Field Wash

Thoroughly wash hands and face with soap and water. If O&M activities are expected to be conducted for a period of time longer than 6 months, shower facilities will be provided for Site personnel.

10. General Safety and Personal Hygiene

1. Eating at the Site is prohibited in the EZ and CRZ. Designation of eating areas will be the responsibility of the HSO. The location of the EZ and CRZ areas may change throughout the duration of the project to maintain adequate separation from the non-active work area(s).
2. Smoking at the Site is prohibited in the EZ and CRZ.
3. Individuals getting wet to the skin with effluent from decontamination operations must wash the affected area immediately. If clothes in contact with skin are wet, then these must be changed.
4. Hands must be washed with soap and water before eating, drinking, smoking, and before using toilets.
5. Disposable coveralls and soiled gloves generated during groundwater and river water monitoring and sampling will be placed in plastic garbage bags and disposed with sanitary waste. Material and waste containing Site-related chemicals will be placed in covered containers at the end of every shift or sooner, if deemed necessary by the HSO. Waste will be stored at a secured area within the City POTW until a sufficient quantity of containers have been accumulated for shipment to a licensed off-Site disposal facility in accordance with applicable Federal and New York State Regulations.
6. Personnel working on Site that could potentially need to wear an air purifying respirator will not be permitted to wear facial hair that interferes with the mask-to-face seal on air-purifying respirators.

11. Medical Surveillance

In accordance with the requirements detailed in 29 CFR 1910.120 and 29 CFR 1910.134, all Site personnel who will come in contact with materials with potentially elevated chemical presence will have received, within 1 year prior to starting field activities, medical surveillance by a licensed physician or physician's group.

Medical records for all on-Site personnel will be maintained by their respective employers. The medical records will detail the tests that were taken and will include a copy of the consulting physician's statement regarding the tests and the employee's suitability for work.

The medical records will be available to the employee or his designated representative upon written request, as outlined in 29 CFR 1910.1020.

Each employer will provide certifications to the O&M Project Manager that its personnel involved in Site activities will have all necessary medical examinations and will have obtained medical certification prior to commencing work which requires respiratory protection or potential exposure to hazardous materials. Personnel not obtaining medical certification will not perform work within the CRZ and EZ.

Interim medical surveillance will be completed if an individual exhibits poor health or high stress responses due to any Site activity or when accidental exposure to elevated concentrations of chemicals occur.

12. Environmental Control Program

This section of the HASP outlines measures to be implemented at the Site to prevent hazards associated with environmental conditions.

12.1 Weather Monitoring

The HSO or O&M Project Manager will be responsible for checking weather forecasts for the next day and week of work to provide advance notification of any severe weather conditions. Severe weather conditions (e.g., heavy rain) may cause unsafe conditions at the Site and in some situations work may have to be stopped.

12.2 Rain and Snow

Excessive amounts of precipitation may cause potential safety hazards for all work tasks. The hazards would be most commonly associated with slipping, tripping, or falling due to slippery surfaces and further hazards are detailed by work task (Table C7.1).

Severe weather conditions will result in work stoppage and the implementation of further emergency measures, as described in Attachment C.IV of the HASP.

12.3 Temperature

The O&M activities are expected to be conducted throughout any given year. Low and high temperatures may be experienced which require measures to be implemented to prevent health and safety hazards from occurring. Potential hazards arising from temperature extremes are heat stress and cold exposure.

The potential hazard due to worker heat stress is particularly important if high protection levels of PPE are in use (e.g., respirators). A detailed monitoring program and prevention measures to implement to reduce heat stress are detailed in Attachment C.II. It is the responsibility of the HSO to determine which measures are appropriate to implement to prevent heat stress; these will depend largely on daily Site conditions.

Exposure to cold is similar to heat stress in that the HSO must determine the appropriate preventative measures to implement. Some of the measures which may be implemented include: more frequent breaks, additional clothing and partial enclosure of work areas. Detailed cold exposure prevention measures are also included in Attachment C.II.

12.4 Wind

High winds may be encountered at the Site and these can cause hazards that may affect Site personnel health and safety. Preventative measures that will be implemented if necessary are as follows:

i. Restricted Site activity
ii. Battening down light equipment or building materials
iii. Partially enclosing work areas
iv. Reduction or stoppage of work activities

12.5 Working in and on the River

Working close to the River or from a barge stationed in the River can be dangerous. The River has a strong current and could carry any individual quite a distance if one falls into the River. Each spring, usually in April, a large flow of ice moves down the River. The flow of ice can last up to 3 weeks. The force of the ice can move boulders along the floor of the River and objects which are stationed or anchored (e.g., docks). Preventative measures that will be implemented when working in and/or on the River are as follows:

i. All personnel working from a boat, barge, and directly along the shoreline will wear a personal floatation device
ii. A small boat will be immediately available to aid in any rescue attempt if personnel were to fall into the River
iii. Ring buoys with at least 90 feet of line shall be provided and readily available for emergency rescue operations. Distance between ring buoys shall not exceed 200 feet
iv. The O&M Project Manager will be consulted prior to anchoring any boat, barge, or equipment in the River
v. Reduction or stoppage of work activities during excessive ice flow conditions

13. Confined Space Entry Procedure

A confined space provides the potential for unusually high concentrations of contaminants, explosive atmospheres, oxygen deficient atmospheres, limited visibility, and restricted movement. This section establishes requirements for safe entry into, continued work in, and safe exit from confined spaces. Additional information regarding confined space entry can be found in 29 CFR 1926.21, 29 CFR 1910.146, and NIOSH-106. Entry into a confined space will only be undertaken after remote methods have been tried and found not to be successful. If confined space entry is required, such work will only be undertaken following the guidelines presented in this section.

13.1 Definitions

Confined Space is a space or work area not designed or intended for normal human occupancy, having limited means of egress and poor natural ventilation; and/or any structure, including buildings or rooms, which have limited means of egress.

Confined Space Entry Permit (CSEP) is a document to be initiated by the supervisor or personnel who are to enter into or work in a confined space. The CSEP will be completed by the personnel involved in the entry and approved by the HSO before personnel will be permitted to enter the confined space. The CSEP shall be valid only for the performance of the work identified on the permit and for the location and time specified on the permit. The beginning of a new shift with change of personnel will require the issuance of a new CSEP. A copy of the CSEP is provided in Attachment C.V.

Confined Space Observer/Attendant is an individual assigned to monitor the activities of personnel working within a confined space. The confined space observer monitors and provides external assistance to those inside the confined

space. The confined space observer summons rescue personnel in the event of emergency and assists the rescue team.

13.2 General Provisions

The following general provisions will apply to confined space entry:

i. When possible, confined spaces should be identified with a posted sign which reads: Caution - Confined Space
ii. Only personnel trained and knowledgeable of the requirements of these confined space entry procedures will be authorized to enter a confined space or be a confined space observer
iii. A CSEP must be issued prior to the performance of any work within a confined space. The CSEP will become a part of the permanent and official health and safety record for the Site
iv. Natural ventilation shall be provided for the confined space prior to initial entry and for the duration of the CSEP. Positive/forced mechanical ventilation may be required. However, care should be taken to not spread contamination outside of the enclosed area
v. If flammable liquids are anticipated to be within the confined space, explosion proof equipment will be used. All equipment shall be positively grounded
vi. The contents of any confined space shall, where necessary and where possible, be removed prior to entry. All sources of ignition must be disconnected and/or removed prior to entry
vii. Hand tools used in confined spaces shall be in good repair, explosion proof and spark proof, and selected according to intended use. Where possible, pneumatic power tools are to be used
viii. Hand-held lights and other illumination utilized in confined spaces shall be equipped with guards to prevent contact with the bulb and must be explosion proof
ix. Compressed gas cylinders, except cylinders used for self-contained breathing apparatus (SCBA) shall not be taken into confined spaces. Gas hoses shall be removed from the space and the supply turned off at the cylinder valve when personnel exit from the confined space
x. If a confined space requires respiratory equipment or where rescue may be difficult, safety belts, body harnesses, extraction equipment and lifelines will be used. The outside observer shall be provided with the same equipment as those working within the confined space
xi. A ladder or extraction device is required in all confined spaces deeper than the employee's shoulders. The ladder shall be secured and not removed until all personnel have exited the confined space
xii. Only SCBA or NIOSH-approved airline respirators equipped with a 5-minute emergency air supply (egress bottle) shall be used in untested spaces or in any confined space with conditions determined immediately dangerous to life and health
xiii. Where air-moving equipment is used to provide ventilation, chemicals shall be removed from the vicinity to prevent their introduction into the confined space
xiv. Vehicles shall not be left running near confined space work or near air-moving equipment being used for confined space ventilation
xv. Smoking in confined spaces will be prohibited at all times
xvi. Any deviation from these confined space entry procedures requires the prior permission of the HSO.

13.3 Procedure for Confined Space Entry

The HSO and confined space entry personnel shall adhere to the following confined space entry procedures:

i. Evaluate the job to be done and identify the potential hazards before a job in a confined space is scheduled
ii. Initiate a CSEP in concurrence with the HSO or designated alternative
iii. Ensure that the confined space is ventilated before starting work in the confined space and for the duration of the time that the work is to be performed in the confined space

iv. Ensure that the personnel who enter the confined space and the confined space observer helper are familiar with the contents and requirements of this instruction and the CSEP

v. Ensure remote atmospheric testing of the confined space prior to and during employee entry and before validation/revalidation of a CSEP to ensure the following requirements:

   a. Oxygen content between 19.5 percent and 23.0 percent,

   b. No concentration of combustible gas in the space. Sampling will be done throughout the confined space and specifically at the lowest point in the space,

   c. The absence of other atmospheric contaminants if the space has previously contained toxic, corrosive, or irritant material, and

   d. If remote testing is not possible, Level B PPE is required for confined space entry.

The CSEP shall be considered void if work in the confined space does not start within one hour after the tests in Item v) above are performed or if significant changes within the confined space atmosphere or job scope occurs.

The CSEP posted at the work Site shall be removed at the completion of the job or the end of the shift, whichever is first.

13.4 Confined Space Observer

The duties of the confined space observer are as follows:

i. While personnel are inside the confined space, a confined space observer will monitor the activities and provide external assistance to those in the confined space. The observer will not have other duties which may take his attention away from the work or require him to leave the vicinity of the confined space at any time while personnel are in the confined space

ii. The confined space observer shall maintain at least voice contact with all personnel in the confined space. Visual contact is preferred, if possible

iii. The confined space observer shall be instructed by his supervisor or the HSO in the method for contacting rescue personnel in the event of an emergency

iv. If irregularities within the confined space are detected by the observer, personnel within the confined space will be ordered to exit

v. In the event of an emergency, the confined space observer must not enter the confined space prior to contacting and receiving assistance from a helper. Prior to this time, he should attempt to remove personnel with the lifeline and to perform all other rescue functions from outside the space

i. A helper shall be designated to provide assistance to the confined space observer in case the observer must enter the confined space to retrieve personnel. The helper shall be, at a minimum, in radio contact with the observer.

14. Emergency Response and Contingency Plan

It is essential that Site personnel be prepared in the event of an emergency. Emergencies can take many forms; illnesses or injuries, chemical exposure, fires, explosions, spills, leaks, releases of harmful contaminants, or sudden changes in the weather. The following sections outline the general procedures for emergencies. Emergency information should be posted as appropriate.

14.1 Emergency Contacts

Fire:	911
Police:	911
Ambulance:	911
Hospital:	DeGraff Memorial Hospital 445 Tremont Street North Tonawanda, New York Telephone: Emergency Dept. 690-2111
Directions to Hospital:	River Road south to Wheatfield Street. Turn left. Take Wheatfield Street to the Twin City Memorial Highway, Rt. 425 south. Turn right. Taken Rt. 425 south four blocks to Tremont Street. Turn right. The hospital is on the left. Figure 14.1 provides the emergency route from the Site.

14.2 Additional Emergency Numbers

National Response Center (NRC) 800-424-8802

Agency for Toxic Substances and Disease Registry 404-488-4100 (24-Hour)

Chemtrec 800-424-9300

Poison Control Center 878-7654

Niagara County Health Department 716-439-7444

NYSDEC Project Manager (Megan Kuczka) 716-851-7220

Project Manager (Chelsea Spahr) 716-695-8565

O&M Project Manager (Mark Zellner) 716-695-8585

Project Safety Professional (To be determined) .....

14.3 Emergency Equipment Available On Site

The following emergency equipment will be available on Site when repairs/replacement of RA components require the use of heavy equipment and/or confined space entry is anticipated. The listed medical equipment and one fire extinguisher will be available for all on-Site O&M activities.

	Location
Communication Equipment	
– Emergency Alarms/Horns	CRZ
Medical Equipment	
– OSHA approved first aid kit sized for a minimum of 5 people – Portable emergency eyewash.	CRZ or Support Zone
Fire Fighting Equipment	
– Two 20-pound ABC type dry chemical – fire extinguishers – Two SCBAs	CRZ

14.4 Project Personnel Responsibilities During Emergencies

Health and Safety Officer (HSO)

As the administrator of the HASP, the HSO has primary responsibility for responding to and correcting emergency situations. The HSO will:

i. Take appropriate measures to protect personnel including: withdrawal from the EZ, total evacuation and securing of the Site or upgrading or down grading the level of protective clothing and respiratory protection
ii. Take appropriate measures to protect the public and the environment including isolating and securing the Site, preventing runoff to surface waters, and ending or controlling the emergency to the extent possible
iii. Ensure that appropriate federal, state, and local agencies are informed, and emergency response plans are coordinated. In the event of fire or explosion, the local fire department should be summoned immediately. In the event of an air release of toxic materials, the local authorities should be informed in order to assess the need for evacuation. In the event of a spill, sanitary districts and drinking water systems may need to be alerted
iv. Ensure that appropriate decontamination treatment or testing for exposed or injured personnel is obtained
v. Determine the cause of the incident and make recommendations to prevent the recurrence
vi. vi) ensure that all required reports have been prepared.

14.5 Medical Emergencies

Any person who becomes ill or injured in the EZ must be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination should be completed and first aid administered prior to transport. If the patient's condition is serious, at least partial decontamination should be completed as much as possible without causing further harm to the patient. First aid should be administered while awaiting an ambulance or paramedics. All injuries and illnesses must immediately be reported to the HSO and O&M Project Manager.

Any person transporting an injured/exposed person to a clinic or hospital for treatment should take with them directions to the hospital and a copy of the compounds of concern to which they may have been exposed.

Any vehicle used to transport contaminated personnel will be cleaned or decontaminated as necessary.

14.6 Fire or Explosion

In the event of a fire or explosion, the local fire department should be summoned immediately. Upon their arrival, the HSO or designated alternate will advise the fire commander of the location, nature and identification of the hazardous materials on Site.

If it is safe to do so, Site personnel shall:

i. If hazardous, report to the NYSDEC On-Scene Coordinator and/or Project Manager
ii. Use firefighting equipment available on Site
iii. Remove or isolate flammable or other hazardous materials which may contribute to the fire

14.7 Spill Control and Response Plan

During all active work at the Site involving the transport and handling of waste or contaminated material, a Spill Control and Response Plan will be in effect. This plan, as presented herein, will provide contingency measures for potential releases of material from tanks or drums handled at the Site.

The following equipment will be available at the Site and used for any unexpected spills:

i. Non-combustible absorbent
ii. 55-gallon DOT-approved drum(s)
iii. Shovels
iv. An appropriate pump.

Hand tools which are used will generally be discarded with the waste and/or contaminated material unless it is determined appropriate to decontaminate the tools. If tools are decontaminated, they will receive a detergent wash in addition to steam cleaning or hot water cleaning.

In the event that a drum or container of liquid is spilled on Site outside of an excavation area, the drum handling team will immediately respond to the spill. The spilled liquids will be confined to the immediate area of the spill and the liquids will be pumped, with the use of a portable hand pump, into a repack drum. The spilled liquids will be confined by diking around the spill with native material or with an inert absorbent. Any residual liquids which cannot be pumped will be absorbed with a sufficient quantity of inert absorbent to ensure that no free liquids remain. If the spill occurred on soil, the visibly affected soil will be excavated to limits based on a visual determination of spill contamination. The absorbent and excavated material will be drummed and stored at the POTW pending the receipt of analytical results to determine appropriate disposal.

Liquids spilled within excavations will be pumped, with the use of a portable hand pump, into a repack drum. Soil/fill adjacent to the spill area will be placed to absorb any residual liquid. Materials underlying the spill zone will be treated as contaminated materials based on a visual determination of spill contamination. If the contaminated material is located above the Site cap demarcation geotextile, it will be excavated, drummed and stored at the POTW pending the receipt of analytical results to determine appropriate disposal.

The need to conduct post-cleanup sampling and the analytical requirements for sampling native soil in which a release occurs above the demarcation geotextile will be determined and agreed to by the NYSDEC. If required, samples will be collected over the immediate area of the spill. Collected samples will be analyzed for parameters mutually agreed to by the City/NYSDEC. The parameters selected will be based on data available for the released materials.

14.7.1 On-Site Contingency Plan

In the event that a release of a hazardous substance occurs, the following protocols will be implemented:

i. Notification of release: if human health or the environment are threatened, then the National Response Centre (NRC) and NYSDEC will be notified as soon as possible. Appropriate local authorities (police, fire department, traffic control, etc.) will also be notified. NRC will be notified of any release of reportable quantities including all releases which threaten human health or the environment. The NYSDEC will determine if other releases require notification to the NRC. In any event, the on-Site NYSDEC representative will receive the initial notification of a hazardous materials release
ii. Decontamination procedures: decontamination procedures may be required after cleanup to eliminate traces of the substance spilled or to reduce it to an acceptable level. Personnel decontamination may include disposing of clothing and equipment as appropriate. All contaminated materials including equipment, clothes and other materials that cannot be decontaminated will be properly containerized, labeled and placed in the staging area for proper disposal
iii. Depending on the material that was spilled, an appropriate release report will be submitted to the NYSDEC summarizing the release and response action.

If a major release of material stored in a tank or container occurs at the Site, the following actions will immediately be taken:

i. Notify the O&M Project Manager
ii. Take immediate measures to control and contain the release

iii. Keep unnecessary personnel away; isolate the area of release and deny entry
iv. Do not allow anyone to touch released material
v. Stay upwind; keep out of low areas.

An employee alarm system will be used as necessary to signify a major release or an emergency and will consist of three short blasts using an air horn.

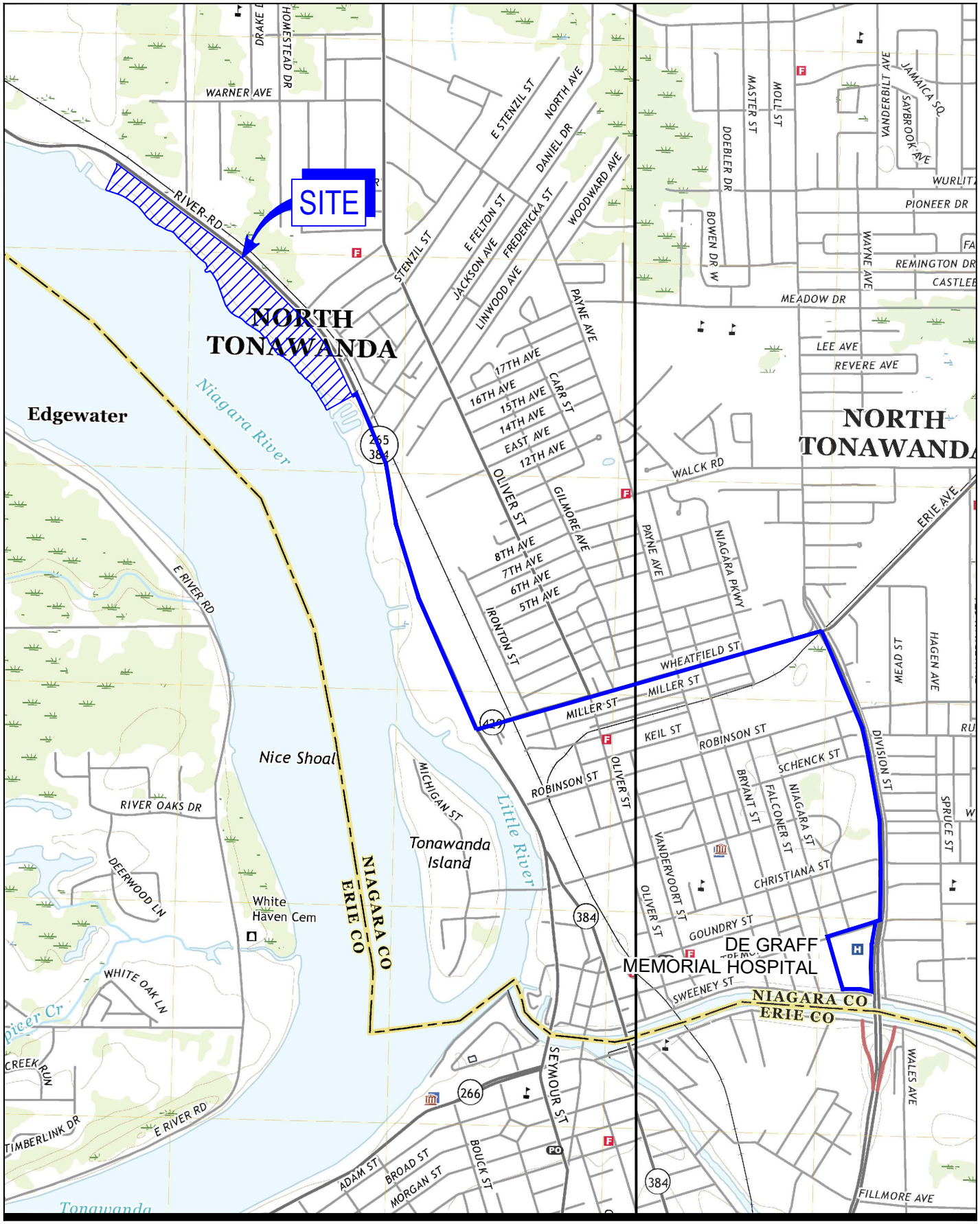
15. Control of Hazardous Energy

The Control of Hazardous Energy Program is presented in Attachment C.VI. The requirements in the program shall be used by all on-Site personnel performing O&M activities to ensure that equipment being worked on is isolated from all potential hazardous energy sources and locked out or tagged out before any individual performs any servicing or maintenance activity where unexpected energization, startup, or release of energy could cause an injury. Energy sources can be electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy. This program establishes the minimum safety requirements to ensure the proper deactivation of moveable, electrically energized, pressurized equipment or systems prior to repairing, cleaning, adjusting, or performing similar work activities. This program complies with the requirements in 29 CFR 1910.147.

16. Recordkeeping

The O&M Project Manager shall establish and maintain records of all necessary and prudent monitoring activities as described below:

i. Name and job classification of the employees involved on specific tasks
ii. Records of qualitative fit testing and physical examination results for Site personnel
iii. Records of all OSHA training certification for Site personnel
iv. Records of training acknowledgment forms
v. Emergency report sheets describing any incidents or accidents.



0 1000 2000 ft

1" = 2000 ft

N

GHD

GRATWICK - RIVERSIDE PARK SITE
NORTH TONAWANDA, NEW YORK
HEALTH AND SAFETY PLAN

Project No. **7987**
Date **September 2022**

EMERGENCY HOSPITAL ROUTE

FIGURE C14.1

Filename: \\ghdnet\ghd\CA\Waterloo\Projects\662\007987\Digital_Design\ACAD\Figures\RPT024\007987-GHD-00-00-RPT-EN-D112_WA-024.dwg
Plot Date: 15 September 2022 4:10 PM

Data Source: USGS QUADRANGLE MAPS;
TONAWANDA EAST, NY, 2019;
TONAWANDA WEST, NY, 2019.

Table C2.1

**Maximum Concentration of the Compounds Of Concern
In Site Black Viscous Materials (BVM), Sediments and Soils
Gratwick-Riverside Park Site
North Tonawanda, New York**

Compound	Maximum Concentration (µg/kg) BVM	Soils	Sediments
Carbon Disulfide	ND 4,000	26	ND 12
Trans-1,2-dichloroethene	ND 4,000	2	200 (1)
Benzene	ND 4,000	4	ND 12
Ethylbenzene	ND 4,000	9	20
Tetrachloroethene	ND 4,000	96	21
Toluene	22,000	10	41
Total Xylenes	ND 4,000	22	140
Trichloroethene	ND 4,000	13	120
Phenanthrene	ND 66,000	49,000	2,100
Pyrene	ND 66,000	29,000	2,400
Chrysene	ND 66,000	18,000	1,200
Benzo(b)fluoranthene	ND 66,000	32,000	1,300
Benzo(a)pyrene	ND 66,000	19,000	670
Indeno(1,2,3-cd)pyrene	ND 66,000	11,000	300
Benzo(g,h,i)perylene	ND 66,000	8,300	220
Naphthalene	ND 66,000	4,000	80
2-Methylnaphthalene	ND 66,000	1,700	100
Fluoranthene	ND 66,000	54,000	2,200
Benzo(a)anthracene	ND 66,000	19,000	1,500
Diethylphthalate	ND 66,000	140	28
Di-n-butylphthalate	ND 66,000	710	2,000
Bis(2-ethylhexyl)phthalate	ND 66,000	1,200	92
Di-n-octylphthalate	ND 66,000	460	270
4,4'-DDE	ND 2,000	38	21
4,4'-DDT	ND 5,000	19,000	ND
Polychlorinated Biphenyls	980,000	7,200	830
Acenaphthene	ND 66,000	3,600	50
Acenaphthylene	ND 66,000	840	200
Dibenzofuran	2,600,000	4,500	32,000
Dibenz(a,h)anthracene	ND 66,000	3,200	66
Anthracene	ND 66,000	13,000	630

Note:

(1) Total.

Table C2.2

Exposure Routes and Exposure Levels for the Compounds of Concern
Gratwick-Riverside Park Site
North Tonawanda, New York

Contaminant	Exposure Routes	Acceptable Exposure Levels in Air
Polychlorinated Biphenyls	Inhalation, Ingestion Suspected Human Carcinogen	0.5 mg/m^3 (1) 5 mg/m^3 (2)
Trans-1,2-dichloroethene	Inhalation, Ingestion	200 ppm(1) 1,000 ppm(2)
Benzene	Inhalation, Ingestion, Skin Absorption Human Carcinogen	.5 ppm(1) 1 ppm(4) 500 ppm(2)
Tetrachloroethene	Inhalation, Ingestion Animal Carcinogen	25 ppm(1) 150 ppm(2)
Toluene	Inhalation, Ingestion Skin Absorption	50 ppm(1) 500 ppm(2)
Ethylbenzene	Inhalation, Ingestion	100 ppm(1) 800 ppm(2)
Total Xylenes	Inhalation, Ingestion	100 ppm(1) 900 ppm(2)
Di-n-butylphthalate	Inhalation, Ingestion	Not Established
Bis(2-ethylhexyl)phthalate	Inhalation, Ingestion	Not Established
Di-n-octylphthalate	Inhalation, Ingestion	Not Established
4,4'-DDE	Inhalation, Ingestion	Not Established
4,4'-DDT	Inhalation, Ingestion, Skin Absorption	1 mg/m^3 (1)
Carbon Disulfide	Inhalation, Ingestion Skin Absorption	10 ppm(1) 500 ppm(2)
Trichloroethene	Inhalation, Ingestion	50 ppm(1) 1,000 ppm(2)
Phenanthrene	Inhalation, Ingestion	Not Established
Pyrene	Inhalation, Ingestion	Not Established
Chrysene	Inhalation, Ingestion Suspected Human Carcinogen	0.2 mg/m^3 (1)
Benzo(b)fluoranthene	Inhalation, Ingestion, Suspected Human Carcinogen	Not Established
Benzo(a)pyrene	Inhalation, Ingestion Suspected Human Carcinogen	0.2 mg/m^3 (4)

Table C2.2

Exposure Routes and Exposure Levels for the Compounds of Concern
Gratwick-Riverside Park Site
North Tonawanda, New York

Contaminant	Exposure Routes	Acceptable Exposure Levels in Air
Indeno(1,2,3-cd)pyrene	Inhalation, Ingestion	Not Established
Benzo(g,h,i)perylene	Inhalation, Ingestion	Not Established
Naphthalene	Inhalation, Ingestion	10 ppm(1) 250 ppm(2)
2-Methylnaphthalene	Inhalation, Ingestion	Not Established
Fluoranthene	Inhalation, Ingestion	Not Established
Benzo(a)anthracene	Inhalation, Ingestion	Not Established
Diethylphthalate	Inhalation, Ingestion	5 mg/m3(1)
Acenaphthene	Inhalation, Ingestion	Not Established
Acenaphthylene	Inhalation, Ingestion	Not Established
Dibenzofuran	Inhalation, Ingestion	Not Established
Dibenz(a,h)anthracene	Inhalation, Ingestion	Not Established
Anthracene	Inhalation, Ingestion	Not Established

Notes:

(1) 2022 Values, American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values® (TLVs).
(2) Immediately Dangerous to Life and Health (IDLH) level.
(3) Short-Term Exposure Limit (STEL) 15 minutes.
(4) Federal OSHA Permissible Exposure Limit (PEL).
mg/m^3 Milligrams Per Cubic Meter.
ppm Parts Per Million.

Table C6.1

SPECIFIC PERSONAL PROTECTION LEVELS
GRATWICK-RIVERSIDE PARK SITE
NORTH TONAWANDA, NEW YORK

Work Tasks	Maximum Protection Level[1]	Alternate Protection Level[2]
Inspections and Maintenance of Completed RA Components (i.e., Storm Sewers, Shoreline Enhancements and Groundwater Withdrawal System)	Modified D [3] B or C [4]	D[3] Modified D [4]
Water Level Measuring Activities	C	Modified D
Groundwater and Surface Water Monitoring and Sampling Activities	C	Modified D
Decontamination Activities	C	Modified D
Vegetative Cover Maintenance (i.e., Mowing, Reseeding, Dead Bush/Tree Replacement)	D	D
Mobilization and Demobilization of Labor, Materials, and Equipment to and from the Site	Modified D	D
Surveying Activities	Modified D	D
Repair/Replacement of Barrier Wall Groundwater Withdrawal System, Permeable Soil Cap and Shoreline Remediation/Enhancement Activities	B or C	Modified D
Excavation of Site Materials	B or C	Modified D
Construction of Park Facilities (i.e., Picnic Shelter, and Access Roads)	D	D

Notes:

Specific requirements of protection levels are detailed in Section 6.1.

(1) Level B: To be worn when realtime air monitoring levels for organic vapors are greater than 50 parts per million (ppm) or during activities where an immediate danger to life or health (IDLH) situation may exist.

Level C: To be worn when the criterion for using air-purifying respirators (APRs) are met and a lesser level of skin protection is needed.

Modified D: To be worn when dermal protection is required however, no respiratory hazards are present. It provides minimal protection against chemical hazards.

(2) Alternate protection levels will be used if monitoring indicates that conditions are appropriate or the HSO and O&M Project Manager agree that there is a reduced potential of exposure.

(3) Visual Inspections

(4) Maintenance

Table C7.1

Anticipated Hazards/Risks and Appropriate Precautions
Gratwick-Riverside Park Site
North Tonawanda, New York

	Activity	*Anticipated Hazards/Risks*	*Appropriate Precautions*
1.	Mobilization and Demobilization Activities, Surveying Activities, Construction of Park Facilities, and Vegetative Cover Maintenance	• slip/trip/fall hazards • potential back injuries from lifting heavy objects • potential heat or cold stress • severe weather • electrical hazards from power sources • moving or backing vehicles • cuts to hands from working with sharp objects • potential drowning from working in and or on the Niagara River • excessive noise	• Modified D or Level D personal protection • practice safe lifting techniques • participate in on-Site training programs • practice good personal hygiene principles • use a spotter around moving or backing equipment • work activities will be reduced or suspended during severe weather conditions • grounded plugs should be used to reduce the hazard of electrical shock. Do not stand in water when handling equipment. Electrical equipment will be approved. • keep first aid supplies readily available • wear leather gloves when working with sharp objectives • wear personal floatation devices when working in or on the Niagara River • wear appropriate hearing protection
2.	Repair/Replacement of Barrier Wall, Groundwater Withdrawal System, Permeable Soil Cap, Sloped Bank Shoreline Stabilization and River Remediation/Enhancement Activities, Excavation of Site Materials, Inspections and Maintenance of Completed RA Components, Water Level Measuring Activities, Groundwater and Surface Water Monitoring and Sampling Activities, and Decontamination Activities.	• slip/trip/fall hazards • potential back injuries from lifting heavy objects • potential heat or cold stress • severe weather • electrical hazards from power sources • moving or backing vehicles and equipment • personnel injuries from sharp objects, falling debris or pinch points • direct contact with potentially contaminated soils, groundwater, leachate and waste materials • hazards presented by the use of heavy equipment	• Levels B, C and Modified Level D, based on realtime air monitoring or established protection levels (see Table C6.1) • practice safe lifting techniques • participate in all on-Site training programs • be trained with all appropriate equipment standard operating procedures • wear leather gloves when working with sharp objectives • practice good personal hygiene principles • take proper precautions in unsafe areas • use the "Buddy System"

Table C7.1

Anticipated Hazards/Risks and Appropriate Precautions
Gratwick-Riverside Park Site
North Tonawanda, New York

Activity	*Anticipated Hazards/Risks*	*Appropriate Precautions*
2. Continued...	• overhead and underground hazards (i.e., electrical lines, gas, or water lines) • potential burns from hot equipment • hazards presented by the use of specialized equipment (e.g., decontamination equipment) • hazards presented by entry into a confined space (i.e., oxygen deficient, working in small tight areas and falling overhead objects) • reduced field of vision from wearing full-face respirators • potential drowning from working in and or on the Niagara River • excessive noise	• perform an underground utilities location • only essential personnel allowed in work area • if performing confined space entry work, make sure permit system is in place and workers have participated in a training program • use a spotter around moving or backing equipment • identify all high temperature objects or equipment • work activities will be reduced or suspended during severe weather conditions • grounded plugs should be used to reduce the hazard of electrical shock. Do not stand in water when handling equipment. Electrical equipment will be approved. • keep first aid supplies readily available • wear personal floatation devices when working in or on the Niagara River. • wear appropriate hearing protection

Attachments

Attachment C.I

Training Acknowledgement Form

Training Acknowledgment Form

(Not required for surficial maintenance crew - e.g., grass cutting)

Please Print:

Name: _____

Address: _____

Social Security Number: _____

Employer: _____

Job Site: O&M Activities, Gratwick-Riverside Park Site, North Tonawanda, NY

I have attended and understood the mandatory Site-specific initiation session for the above referenced job site. This program referenced the following topics:

i) Known potential hazards on Site

ii) Level of personal protection equipment required

iii) Emergency procedures for the Site

iv) The basics of the Site-specific Health and Safety Plan

I further confirm that I have been thoroughly trained on the standard operating procedures of equipment I will be operating or procedures (e.g., confined space) which I will be participating in.

_____ _____

(Date) (Signature)

I further confirm that I have the required 40-hour and 8-hour annual refresher training to comply with 29 CFR 1910.120, and have a respirator for which I have been fit tested.

_____ _____

(Date) (Signature)

Attachment C.II

Temperature Stress Prevention And Monitoring

Heat Stress Prevention And Monitoring [1]

Heat stress may occur at any time work is being performed at elevated temperatures. Wearing of chemical protective clothing, which may result in decreasing natural body ventilation, increases the risk of heat stress.

If the body's physiological processes fail to maintain a normal body temperature because of excessive heat, a number of physical reactions can occur, ranging from mild (such as fatigue, irritability, anxiety, and decreased concentration, dexterity movement) to fatal. Because heat stress is one of the most common and potentially serious illnesses at hazardous waste sites, regular monitoring and other preventative measures are vital.

Site workers must learn to recognize and treat the various forms of heat stress. The best approach is preventative heat stress management. In general, if possible:

1. Have workers drink 16 ounces of water before beginning work, such as in the morning or after lunch. Provide disposable 4-ounce cups, and water that is maintained at 50 to 60°F. Urge workers to drink one to two of these cups of water every 20 minutes for a total of 1 to 2 gallons per day. Provide a cool area for rest breaks. Discourage the intake of coffee during working hours. Monitor for signs of heat stress.
2. Acclimate workers to Site work conditions by slowly increasing workloads (e.g., do not begin Site work activities with extremely demanding activities).
3. Provide cooling devices to aid natural body ventilation. These devices, however, add weight and their use should be balanced against worker efficiency. An example of a cooling aid is long cotton underwear which acts as a wick to absorb moisture and protect the skin from direct contact with heat-absorbing protective clothing.
4. In extremely hot weather, conduct field activities in the early morning and evening.
5. Ensure that adequate shelter is available to protect personnel against heat as well as cold, rain, snow, etc., which can decrease physical efficiency and increase the probability of both heat and cold stress. If possible, set up the command post in the shade.
6. In hot weather, rotate shifts of workers wearing impervious clothing.
7. Good hygienic standards must be maintained by frequent changes of clothing and showering. Clothing should be permitted to dry during rest periods. Persons who notice skin problems should immediately consult medical personnel.

The following is a discussion of specific results of heat stress.

Heat Stroke

Heat stroke is an acute and dangerous reaction to heat stress caused by failure of heat regulating mechanisms of the body; the individual's temperature control system that causes sweating stops working correctly. Body temperature rises so high that brain damage and death will result if the person is not cooled quickly.

- Symptoms - Red, hot, dry skin, although person may have been sweating earlier; nausea; dizziness; confusion; extremely high body temperature; rapid respiratory and pulse rate; unconsciousness or coma.

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[1] Sources: (USEPA, 1985) 29 United States Code of Federal Regulations, 1910.29

- Treatment - Cool the victim quickly. If the body temperature is not brought down fast, permanent brain damage or death will result. Soak the victim in cool, but not cold water; sponge the body with cool water or pour water on the body to reduce the temperature to a safe level (102°F). Observe the victim and obtain medical help. Do not give coffee, tea, or alcoholic beverages.

Heat Exhaustion

Heat exhaustion is a state of every definite weakness or exhaustion caused by the loss of fluids from the body. The condition is much less dangerous than heat stroke, but it nonetheless must be treated.

- Symptoms - Pale, clammy, moist skin; profuse perspiration and extreme weakness. Body temperature is normal, pulse is weak and rapid, breathing is shallow. The person may have a headache, may vomit and may be dizzy.
- Treatment - Remove the person to a cool, air conditioned place, loosen clothing, place in a head-low position and provide bed rest. Consult physician, especially in severe cases. The normal thirst mechanism is not sensitive enough to ensure body fluid replacement. Have patient drink one to two cups of water immediately, and every 20 minutes thereafter until symptoms subside. Total water consumption should be about 1 to 2 gallons per day.

Heat Cramps

Heat cramps are caused by perspiration that is not balanced by adequate fluid intake. Heat cramps are often the first sign of a condition that can lead to heat stroke.

- Symptoms - Acute painful spasms of voluntary muscles (e.g., abdomen and extremities).
- Treatment - Remove victim to cool area and loosen clothing. Have patient drink one to two cups of water immediately and every 20 minutes thereafter until symptoms subside. Total water consumption should be 1 to 2 gallons per day.

Heat Rash

Heat rash is caused by continuous exposure to heat and humid air and is aggravated by chafing clothes. The condition decreases ability to tolerate heat.

- Symptoms - Mild red rash, especially in areas of the body that come into contact with protective gear.
- Treatment - Decrease amount of time in protective gear and provide powder to help absorb moisture and decrease chafing.

Heat Stress Monitoring and Work Cycle Management

For strenuous field activities that are part of on going Site work activities in hot weather, the following procedures shall be used to monitor the body's physiological response to heat, and to manage the work cycle, even if workers are not wearing impervious clothing. These procedures are to be instituted when the temperature exceeds 70°F. If possible these measures will be supplemented by the use of automatic monitoring equipment which can be worn by the workers under their PPE.

- Measure Heart Rate - Heart rate (HR) should be measured by the radial pulse for 30 seconds as early as possible in the resting period. The HR at the beginning of the rest period should

not exceed 110 beats/minute. If the HR is higher, the next work period should be shortened by 33 percent, while the length of the rest period stays the same. If the pulse rate still exceeds 110 beats/minute at the beginning of the next rest period, the following work cycle should be further shortened by 33 percent. The procedure is continued until the rate is maintained below 110 beats/minute.

- Measure Body Temperature - When ambient temperature is over 90°F, body temperatures should be measured with a clinical thermometer as early as possible in the resting period. If oral temperature (OT) at the beginning of the rest period exceeds 99.6°F, the next work period should be shortened by 33 percent, while the length of the rest period stays the same. If the OT exceeds 99.6°F at the beginning of the next rest period, the following work cycle should be further shortened by 33 percent. The procedure is continued until the body temperature is maintained below 99.6°F.
- Physiological Monitoring Schedule - The following Suggested Frequency of Physiological Monitoring Schedule for Fit and Acclimated Workers shall be used as a guideline.

Temperature (Adjusted)	(Level D)	(Level C)
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5°F (30.8°-32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5°-87.5°F (28.1°-32.2°C)	After each 90 minutes of work	After each 60 minutes of work
77.5°-82.5°F (25.3°-28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5°-77.5°F (22.5°-25.3°C)	After each 150 minutes of work	After each 120 minutes of work

Measure the air temperature with a standard thermometer. Estimate the fraction of sunshine by judging what percent of the sun is out.

100% sunshine = no cloud cover = 1.0

50% sunshine - 50% cloud cover = 0.5

0% sunshine - full cloud cover = 0.0

Adjusted temp. = actual temp. + 13 x (% sunshine factor).

The length of work period is governed by Frequency of Physiological Monitoring. The length of the rest period is governed by physiological parameters (heart rate and oral temperature). For example, if an individual's heart rate exceeds 110 beats/minute at the beginning of the rest period, that individual will remain on rest-time until his/her heart rate drops well below 110 beats/minute and their next work period (= duration of time before suggested physiological monitoring) is decreased by 33 percent.

Cold Stress Prevention And Monitoring

Persons working outdoors in low temperatures, especially at or below freezing are subject to cold stress. Exposure to extreme cold for a short time causes severe injury to the surface of the body, or results in profound generalized cooling, causing death. Areas of the body which have a high surface area-to-volume ratio such as fingers, toes, and ears, are the most susceptible.

Chemical protective clothing generally does not afford protection against cold stress. In many instances, it increases susceptibility. Hazardous waste Site workers must learn to dress carefully to provide chemical protection and thermal insulation while not dressing so warmly that exercise or strenuous activity will result in heat stress.

Provisions must also be made for the fact that after physical activity and accumulation of body heat, sudden chilling during decontamination and rest breaks may increase susceptibility to colds, etc.

Two factors influence the development of a cold injury: ambient temperature and the velocity of the wind. Wind Chill Indices describe the chilling effect of moving air in combination with low temperature.

As a general rule, the greatest incremental increase in wind chill occurs with a wind of 5 miles per hour (mph). Additionally, water conducts heat 240 times faster than air; thus, the body cools suddenly when chemical-protective equipment is removed if the clothing underneath is perspiration-soaked.

Frostbite

Local injury resulting from cold is included in the generic term frostbite. Frostbite of the extremities can be categorized into:

1. Frost nip or incipient frostbite is characterized by sudden blanching or whitening of skin;
2. Superficial frostbite is characterized by skin with a waxy or white appearance and is firm to the touch, but tissue beneath is resilient; and
3. Deep frostbite is characterized by tissues that are cold, pale, and solid.

To administer first aid for frostbite:

1. Take the victim indoors and rewarm the areas quickly in water that is between 39°C and 41°C (102°F to 105°F);
2. Give a warm drink - water or juices, no coffee, tea, or alcohol. The victim must not smoke;
3. Keep the frozen parts in warm water or covered with warm clothes for 30 minutes even though the tissue will be very painful as it thaws;
4. Then elevate the injured area and protect it from injury;
5. Do not allow blisters to be broken;
6. Use sterile, soft, dry material to cover the injured areas; and
7. keep victim warm and get immediate medical care.

After thawing, the victim should try to move the injured areas a little, but no more than can be done alone, without help. Seek medical attention as soon as possible.

Note:

1. Do not rub the frostbitten part (this may cause gangrene).
2. Do not use ice, snow, gasoline, or anything cold on the frostbitten area.
3. Do not use heat lamps or hot water bottles to rewarm the part.
4. Do not place the part near a hot stove.

Hypothermia

Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature. It may also be caused by exposure to cold water temperatures (i.e., falling into the River). Its symptoms are usually exhibited in five stages:

1. Shivering
2. Apathy, listlessness, sleepiness
3. (sometimes) rapid cooling of the body to less than 95°F
4. Unconsciousness, glassy stare, slow pulse, slow respiration
5. Death

If hypothermia is suspected in any field personnel, move person to a warmer location until symptoms recede, contact HSO, and/or seek medical assistance.

Attachment C.III

Severe Weather Procedures

Severe Weather

When projects are conducted outside, the potential for severe weather must be considered. Thunderstorms, tornadoes, and winter storms can develop quickly, jeopardizing Site safety. The following emergency procedures are to be followed in the event of severe weather.

Thunderstorms and Lightning

1. Monitor weather conditions at all times while working. At a sign of an impending storm - increased cloudiness, darkened skies, increased wind - listen to a radio for the latest weather information.
2. When a thunderstorm accompanied by lightning is in the project area, reduce activities or cease work immediately.
3. Perform decontamination as quickly and orderly as possible, if work stoppage is necessary.
4. Seek shelter inside nearest building or Site trailer.
5. If you are caught in an open area and you feel your hair stand on end, lightning may be about to strike you. Drop to your knees and bend forward, putting your hands on your knees. DO NOT LIE FLAT ON THE GROUND.
6. If someone has been struck by lightning, monitor life signs and begin administering mouth-to-mouth resuscitation or cardiopulmonary resuscitation as needed. Send for help.
7. Check conscious victims for burns, especially at the fingers and toes and next to buckles and jewelry. Administer first aid for shock. Do not let the victim walk around.

Tornadoes

1. Tornadoes usually develop from thunderstorms and normally occur at the trailing edge of the storm. Most tornadoes occur in the months of April, May, June, and July in the late afternoon and early evening hours.
2. When storms are predicted for the project area, monitor weather conditions on a radio. A tornado watch is issued when favorable conditions exist for the development of a tornado. A tornado warning is issued by the local weather service office whenever a tornado has actually been sighted or is strongly indicated by radar.
3. If a tornado warning is issued, seek shelter immediately.
4. If a tornado warning is issued and you are in a vehicle or a Site trailer, leave and go to the nearest building.
5. Once a tornado has passed the Site, Site personnel are to assemble at the designated Support Zone (SZ) area to determine if anyone is missing. Administer first aid and seek medical attention as needed.

Winter Storms

1. When snow or ice storms are predicted for the project area, Site personnel should monitor weather conditions on a radio. A winter storm watch is issued when a storm has formed and is approaching the area. A winter storm warning is issued when a storm is imminent and immediate action is to be taken.
2. When a storm watch is issued, monitor weather conditions and be prepared to halt Site activities. Seek shelter in nearest building or Site trailer.

Attachment C.IV

Confined Space Entry Permit

Confined Space Entry Permit

SITE NAME/LOCATION/REF. NO.: Gratwick-Riverside Park Site
North Tonawanda, New York
Remedial Action O&M Activities

Work Activity: _____

Duration: Issue Date: _____ Time: _____ Filled Out by: _____

Potential Hazards:
(System Generated)

(Work Generated)

Confined Space Entry Permit

AIR MONITORING: PRE-ENTRY_____ PERIODIC_____CONTINUOUS_____

Date/Time	*By (Init)*	*%O_2*	*ppm CO*	*% LEL*	*Other Test Type*	*Result*

Isolation:

Purging Required: Yes ☐ No ☐ PURGING CONFIRMED:

Safety Tags Required: Yes ☐ No ☐

Ventilation Required: Yes ☐ No ☐

Continuous _____ Other _____

Emergency Rescue Equipment Required:

_____Communications Device
_____First Aid Kit
_____Stretcher/Backboard
_____Fire Extinguisher
_____SCBA
_____Other _____

_____Winch/Hoist
_____Harness with Lifeline (type)
_____PPE (type)
_____Lighting (type)

Confined Space Entry Permit

Personal Protective Equipment Required:

_____	Hardhat	_____	Respiratory Protection
_____	Safety Glasses		(type)
_____	Face Shield	_____	Coveralls
_____	Ear Plugs/Muff		Chemical Suits
_____	Emergency Escape Pack	_____	Rain Suits
_____	Lanyards	_____	Lifelines
_____	Gloves (type)	_____	
_____	Harnesses (type)	_____	
_____	Other	_____	

Additional Work Instructions:

Emergency Contact Phone No._____

Persons Entering Confined Space (Print Name)

_____	_____
_____	_____
_____	_____
_____	_____

Standby Person Required: Yes ☐ No ☐ (Print Names)

_____	_____

Confined Space Entry Permit

I have reviewed and met the requirements of this permit and expect that this work shall be done safely. Entrants have been instructed on the proper confined space entry procedures, requirements and conditions.

Entry Authorized By: _____ Date: _____

All work under this permit has been completed and all materials and entrants have been withdrawn from the confined space.

_____ _____

Attendant or Entrant Date

Attachment C.V

Lock Out Procedures

Contents

Control of Hazardous Energy

1. Introduction

This program shall be used by all on-Site personnel performing O&M activities to ensure that equipment being worked on is isolated from all potential hazardous energy sources and locked out or tagged out before any individual performs any servicing or maintenance activity where unexpected energization, startup, or release of energy could cause an injury. Energy sources can be electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy. This program establishes the minimum safety requirements to ensure the proper deactivation of moveable, electrically energized, pressurized equipment or systems prior to repairing, cleaning, adjusting, or performing similar work activities. This program complies with the requirements in 29 CFR 1910.147.

2.0 Definitions

Affected Employee:	An employee whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.
Authorized Employee:	A person who locks out or tags out machines or equipment in order to perform servicing or maintenance on that machine or equipment. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance covered under this section.
Capable of Being Locked Out:	An energy isolating device is capable of being locked out if it has a hasp or other means of attachment to which, or through which, a lock can be affixed, or it has a locking mechanism built into it. Other energy isolating devices are capable of being locked out, if lockout can be achieved without the need to dismantle, rebuild, or replace the energy isolating device or permanently alter its energy control capability.
Energized:	Connected to an energy source or containing residual or stored energy.
Energy Isolating Device:	A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: a manually operated electrical circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from all underground supply conductors, and, in addition, no pole can be operated independently; a line valve; a block; and any similar device used to block or isolate energy. Push buttons, selector switches and other control circuit type devices are not energy isolating devices.

Energy Source:	Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.
Hot Tap:	A procedure used in the repair, maintenance, and services activities which involves welding on a piece of equipment (pipelines, vessels, or tanks) under pressure, in order to install connections or appurtenances. It is commonly used to replace or add sections of pipeline without the interruption of service for air, gas, water, steam, and petrochemical distribution systems.
Lockout:	The placement of a lockout device on an energy isolating device, in accordance with an established procedure, ensuring that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.
Lockout Device:	A device that utilizes a positive means such as a lock, either key or combination type, to hold an energy isolating device in a safe position and prevent the energizing of a machine or equipment. Included are blank flanges and bolted slip blinds.
Normal Production Operations:	The utilization of a machine or equipment to perform its intended production function.
Servicing and/or Maintenance:	Workplace activities such as constructing, installing, setting up, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning, or unjamming of machines or equipment and making adjustments or tool changes, where the employee may be exposed to the *unexpected* energization or startup of the equipment or release of hazardous energy.
Setting Up:	Any work performed to prepare a machine or equipment to perform its normal production operation.
Tagout:	The placement of a tagout device on an energy isolating control, in accordance with an established procedure, to ensure that the equipment being controlled may not be operated until the tagout device is removed.
Tagout Device:	A prominent warning device, such as a tag and a means of attachment, which can be securely fastened to an energy isolating device in accordance with an established procedure, to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

3.0 Responsibilities

3.1 Responsibilities of the Project Manager

It is the O&M Project Manager's responsibility to communicate to the on-Site personnel performing O&M activities that it will be necessary to control hazardous energy as it relates to project activities.

3.2 Responsibilities of the Project Coordinator or Field Technician

It is the responsibility of the on-Site personnel to implement the following components of the Energy Control Program (ECP) as they relate to project activities:

i) That a proper Lockout/Tagout system is utilized for project activities.

ii) That full employee protection is achieved through the Lockout/Tagout system.

iii) That the proper energy control procedures are written out and followed during project activities.

iv) That the proper protective materials and hardware are available for project activities (i.e., locks, tags, chains, etc.).

v) Provide for periodic inspection of energy control procedures.

vi) Provide and/or ensure training so that the procedures of the ECP are understood and the knowledge and skills required for safe application, usage, and removal of the energy controls are acquired by all appropriate project personnel.

vii) Ensure that the energy isolation is performed by only authorized personnel.

viii) Ensure that notification has been given to affected persons of the application and removal of Lockout/Tagout devices.

ix) Submit any Contractor's or Subcontractor's ECP to the O&M Project Manager for review prior to initiating energy control procedures.

4.0 Sequence for Lockout/Tagout Procedure

1. The employee who is responsible for doing the work shall identify the work to be done.
2. Determine what energy sources and energy isolating devices are involved.
3. Obtain necessary locks, multiple lock adapters, tags, tools, and personal protective equipment.
4. Notify all affected individuals that a Lockout/Tagout is being implemented.
5. If the equipment is operating, shut it down by following the written energy control procedure.
6. Isolate each energy source (electrical, mechanical, air, hydraulic, etc.) from the equipment with the appropriate switch, valve, or other energy isolating device.
7. Lockout and tagout (subject to) the energy isolating devices - with one individually assigned lock per device for each individual who is to perform the work. The key must remain in the possession of the individual who applied the lock for as long as that individual is to be protected by that lock. Use tagout only where the equipment is not lockable.
8. Stored energy must be controlled (dissipated or restrained) by methods such as grounding, repositioning, blocking, bleeding down, etc.

9. Verify De-energization. After the equipment has been locked out and/or tagged out, and after ensuring that no personnel are exposed, the employee will take the following steps and any other necessary to verify de-energization and an effective Lockout/Tagout:

    i) Operate the push button or other normal operating controls to make certain the equipment will not operate. Caution: Return operating controls to neutral or "off" position after the test.

    ii) Before performing electrical work on a circuit, verify that the circuit is de-energized and all system components discharged by use of a voltage tester. First, verify voltage tester operation on a known source in accordance with the manufacturer's guidelines.

10. Restoring Equipment to Service. The Lockout/Tagout is to be removed by the individual who applied it unless it was transferred (to protect another individual) pursuant to established procedures. Before Lockout/Tagout devices are removed and energy is restored (either for testing or normal service):

    i) Ensure that tools and other servicing materials are removed.

    ii) Ensure that the equipment has been properly reassembled or otherwise returned to operational status.

    iii) Ensure that individuals who were working on the equipment are in a safe location outside the zone of operation.

Notify all affected individuals that the equipment is being returned to service.

5.0 Rules for Using Energy Control (Lockout/Tagout) Procedures

1. Double check Lockout/Tagout applications yourself.
2. Do not attempt to operate any switch, valve, or other energy isolating device bearing a Lockout/Tagout.
3. Immediately notify your supervisor of any problems or unusual situations that arise in performing energy control procedures.
4. Appropriate procedures must be followed to ensure the effectiveness of Lockout/Tagout protection during and following shift or personnel changes.

    In the event an individual leaves a job that is not complete and is relieved by another individual, the procedure is:

    i) The first individual is to remove his/her Lockout/Tagout.

    ii) The second individual is to install his/her Lockout/Tagout at the same time.

    Where this is not possible or practical:

    i) The first individual may transfer his/her key or assign (using an approved form completed and signed by the first individual) his/her Lockout/Tagout to the second individual.

    ii) The second individual will promptly update the Lockout/Tagout to identify himself/herself as the person responsible for the Lockout/Tagout.

5. In the event an individual fails to remove his Lockout/Tagout and cannot be located, and it is necessary to operate the equipment, the employee will be called at home to determine if it is safe to operate the equipment. In the event the employee cannot be located, the supervisor, accompanied by a second supervisor (if on site), may remove the Lockout/Tagout after having made a thorough

physical check of the machinery in question and completing and signing the Lockout Removal Record.

5.1 Lockout/Tagout Procedures Involving More than One Person

General Rule

1. If more than one individual is required to Lockout/Tagout equipment, each shall place his or her own personal Lockout/Tagout on the energy isolating device(s).

Special Rule

1. If it is not possible or practical for every individual working on a job to place his/her Lockout/Tagout on every piece of equipment covered by Lockout/Tagout, one designated person of a work crew, or a supervisor with the knowledge of the crew, may Lockout/Tagout equipment for the whole crew. In those cases, if the device is lockable, the designated individual will place his/her key (or keys if multiple devices are involved) in a group lock box and members of the crew must attach their locks to the lock box. It is the responsibility of the designated individual to carry out all steps of the lockout procedure and inform the crew when it is safe to work on the equipment. Additionally, the designated person may not remove a crew Lockout/Tagout until it has been verified that all individuals are safely removed.

5.2 Use of Energy Isolating Devices

1. Any energy sources not controlled by at least two control circuit devices must be controlled by a manually operated energy isolation device (electrical disconnect, circuit breaker, line valve, block, etc.).
2. This device must be in line of sight and under the control of the individual performing the work; otherwise it must be locked or tagged.

5.3 Stored Energy

1. Any stored energy not controlled by at least two control circuit devices or an energy isolating device must be released.

5.4 Energy Control for Testing or Positioning Activities

In some situations, equipment must be energized to test or position the equipment or its components. In those situations, Lockout/Tagout devices may be temporarily removed in accordance with standard Lockout/Tagout procedures provided the work is performed using alternative measures which provide effective protection and provided all unnecessary energy sources are locked out and tagged.

Appendix D

Standard Forms

List of Standard Forms

Form 1	Groundwater Sampling Equipment and Supply Checklist
Form 2	Groundwater Sampling • Completion Checklist
Form 3	Well Inspection Summary
Form 4	Groundwater Sampling • Well Purging Information Form
Form 5	Groundwater Sampling • Sample Collection Data Sheet
Form 6	Effluent Sampling Equipment and Supply Checklist
Form 7	Effluent Sampling • Completion Checklist
Form 8	Effluent Sampling • Field Information Form
Form 9	Effluent Sampling • Sample Collection Data Sheet
Form 10	Water Level Measurement Equipment and Supply Checklist
Form 11	Water Level Measurement • Completion Checklist
Form 12	Water Level Record
Form 13	Monthly Inspection Log
Form 14	Maintenance Record Log

GRATWICK-RIVERSIDE PARK SITE

GROUNDWATER SAMPLING EQUIPMENT AND SUPPLY CHECKLIST

EQUIPMENT:

- ☐ Well pump/power cable (spare)
- ☐ Generator
- ☐ Bailer(s) (1)
- ☐ Tubing
- ☐ Container for purge water (1)

INSTRUMENTS:

- ☐ Water level indicator (1)
- ☐ Thermometer *(1)
- ☐ pH meter *(1)
- ☐ Conductivity probe *(1)
- ☐ Turbidity meter (Nephlometer) (1)
- ☐ Other _____

* - or combination pH/cond/temp meter

SUPPLIES:

- ☐ Gasoline can/gas
- ☐ Polypropylene rope (1)
- ☐ Aluminum foil
- ☐ Paper towels
- ☐ pH buffer solution(s) (1)
- ☐ Conductivity standard solution(s) (1)
- ☐ Decontamination fluids
  - ☐ Deionized water
  - ☐ Hexane (pesticide grade)
  - ☐ Methanol (pesticide grade)
  - ☐ Nitric acid rinse
- ☐ Sample jars (extra) (1)
- ☐ Sample jar labels (1)
- ☐ Cooler(s)/ice packs/packing materials (1)
- ☐ Paper cups (1)
- ☐ Trash bags (1)
- ☐ Bailer brush
- ☐ Sample preservatives
- ☐ Disposable droppers
- ☐ Plastic spray bottles
- ☐ Plastic basin or pan (1)
- ☐ Polyethylene sheeting

PERSONAL PROTECTIVE EQUIPMENT:

- ☐ Tyveks (assorted sizes and types)
- ☐ Nitrile gloves (1)
- ☐ Hard hats/liner
- ☐ Field overboots
- ☐ Work gloves (cotton and chemical resistant) (1)
- ☐ Safety glasses/or side shields on OSHA-approved prescription lenses (1)
- ☐ First-aid kit
- ☐ Respirator
- ☐ Check Health and Safety Contingency Plan

DOCUMENTATION:

- ☐ Chain-of-Custody forms (1)
- ☐ Well logs (1)
- ☐ Notebook/Field book (1)
- ☐ Photolog
- ☐ Courier manifests
- ☐ Previous well logs/ previous historical well data
- ☐ Site map (1)
- ☐ O&M Plan (1)

MISCELLANEOUS:

- ☐ Well cap keys and Site access keys (1)
- ☐ Bolt cutters (1)
- ☐ Camera/film
- ☐ Knife (1)
- ☐ Spare batteries for instruments (1)
- ☐ Lock de-icer (winter)
- ☐ Reinforced packing tape (1)
- ☐ Custody seal tape (1)
- ☐ Pen/pencil/indelible marking pen (1)
- ☐ Tool box (1)
- ☐ Spare locks/keys

Completed by: _____ *Date:* _____

Note: (1) Applicable for Gratwick-Riverside Park O&M Activities as of March 2002.

FORM 1

GRATWICK-RIVERSIDE PARK SITE

GROUNDWATER SAMPLING • COMPLETION CHECKLIST

PRIOR PLANNING AND COORDINATION:

- ☐ Confirm well numbers, location and accessibility. (1)
- ☐ Review of project documents (i.e., QAPP, HASP, and sampling procedures in the O&M Manual), sampling QA/QC, and site-specific sampling requirements. (1)
- ☐ Historical well data; depth, pH, performance and disposition of purge water. (1)
- ☐ Site access notification and coordination.
- ☐ Coordinated with laboratory. (1)
- ☐ Procured, inventoried, and inspected all equipment and supplies. (1)
- ☐ Prepared, calibrated, and performed required maintenance on equipment. (1)

FIELD PROCEDURE:

- ☐ Instruments calibrated daily. (1)
- ☐ Sampling equipment decontaminated in accordance with the QAPP. (1)
- ☐ Initial well measurements logged. (1)
- ☐ Well volume calculated and specified volumes removed. (1)
- ☐ Purged water collected. (1)
- ☐ Specified samples and QA/QC samples taken per Quality Assurance Project Plan (QAPP). (1)
- ☐ Samples properly labeled, preserved, and packed. (1)
- ☐ Well was secured after completion of sampling. (1)
- ☐ Sample dates, times, locations and sample numbers recorded in applicable log(s). (1)
- ☐ Samples properly stored if not shipped/delivered to lab same day. (1)
- ☐ Samples shipped with complete and accurate Chain-of-Custody record. (1)

FOLLOW-UP ACTIVITIES:

- ☐ All equipment has been maintained, decontaminated, and returned. (1)
- ☐ Sampling information reduced and required sample keys and field data distributed. (1)
- ☐ Chain-of-Custody records filed. (1)
- ☐ Expendable stock supplies replaced. (1)
- ☐ Access keys and well cap keys returned. (1)
- ☐ Arranged disposal/treatment for purged water and decontamination fluids. (1)
- ☐ Confirm all samples collected. (1)

Completed by: _____ *Date:* _____

Note: (1) Applicable for Gratwick-Riverside Park O&M Activities as of March 2002.

FORM 2

GRATWICK-RIVERSDIE PARK SITE
WELL INSPECTION SUMMARY

PROJECT NAME: Gratwick-Riverside Park Site

INSPECTION CREW MEMBERS: _____ SUPERVISOR: _____

DATE OF INSPECTION: | | | | | | |
(MM DD YY)

Well I.D. Number	*Lock*	*Surface Seal*	*Protective Casing*	*Riser*	*Water Level (ft. BTOC)*	*Well Depth (ft. BTOC)*	*Other Comments*

Additional Comments: _____

_____

_____

FORM 3

GRATWICK-RIVERSIDE PARK SITE
GROUNDWATER SAMPLING • WELL PURGING INFORMATION

SITE/PROJECT NAME: Gratwick-Riverside Park Site

DATE: | | | | | | | (MM DD YY)

CREW MEMBERS: _____

SUPERVISOR: _____

PURGING METHOD: _____

WELL INFORMATION

WELL NUMBER: _____

WELL TYPE (diameter/material): _____

MEASURING POINT ELEVATION: _____

STATIC WATER DEPTH: _____ ELEVATION _____

BOTTOM DEPTH: _____ ELEVATION _____

WATER COLUMN LENGTH: _____

SCREENED INTERVAL: _____

WELL VOLUME: _____

Note: For 2" dia. well, 1 foot = 0.14 gallons (Imp.) or 0.16 gallons (US).
For 4" dai. well, 1 foot = 0.54 gallons (Imp.) or 0.65 gallons (US).

	1	2	3	4	5	TOT/AVG
VOLUME PURGED (total volume)						
FIELD pH						
FIELD TEMPERATURE						
FIELD CONDUCTIVITY						
CLARITY/TURBIDITY VALUES (NTU)						
COLOR						
ODOR						
COMMENTS						

I CERTIFY THAT SAMPLING PROCEDURES WERE IN ACCORDANCE WITH APPLICABLE PROTOCOLS

DATE PRINT NAME SIGNATURE

FORM 4

GRATWICK-RIVERSIDE PARK SITE
GROUNDWATER SAMPLING • SAMPLE COLLECTION DATA SHEET

PROJECT NAME: Gratwick-Riverside Park Site

INSPECTION CREW MEMBERS: _____ SUPERVISOR: _____

DATE OF INSPECTION: | | | | | | | |
(MM DD YY)

Sample I.D. Number	*Well Number*	*Well Volume (Gallons)*	*Volume Purged (Gallons)*	*Sample Time*	*Sample Description*	*Analysis Required*	*Chain-of-Custody Number*

Additional Comments: _____

_____

_____

FORM 5

GRATWICK-RIVERSIDE PARK SITE

EFFLUENT SAMPLING EQUIPMENT AND SUPPLY CHECKLIST

EQUIPMENT:

- ☐ Thermometer (1)
- ☐ pH meter (1)
- ☐ Turbidity meter (Nephlometer) (1)

PERSONAL PROTECTIVE EQUIPMENT:

- ☐ Nitrile gloves (1)
- ☐ Hard hat/liner
- ☐ Safety glasses/or sideshields on OSHA-approved prescription lenses (1)
- ☐ First-aid kit
- ☐ Respirator
- ☐ Check HASP

SUPPLIES:

- ☐ Paper towels
- ☐ pH buffer solution(s) (1)
- ☐ Decontamination fluids
  - ☐ Deionized water
  - ☐ Hexane (pesticide grade)
  - ☐ Methanol (pesticide grade)
  - ☐ Nitric acid rinse
- ☐ Sample jars (extras)
- ☐ Sample jar labels
- ☐ Cooler(s)/ice packs/packing materials (1)
- ☐ Trash bags (1)
- ☐ Sample preservatives
- ☐ Disposable droppers
- ☐ Plastic basin or pan
- ☐ Polyethylene sheeting

DOCUMENTATION:

- ☐ Chain-of-Custody forms (1)
- ☐ Notebook/Field book (1)
- ☐ Courier manifests
- ☐ Site map (1)
- ☐ O&M Plan (1)

MISCELLANEOUS:

- ☐ Site access keys (1)
- ☐ Lock de-icer (winter)
- ☐ Spare batteries for instruments (1)
- ☐ Knife (1)
- ☐ Duct tape (1)
- ☐ Reinforced packing tape (1)
- ☐ Custody seal tape (1)
- ☐ Pen/pencil/indelible marking pen (1)
- ☐ Tool box (1)

Completed by: _____ *Date:* _____

Note: (1) Applicable for Gratwick-Riverside Park O&M Activities as of March 2002.

FORM 6

GRATWICK-RIVERSIDE PARK SITE

EFFLUENT SAMPLING • COMPLETION CHECKLIST

PRIOR PLANNING AND COORDINATION:

- ☐ Review of project documents (i.e., QAPP, HASP, and sampling procedures in the O&M Manual), sampling QA/QC, and site-specific sampling requirements. (1)
- ☐ Site access notification and coordination.
- ☐ Coordinated with laboratory. (1)
- ☐ Procured, inventoried, and inspected all equipment and supplies. (1)
- ☐ Prepared, calibrated, and performed required maintenance on equipment. (1)

FIELD PROCEDURE:

- ☐ Instruments calibrated daily. (1)
- ☐ Sampling equipment decontaminated in accordance with the QAPP. (1)
- ☐ Temperature, pH, and turbidity logged. (1)
- ☐ Sampling details logged in appropriate field book and on field form. (1)

FOLLOW-UP ACTIVITIES:

- ☐ All equipment has been maintained, decontaminated, and returned. (1)
- ☐ Sampling information reduced and required sample keys and field data distributed. (1)
- ☐ Chain-of-Custody records filed. (1)
- ☐ Expendable stock supplies replaced. (1)
- ☐ Access keys returned. (1)
- ☐ Arranged disposal/treatment for decontamination fluids. (1)
- ☐ Confirm all samples collected. (1)

Completed by: _____ *Date:* _____

Note: (1) Applicable for Gratwick-Riverside Park O&M Activities as of March 2002.

FORM 7

GRATWICK-RIVERSIDE PARK SITE
EFFLUENT SAMPLING • FIELD INFORMATION FORM

SITE/PROJECT NAME: Gratwick-Riverside Park Site **LOCATION:** Effluent Sampling Port

FIELD MEASUREMENTS

SAMPLE DATE (MM DD YY)	SAMPLE TIME (HH mm)	INSTANTANEOUS FLOW (GPM)	TOTAL FLOW (Gallons)

NOTES:

FIELD COMMENTS

SAMPLE APPEARANCE: _____ ODOR: _____ COLOR: _____ TURBIDITY: _____

WEATHER CONDITIONS WIND SPEED _____ DIRECTION: _____ PRECIPITATION OUTLOOK (Y/N): _____

ADDITIONAL COMMENTS: _____

I CERTIFY THAT SAMPLING PROCEDURES WERE IN ACCORDANCE WITH APPLICABLE PROTOCOLS

FORM 8

DATE PRINT NAME SIGNATURE

GRATWICK-RIVERSIDE PARK SITE
EFFLUENT SAMPLING • SAMPLE COLLECTION DATA SHEET

PROJECT NAME: Gratwick-Riverside Park Site

SAMPLING CREW MEMBERS: _____ SUPERVISOR: _____

DATE OF SAMPLE COLLECTION: | | | | | | | | (MM DD YY)

Sample I.D. Number	Field pH	Field Temp.	Field Turb.	Instantneous Flow Velocity	Total Flow	Time	Sample Description & Analysis	Chain-of-Custody Number

Additional Comments: _____

FORM 9

GRATWICK-RIVERSIDE PARK SITE

WATER LEVEL MEASUREMENT EQUIPMENT AND SUPPLY CHECKLIST

INSTRUMENTS:

- ☐ Water level indicator (1)
- ☐ Steel Tape
- ☐ Plopper

SUPPLIES

- ☐ Foil
- ☐ Paper towels (1)
- ☐ Decontamination Fluids
  - ☐ Deionized water
  - ☐ Hexane (pesticide grade)
  - ☐ Methanol (pesticide grade)
  - ☐ Nitric acid rinse
- ☐ Trash bags (1)
- ☐ Plastic spray bottles (1)

PERSONAL PROTECTIVE EQUIPMENT:

- ☐ Tyveks (assorted sizes and types)
- ☐ Nitrile gloves (1)
- ☐ Hard hats/liner
- ☐ Field overboots
- ☐ Work gloves (cotton and chemical resistant) (1)
- ☐ Safety glasses/or side shields on OSHA-approved prescription lenses (1)
- ☐ First-aid kit
- ☐ Respirators
- ☐ Check HASP

DOCUMENTATION

- ☐ Well logs (1)
- ☐ Notebook/Field book (1)
- ☐ Photolog
- ☐ Previous well logs
- ☐ Site map (1)
- ☐ O&M Plan (1)

MISCELLANEOUS:

- ☐ Well cap keys and Site access keys (1)
- ☐ Bolt cutters (1)
- ☐ Camera/film
- ☐ Knife (1)
- ☐ Spare batteries for instruments (1)
- ☐ Lock de-icer (winter)
- ☐ Pen/pencil/indelible marking pen (1)
- ☐ Tool box (1)
- ☐ Spare locks/keys

Completed by: _____ *Date:* _____

Note: (1) Applicable for Gratwick-Riverside Park O&M Activities as of March 2002.

FORM 10

WATER LEVEL MEASUREMENT • COMPLETION CHECKLIST

PRIOR PLANNING AND COORDINATION:

- ☐ Confirm well numbers, location and accessibility. (1)
- ☐ Review of project documents (i.e., QAPP, HASP, and sampling procedures in the O&M Manual), sampling QA/QC, and Site-specific sampling requirements. (1)
- ☐ Historical data; depth, water level measurements. (1)
- ☐ Site access notification and coordination.
- ☐ Procured, inventoried, and inspected all equipment and supplies. (1)
- ☐ Prepared, calibrated, and performed required maintenance on equipment. (1)

FIELD PROCEDURE:

- ☐ Instruments calibrated daily. (1)
- ☐ Equipment decontaminated in accordance with the QAPP. (1)
- ☐ Initial well measurements logged. (1)
- ☐ Well was secured after measurements (if applicable). (1)
- ☐ Measurement dates times, locations and results have all been recorded in applicable log(s). (1)

FOLLOW-UP ACTIVITIES:

- ☐ All equipment has been maintained and returned. (1)
- ☐ Water elevation data is reduced and checked, and field data distributed. (1)
- ☐ Expendable stock supplies replaced. (1)
- ☐ Access keys and well cap keys returned. (1)
- ☐ Confirm all measurements taken. (1)

Completed by: _____ *Date:* _____

Note: (1) Applicable for Gratwick-Riverside Park O&M Activities as of March 2002.

FORM 11

GRATWICK-RIVERSIDE PARK SITE
WATER LEVEL RECORD

PROJECT NAME: Gratwick-Riverside Park Site

LOCATION: Wheatfield, New York

DATE: | | | | | | | | (MM DD YY)

CREW MEMBERS: _____

Observation Well	Time of Measurement	Top of Casing Elevation A	Depth to Water B	Water Level Elevation A-B
		feet	feet	feet

FORM 12

GRATWICK-RIVERSIDE PARK SITE
MONTHLY INSPECTION LOG

PROJECT NAME: Gratwick-Riverside Park Site

LOCATION: North Tonawanda, New York

DATE: ☐☐☐☐☐☐ (MM DD YY)

INSPECTOR(S): _____

	Item	*Inspect For*	*Action Required*	*Comments*
1.	**Perimeter Collection System/Off-Site Forcemain**			
☐	Manholes	- cover on securely		
☐		- condition of cover		
☐		- condition of inside of manhole		
☐		- flow conditions		
☐	Wet Wells	- cover on securely		
☐		- condition of cover		
☐		- condition of inside of wet well		
2.	**Landfill Cap**			
☐	Vegetated Soil Cover	- erosion		
☐		- bare areas		
☐		- washouts		
☐		- leachate seeps		
☐		- length of vegetation		
☐		- dead/dying vegetation		

FORM 13

GRATWICK-RIVERSIDE PARK SITE
MONTHLY INSPECTION LOG

PROJECT NAME: Gratwick-Riverside Park Site

LOCATION: North Tonawanda, New York

DATE: ☐☐☐☐☐☐ (MM DD YY)

INSPECTOR(S): _____

	Item	*Inspect For*	*Action Required*	*Comments*
2.	**Landfill Cap (continued)**			
☐	Access Roads	- bare areas, dead/dying veg.		
☐		- erosion		
☐		- potholes or puddles		
☐		- obstruction		
3.	**Wetlands (Area "F")**	- dead/dying vegetation		
		- change in water budget		
		- general condition of wetlands		
4.	**Other Site Systems**			
☐	Perimeter Fence	- integrity of fence		
☐		- integrity of gates		
☐		- integrity of locks		
☐		- placement and condition of signs		

FORM 13

GRATWICK-RIVERSIDE PARK SITE
MONTHLY INSPECTION LOG

PROJECT NAME: Gratwick-Riverside Park Site

LOCATION: North Tonawanda, New York

DATE: ☐☐☐☐☐☐ (MM DD YY)

INSPECTOR(S): _____

	Item	*Inspect For*	*Action Required*	*Comments*
4.	**Other Site Systems (continued)**			
☐	Drainage Ditches/ Swale Outlets	- sediment build-up		
☐		- erosion		
☐		- condition of erosion protection		
☐		- flow obstructions		
☐		- dead/dying vegetation		
☐		- cable concrete/gabion mats and riprap		
☐	Culverts	- sediment build-up		
☐		- erosion		
☐		- condition of erosion protection		
☐		- flow obstructions		
☐	Gas Vents	- intact /damage		
☐	Wells	- locks secure		
☐	Shoreline Stabilization	- condition of gabion mats and riprap		

FORM 13

MAINTENANCE RECORD LOG

PROJECT NAME: Gratwick-Riverside Park Site LOCATION: North Tonawanda, New York

CREW MEMBERS: _____

1. Date: | | | | | | | (MM DD YY)

   Time: | | | | | (HH mm)

   Scheduled/Unscheduled: _____

   Type of Maintenance Performed: _____

2. Company Performing Maintenance

   Name: _____

   Address: _____

   _____

   Contact Name: _____

3. Methods Used:

   _____

   _____

   _____

   _____

   _____

   Description of Material Removed:

   _____

   _____

   _____

   _____

   _____

   Problems/Comments:

   _____

   _____

   _____

   _____

   DATE INSPECTOR INSPECTOR'S SIGNATURE

FORM 14

Appendix E

Security System: Troubleshooting Instructions

®ADEMCO

Security System

ACCESS CODE: 2740

VISTA-10SE

THIS ISSUE INCLUDES THE NEW "QED" (QUICK ENROLLMENT OF DEVICES) PROCEDURE FOR 5800 SERIES TRANSMITTERS

Installation Instructions • Installation Instructions • Installation Instructions

N7227V4 4/97

Section 16. SYSTEM OPERATION

Security Codes

Installer Code

The installer programs the 4-digit Installer Code initially as part of the programming procedure. The factory default Installer code is "**4-1-1-1**", but may be changed in field *20. **Note:** The Installer Code is defined as User #1.

The Installer code is the only code that can allow re-entry into programming mode. In normal operation mode, only the Master code can be used to enter the User codes (refer to *Assigning the Master Code*).

See *MECHANICS OF PROGRAMMING* section in the **PROGRAMMING GUIDE** manual for details on exiting the programming mode via *98 or *99.

Assigning the Master Code

In normal operation mode, assign the 4-digit Master Code as follows:

Installer Code + 8 + 2 + 4-digit Master Code

Note: The Master Code is defined as User #2.

Changing the Master Code

In normal operation mode, the Master code can be changed by entering:

Master Code + 8 + 2 + New Master Code + New Master Code again

User Codes

In normal operation mode, the Master security code can be used to assign up to 4 secondary 4-digit security codes. It can also be used to remove secondary codes from the system (individually).

To assign (or change) a Secondary security code, enter *(via keypad)*:

Master Code + [CODE key] + User # (3–6) + desired 4-digit Secondary Code

The system will emit a single beep when each secondary code has been successfully entered.

To delete a Secondary security code, enter *(via keypad)*:

Master Code + [CODE key] + User # (3–6)

Notes:

- All Master and Secondary security codes permit access to the system for arming, disarming, etc.
- If a secondary code is inadvertently repeated for different users, the lower user number will take priority.
- Opening and closing reports are sent for the Master code as No. 02, with the appropriate subscriber number. Secondary user codes are sent as Nos. 3 through 6 respectively, with the appropriate subscriber number.

Duress Code

Important: This code is useful only when the system is connected to a central station.

This feature is intended for use when you are forced to disarm or arm the system under threat. When used, the system will act normally, but can silently notify the central station of your situation, if that service has been provided. The Duress code may be any 4-digit code assigned to User Number 8.

To program a Duress code:

1. Enter Master Code.
2. Press the CODE [8] key.
3. Press the [8] key again (8 = Duress code User No.).
4. Enter the desired 4-digit Duress Code. The keypad will beep once.
   Note: The Duress code must differ from the Master Code or any other User's Code.

To change the Duress code:

Repeat steps 1, 2, and 3, and then step 4 with the new Duress Code.

To delete the Duress code:

Perform steps 1, 2, and 3, and then stop. When the keypad beeps once it signifies that the code has been deleted.

Keypad Functions

General Information

Note that if you enabled QUICK ARM (field *21), the [#] key can be pressed instead of entering the security code, for any of the arming procedures (Away, Stay, Instant, Maximum, etc.). The security code is *always* required, however, when disarming the system.

NOTE: The "Quick Arm" feature will function only if the Master Code has been programmed (see *Assigning the Master Code* on the previous page).

The keypad allows the user to arm and disarm the system, and perform other system functions, such as bypassing zones, and display zone descriptors. Zone and system conditions (alarm, trouble, bypass) are displayed in the Display Window.

When an alarm occurs, keypad sounding and external sounding will occur, and the zone(s) in alarm will be displayed on the keypad. Pressing any key will silence the keypad sounder for 10 seconds. Disarming the system will silence both keypad and external sounders. When the system is disarmed, any zones that were in an alarm condition during the armed period will be displayed (memory of alarm). To clear this display, simply repeat the disarm sequence (enter the security code and press the OFF key) *again.*

The keypads also feature chime annunciation, and 3 panic key pairs, or individual panic keys (depending on keypad type – see *Panic Keys* on next page), for silent, audible, fire or personal emergency alarms. These keys can notify the central station of an alarm condition, if that service is connected.

Arming Functions

The following is a brief list of system commands. For detailed information concerning system functions, refer to the User's Manual.

Disarmed, Not Ready .....Before arming, the system must be in the READY condition (all zones must be intact). If the "NOT READY" message appears, press the READY [*] key to display faulted zones.

Arming Away ..... Enter code + AWAY [2].

Arming Stay ..... Enter code + STAY [3].

Arming Instant ..... Enter code + INSTANT [7].

Arming Maximum ..... Enter code + MAXIMUM [4].

Quick Arming ..... Simply press [#] key in place of code, then press
(if enabled) .....AWAY, STAY, INSTANT, or MAXIMUM to arm system as desired. Note that the [#] key cannot be used in place of code when disarming the system.

Disarming ..... Enter code + OFF [1].

Bypassing Zones ..... Enter code + BYPASS [6] + zone number(s).

Forced (Quick) Bypass ..... To automatically bypass all faulted zones, use
(if enabled) ..... the "Quick Bypass" method:
Enter code + BYPASS, then wait for all open zones to be displayed. Arm when display indicates "Bypass" and "Ready to Arm".

Chime Mode ..... Enter code + CHIME [9].
To turn chime off, enter code + CHIME again.

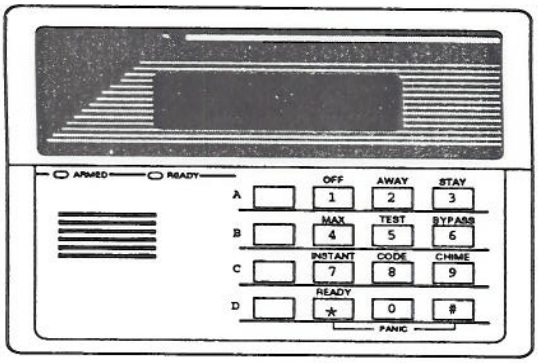
SUMMARY OF ARMING MODES

Arming Mode	Features for Each Arming Mode			
	Exit Delay	Entry Delay	Perimeter Armed	Interior Armed
AWAY	Yes	Yes	Yes	Yes
STAY	Yes	Yes	Yes	No
INSTANT	Yes	No	Yes	No
MAXIMUM	Yes	No	Yes	Yes

Panic Keys

There are three individual panic keys or, on some keypads, panic key pairs. If programmed, they can be used to manually initiate alarms and send a report to the central station.

Each key (or key pair) can be individually programmed for 24-hour Silent, Audible, Personal or Fire Emergency responses. The panic function is activated when both keys of the appropriate key pair are pressed at the same time, or the appropriate lettered key is pressed for at least 2 seconds.



Shown on the left is a typical keypad with individual Panic keys (shown lettered).

The panic functions are identified by the system as follows:

Keys	Displayed as Zone
[A], or [1] & [*]	95
[B], or [*] & [#]	7
[C], or [3] & [#]	96

Notes:

- Keys [A], [B], [C] are not on all keypads.
- Key [D], if present, is not active here.

Important: For the Silent Panic functions to be of practical value, the system must be connected to a central station.

4285 Phone module (if used)

Refer to the separate instructions supplied with the Phone module for information concerning its operating procedures.

Note: The Phone module **cannot** be used to add user codes in this system. User codes must be added by using a wired keypad.

Relay Outputs (if used)

If relay outputs are used, two keypad entries available to the user are included among the system operation choices (34 and 35) that may be programmed (see the *RELAY OUTPUTS* section). They can manually activate or de-activate the relay(s) for starting or stopping some action, such as turning lights on or off, etc.

These keypad entries are: **Security Code + [#] + [7]**
and **Security Code + [#] + [8]**

Note: Whichever entry is used to start/stop the action cannot also be used to stop/start it. The opposite action must either be performed by the other keypad entry or by some other event or operation offered in the programming section.

Exit Alarm Displays (if programmed)

- **A display of "CANCELED ALARM" or "CA" and a zone indication** will appear if an exit or interior zone contained a fault during closing at the time the exit delay ended (e.g., exit door left open), *but the system was disarmed during the entry delay time.* The alarm sounder and keypad sound continuously, but stop when the system is disarmed. No message will be transmitted to the central station.
- **A display of "EXIT ALARM" or "EA" and a zone indication** will appear if an exit or interior zone contained a fault during closing at the time the exit delay ended, *but the system was NOT disarmed during the entry delay time.* The alarm sounder and keypad sound continuously until the system is disarmed (or timeout occurs). An "exit alarm" message is sent to the central station.

(Continued)

- **The "EXIT ALARM" display, etc.** will also result if an alarm from an exit or interior zone occurs within two minutes after the end of an exit delay.

In any of the previous cases, use a second OFF sequence (code plus OFF key) to clear the display.

Trouble Conditions (See Troubleshooting Guide also)

General Information

The word "CHECK" on the keypad's display, accompanied by a rapid "beeping" at the keypad, indicates that there is a trouble condition in the system. The audible warning sound can be silenced by pressing any key. Instruct users to call for service immediately upon seeing any of the following messages.

"Check" and "Battery" Displays

- **A display of "CHECK" and one or more zone numbers** indicates that a problem exists with the displayed zone(s) and requires attention.
- A display of **"CHECK"** and **09** indicates that communication between control and a zone expander or wireless receiver is interrupted. Check the wiring and DIP switch settings on the units.
- **If there are wireless sensors in the system,** the CHECK condition may also be caused by some change in the environment that prevents the receiver from receiving signals from a particular sensor.
- **A display of "BAT"** (Fixed-word keypads) **or "SYSTEM LO BAT"** (Alpha keypads) **with no zone number** indicates that the system's main standby battery is weak.
- **A display of "BAT"** (Fixed-word keypads) **or "LO BAT"** (Alpha keypads) **with a zone number and a once per minute "beeping" at the keypad** indicates that a low battery condition exists in the wireless sensor displayed (zone "00" indicates a wireless keypad). If the battery is not replaced within 30 days, a CHECK display may occur.

  Note: Some wireless sensors contain a non-replaceable long-life battery which requires replacement of the entire unit at the end of battery life (e.g., Nos. 5802, 5802CP).

Power Failure

- **If there is no keypad display at all, and the POWER indicator (if present) is not lit,** operating power for the system has stopped and the system is inoperative.

  Note: The control panel will power up in its previous state (armed or disarmed) after a complete power failure, but will not retain any memory of bypasses.
- **If the message "AC LOSS"** (Alpha keypads) **or "NO AC"** (Fixed-word keypads) **is displayed, and the POWER indicator (if present) is off,** the keypad is operating on battery power only.

  Note: There is a random delay up to 48 minutes before the system will report an AC failure to the central station. The keypad response is about 6 seconds. The restore report has a random delay of up to 12 minutes (if the AC failure report was sent).
- **If the battery standby capacity is used up during a prolonged AC power outage,** the control's auxiliary power will shut down to minimize deep discharge of the battery.

Other Displays (Fixed Word displays are in parentheses)

Busy-Standby (dl). If this remains displayed for more than 1 minute, the system is disabled.

Modem Comm (CC) The system is in communication with the central station for change of function or status verification.

Comm. Failure (FC) A communication failure has occurred.

Open Circuit (OC) The keypad is not receiving signals from the control and sees an open circuit.

Long Rng Trbl (bF) Back-up LRR communication failure.

Section 17. TROUBLESHOOTING GUIDE

SYSTEM (including Wireless)

SYMPTOM	POSSIBLE CAUSE	REMEDY
1. Transmitter signal not received at 4281/5881.	1a. Transmitter or 4281/5881 not properly powered. 1b. If Transmitter is 5827/5827BD, house ID code not set in field *24, or transmitter not set to same house code set in that field. 1c. Transmitter located too for from 4281/5881. 1d. Metal shielding between transmitter and 4281/5881. 1e. Transmitter malfunctioning. 1f. 4281/5881 malfunctioning. 1g. Transmitter No. (zone) not programmed. 1h. 4281/5881 address incorrect. 1i. Field *22 not set properly.	1a Check or change transmitter's battery. Check the control's AC power. 1b. Check code switches inside transmitter. Must match with RF House Code programmed in control. 1c. Move transmitter or 4281/5881. 1d. Check for large metal obstructions, then relocate transmitter if necessary. 1e. Verify by activating 4281/5881 with another, similar transmitter. If O.K. now, return defective transmitter. 1f. Verify by making sure other transmitters cannot activate 4281/5881. If defective, replace and return original 4281/5881. 1g. Verify programming. 1h. Set DIP switch for address "0". 1i. Set field *22 to "1" for 4281 RF receiver, or "2" for 5881 RF receiver
2. Transmitter zone number appears during Go/NoGo test mode, but does not clear.	2a. Transmitter zone type (ZT) is set to 00 (Not Used). 2b. Transmitter battery not installed. 2c. 5700 System transmitter's DIP switch not set properly (house ID and transmitter ID). 2d. 5800 System transmitter serial No. not entered in system. 2e. With 5700 System, no response at all to *any* transmitter.	2a. Set ZT to a valid active zone type in field *56. 2b. Install proper battery. 2c. Check and set the DIP switch. 2d. Enter unit's serial No. in field *56. 2e. Check 4281 receiver.
3. Low Battery message on keypad.	3a. "Bat" or "System Lo Bat" (no zone Nos.) 3b. "Bat" or "Lo Bat" + "00". 3c. "Bat" or "Lo Bat" + "nn".	3a. System battery is low or missing. 3b. Remote RF keypad battery is low. 3c. Transmitter for zone "nn" has a low battery.
4. Periodic beep(s) from keypad.	4a. System is in TEST mode. 4b. A wireless transmitter low battery has occurred and is displayed. 4c. A supervision CHECK has occurred.	4a. Enter "Code" + OFF to exit TEST mode. 4b. Enter "Code" + OFF and replace the battery. 4c. Check the wireless transmitter indicated. Restore communication to the RF receiver to cancel the condition.
5. With 5800 RF System, no response to a transmitter in normal operation, although zone number clears during Go/NoGo mode.	Put control in TEST mode. If zone does not respond, try operating the tamper switch or another input to the transmitter. 5a. If another input causes the zone to be displayed, the wrong loop input was entered when programming. 5b. If no response at all from this transmitter, this physical transmitter has not been entered into the system. Go/NoGo display is being cleared by another unit programmed for this zone.	5a. Delete input's serial number (not the zone), and enter the proper loop input (see field *56). 5b. Determine which transmitter is programmed for this zone and reprogram as necessary.
6. Nuisance or phantom alarm.	6a. Sensors not properly installed, wired, or monitored. 6b. Universal transmitter (5715/5817) programmed wrong.	6a. Check installation to see if in accordance with established procedure. 6b. Check programming switches on transmitter.
7. Intrusion alarm for no apparent reason.	7a. Protected door or window opened while system armed. 7b. Improper user operation of exit/entry delays. 7c. Magnets located too far from switches, and/or doors and windows not properly aligned.	7a. Check with all occupants of protected premises. 7b. Check setting of entry delay . Exit delay is 15 seconds longer than the entry delay time. Remind user of same. 7c. Check all openings for proper switch and magnet orientation.

(Continued)

TROUBLESHOOTING GUIDE (continued)

SYMPTOM	POSSIBLE CAUSE	REMEDY
7. Intrusion alarm for no apparent reason. (continued)	7d. Magnetic contacts improperly connected or wire broken.	7d. Check wiring connections. Be sure wires are properly stripped and are tightly fastened to screw terminals.
	7e. Entry door programmed as "Instant"	7e. Check and revise programming. Re-program transmitter number.
	7f. Loose fitting door or window being rattled by wind or vibrations.	7f Mount magnet closer to magnet.
8. Repeated low battery signal.	8a. Transmitter located where temperature drops below 32°F.	8a. Change location. Use magnetic contacts to protect opening.
	8b. Poor quality or unspecified battery in transmitter.	8b. Check battery. Use only batteries specified in the instructions (does not apply to transmitters with non-replaceable batteries).
	8c. Transmitter malfunctioning.	8c. Replace faulty transmitter.
9. Local bell and keypad sound continuously after arming.	9. Exit or interior zone contained a fault at end of Exit Delay (e.g., Exit door left open). *The "Exit Alarm" display, etc. will also result if an alarm from an exit or interior zone occurs within two minutes after the end of an exit delay.* →	9a. If system disarmed *before* ensuing entry time runs out, "CA" or "Canceled Alarm" will be displayed. Sounding will stop.
		9b. If system *not* disarmed before entry time ends, "EA" or "Exit Alarm" will be displayed and Exit Alarm message will be sent to central station. Sounding will continue until system is disarmed or timeout occurs.
		Clear display by entering code + OFF a second time. Avoid fault when re-arming.

CONTROL

SYMPTOM	POSSIBLE CAUSE	REMEDY
1. "POWER" light off or "NO AC" displayed	1a. Interrupted AC power supply.	1a. Check transformer connection and power line circuit breaker.
2. Digital communicator message not being received.	2a. Control in TEST mode.	2a. Remove from TEST mode.
	2b. Telephone connection not secure.	2b. Check all connections.
	2c. Digital communicator malfunctioning	2c. Check with a different VISTA–10SE.
	2d. Telephone number in program needs prefix or access code.	2d. Program prefix or access code into the control
	2e. Telephone call to central monitoring station requires operator assistance.	2e. System cannot work in this situation.
3. Does not arm properly.	3a. READY light not on.	3a. Check for faulted zone(s) by pressing [*]; make faulted zone(s) intact, or use Bypass arming, if desired.
4. VISTA–10SE doesn't respond to keystrokes on keypad.	4a. "CC" or "MODEM COMM" displayed.	4a. System is in communication with downloader at central station. Wait until download session is finished.
	4b. "d1" or "System Busy" displayed.	4b. System has just been powered and is in its one minute initialization. To bypass this time, press '#' + '0'.
	4c. "E4" or "E8" displayed.	4c. More zones have been programmed than the zone expansion modules can handle. Delete some zones or use a higher capability RF receiver.
	4d. Keypad address setting incorrect.	4d. Keypads must be set for address 31 (non-addressable mode).

SMOKE DETECTOR

SYMPTOM	POSSIBLE CAUSE	REMEDY
1. Detector alarms, no apparent reason.	1a. Dust, dirt in sensing chamber.	1a. Clean unit's sensing chamber with vacuum cleaner per unit's instructions.
	1b. Improper location.	1b. See unit's instructions for locations to avoid. Relocate as necessary.
	1c. Unit malfunctioning.	1c. Replace detector.
2. Detector's siren sounds.	2a. Unit not receiving required power.	2a. Check for proper installation of battery. Try new battery.
	2b. Unit malfunctioning.	2b. Replace detector.

Appendix F

Auto Dialer: Maintenance and Troubleshooting Instructions

CHAPTER 5 - Maintenance/Troubleshooting

The *Series 1000* Dialer is built to require minimal maintenance. Only three items, the system battery, fuse, and internal clock, require your attention from time to time for your dialer to continue performing with no problems.

BATTERY: A battery in typical standby use will last approximately 2 to 4 years. Battery life is mostly dependent upon the number of power outages sustained and the age of the battery. A new battery should take no longer than 24 hours to gain full charge, capable of powering the system through a power outage of typically 6 hours. Battery backup time may vary by a few hours depending on your I/O module configuration; the battery backup time is proportional to the number and types of I/O modules you have installed in your dialer.

Check the System Battery by using a DC voltmeter to measure the open circuit (no-load) terminal voltage of the battery at room temperature (20 degrees Celsius). If the voltage is less than 12.5 volts, the battery has a residual capacity of less than 50%. If the voltage is less than 12.0 volts, the battery is completely worn out.

Refer to Chapter 2, ***Battery Connection***, for instructions on installing a new battery and adjusting the dialer's battery charging circuit.

ONBOARD CLOCK: After initially setting time and date, periodically check the accuracy of your dialer's onboard clock. It may run a couple of minutes fast or slow per month. In addition, you will have to set the time back/forward to correspond with Daylight Savings Time. The time can be conveniently reviewed and adjusted over the telephone by entering the touch tone command with the new time in 24-hour format (**060HHMM). Refer to Chapter 3, *Time and Date*, for additional explanation and examples.

An internal 3 Volt lithium cell maintains time/date when power to the dialer is removed. It has a capacity of approximately a year. If power to your dialer is to be removed for an extended period, consult the factory about removing an internal jumper to preserve battery energy.

FUSES: Consult the following table for fuse replacement. Blown fuses can be indicative of other problems. Verify field wiring and sensor electronics if replaced fuses blow repeatedly.

For:	Use the following:
Series 1000 Dialer	Littelfuse Micro 2A273 -- Microfuse 2A/125V
Grayhill Output Modules	Littelfuse Metric (5 X 20 mm) -- Use Amp/Volt rating of old fuse
Opto 22 Output Modules	Wickmann TR5 Sub-Miniature -- Use Amp/Volt rating of old fuse

TROUBLESHOOTING:

Symptom: **Voice data lost or clock and calendar lost.**
Cause: 3v battery replacement.
Cause: Jumper J14 on processor board not installed.

Symptom: **Unable to place telephone calls (Line LED comes on but no ring at called telephone number).**
Cause: Phone number not entered correctly.
Cause: Call being placed to different number/list than expected.
Cause: Phone line not plugged-in, phone line broken or in use.

Symptom: **Unable to program with local telephone even when Off Hook light is on.**
Cause: Incorrect command format (all commands begin with * or **). To clear out the message buffer at any time, press the '#' key.
Cause: Touch-tone phone must be used (listen for tones when keys are pressed).
Cause: Phone not plugged in correctly (local telephone must be plugged into PHONE jack, and OFF HOOK LED should be on).
Cause: Dialer off-hook placing call (LINE LED is on).
Cause: You hear 'System Ready', but are not able to get a response. Loud or semi-noisy environment: program from a remote phone or use a mute button on the local phone.

Symptom: **Not placing alarm call (Line LED does not come on at all) with Input channel in fault condition even though Power/Fault Indicator is blinking 50 On/50 Off.**
Cause: Local telephone is off-hook.
Cause: System or telephone disable timer set.
Cause: Intercall (Snooze or Call-spacing) delay set.
Cause: No valid telephone numbers to call for channels in alarm.

Symptom: **Not placing alarm call with Input channel in fault condition. Also, Power/Fault Indicator is still at a steady flicker.**
Cause: No faults are currently recognized by the dialer.
Check to see what the dialer thinks it is reading for this channel Type in ***c0** to listen to the channel's current condition.
If it says that the channel is **'Spare'**, the channel hasn't been programmed yet. It needs to be programmed (see Section **Configuring Input/Output Modules**).
If it says inproper input condition, need to check external Wiring, I/O Module Type plugged into the dialer channel, and Dialer Channel Type Programming (***c2**).
If it says the proper input condition, make sure the channel is properly set to being **Normally Open** or **Normally Closed** (***c2**, see Section **Configuring Input/Output Modules**)
Then, you need to check the channel's **Alarm Configuration** (***c8**). If set as 'None', no calls will be made from this channel. Need to set to **Call On Alarm** (****c82**).

Symptom: **Dialer is dead (Power LED is on steady, not flickering).**
Cause: Possible external damage or non-recoverable CPU error (Call Technical Support).

Symptom: **Dialer is dead (Power LED is off).**
Cause: Check power to dialer. Make sure it is wired properly to the dialer.
Cause: Possible external damage or Non-recoverable CPU failure (Call Technical Support).

Symptom: **MicroMax Surge Protector - Dialer is not responding locally and seemingly hangs up the call right after the first ring (Power LED is blinking).**

Cause: If you have a MicroMax surge protector on the line, the surge protector may be interfering with the dialer's operation. Possible Cure: Try unplugging the line connector from the dialer so it isn't connected to any device and then turn on and off the dialer a few times trying to get it to pick up locally (It may take a few times for it to work). If it still doesn't respond, try connecting the wall jack directly to the dialer and try cycling power a few times while trying to again connect locally. If none of this works, Call Technical Support.

Appendix G

Data Logger: Battery Replacement Procedures and Error Message Summary

1.3 PREVENTIVE MAINTENANCE

1.3.1 MAINTENANCE SCHEDULE

3-yearly Change battery

1.3.2 Changing the battery

The following procedure applies to recorders fitted with the replaceable coin-cell lithium battery (BR2330 or similar) available from the recorder manufacturer under part number PA261095. Such batteries have been fitted as standard since Status level T35 (November 1999). Recorders manufactured prior to this were fitted with a Nickel-Cadmium battery permanently mounted on a replaceable circuit board (Part No AH249860). If your recorder is fitted with such a board, it should be replaced with the new coin-cell board (AH261096), using kit LA261398. This kit contains full instructions for the replacement.

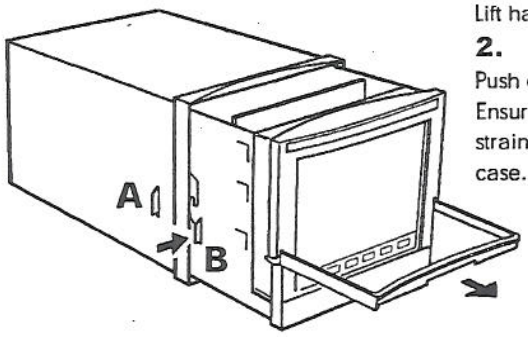
Configuration is retained during battery replacement. volatile values (e.g. time, date, totaliser and maths values) are also retained providing that the recorder has been powered for at least 1 hour prior to the start of the battery replacement procedure.

EQUIPMENT REQUIRED

In addition to normal Pozidriv and slotted-head screwdrivers, the following tools are required.

1. Plastic tweezers
2. 'Stubby' or 'offset' Pozidriv screwdriver (optional)

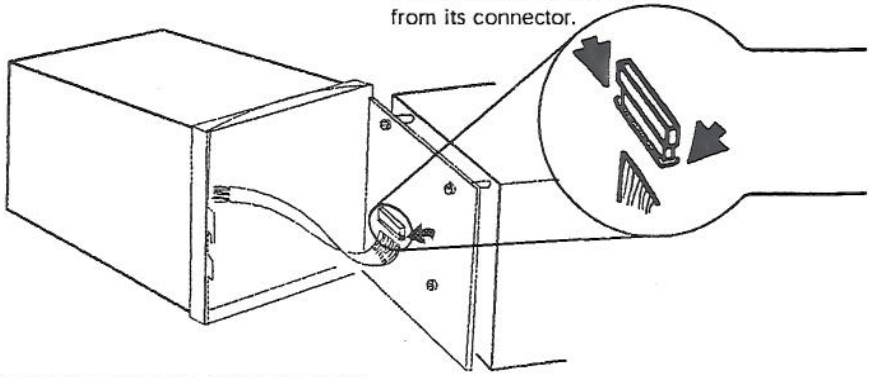
ACCESS TO THE BATTERY BOARD

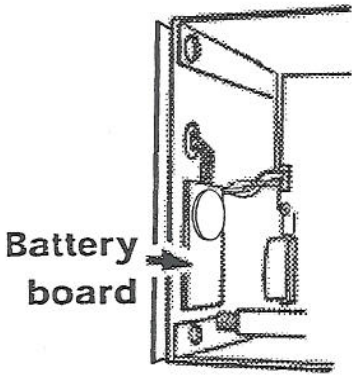


1.
Lift handle and pull until catch A engages

2.
Push catch 'B' in, to unlatch the chassis. Ensuring that the internal flexi-cable is not strained, pull the chassis gently out of the case.

3.
Gently push connector 'ears down to release the flexi-cable from its connector.





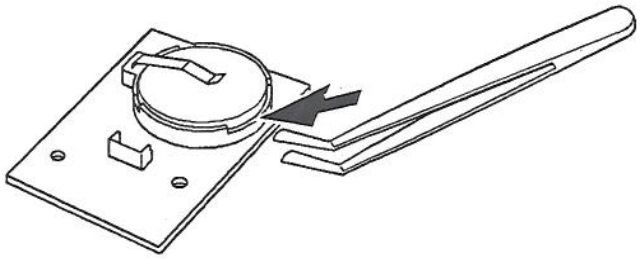
4.
Remove the chassis from the case, and remove the battery board by disconnecting the on-board connector and undoing the two screws.
(See the additional instructions below, if these screws cannot be accessed.)

Place the board on a non-conductive surface (there are no static-sensitive components on this board) and replace the battery as shown below.

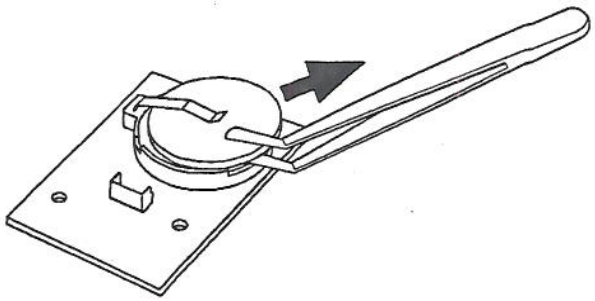
BATTERY REPLACEMENT

Once access to the board has been gained, this procedure is simply a matter of extracting the battery from its holder, as shown below, and pushing the replacement into place, ensuring correct polarity (+ to top),

A PLASTIC or other NON-CONDUCTIVE tool must be used to extract the battery. Use of metal tools will discharge the battery. Plastic tweezers, such as those shown below are available from electronics components distributors..



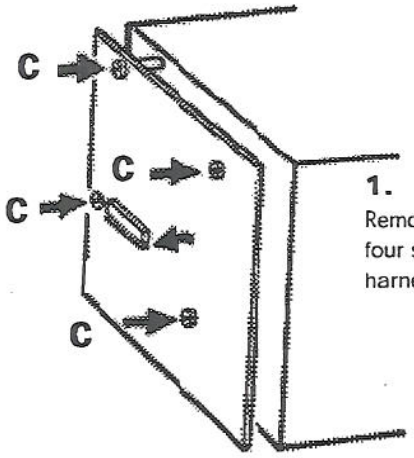
1.
Insert the PLASTIC tweezers (or other non-conductive tool.



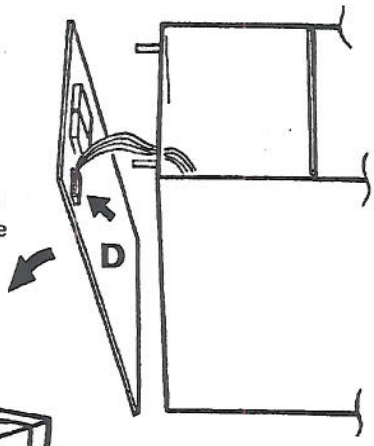
2.
Grasp the battery and pull it out of its holder

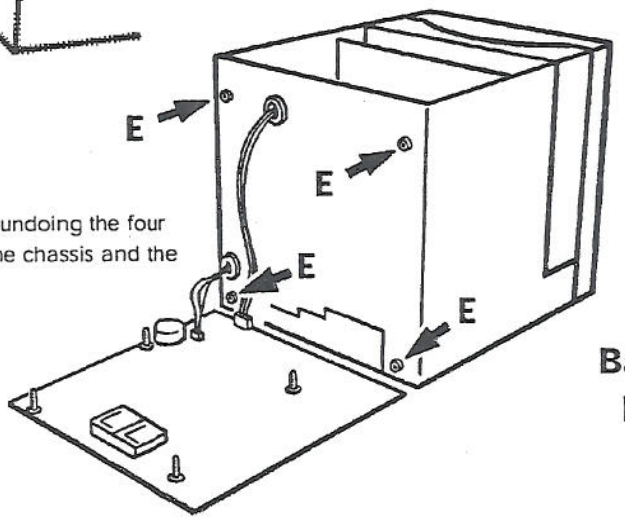
ACCESS TO THE BATTERY BOARD (Cont.)

If the battery board screws cannot be accessed, the back plate of the recorder can be removed as desribed below, and the battery replaced with the board in-situ.

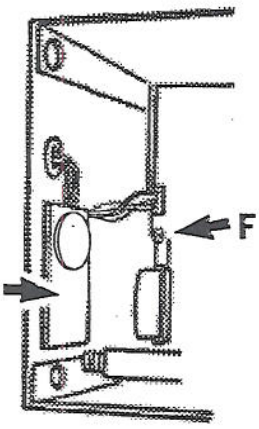


1.
Remove the SBC circuit board by removing its four securing screws (C) and disconnecting the harness connecror (D)





2.
Remove the backplate by undoing the four screws (E) at the rear of the chassis and the single screw (F) 'inside'.



6.8 OTHER INFORMATION

6.8.1 Error messages

In the event of an error occurring during disk use, a message will appear either for a few seconds, or until an associated 'CLEAR' key is operated. The following error messages are possible, if all disk/card options are fitted: Note that the word 'disk' is used for both floppy discs and hard drives ('PC Cards').

Bad filename	Disk reader fault
Directory empty	Disk read failure
Disk overdrive	Disk write failure
Disk changed	Disk data corrupted
Disk not formatted	Disk full
Disk not fitted	Disk worn - please replace
File write protected	Disk corrupt - please replace
Invalid disk change	

Though many of the above are self explanatory, the following information may be useful.

BAD FILENAME

Appears if non-usable characters (e.g. spaces, slash characters) are used when entering file names for configuration files. See section 6.7.1 above for the acceptable character set.

DISK CORRUPT - PLEASE REPLACE

This message appears when the disk is damaged to the extent that a write cannot be performed properly. In such cases, it is possible that some data has been lost. If the damaged area is in the system part of the disk, it might appear to the recorder to be unformatted, and the disk icon will disappear. The disk should be replaced immediately.

DISK OVERDRIVE

Data from the recorder is stored temporarily in an internal (buffer) memory, before being transferred to the disk. (This cuts down on the number of read/write operations performed on the disk, and thus increases its life.) Should the disk be unavailable for this transfer, the buffer memory will become full and 'overflow'. When this happens the Disk Over-drive' message is generated.

The disk might be unavailable because (for example) it is off line, it is damaged or, it is missing. Note that the disk can be switched off line for short periods by the Remote Operation Option (under user control) in order to maximise the MODEM transmission rate.

DISK WORN - PLEASE REPLACE

Appears when a number of attempts had to be made before a write to disk was successful. No data is lost, but it is recommended that the disk be replaced as soon as is practicable.

INVALID DISK CHANGE

This message occurs when the disk is removed without it's having been switched off-line first, and indicates the possibility that data has been lost.

Section 7 Reference

Contents

7.1 ERROR MESSAGES

See section 6.8.1 for Mass Storage Media error messages

BAD REMOTE CJ Temp

This message appears at any time if a channel measuring a remote temperature is OFF or is not generating a valid output. The message remains until cleared by the operator

BAT BACK RAM Cleared

This appears if the back-up battery has failed AND the unit has been switched off for more than 48 hours (typical) without a replacement being fitted. The battery maintains the real-time clock and supports the RAM which holds totaliser and counter values (if the Totaliser/Counter/Timer option is fitted).

BATTERY FAILURE

This message appears when the RAM support battery is no longer holding its charge and should be replaced.

CLOCK FAILURE

This message appears at power-up if

a. the clock has lost date or time (or the clock has never been set), or
b. if the battery is exhausted (see 'Bat Backed RAM Cleared' above) or
c. there is a hardware fault in the clock circuit.

The error is cleared by setting time and date.

DV RUN TIME ERROR

This is printed on the chart when a derived variable cannot calculate a value. Examples are if the divisor in a divide function passes through zero, or if the input value to a square root extraction function goes negative.

EEPROM DB DEFAULTED

This message appears at power up if any part of the database is found to be corrupt at power-up, and the database has been defaulted.

INPUT CHAN FAILURE

Input channel hardware fault, or if configured to use a remote CJ, the remote CJ is disabled or is not providing a suitable signal.

INVALID INDEX

This message appears if a channel / totaliser etc. number is entered which is greater than the maximum number of channels / totalisers etc. fitted.

INVALID CONFIG

This message appears if one part of the configuration conflicts with another e.g. if the linearisation type does not match the input type.

MODEM FAILURE

Occurs if:

a. Modem not fitted/powered-on
b. Wiring to Modem incorrect
c. Incompatible type of Modem in use
d. User-entered initialisation string not recognised.

7.1 ERROR MESSAGES (Cont.)

OUTPUT CH FAILURE

Output channel hardware fault

> RANGE

This appears whenever the value of the I/O signal lies above the currently selected hardware range.

< RANGE

This appears whenever the value of the I/O signal lies below the currently selected hardware range.

Appendix H

Magnetic Flow Meter: Troubleshooting Instructions

7 Trouble-shooting, Maintenance and Repairs

7.1 Response of the measuring system on faults or alarm

The Promag 33 distinguishes between two kinds of error:
- System error (failure): instrument failure, power failure
- Process error (alarm): empty pipe, measuring range exceeded

Errors which occur during normal operation are indicated on the display (see page 90).
The error response of the outputs is described in the following table.

Positive Zero Return *not* activated			
	Current output	**Pulse / Frequency output**	**Relay outputs 1 / 2**
No System / process error present	Measurement OK	Measurement OK	Switching response → see page 60, 61
System or process error present	Failsafe mode selectable (see page 51): MIN. CURRENT 0–20 mA → 0 mA 4–20 mA → 2 mA MAX. CURRENT 0/4–20 mA (25 mA) → 25 mA 0/4–20 mA → 22 mA HOLD VALUE Last valid measured value is held. ACTUAL VALUE Normal measured value output despite fault.	Failsafe mode selectable (see page 57): FALLBACK VALUE Signal → 0 Hz. Totalizer stops operating. LAST VALUE Last valid measured value is held. The totalizer operates with this value. ACTUAL VALUE Normal measured value is given despite fault, also with totalizer.	Switching response → see page 60, 61

Positive Zero Return *activated*			
	Current output	**Pulse / Frequency output**	**Relay outputs 1 / 2**
No system and process errors present	For 0–20 mA → 0 mA For 4–20 mA → 4 mA	Signal at the fallback value: → no signal output (0 Hz)	Relays 1 and 2 are live, i.e. energised
System error only present			
Process error only present			
System and process error present			

Positive Zero Return and Simulation

Caution!
Note the following points when measured value suppression or simulation is active:

Measured value suppression:
- This function has top priority. The appropriate status message "S. POSITIVE ZERO RETURN ACTIVE" is also displayed with priority in the HOME position. Any error messages which occur during this time can only be asked for and displayed with the aid of the diagnostic function.
- Measured value suppression sets all signal outputs to zero (corresponding to zero flow).
- Both relays are live, i.e. energised.

Simulation:
- This function has second highest priority, likewise the corresponding status message. Any error messages which occur during this time can only be asked for and displayed with the aid of the diagnostic function.
- Normal output of system errors via the alarm output (relay 1).
- Normal functioning of relay 1 or 2 as per configuration (see pages 60 and 61).

7.2 Trouble-shooting and remedy

All instruments undergo various stages of quality control during production. The last of these stages is the wet calibration carried out on state-of-the-art calibration rigs. The following summary helps to identify possible causes of error during normal measurement.

Warning!
This error diagnosis cannot be carried out with Ex instruments as they must be opened and thus the ignition protection type is no longer present.

Type of error	Remedy (Step 1 → 2 → ...)
Does a message indicating error, alarm or status appear on the display?	Appropriate measures can be carried out for every message: – Error messages **F: ....** → see page 90 – Alarm messages **A: ....** → see page 92 – Status messages **S: ....** → see page 93 For error messages it is possible to call up further sources of error via the diagnosis function (⊡⊡).
No display and no output signal.	**1** Check the power supply → Terminals 1, 2 **2** Check the fuse → see page 23, 24 85...260 V AC: 1 A slow-blow 20...55 V AC and 16...62 V DC: 2.5 A slow-blow **3** Replace electronics → see page 96
The display is blank, with outputs still functioning.	**1** Check the ribbon cable connector of the display module → see page 96 (No. 3b) **2** Replace display module → see page 96 **3** Replace electronics → see page 96
Display text is shown in a foreign or a language that is not understood.	Switch off the power supply. Switch on the instrument again while simultaneously pressing the ⊡ keys. The display text is then shown in English at maximum contrast.
No current or pulse output signals despite display showing measured values?	**1** Check the ribbon cable connector to the terminal compartment → see page 96 (No. 8) **2** Replace electronics → see page 96
Does the instrument show negative flow values although the fluid in the piping is flowing forward?	**1** Remote version → switch off the power supply, check the wiring (see page 26) and if necessary change round Terminals 41 and 42. **2** Change the setting in the function "FLOW DIRECTION" accordingly → see page 75
Is the display unsettled despite continuous flow?	**1** Check ground and potential equalisation → see page 28 **2** Check to see if air bubbles are in the fluid. **3** Increase the time constant for the current output → see page 51 **4** Increase the display damping for flow → see page 68

continued on next page

Type of error	Remedy (Step 1 → 2 → ...)
The display is pulsing or unstable, e.g. due to piston, hose or diaphragm pumps or those pumps with similar characteristics.	Carry out the following settings in the operating matrix: 1 Function DISPLAY DAMPING > 10 seconds 2 Function TIME CONSTANT > 5 seconds page 51 3 Function LOW FLOW CUTOFF = 0 page 72 4 Function NOISE SUPPRESSION = OFF page 72 5 Function MEASURING MODE = BIDIRECTIONAL page 75 6 Function AMPLIFIER MODE = MODE 2 page 76 If this does not produce satisfactory results, then, a pulse damper must be installed between the pump and the Promag.
Is there is a difference between the internal totalizer of Promag and the external counter?	This error occurs especially with back flows in the piping as the pulse output cannot "subtract" such flows. The following solutions are available: **Solution 1:** Negative flows are ignored, i.e. the display of the Promag or external counter show identical values → set function "MEASURING MODE" to "UNIDIRECTIONAL" (see page 75). **Solution 2:** Flows in both directions are registered. This requires an external counter or other evaluating unit to add or subtract the appropriate pulses (forward/reverse). Proceed as follows: 1 Fct. MEASURING MODE → BIDIRECTIONAL page 75 2 Fct. RELAY 2 FUNCTION → FLOW DIRECTION page 62 3 Connect the pulse output (Terminals 20/21 with HART; Terminals 26/27 with RS 485) to the input of the external counter. 4 Connect relay 2 (Terminal 24/25) to the flow direction input of the external counter. 5 *Negative flow direction* → The external counter is to be set so that the appropriate pulses are subtracted for negative flow (relay 2 is then de-energised). 6 *Positive flow direction* → The external counter is to be set so that the appropriate pulses are added with positive flow (relay 2 is then energised).
Is a low flow indicated despite standstill of the fluid and filled measuring tube?	1 Check ground and potential equalisation → see page 28 2 Check to see if air bubbles are in the fluid. 3 Activate "LOW FLOW CUTOFF" function, i.e. enter or increase the switch point value → see page 72
Is a measured value shown despite an empty pipe?	1 Carry out an empty or full pipe adjustment and then switch on the empty pipe detection function → see page 73 ff. 2 Check the following terminal connections: • Electronics: EPD cable → see page 96 (No. 5c) • Remote version: EPD cable → see page 26 (Terminals 36 and 37) 3 Fill the measuring tube.
The current output cannot be set to "0–20 mA".	In the function group COMMUNICATION, the function "PROTOCOL" must be set to "OFF" → see page 69

continued on next page

Type of error	Remedy (Step 1 → 2 → ...)
The current output signal is always 4 mA, whatever the flow signal.	In the function group COMMUNICATION, the function "BUS ADDRESS" must be set to "0" → see page 69
The error cannot be remedied or else there is another type of error. In such cases please contact your local E+H Service organisation.	The following solutions are possible: **Request an E+H service technician** The following information is required when contacting a customer service technician: – brief description of the error – order code given on the nameplate → see page 7, 8 **Repair** Note the procedures on page 97 ("Repairs") before returning the instrument for repair. Please state a brief description of the error on the delivery note. **Replacing the electronics** If a new electronic plug-in board is ordered, we require the full order code which can be taken from the instrument order structure: *Order structure (Promag 33)* **33** ____–_____  *Order code* **33 X MOD** – □□□□ *Electronic plug-in board* The last four places correspond to the order code on the nameplate of the transmitter → see page 7.

Error message (Failure)	Code	Cause (Call up by ⊡)	Remedy
F: SYSTEM ERROR AMPLIFIER	10	**: NO AMPLIFIER RESPONSE** Faulty data transmission between communication module and amplifier.	Replace electronics (see page 89, 96)
F: VALUE NOT ACCEPTED	17	The value entered was not correctly accepted by the amplifier.	1. Re-enter the parameter again. 2. Switch the power supply off and on again. 3. Replace electronics (see page 89, 96)
F: SYSTEM ERROR COM-MODULE	11	**: MODULE NOT COMPATIBLE** Communication module and amplifier are not compatible.	Replace electronics (see page 89, 96)
	12	**: EEPROM FAILURE** Error when accessing EEPROM data (process and adjustment data of the communication module).	Replace electronics (see page 89, 96)
	13	**: RAM ERROR** Error when accessing the main memory (RAM).	Replace electronics (see page 89, 96)
	14	**: ROM ERROR** Error when accessing the program memory (ROM).	Replace electronics (see page 89, 96)
	15	**: LOW VOLTAGE DETECTED** The voltage supplied by the DC/DC converter on the communication module is too low.	1. Check the power supply. 2. Replace electronics (see page 89, 96)
	16	**: VOLTAGE REFERENCE** Voltage reference of the communication module is out of tolerance, i.e. correct functioning of the current output is not assured.	Replace electronics (see page 89, 96)

Alarm message	Code	Cause	Remedy
A: EPD ADJUSTMENT VALUES MISSING	18	EPD is switched on, but no adjustment has taken place.	Carry out an EPD adjustment as per page 73 ff.
A: EPD ADJUSTMENT NOT POSSIBLE	19	EPD is switched on, but an adjustment is not possible because the conductivity of the fluid is outside the permissible range (too high or too low).	With such fluids, the EPD function cannot be used!
A: EPD ADJUSTMENT FULL = EMPTY	20	EPD is switched on, but an alarm message is displayed because the adjustment values for full and empty pipe are identical.	Repeat the EPD adjustment as per page 73 ff.
A: EPD ADJUSTMENT FULL <=> EMPTY	21	EPD is switched on, but an alarm message is displayed because the adjustment did not take place with full or empty pipe.	Repeat the EPD adjustment as per page 73 ff.
A: EMPTY PIPE DETECTED	22	The measuring tube is not completely full or may be empty.	Check the process conditions of your installation.
A: FLOW TOO HIGH	23	The fluid velocity in the measuring tube is larger than 12.5 m/s. The measuring range of the transmitter electronics is exceeded.	Reduce the flow rate.
A: CURRENT OUTP. TOO HIGH	24	The actual flow rate is too high for the scaled full scale value (I_{max} = 25 mA resp. 20,5 mA with NAMUR).	1. Scale higher full scale values (see page 49, 51) or 2. Reduce flow rate.
A: FREQ. OUTPUT OVERFLOW	25	The actual flow rate is too high for the scaled full scale value (f_{max} = approx. 163 % of f_{End}).	1. Scale a higher full scale value (see page 55) or 2. Reduce flow rate.
A: BATCH TIME EXCEEDED	26	The maximum time for a batching cycle has been exceeded.	1. Identify the cause for exceeding the time provided, e.g. a possible plant error (defective or blocked valve). 2. It may be necessary to increase the maximum batching time or to switch off the "MAX. BATCH TIME" function (see page 65).

Status message	Code	Cause	Remedy
S: POS. ZERO RET. ACTIVE	1	Measured value suppression active. This message has top priority for Promag 33.	–
S: CURRENT OUTP. SIMUL. ACTIVE	2	Current simulation active	–
S: FREQ. OUTPUT SIMUL. ACTIVE	3	Frequency simulation active	–
S: EPD ADJUSTMENT RUNNING	27	EPD adjustment in progress (full / empty pipe adjustment).	–
S: BATCHING IS RUNNINING	28	Batching in progress until the selected quantity has been discharged.	–

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