

Old Cortland County Landfill

**Town of Solon
Cortland County, New York**

Post-Closure Monitoring and Site Maintenance Plan

**October 2002
Revised June 2006**



Engineers • Environmental Scientists • Planners • Landscape Designers

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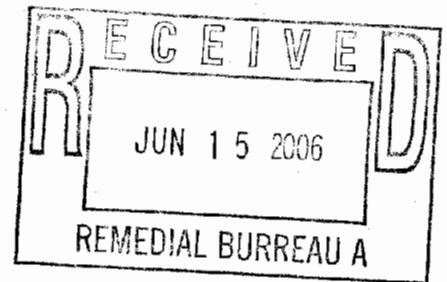


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Post-Closure Monitoring and
Site Maintenance Plan

Old Cortland County Landfill Closure

Town of Solon
Cortland County, New York



Prepared For:

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1.0 Introduction

The Post-Closure Monitoring and Maintenance Plan consists of two related monitoring programs:

- The Environmental Monitoring Program for groundwater, surface water and landfill gas, and the
- Site Maintenance Program.

The overall plan is to be administered through the Cortland County Department of Solid Waste. This plan is intended to serve as the guide for all monitoring and necessary maintenance activities at the closed Old Cortland County Landfill for a minimum of thirty years after closure.

1.1 Site Location

The Old Cortland County Landfill is located on the east side of abandoned Town Line Road in the northwest corner of the Town of Solon, approximately 5 miles northeast of the City of Cortland, New York. The landfill is part of a 539.9-acre parcel currently owned by Cortland County that encompasses the Old County Landfill, the Abandoned City of Cortland Landfill, the Buckbee-Mears Sludge Disposal Areas, the closed Pine Tree Landfill site and the active Cortland County Landfill. The lined Pine Tree Landfill site and the active County Landfill are not part of this specific monitoring program.

1.2 Training Requirements

All personnel that conduct intrusive on-site activities, (e.g., groundwater sampling, gas monitoring), shall have the OSHA 1910.120 40-Hour Hazardous Waste Operation Training Certification and current refresher course. This training will not be required for site workers responsible for general site inspections or for mowing the vegetative cover.

2.0 Environmental Monitoring Program

2.1 Location of Monitoring Points

Sixteen groundwater-monitoring wells were sampled during the remedial investigation of the Old Cortland County Landfill. Twelve of the monitoring wells were installed as part of the investigation, two locations were historically utilized to monitor the lined Pine Tree Landfill, and two locations were previously installed upgradient of the Old Cortland County Landfill. Seven of the locations exist as shallow monitoring wells installed within the uppermost overburden unit and nine exist as wells installed within bedrock. Surface water samples were also collected at five locations during the investigation.

Of the locations sampled during the initial investigation, thirteen groundwater-monitoring wells will be sampled as part of the post-closure monitoring program. Monitoring wells EB-1 (abandoned during cap construction), D-1 and DO-2 will not be sampled during post-closure monitoring. Locations D-1 and DO-2 were previously installed to assess the groundwater quality at the lined Pine Tree Landfill. Additional monitoring wells installed as part of the RI adequately monitor the area between the landfill and locations D-1 and DO-2. Therefore, locations D-1 and DO-2 will only be utilized as contingency monitoring points on an as-needed basis.

Surface water locations SW-1, SW-2 and SW-3 are currently sampled as part of the operation Cortland County Landfill west side extension monitoring program. Data acquired during this monitoring can be reviewed as necessary in conjunction with the post-closure monitoring reporting for the Old Cortland County Landfill. Surface water locations SW-4 and SW-5 monitor Maybury Brook, located approximately 1,500 feet east of the landfill site. Maybury Brook

is off-site, and these sampling locations are considered to be indicators of background surface water quality. These locations will not be monitored during the post-closure period unless deemed necessary as contingency monitoring points.

Figure 1 presents all locations to be utilized during post-closure monitoring. Table 2-1 summarizes those locations and associated monitoring units to be utilized as part of the post-closure monitoring program for the Old Cortland County landfill.

Table 2-1 Post-Closure Monitoring Locations		
	Overburden	Bedrock
Upgradient	CD-1	CD-1RA
Downgradient	MW-1A	MW-1B
	MW-2A	MW-2B
	MW-6A	MW-3A
	MW-7A	MW-3B
		MW-4A
		MW-5A
		MW-6B

2.2 Contaminant of Concern

The following table 2-2 is a listing of contaminants of concern identified within the DEC March 1999 Record of Decision. These constituents and corresponding matrices should be closely examined during post-closure monitoring and reporting activities to ensure they stay consistent with historical analytical data and do not develop any worsening trends within the groundwater/soil.

Table 2.2
Nature and Extent of Contamination

Media	Class	Contaminant of Concern	Concentration Range (ppb)	Frequency of Exceeding SCGs	SCG (ppb)
Groundwater	Volatile Organic Compounds (VOCs)	Benzene	ND to 6	2 of 32	0.7
	Inorganics	Arsenic	3 to 353	6 of 32	25
		Lead	4 to 454	5 of 32	25
Soils	Leachate Indicator	Chloride	ND to 269,000	NA	NA
		COD	ND to 4,000,000	NA	NA
		Ammonia	ND to 21,700	NA	NA
Leachate	VOCs	Xylene (total)	350 to 450	2 of 2	5
		Ethylbenzene	140 to 160	2 of 2	5
		Chlorobenzene	35 to 61	2 of 2	5
	SVOCs	Phenol	ND to 18	1 of 2	1
	Leachate Indicators	Chloride	1220 to 1260	2 of 2	250
		Ammonia	271 to 544	2 of 2	2
		Total Dissolve Solids	2370 to 3660	2 of 2	500
Media	Class	Contaminant of Concern	Concentration Range (ppm)	Frequency of Exceeding SCGs	SCG (ppm)
Sediments	Inorganics	Arsenic	5 to 28	3 of 6	6
		Chromium	16 to 31	2 of 6	26
		Copper	15 to 27	3 of 6	16
		Zinc	73 to 229	2 of 6	120
		Manganese	400 to 26,100	3 of 6	460

2.3 Sampling Schedule

Post-closure monitoring will be conducted quarterly at the designated groundwater and surface water sampling locations. Routine water quality analyses will be performed three times a year, and the additional sampling rounds will be analyzed for Baseline parameters. Table 2-3 presents the proposed schedule of water quality sampling during the next five years.

The established monitoring program will be evaluated at five year intervals.

Table 2-3 Post-Closure Sampling Schedule				
Year	1 st Quarter	2 nd Quarter	3 rd Quarter	4 th Quarter
2003	B	R	R	R
2004	R	B	R	R
2005	R	R	B	R
2006	R	R	R	B
2007	B	R	R	R
2008	NYSDEC Review			
Notes: (B) = 1998 Part 360 Baseline Analysis (R) = 1998 Part 360 Routine Analysis				

2.4 Sampling Procedures

2.4.1 Monitoring Well Sampling

Each monitoring well will be equipped with a dedicated bailer or bladder pump used both for well purging and for sample collection. The following sampling procedures should be used:

- Sampling will be conducted in sequence from upgradient/ background wells to the downgradient wells, or from the potentially least contaminated to the potentially most contaminated in order to minimize any cross contamination.
- Inspect each well for any visible damage to the well casing or surface seal. Immediately notify the landfill administrator if well damage is observed or suspected.
- Measure and record the groundwater level to the nearest 0.01-foot. The measuring device will be cleaned prior to initial use with a phosphate-free detergent (such asalconox), rinsed

thoroughly with distilled water and finally wiped dry with a clean paper towel. Groundwater levels should be compared to past levels as a check.

- Field personnel will put on new disposable gloves at each sampling location.
- Purge each well of at least three volumes of water or evacuate completely at least once, depending on the well hydraulics. The volume of water contained in a 2-inch cased well may be determined by multiplying the height of water column by a volumetric conversion factor of 0.163 gallons per foot of water column height. Periodic measurements of specific conductance, temperature and pH during purging can, on the attainment of stabilized readings, indicate that all stagnant water has been removed and replaced by fresh formation water. Evacuation methods must create the least possible turbidity in the well and should not lower the water level below the top of the sand pack when feasible.
- When purging a well with a dedicated bailer, the rope will not touch the ground. During well purging, the dedicated bailer will be carefully lowered just below the surface of the water, retrieved and emptied, etc. The same dedicated bailer will be used to obtain the sample.
- When purging a well with a dedicated bladder pump, the compressor engine exhaust should be positioned away from any open wells. The cycle and flow rate of the pumps should be adjusted to low flow conditions that create the least possible turbidity in the wells.

- After purging of the well, volatile organic samples must be collected first (when required).
- Measure and record the field-determined parameters: oxidation-reduction potential (ORP or Eh), specific conductance, temperature, turbidity, and pH. Measurement devices will be calibrated daily. Decontamination of meters will occur after each use. Also note the general sample appearance: color, sediment, immiscible components, and odor.
- Samples should be collected and containerized in the order of the volatilization sensitivity of the parameters. The general preferred order of collection is as follows:
 - Purgeable volatile organics
 - Total organic carbon (TOC)
 - Extractable organics
 - Total metals
 - Phenols
 - Cyanide
 - Sulfate and chloride
 - Nitrate and ammonia
 - Any other parameters
- Volatile organic sample bottles must be filled to capacity with no headspace for volatilization. Bottles must be gently filled, tightly capped, inverted and inspected. If any bubbles can be seen in the sample, the sample must be retaken. When a satisfactory sample has been obtained, it should be immediately chilled (4°C).

- The remaining sample containers should be filled leaving a ten percent void at the top of the container to prevent loss of preservatives and allow for potential expansion during transport.
- All sample containers and coolers will be supplied by the laboratory. Necessary preservatives will be pre-placed in the sample bottles by the laboratory.
- Pack the filled sample bottles in a cooler chest for transportation to the laboratory. All samples shall be shipped the same day they are obtained. Samples should be stored and transported at a temperature of approximately 4 degrees Celsius.
- Complete the field sampling data sheets, chain-of-custody form, and any other notes in the field-sampling logbook prior to leaving the site.
- All locations are to be cleaned up and the well locked before proceeding to the next well.

Field Sampling data sheets should be completed for each sampling locations. The sheets should include the measurements and observations outlined above and in Section 2.6. A sample Field Sampling Data Sheet is attached in appendix A.

2.4.2 Sample Preservation

To ensure the integrity of the water quality samples during transportation from the field to the laboratory, the USEPA guidelines for sample containers, preservatives and maximum holding times should be observed. All requirements are summarized in table 2-4.

Table 2-4
Sample Handling and Laboratory Guidelines

Parameter/Test Method	Preservation	Hold Time (Extraction)	Hold Time (Analysis)
TKN	H ₂ SO ₄ , pH<2; Chill at 4°C	--	28 days
Ammonia	H ₂ SO ₄ , pH<2; Chill at 4°C	--	28 days
Nitrate	Chill at 4°C	--	48 hours
COD	H ₂ SO ₄ , pH<2; Chill at 4°C	--	28 days
BOD ₅	Chill at 4°C	--	48 hours
TOC	H ₂ SO ₄ or HCl, pH<2; Chill at 4°C	--	28 days
Solids (TDS)	Chill at 4°C	--	Immediate
Sulfate	Chill at 4°C	--	28 days
Alkalinity	Zero Headspace – Do Not Open; Chill at 4°C	--	14 days
Phenols	H ₂ SO ₄ , pH<2; Chill at 4°C Glass Container	--	28 days
Chloride	None	--	28 days
Bromide	Chill at 4°C	--	Analyze ASAP
Hardness	None	--	NA
Color	Chill at 4°C	--	48 hours
Boron	Chill at 4°C	--	--
Metals	HNO ₃ , pH<2	--	6 months
Cyanide	Chill at 4°C, NaOH, pH<2 (0.6g Ascorbic Acid)	--	14 days
Chromium VI	Chill at 4°C	--	24 hours
Mercury	HNO ₃ , pH<2	--	28 days
Method 8080	Chill at 4°C, Glass Container Teflon Liner	5 days (VTSR)	40 days
Method 8150	Chill at 4°C, Glass Container Teflon Liner	5 days (VTSR)	40 days
Method 8260	Chill at 4°C, Glass Container Teflon Liner	--	7 days (VTSR)

2.5 Water Quality Analyses

All of the scheduled baseline and routine water quality analyses will be performed in accordance with the 1998 NYSDEC 6 NYCRR Part 360 Regulations. The values for field determined physical and chemical parameters (i.e., specific conductance, temperature, pH, ORP-Eh and dissolved oxygen) will be reported to the analytical laboratory when samples are submitted, and both sets of data (field and laboratory parameters) will be included on the analytical report. All laboratory analytical data will be reported in accordance with NYDSEC Analytical Services Protocol (ASP) guidelines.

2.5.1 Leachate Sampling

One leachate seep was observed south of the Old Cortland County Landfill near a settling pond during the remedial investigation. Following capping of the landfill, leachate flow has not been observed. There is no leachate collection system installed as a component of this closure. Collection and analysis of the landfill leachate is therefore not necessary or possible. However, in the event that future leachate seeps with significant flow are observed during routine inspections, the leachate seep shall be sampled. Surface water and sediment samples shall be collected annually from the identified seeps during the period of predominate flow. Provisions shall also be made to repair the seep area in accordance with the Site Maintenance Plan presented in Section 3.

2.5.2 Volatile Organic Gas Monitoring

A total of 31 volatile organic gas-monitoring locations were sampled downgradient of the Old Cortland County Landfill as part of the remedial investigation. With the exception of one reading, all soil gas measurements were below 3 ppm, often considered within the range of

"background" values with respect to the use of direct-read photoionization detectors (PIDs). It was concluded in the Remedial Investigation Report that there is not a definable soil gas (volatile organic vapor) "plume" associated with areas of groundwater contamination downgradient from the Old Cortland County Landfill. Subsequent volatile organic gas monitoring is therefore not required.

2.5.3 Explosive Gas Monitoring (Methane)

A post-closure gas-monitoring program will be initiated at the Old Cortland County Landfill to document the presence of any decomposition gases (primarily methane). The methane gas surveys will be conducted semi-annually during sample collection site visits. Ideally, the gas survey will be conducted when the ground is frozen or wet, and wind velocities and atmospheric pressure are low.

A portable methane gas detection instrument will be utilized to take gas readings at each of the designated groundwater monitoring points included as part of the post-closure monitoring program. The exposed ends of the monitoring points will be sealed with parafilm tape at least one hour prior to taking the explosive gas reading. This will allow gases that are normally vented to accumulate in the well's headspace. A sample explosive gas monitoring log is attached in appendix B. The parafilm tape will be punctured and the gas meter probe will be immediately inserted into the gas monitoring location for direct readings.

If methane gas concentrations at a specific location are detected greater than 25 percent of the Lower Explosive Limit (L.E.L.), the results will be documented in the field and then evaluated regarding potential action during the preparation of the post-closure monitoring report.

2.6 Documentation and Reporting

2.6.1 Water Quality Sampling Records

A field logbook or field sampling sheet must be maintained as a written record of the sample collection process at each monitoring point. The following minimum information should be recorded (see appendix A):

- Project ID; sampling point ID; sampling personnel; date and time; weather conditions; sampling sequence.
- Well depth; casing diameter; reference datum; static water level; well volume; well condition.
- Purging method; purging time/duration; well recovery/recharge rate; volume purged.
- Sample withdrawal method; sampling time; number and type of containers; field measured parameters; sample filtration; sample appearance/field observations.
- Sample storage and transportation method; delivery date and time; analytical parameters requested.

Each sample bottle should be legibly and indelibly labeled with the following minimum information:

- Sampling point ID; project ID; collection data and time; parameters requested (if space permits).

The delivery of samples to the analytical laboratory must be accompanied by a completed chain-of-custody record, on which the following minimum information should be recorded:

- Project ID; sampling point ID; collection date and time; parameters requested; number and type of containers; signature of collector; signature of persons maintaining custody; inclusive dates of possession.

2.6.2 Gas Monitoring Records

A field logbook or field sampling sheet must be maintained as a written record of the gas monitoring. The following minimum information should be recorded (see appendix B):

- Project ID; sampling point ID; sampling personnel; date and time; weather conditions including wind velocity and barometric pressure; sampling sequence, and reading in Lower Explosive Limit (L.E.L) or percent gas.

2.6.3 Quality Control

The analytical laboratory must be ASP/CLP certified by the DOH's Environmental Laboratory Approval Program (ELAP), and must maintain and utilize proper analytical Quality Assurance/Quality Control (QA/QC) procedures.

All equipment used for field determinations must be calibrated at least daily prior to and after use. After use at each monitoring point, the probes and apparatus must be thoroughly cleaned and rinsed prior to contacting any water from the next sampling point.

2.6.4 Data Validation

Analytical results obtained throughout the implementation of this plan will be subject to third-party data validation on an annual basis to ensure that the resulting data were generated in accordance with the QA/QC guidelines specified by the NYSDOH ASP/CLP programs. Analytical data will be validated during one event per year when the Baseline analysis event is performed. Validation deficiencies, if any, will be provided to the contract laboratory so data in subsequent reports will be consistent with QA/QC guidelines. The third-party data validation contractor will be pre-approved by the County's consultant and selected prior to the initial sampling event. The selected validator will be required to document his/her qualifications to meet the NYSDEC specifications and criteria for validation.

2.6.5 Monitoring Reports

The semi-annual monitoring report will consist of the field sampling data sheets or transcriptions from the field logbook for each monitoring point, the field inspection form, the chain-of-custody record, and the laboratory analysis report. The latter should include:

- Project ID; sample point ID; sampling data and time; date of analysis, analytical results including field-determined parameters.

All analytical and field data will be reviewed and compiled in a database of historical results. Excursions over applicable NYSDEC Part 703 water quality standards or guidance values will be evaluated and presented. Field observations of leachate seeps and other cap concerns and or deficiencies will be included as well.

In addition, an annual summary report will be prepared as part of the Fourth Quarter report. Observations as to well access and maintenance conditions will be noted, and recommendations for any necessary improvements will be made. Conclusions will also be drawn about the status of the site and the general groundwater quality.

2.7 Contingency Water Quality Monitoring

In the unlikely event that groundwater or surface water quality demonstrates a significant statistical variance from the historical water quality or exhibits the presence of leachate indicators which have been historically absent or present at low levels, all of the affected monitoring points will be re-sampled following review and/or recommendations by NYSDEC and the County's water quality consultant.

3.0 Post-Closure Site Maintenance Activities

Following closure, specific maintenance activities will be performed routinely to monitor the integrity of the landfill cover system. There are no planned uses for the landfill property during the post-closure period. The following section identifies the maintenance activities:

3.1 Routine Inspections

Routine inspections should be performed on the landfill site to identify any problems that might have developed with the cap system, drainage system and gas vent system. This inspection should also identify the presence of any vectors on the site. Since the site will remain a closed landfill with limited access, the inspection will be performed at the same time as the semi-annual water quality-sampling round associated with the Environmental Monitoring Program during the Second and Fourth Quarters of each year. A sample inspection form is attached in appendix C.

3.2 Cap System

Problems with the landfill cap could include cracking, settlement, erosion or loss of vegetation in the cover soils on the top of the landfill or on the sideslopes. If the cover soils contain cracks or settlements, the barrier layer (i.e., geomembrane) should be exposed to determine if it is still operational. If this layer has been damaged, it should be repaired prior to replacing the cover soils and reseeded. All activities associated with the repair of the barrier layer (e.g., construction, testing) will be performed under the supervision of a licensed professional engineer. Any erosion in the cover soil should be repaired by replacing the eroded soil and compacting it prior to re-establishing the vegetative

cover. Any loss of vegetation should be repaired by reseeding, fertilizing and mulching the unprotected area. In order to prevent excessive vegetative growth which may damage the barrier layer, the vegetative cover should be mowed bi-annually.

3.3 Drainage System

The drainage system inspection should identify any erosion of the ground surface in the area of the toe of slope where water discharges from the soil drainage layer. Additionally, all perimeter swales, downchutes and culverts should be inspected to ensure proper performance. All eroded areas should be repaired and reseeded to prevent additional erosion.

3.4 Gas Venting System

Inspection of the gas venting system should include checking the vents for any physical damage or plugging, and checking the cap adjacent to the vents for any settlement. All plugs or clogs in the vents should be cleared, and any damaged vents should be repaired or, if necessary, replaced.

3.5 Vectors

The presence of any vectors on the site should be identified. If vectors are identified, actions will be taken to remove them from the site.

3.6 Access Roads

All access roads should be inspected quarterly for signs of erosion or excessive wear, and reported to the County Solid Waste Department for repairs.

3.7 Emergency Contacts

The following is a list of emergency contacts applicable to health, safety and environmental emergencies and/or issues:

Owner's Contact: Donald R. Chambers (607) 756-8852
(Cortland County)

Engineer's Contact: Paul Dudden, P.E. (315) 457-5200
(Barton & Loguidice, P.C.)

NYSDEC Region 7: Jim Burke, P.E. (315) 426-7400

Cortland County Health
Department: (607) 753-5035

Personal Injury, Accident or Fire: 911
(Emergency)

Appendix A

Field Sampling Data Sheet

FIELD SAMPLING DATA SHEET

SITE: _____

SAMPLE LOCATION: _____

CLIENT: _____

JOB #: _____

Weather Conditions: _____

Temp: _____

SAMPLE TYPE: Groundwater ☐
Sediment ☐

Surface Water ☐ Other (specify): _____
Leachate ☐

WATER LEVEL DATA

Static Water Level (feet)*:	
Measured Well Depth (feet)*:	
Well Casing Diameter (inches):	
Volume in Well Casing (gallons):	

*depth from measuring point

Measuring Point: Top of Riser ☐

Other (specify): _____

Measured by _____

Time: _____ Date: _____

PURGING METHOD

Equipment: Bailer ☐ Submersible Pump ☐ Air Lift System ☐
Bladder Pump ☐ Foot Valve ☐ Peristaltic Pump ☐
Dedicated ☐ Non-dedicated ☐

Volume of Water Purged (gallons):

Did well purge dry? No ☐ Yes ☐

Did well recover? No ☐ Recovery time: _____

SAMPLING METHOD

Equipment: Bailer ☐ Submersible Pump ☐ Air Lift System ☐
Bladder Pump ☐ Foot Valve ☐ Peristaltic Pump ☐
Dedicated ☐ Non-dedicated ☐

Sampled by: _____ Time: _____ Date: _____

SAMPLING DATA

Sample Appearance

Color _____ Sediment _____

Odor _____

Field Measured Parameters

pH (Standard Units)		Sp. Conductivity (umhos/cm)	
Temperature (F)		Eh-Redox Potential (mV)	
Turbidity (NTUs)		Dissolved Oxygen (mg/L)	

Samples Collected (Number/Type):

Samples Delivered to: _____ **Time:** _____ **Date:** _____

COMMENTS: _____

Appendix B

Explosive Gas Monitoring Log

Old Cortland County Landfill (Closed)

GAS SURVEY LOG

Instrument Model : _____

Barometric Pressure: _____

Wind Velocity (mph): _____

Temperature (F): _____

Location	Gas Reading (% vol.) or (% L.E.L.)	Comments
MW-1A		
MW-1B		
MW-2A		
MW-2B		
MW-3A		
MW-3B		
MW-4A		
MW-5A		
MW-6A		
MW-6B		
MW-7A		
CD-1		
CD-1RA		
	ND--None Detected	
Logged by: _____		Date: _____

Appendix C

Landfill Inspection Form

**LANDFILL WALKOVER
POST - CLOSURE INSPECTION FORM**

____ Quarter 20 ____

Site: _____
Client: _____
Proj.#: _____

Date: _____
Inspector: _____
Weather: _____

Site Security

Access Locked? _____

Perimeter Fencing? _____

Monitoring Wells

Well I.D.'s: _____

Well locks: _____

Surface Seals: _____

Gas Vents

Vent Conditions: _____

Maintenance Buildings

Condition (If Applicable): _____

Landfill Cap

Vegetation: _____

General Condition: _____

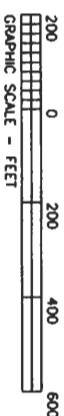
Additional Comments:

Figure 1

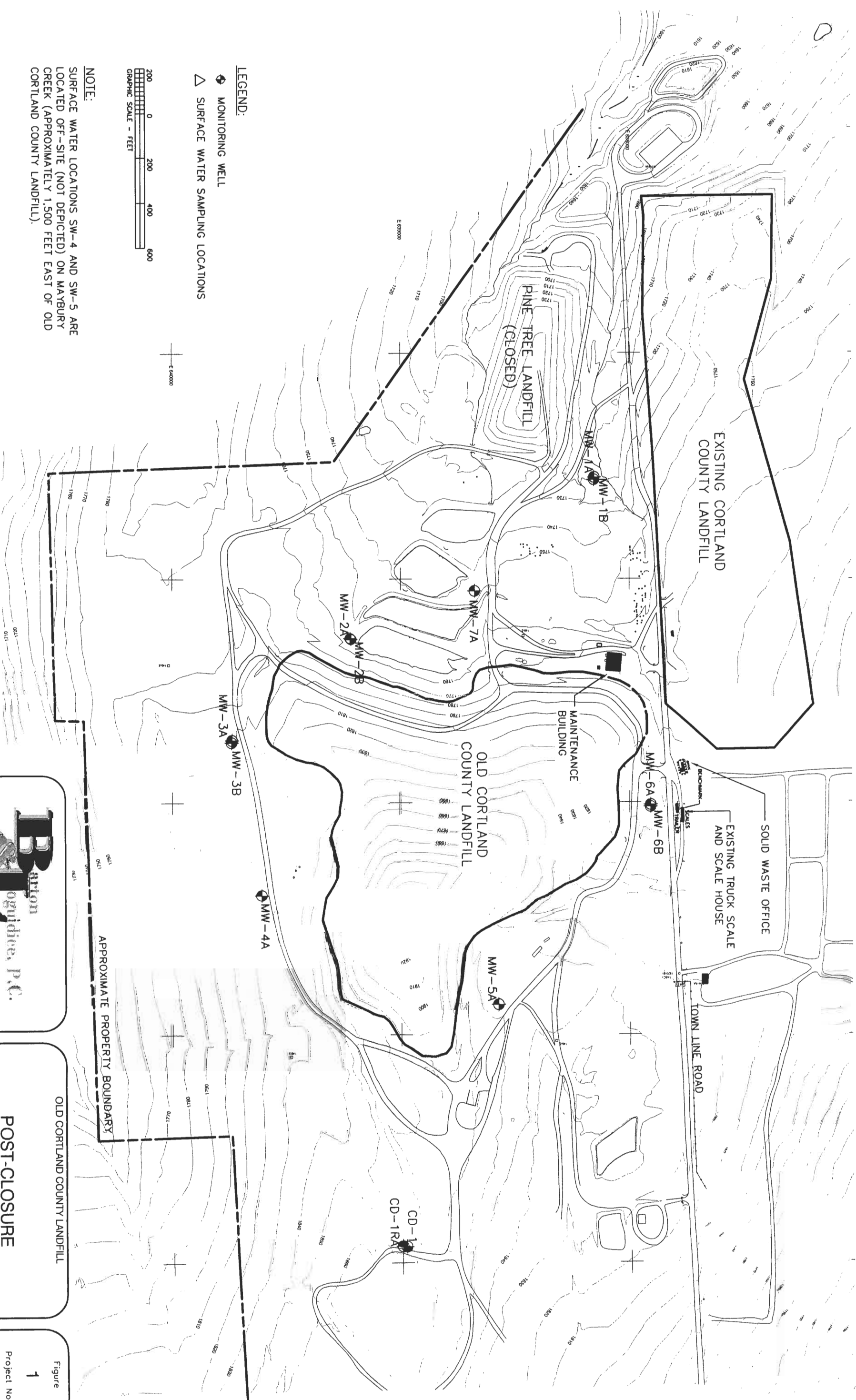
Post-Closure Monitoring Locations

NOTE:
SURFACE WATER LOCATIONS SW-4 AND SW-5 ARE LOCATED OFF-SITE (NOT DEPICTED) ON MAYBURY CREEK (APPROXIMATELY 1,500 FEET EAST OF OLD CORTLAND COUNTY LANDFILL).

- LEGEND:**
- MONITORING WELL
 - △ SURFACE WATER SAMPLING LOCATIONS



± E 640000



Barton
Consulting Engineers
P.C.

290 Elmwood Davis Road / Box 3107, Syracuse, New York 13220

**POST-CLOSURE
MONITORING LOCATIONS**

TOWN OF SOLOON

CORTLAND COUNTY, N.Y.

OLD CORTLAND COUNTY LANDFILL

Figure

1

Project No.

331.035