

**TOWN OF ISLIP  
SUFFOLK COUNTY, NEW YORK**

**SONIA ROAD LANDFILL  
WEST BRENTWOOD, NEW YORK  
SITE REGISTRY NO. 152013**

**POST CLOSURE MONITORING AND MAINTENANCE PLAN**

VOLUME 1 OF 4



**Dvirka and Bartilucci**  
Consulting Engineers

**Post Closure Monitoring and Maintenance Plan  
for the  
Sonia Road Landfill**

**Volume 1 of 4**

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October 2000

**POST CLOSURE MONITORING AND MAINTENANCE PLAN  
FOR THE  
SONIA ROAD LANDFILL**

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# Section 1



## **1.0 INTRODUCTION**

Sonia Road Landfill is located in the Town of Islip, Suffolk County, New York (see Figure 1-1). The capping/closure of the Sonia Road Landfill has been implemented because the landfill was identified by the New York State Department of Environmental Conservation (NYSDEC) from investigations done in 1994 as a Class 2 Inactive Hazardous Waste Site which poses a significant potential threat to the public health or environment and for which action is required. The Town of Islip has pursued the capping/closure of the landfill as a presumptive remedy consistent with the guidance offered by NYSDEC TAGM No. HWR-92-4044, Accelerated Remedial Actions at Class 2, Non-RCRA Regulated Landfills. This Post-Closure Monitoring and Maintenance Plan (PCMMP) has been prepared for the 30-year post-closure monitoring period following the closure of Sonia Road Landfill site.

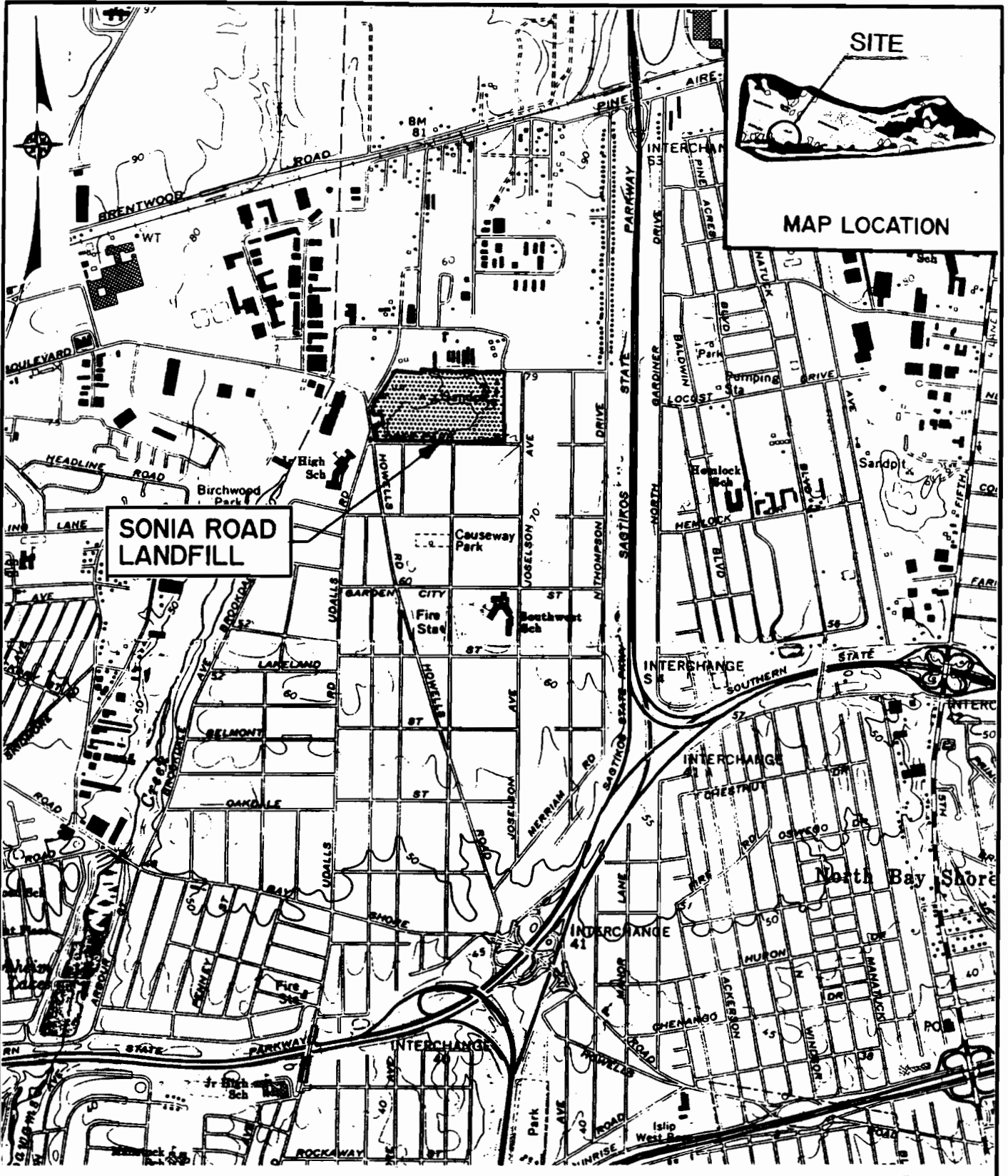
The Town of Islip is the owner of the Sonia Road Landfill. The Town of Islip Department of Environmental Control (TOIDEC) administers the site on behalf of the Town, and is responsible for the implementation of the requirements set forth in this Post Closure Monitoring and Maintenance Plan. The Islip Resource Recovery Agency, acting on behalf of the Town of Islip, has administered the design and construction of the landfill closure including the preparation of this Post Closure Monitoring and Maintenance Plan.

### **1.1 Site Background**

The Sonia Road Landfill site is NYSDEC Site No. 1-52-013. It is inactive and last received waste in the year 1977. The eastern half of the landfill last received waste in the early 1970s and by 1973-1974 had been converted to a local park. The western half of the landfill continued receiving wastes up until 1977. In the early 1980s, the use of the eastern half of the landfill as a local park was discontinued. Since that time, the site has not been utilized for a secondary purpose.

There are no surface waters on or contiguous to the site. The landfill is an unlined landfill, and the means to monitor leachate does not exist. The closure is in accordance with the Record of Decision (ROD) dated July 1998 (see copy of ROD-Appendix A).





SONIA ROAD LANDFILL

SITE LOCATION MAP

**db** Dvirka and Bartilucci  
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FIGURE 1-1

In the 20 plus years since active landfilling was discontinued, natural vegetation had established itself over what was a thoroughly disturbed and filled site.

The site was categorized as a generally flat to mildly sloping site. The eastern half and the western half were separated by a berm roughly 15 feet in height representing the continued landfilling of the western half after the eastern half was converted to a park. The eastern half of the site was essentially flat with mild interior depressions. During periods of precipitation, these depressions accumulated surface water run-off and ponded the water until dissipated by percolation or evaporation.

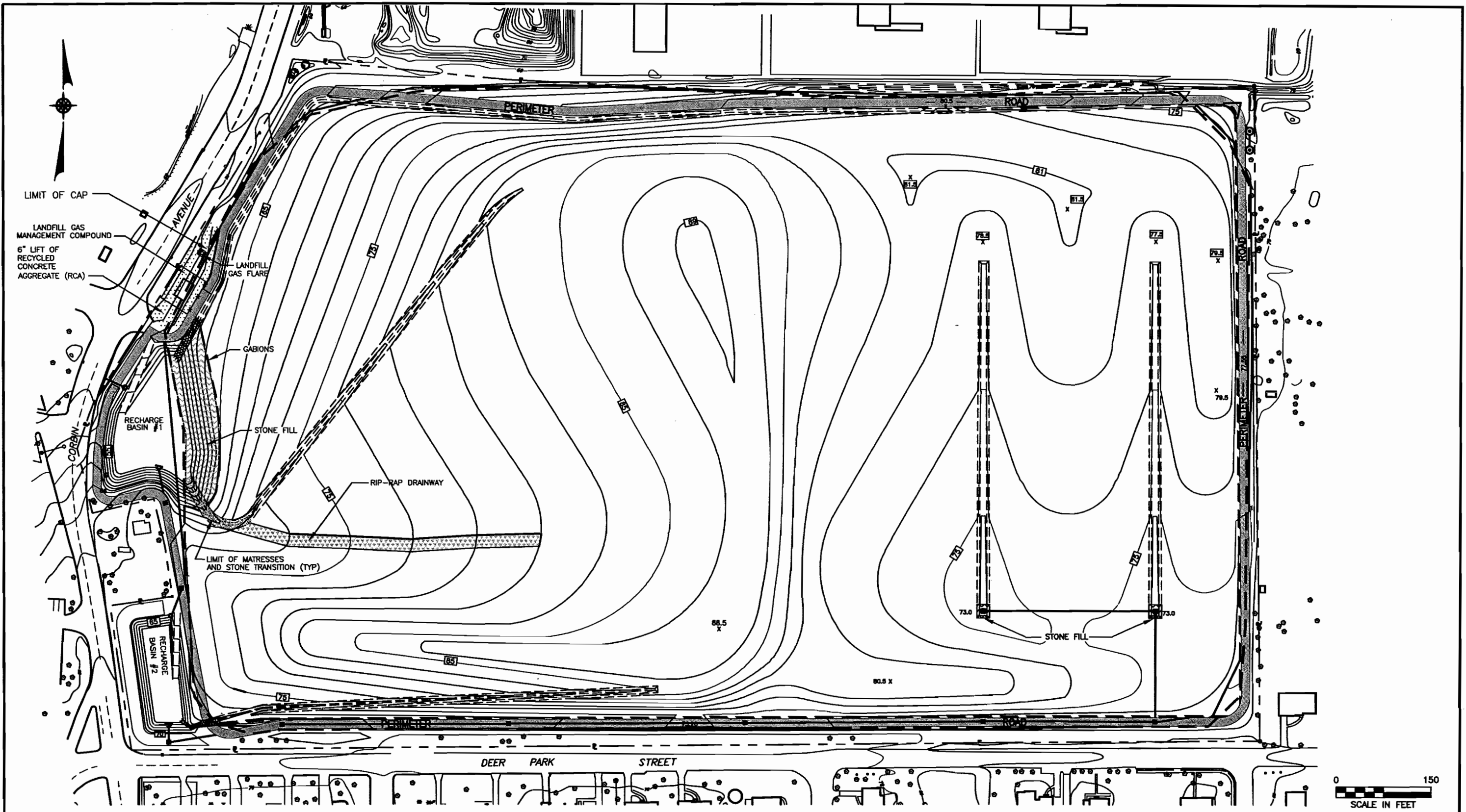
There were no structures or obvious features remaining on the eastern half, other than an asphalt area and a concrete pad, which reflected the use of this area as a park. The ground surface of the eastern half generally ranged in elevation from 76 feet AMSL to 69 feet AMSL with a mild, irregular slope from north to south and from west to east. The topography of the eastern half was punctuated by two screening berms located along the eastern and southern boundaries, and which served to limit the view of the landfill property from the adjacent residences.

The western half of the site was separated from the eastern half by a central ridge which rose approximately 15 to 18 feet to the higher western half. The western half was also mildly sloping from the center of the landfill towards the southwest and northwest corners of the property. A portion of the western half graded sharply to the north. Along the southern boundary of the western half, a screening berm existed to buffer the residential properties beyond Deer Park Street. There were no permanent features located on the western half to suggest that this area was used for secondary purposes after landfilling activity ceased.

## **1.2 Sonia Road Landfill Closure Design**

The current contour elevations and drainage characteristics of the Sonia Road Landfill (see Figure 1-2) reflect the intent of the design drawings, and the results of construction activities for closure/capping of the landfill. Closure construction was ongoing at the time of this plan. The eastern half of the landfill slopes gradually from west to east, with a high elevation of approximately

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SONIA ROAD LANDFILL  
POST CLOSURE MONITORING AND MAINTENANCE

### SITE MAP

ADAPTED FROM DESIGN  
DRAWINGS. SEE AS-BUILT  
DETAILS, DIMENSIONS,  
ELEVATIONS, ETC.

FIGURE 1-2

81.5 feet AMSL, and a low elevation of approximately 73 feet AMSL. There are two major drainage swales in the eastern half of the landfill which slope from north (high end) to south (low end) where each enters separate catch basins which then drain to Recharge Basin No. 2 through a new gravity storm water drain buried beneath the perimeter road along the south edge of the landfill.

At approximately the center of the landfill, the finished grade elevations rise sharply to an elevation of approximately 89 feet AMSL and slope gradually westward to an elevation of approximately 63 feet AMSL at the top of the gabioned slope for Recharge Basin No. 1. There is a riprapped drainage way in the south/central portion, and another drainage swale in the north portion, of the western half of the landfill which join and enter Recharge Basin No. 1 over a Reno mat downchute. There are also two other drainage swales in the western half of the landfill, one along the north perimeter road, and one along the south perimeter road which enter Recharge Basin No. 1 and Recharge Basin No. 2 respectively, over Reno mat downchutes.

Both Recharge Basin No. 1 and Recharge Basin No. 2 were constructed as part of the closure/capping activities and are located on the western boundary of the landfill property. A private parcel of land juts into the landfill property separating the two recharge basins. Recharge Basin No. 1 is the larger and more northerly of the two and is located at approximately the center of the landfill property on its east-west axis. Recharge Basin No. 2 contains a precast concrete overflow structure at its northern end that carries overflow to Recharge Basin No. 1. There is a precast concrete relief structure on the northwest side of Recharge Basin No. 1 that is connected to the existing storm sewer system for the Town of Islip for emergency discharge should the capacity of both recharge basins be exceeded as a result of extreme precipitation. Recharge Basin No. 1 also has the capability of accepting backflow from the Town's storm sewer system should it become surcharged from extreme precipitation events within its tributary area.

An active gas collection and gas monitoring system was constructed during the landfill closure/capping activities. A blower system actively collects landfill gases from 37 new gas recovery wells located throughout the landfill and discharges them to a new flare for destruction. There are an additional 17 landfill gas collection wells (i.e., perimeter collection system), located at relatively uniform intervals around the perimeter of the landfill, which are also connected to the gas

header system leading to the new landfill gas management facility. The blowers and flare are located in the Landfill Gas Management Compound on the western edge of the landfill to the north of Recharge Basin No. 1 and the current landfill entrance from Corbin Avenue. New gas monitoring wells, 17 in number, have been installed at relatively uniform intervals around the perimeter of the landfill in close proximity to the property line, and are to be sampled to determine if gas is migrating off-site.

There is an existing system of groundwater monitoring wells, consisting of 42 wells located both on-site and off-site, which were installed as part of the Remedial Investigation. All 42 Remedial Investigation wells in this groundwater monitoring array will be sampled for two rounds of baseline parameters in accordance with the procedures outlined in the Sampling and Analysis Plan (SAP) which can be found in Volume 3, Section 2. Following these sampling events, an analysis will be performed as to which wells should be incorporated into the Final Groundwater Monitoring Well Array for the site. An appropriate amendment will be made to this Post-Closure Monitoring and Maintenance Plan and the Sampling and Analysis Plan to reflect the final well array.

The perimeter road is continuous and encompasses the entire Sonia Road Landfill site.

There are no surface waters or mapped wetlands on or immediately adjacent to the landfill property. Access to the site is limited by a perimeter chain link fence located at or in close proximity to the site property line.

The final cover for the Sonia Road Landfill was designed to: (1) support vegetation and landscaping; (2) protect the hydraulic barrier layer (i.e., the geomembrane) from physical damage; (3) restrict precipitation from infiltrating the landfill environment (waste mass); and (4) provide monitoring, and active recovery and collection, of the landfill gases. The capping system installed consists of the following, from the surface downward:

- Topsoil Layer: A six (6) inch surface layer of uncompacted soil capable of supporting vegetation;

- Barrier Protection Layer (Type II): A twelve (12) inch layer of clean general fill mixed with wood mulch/wood chips;
- Barrier Protection Layer (Type I): A twelve (12) inch layer of clean general fill;
- Geocomposite Drainage Layer: A fabricated composite consisting of a geosynthetic (polyethylene) drainage layer (geonet) core with a nonwoven geotextile (8 oz./sq. yd., polyethylene) permanently bonded to each side of the geosynthetic drainage layer;
- Geomembrane Cap: The high-density polyethylene (HDPE) geosynthetic liner was placed below the geocomposite drainage layer. The geosynthetic liner is a 60-mil textured HDPE flexible geomembrane;
- Gas Venting Layer: The gas venting layer consists of twelve (12) inches of natural sand with a minimum coefficient of permeability of  $1 \times 10^{-3}$  cm/sec. Active gas collection laterals (lateral extensions of the landfill gas recovery wells) were placed within the sand to collect gas from this layer and the vertical component of the landfill gas recovery wells were extended vertically downward into the waste materials to collect gases generated there.
- Prepared Subgrade: The prepared subgrade surface serves as the graded and compacted surface upon which the veneered layers of the capping system are sequentially constructed. The prepared subgrade surface was achieved through a combination of activities which included: excavation of municipal solid waste in areas of cut, relandfilling of excavated municipal solid waste in areas of fill, and placement of contour grading material (general fill) to achieve the proposed subgrade contours. In areas where the depth of fill required to achieve subgrade elevations exceeded two feet, a six inch layer of compost overs (a byproduct from the Town of Islip Yard Waste Composting Facility) was placed in conjunction with the relandfilling of excavated municipal solid waste.

The above described capping system was constructed throughout the site, to the limits of cap, with the exception of the eastern sideslope area of Recharge Basin No. 1. The eastern sideslope of Recharge Basin No. 1 lies within the limits of waste. In order to mitigate the potential for impounded water to infiltrate the waste mass, a composite hydraulic barrier was designed and constructed. This composite system consisted of layered geosynthetics (60 mil textured HDPE geomembrane, geosynthetic clay liner (GCL) and 60 mil textured HDPE geomembrane) placed above the gas venting layer. The geocomposite drainage layer overlies the composite hydraulic barrier. Above the geocomposite drainage layer, a layer of fine stone fill is placed in lieu of the barrier protection and topsoil layers. The stone fill provides ballast to the geosynthetics. At the top

of the sideslope, a row of stone filled gabion baskets separates the areas with stone fill from the adjacent areas with soils above the geosynthetics.

The 60-mil textured HDPE cap material used on the Sonia Road Landfill was secured to the precast concrete drainage structures using a 2" x 1/4" stainless steel batten strip with 3/8" stainless steel cinch anchors around the periphery of each of the structures. Pipe penetrations of the liner were sealed using an HDPE pipe boot with a stainless steel band clamp to seal the pipe to the HDPE membrane liner.

### **1.3 Purpose and Scope**

The purpose of the Sonia Road Landfill Post-Closure Monitoring and Maintenance Plan (PCMMP) is to define the procedures for all personnel performing routine inspection, maintenance, or repair work on the Sonia Road Landfill following its closure. The PCMMP is based upon the site remaining in an as-built and fully passive state. Any change in use requires Town and NYSDEC approvals, and revision, update, and/or modification of this PCMMP. This PCMMP has been prepared in accordance with 6 NYCRR Part 360 requirements, and NYSDEC Division of Hazardous Waste Remediation guidelines for Development of an Operation, Maintenance and Monitoring Manual. The PCMMP is intended to ensure the following:

- Site is maintained effectively and efficiently
- Site is monitored for the prescribed parameters
- All parties are aware of the specific monitoring and maintenance needs of the site
- Provide a smooth transition of the site from the remedial action phase to the post closure monitoring and maintenance phase

The guidelines and procedures presented in the Sonia Road Landfill PCMMP are in general conformance with the 6 NYCRR Part 360 Requirements (effective September 1997) and are based on a review of site-specific information, including:

- Site visits
- Islip Resource Recovery Agency Sonia Road Landfill General Construction Contract (Contract No. IRRA 1-99)
- Islip Resource Recovery Agency Presumptive Remedy Final Closure Plan
- Remedial Investigation/Feasibility Study Reports
- Remedial Investigation Sampling and Analysis Plan (SAP)

This Sonia Road Landfill PCMMP includes the following information:

- Site inspection guidelines;
- Maintenance and repair procedures;
- Equipment Operations and Maintenance Manuals (Volume 4);
- A Sampling and Analysis Plan for groundwater (Volume 3);
- A Health and Safety Plan (Volume 2);
- A landfill gas monitoring plan;
- Personnel and equipment requirements;
- A contingency plan; and
- An annual cost estimate for implementation of the Post Closure Monitoring and Maintenance Plan.



# Section 2



## **2.0 SITE INSPECTION**

Following the closure of the Sonia Road Landfill, the site will be monitored in accordance with 6 NYCRR Part 360-2.15 criteria, as prescribed in the ROD (Appendix A). The first step in the monitoring process requires the inspection of the site at least four times a year, by qualified, trained landfill personnel. The Standard Inspection Report Form is presented in Appendix B of this Manual. In addition, inspections will also be performed after a specified rainfall event (5-year storm, or greater, as required by NYCRR Part 360). The location and extent of any damage discovered during an inspection will be noted on the standard inspection checklist form, along with any necessary additional information. Any irregularities found during these site inspections will be remediated according to the guidelines provided in Section 3 of this report. A copy of all the inspection reports will be maintained on-file in the offices of the TOIDEC, and included in the facility's annual report.

### **2.1 Cap Integrity**

A minimum of 30 inches of soil cover was placed over the geomembrane during the Sonia Road Landfill closure construction. A small area of the Sonia Road Landfill western sideslopes was covered with a geosynthetic clay liner sandwiched between two 60-mil HDPE textured geomembranes, which was then covered with fine stone filling, with gabion baskets at the top of the slope. This was done to stabilize the steep slopes and to isolate the buried waste materials which, in that area, are in close proximity to Recharge Basin No. 1 and the water that basin might contain after a storm event. Overland flow into Recharge Basin No. 1 could result in erosion if the typical 30 inches of soil cover was used in that area, and water that will collect in the recharge basin must be isolated from the adjacent buried waste to prevent leachate generation. Both the traditional cap and the gabion basket/fine stone filling/geosynthetic clay liner sandwich cap must be inspected to assure their continued integrity.

### 2.1.1 Soil Cover

The soil cover will be visually inspected for signs of erosion damage, settlement, cracking, vectors or waste breakthrough, vandalism, litter, and unauthorized dumping. Leachate seeps were not observed prior to cap installation and are not anticipated during the post-closure period. Erosion, settlement, or cracking of the cover soil will be considered damaging based upon whether the function of the final cover had been impaired in the affected area, e.g., ponded storm water. The minimum final cover thickness must be maintained at 30 inches.

The Town will perform visual observation to determine if settlement has occurred. The following will be noted on inspection logs:

- Visible debris or litter (housekeeping);
- Visible waste (indication of damage to the cap);
- Signs of unauthorized dumping or vandalism such as vehicular tracks or disturbed cover soil; and
- Evidence of surface leachate (indication of damage to the cap).

### 2.1.2 Vegetation

The cover soil of the Sonia Road Landfill cap was vegetated during the cap construction according to the seeding schedule approved through the submittal process. This seeding mix is suitable for maintenance, and is included in the Islip Resource Recovery Agency (IRRA) files for the construction submittal process. However, for small areas of repair (less than 5000 square feet) a retail seed mix of rye grass and fescues would be suitable for maintenance purposes. Inspections of this vegetation will be performed to monitor the vegetative growth and identify problem areas which require reseeding. The vegetative cover will be inspected for bare spots, dead species, and undesirable species. Bare or dead areas of vegetation will be further examined for the possibility of landfill gas, erosion, or vector damage. The apparent cause of any damage will be noted in the inspection report.

### 2.1.3 Composite Hydraulic Barrier/Fine Stone Filling

A geosynthetic clay liner was used in a small area of the cap system to replace the 30 inches of cover soil and allow placement of the geomembrane cap on a steep sideslope at the central western edge of Sonia Road Landfill. The cap in this limited area consists of a geosynthetic clay liner sandwiched between two 60-mil textured HDPE liners, and overlain with NYSDOT 620.02 (fine) stone filling. A series of three gabion baskets anchor this arrangement at the top of the slope. The gabion basket/fine stone filling/geosynthetic clay liner system will be inspected for structural integrity, signs of vandalism, bulging of the sides, or cutting/breakage of the wire fabric. Damaged or deteriorating gabion baskets, damaged geomembrane, instability of the system's structure, burrow holes or nests, and the apparent cause of any damage will be reported in the inspection logs.

### 2.1.4 Erosion Control Fabric

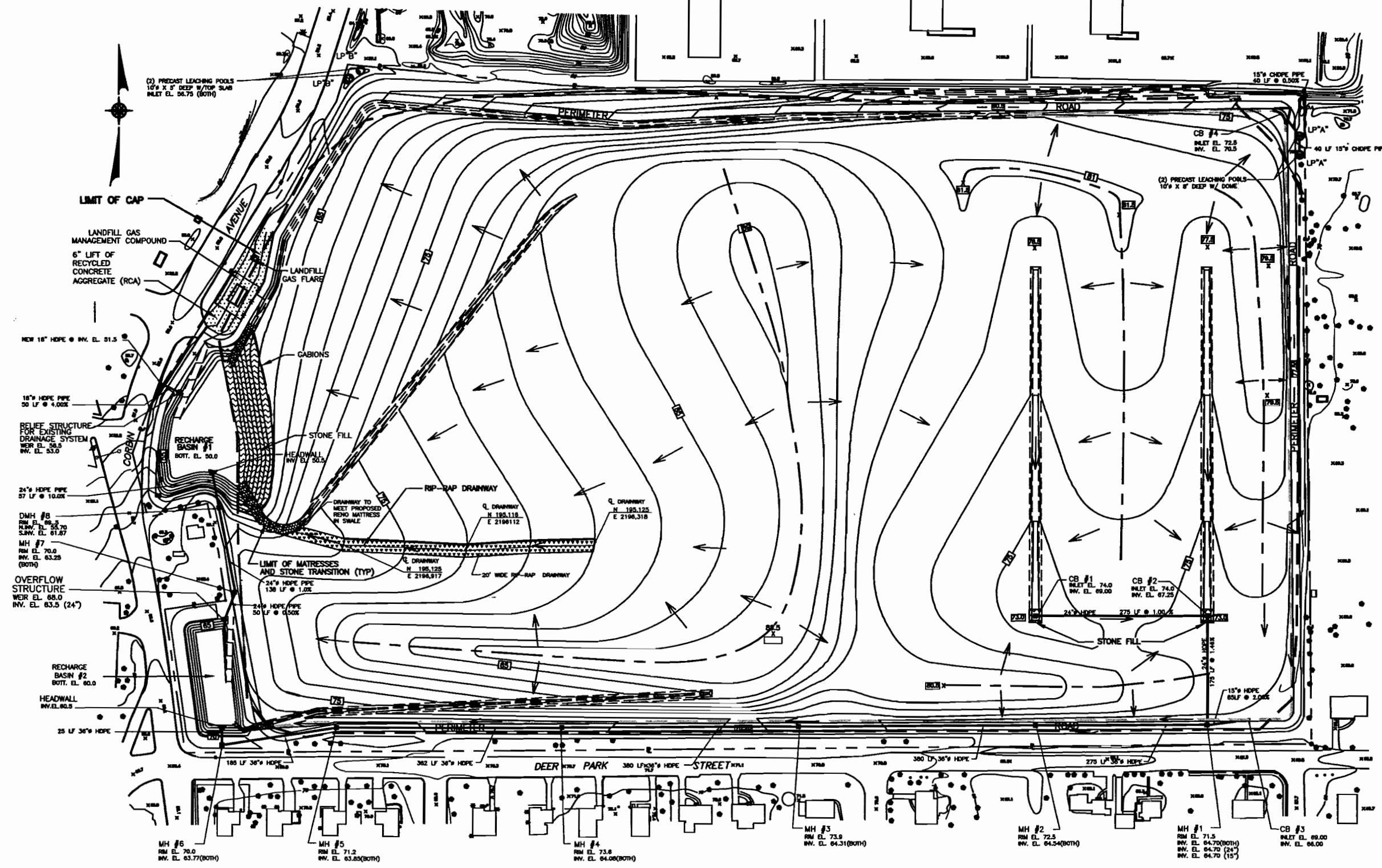
On drainage swales, a polypropylene product was used as an erosion control fabric. During the inspections, areas of erosion or gulying of the vegetative cover will be noted for purposes of additional seeding.

## 2.2 **Storm Water Collection System**

The storm water collection system for the Sonia Road Landfill closure construction consists of diversion swales, catch basins, gravity storm water drains, perimeter swales, rippedrain drainways, and downchutes, which will convey the collected storm water runoff to the on-site groundwater recharge basins (Figure 2-1).

Each of these structures will be monitored for wear or damage and the results of these inspections will be reported in the inspection logs. Any necessary repairs will be performed according to the guidelines provided in Section 3 of this Manual.

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NOTE:  
 1. FINAL CONTOURS REPRESENT THE TOP OF THE TOPSOIL LAYER, ROAD SURFACE ETC.  
 2. ARROWS SHOW OVERLAND FLOW DIRECTION  
 3. WATERSHED DIVIDE IS SHOWN BY



SONIA ROAD LANDFILL  
 POST CLOSURE MONITORING AND MAINTENANCE

STORMWATER COLLECTION SYSTEM (DRAINAGE PLAN)

**db** Dvirka and Bartilucci  
 Consulting Engineers  
 A Division of William F. Cosulich Associates, P.C.

ADAPTED FROM DESIGN  
 DRAWINGS. SEE AS-BUILT  
 DRAWINGS FOR ACTUAL  
 DETAILS, DIMENSIONS,  
 ELEVATIONS, ETC.

FIGURE 2-1

All of the storm water collection, conveyance, drainage, and control structures will be visually inspected for obstructions, siltation, ponded water, and erosion damage such as wash-outs. The location of any obstruction or damage and its cause, if known, will be noted in the inspection logs. Diversion and perimeter swales will also be inspected for loss of vegetation or damage to the erosion control fabric.

The downchutes (two for Recharge Basin No. 1, one for Recharge Basin No. 2) consist of a transition section of stone fill followed by Reno mattresses. The catch basins, manholes, overflow structure for Recharge Basin No. 2, and the outlet structure for Recharge Basin No. 1, are constructed of precast concrete. These structures will be examined for damage or instability which could affect their performance. Erosion of soil beneath or around the structures or Reno mattresses, or signs of slippage of the structures will be noted on the inspection logs.

#### 2.2.1 Downchutes, Gravity Storm Water Drain, and Diversion Swales

Three downchutes were constructed to convey storm water runoff from the landfill without destroying the integrity of the cap. The north swale downchute for Recharge Basin No. 1 receives storm water runoff via diversion swales from the north portions of the western half of the landfill. The south swale downchute for Recharge Basin No. 1 receives storm water runoff via diversion swales from the central portion of the western half of the landfill. The south swale for Recharge Basin No. 2 receives storm water from the diversion swales and catch basins of the entire eastern portion of the landfill via the gravity storm water drain, and a small section in the extreme southern area of the western section of the landfill. The diversion swales, perimeter swales, catch basins, gravity storm water drain and manholes, will be examined on a regular basis for signs of erosion and/or sediment buildup, and noted in the inspection logs.

On occasion, storm water control structures may become damaged and diminished in function by intense rainfall events or by alternating freeze-thaw cycles. Gabions and Reno mattresses, used in the downchutes and at the top of the steep slope on the eastern edge of Recharge Basin No. 1, are particularly susceptible to movement by erosion and undermining. Care should be taken to inspect gabions and Reno mattresses, as well as the diversion swales, after intense rainfall

events. If erosion or undermining is observed, the TOIDEC should notify the regulatory authorities and their engineer immediately, and corrective action should be taken. Any obstructions found in and along the storm water collection route will be promptly removed.

Eroded vegetated areas will be promptly filled with imported soil fill, compacted, and seeded. Eroded or undermined armored channels, such as areas with Reno mattress, will have the subgrade material repaired with material equivalent to the original construction, and the mattress area repaired or replaced, also with material equivalent to that used in the original construction. Any sediment buildup will also be promptly removed with hand tools and will be spread over existing grassed sideslopes.

### 2.2.2 Recharge Basins

The groundwater recharge basins, located on the western side of the landfill, receive storm water discharge from both the eastern and western halves of the landfill. In most circumstances, Recharge Basin No. 1 will receive storm water discharge only from the western half of the landfill, but during periods of heavier precipitation may receive the overflow from Recharge Basin No. 2. Periodic removal of silt and other fines may be necessary to maintain the proper functioning of the two groundwater recharge basins. The recharge basins' sideslopes will be periodically inspected and monitored for signs of erosion.

## 2.3 **Perimeter Access Road**

The perimeter access road around the Sonia Road Landfill is continuous and completely encircles the landfill (Figure 1-2). The road was constructed of a recycled concrete aggregate (RCA) having a minimum thickness of 6 inches. Visual inspections of the road will be conducted for potholes, erosion gullies, loss of aggregate cover, and obstructions. The results of these inspections will be noted on the inspection logs.

## 2.4 Landfill Gas Control and Monitoring

### 2.4.1 Active Gas Extraction and Flaring System

An active gas extraction and flaring system consisting of 37 vertical gas recovery wells was installed at relatively uniform (one well/acre) locations across the interior of the Sonia Road Landfill to facilitate collection of landfill gases through the geomembrane and the transmission of the collected landfill gas to the flare candle. In addition, 17 gas collection wells were installed around the periphery of the site, and connected to the active gas extraction and flaring system. Two positive displacement blowers, one with a capacity of 1,020 scfm, the other with a capacity of 1250 scfm, will run simultaneously to induce extraction of gas from the landfill. The active gas recovery wells are buried and therefore not available for inspection. The 17 gas collection wells can be sampled individually, and a composite sample for the entire system can be collected at the flare header in the landfill gas management compound.

The landfill gas recovery wells are arranged in groups of three to seven wells. Each group of wells is manifolded together with the manifold being connected to the collection header with a throttling valve. There are a total of eight recovery well manifolds (groups) and each manifold flow rate can be controlled with its respective throttling valve.

Each of the 17 gas collection wells is connected directly to the collection header and is fitted with a throttling valve to allow control of the flow rate extracted from the well.

### 2.4.2 Perimeter Monitoring Wells

Perimeter gas monitoring wells are located at approximately 250-foot intervals (some intervals range up to about 360 feet) along the perimeter of the Sonia Road Landfill, the majority located between the perimeter road and the property boundary. Explosive gas monitoring at these wells will be performed regularly during the post-closure period. The intent of the regular monitoring at these locations is to identify the presence and concentration of explosive gases at the site perimeter and the effectiveness of the gas collection wells in preventing landfill gas migration.



Gas monitoring wells will be visually examined during each routine inspection to determine if they are structurally and mechanically sound. The details of the gas monitoring program are presented in Section 5 of this Manual. If a monitoring well sustains damage or cannot provide a representative gas reading, the well will be examined to determine whether the problem can be corrected. This determination will be facilitated by comparing data from previous monitoring activities.

The inspection report will include the details of any gas monitoring well damage and the appropriate action that will be taken to correct the problem, as presented in Section 3 of this Manual.

#### 2.4.3 Gas Condensate Drain System

The gas condensate drain system, consisting of three 9-foot deep, 10-foot diameter precast concrete leaching pools (the bottom 6 feet of each pool are made of leaching rings) located within the gas management compound, will be visually inspected to determine if proper leaching is occurring, or if leachate is building up within the pools. These observations will be noted on the inspection logs.

#### 2.4.4 Barometric Drain

Landfill gas condensate is separated from the landfill gas flow stream by two centrifugal water separators (one for each collection system blower) which are located immediately upstream of the positive displacement blowers. Landfill gas enters the cylindrical water separator vessel on the tangent causing the entrained liquid to accumulate on the vessel walls and drain down to the bottom mounted drain connection. The landfill gas exits the water separator through a top mounted connection. The water separators operate under system pressures (i.e., vacuum).

In order for the captured liquid to pass from the vacuum conditions present in the collection piping to the atmospheric conditions present in the condensate leaching pools, the liquid must pass

through a barometric drain. The barometric drain is a U-shaped arrangement of piping with a geometry which serves to “trap” liquid, permitting vacuum conditions on one side of the “trap” and atmospheric conditions on the other side. The atmospheric side or leg of the barometric drain is vented to the atmosphere and has a removable cap.

Inspection of the barometric drain is necessary to confirm that the U-shaped piping is full of water, thereby creating the “trap.” The inspection of each barometric drain requires removal of the unglued vent cap and insertion of a tape into the atmospheric leg to document that the piping is liquid filled and that the trap has not been sucked out by the system vacuum.

A third barometric drain is located in the area of the south property line adjacent to the southeast corner of Recharge Basin No. 2. This barometric drain services a low point in the buried HDPE collection system piping and is intended to prevent flooding of the piping through the accumulation of landfill gas condensate. There is no water separator associated with this location so that the only liquid which will pass to the leaching ring is that liquid which has a tendency to accumulate at the piping low point. Inspection of this barometric drain and leaching pool combination is the same as described above.

#### 2.4.5 Electrical System

Electrical power is furnished by LIPA to the equipment and components of the landfill gas collection and flaring system as 240/120 Volt, 3 phase, power supplied through a 3 pole, 400A, service entrance rated circuit breaker mounted on a utility pole located at the entrance to the Sonia Road Landfill in the vicinity of the Landfill Gas Management Compound. From a NEMA 4X SS trough, it is distributed to two blower motor starters (30 hp each) at 240 Volts, 3 phase, and also to the Utility Panel (UP).

The UP is a 240/120 Volt, single phase, 60 Hertz, 3W+GND, low voltage, NEMA 4X panel with a main three-pole circuit breaker framed at 100 A and six one-pole branch breakers (20 A, single phase), that feed the ground fault outlets, the flare igniter, Motorized Valve Nos. 1 and 2,

and the Flare Control Panel (FCP). The UP also contains three spare one-pole branch breakers (20 A, single phase), and space for three additional ones if they should be needed.

Each of the blower motor starters contains a control power transformer, and auxiliary contacts for remote status signals and interlocks. The FCP is interlocked by means of a dry contact with each of the blower motor starters so that the blower motors cannot be started unless a positive signal is received from the flame proving system on the flare.

## **2.5 Groundwater Monitoring Wells**

Groundwater monitoring wells will be visually examined during each routine inspection and the functioning of each well will be checked during each quarterly sampling event. The details of the groundwater sampling program are presented in Section 4 of this Manual. If a monitoring well sustains damage, or cannot provide representative groundwater samples, the well will be evaluated to determine whether the problem can be corrected. This determination will be facilitated by comparing data from previous monitoring activities to reveal if the yield of the well is noticeably changed from previous results.

The inspection report will include details of any groundwater well damage and the appropriate action that will be taken to correct the problem, as presented in Section 4 of this Manual. Damaged wells that cannot be rehabilitated should be decommissioned by appropriate methods (i.e., overdrilling, pulling of casing, or grouting in place) and replaced by construction of a replacement groundwater monitoring well to re-establish the integrity of the Sampling and Analysis Plan for groundwater monitoring.

## **2.6 Site Perimeter Fencing**

The site perimeter fencing is a 10 feet high chain link fence with three strands of barbed wire at the top. The site perimeter fencing is installed at or in close proximity to the site property lines. The only gate is located on the west side of the site at the landfill entrance on Corbin Avenue.

The site perimeter fencing will be visually inspected for any signs of vandalism or trespass including, but not limited to, damaged or cut fence fabric, or barbed wire damaged or bent fence posts, rails or gates, damaged locks and chains, etc.

The Landfill Gas Management Compound is encircled on three sides by an 8 feet 6-inch high wooden plank fence. The fourth side is closed with a 10 feet high chain link fence with gate. The landfill gas flare is encircled with a 10 feet high chain link fence with man gate. Inspection of the wooden fence and chain link fence associated with the Landfill Gas Management System shall be visual and shall address the same parameters as the site perimeter fencing.

# Section 3



## **3.0 MAINTENANCE AND REPAIR PROCEDURES**

The need for maintenance or repair work will be governed by the observations made during the regular site inspections previously described in Section 2. Records of this work will be maintained in the permanent landfill files at the Town. This section describes the maintenance and repair procedures that will be followed during the post-closure monitoring period for the Sonia Road Landfill. The personnel and equipment requirements for this 30-year period are presented in Section 6 of this Manual.

### **3.1 Maintenance**

Routine maintenance work will be performed, as necessary, during the 30-year post-closure monitoring period. Mowing, regrading of the cover soils and the perimeter access road, additional seeding, vector control, and the removal of undesirable vegetation species are considered typical maintenance tasks and will be discussed in this section. The TOIDEC will keep records of the maintenance activities performed at the landfill site.

#### **3.1.1 Leachate Control**

Because the Sonia Road Landfill was constructed with solid waste deposited entirely below grade, leachate outbreaks will not occur.

#### **3.1.2 Landfill Gas Control**

Maintenance of the active gas recovery/collection wells and gas collection piping will be performed in addition to the landfill gas monitoring and sampling program that will take place at the perimeter monitoring wells. The gas will be collected through a system of 37 vertical gas recovery wells spaced at relatively uniform (1 well/acre) intervals throughout the landfill area, and 17 gas collection wells spaced at relatively uniform intervals around the perimeter of the landfill, in close proximity to the property line. During this period, the areas above and around the wells, pipes, and connections will be inspected and maintained on a regular basis. Since the gas recovery wells are

buried beneath the cap and inaccessible, no further maintenance will be performed on them. The gas collection wells are accessible, however, and will be inspected routinely to see if there is failure of a structural or mechanical nature. Should such failure be detected and it is determined that the failure is impeding the proper functioning of the gas collection well, the well shall be repaired or replaced, as necessary, to eliminate/correct the failure.

After collection and conveyance, the landfill gas passes through the condensate water separator. Condensate removed in the separator flows by gravity through the barometric drains to the condensate drain system, a series of three leaching pools located within the landfill gas management compound. As part of regular maintenance procedures, the condensate water separator will be inspected to determine if moisture is draining freely from it, or if there is a blockage either within the separator or the lines leading to the barometric drains and the leaching pools. If drainage is not occurring, the separator will be opened and the source of the blockage determined. The separator and the 4" diameter PVC gravity drain lines leading to the barometric drains/leaching pools will be cleaned of any blockages that are found, and placed back into service. Cleaning will be accomplished by either mechanically removing the blockage, or by introducing a cleaning compound and flushing the blockage out of the system.

The leaching pools will also be opened and inspected on a routine basis to determine if they are leaching effectively, or if blockages have developed which inhibit leaching effectiveness, resulting in an accumulation of condensate water within the pools. If there is evidence that leachate effectiveness is inhibited, cleaning of the pools will be performed using a septic system hauler subcontractor, and the pools will be dosed with a cleaning agent, such as hydroxyacetic acid, to re-open the leaching apertures. If, in the unlikely event it becomes necessary to enter the leaching pools, confined space entry procedures, including continuous gas monitoring and ventilation of the pools prior to and during entry using an explosion proof blower, will be implemented.

The above procedures will also apply to the barometric drain/leaching pool arrangement installed on the South Landfill Gas Collection System in the vicinity of the southeast corner of Recharge Basin No. 2.

The landfill gas management system includes two blowers, a flare candle, and other appurtenances that are furnished together as a package, and are installed in or adjacent to the Landfill Gas Management Compound. The principal components of the blower/flare system are:

- A gas/condensate water separator located adjacent to the flare station. The condensate flows by gravity through a barometric drain(s) to a series of three buried leaching pools located within the landfill gas management compound.
- Blowers and a flare candle station which vacuum landfill gas and oxidize the landfill gas through combustion in a stick flare.

The blowers and the flare candle treatment system are regulated through the Flare Control Panel (FCP), which receives signals from the burner management system, and controls the opening and closing two of motorized valves.

Step-by-step operating procedures are detailed in the LFG&E International Operating Manual included in Volume 4. The following discussion is a general guideline for understanding the maintenance of the flare:

- The burner management system includes a flame safeguard package which monitors key parameters and shuts the unit down if an unsafe condition occurs. The key interlocks are as follows:
  - Blower No. 1 Failure (referenced as Blower No. 104A)
  - Blower No. 2 Failure (referenced as Blower No. 104B)
  - Flame Failure
  - Flare Low Temperature
- A basic start up will typically consist of the following automated steps:
  - Pilot ignition (gas pilot or direct spark)
  - Confirm pilot
  - Open electrically operated butterfly valve(s)
  - Start blower(s)
  - Initiate waste gas (landfill gas) flow
  - Confirm flame
  - Shut down pilot or direct spark igniter
  - Monitor flame temperature and flame failure



The landfill gas management system blowers and the flare candle with associated instrumentation and controls will be maintained on a routine basis. Detailed maintenance must be in accordance with the recommendations and requirements of the respective manufacturer/supplier of the equipment package. Please see the appropriate sections of Volume 4 for detailed maintenance information.

In the event that the steady state combustible content (methane concentration) of the extracted landfill gas becomes depleted to the point that a flame cannot be established or sustained, the Flare Control Panel includes an option to override the flare controls and operate the flare stack in a vent mode. The vent mode can only be enabled through the use of a keyed switch on the Flare Control Panel. The operation of the flare stack as a vent should only be instituted with the explicit approval of the TOIDEC.

### 3.1.3 Drainage and Erosion Control

Surface drainage (conveyance) features to control storm water runoff have been designed for the 25-year, 24-hour, Type II storm, using U.S. Department of Agriculture Soil Conservation Service guidelines. The groundwater recharge basin system has been designed for the 25-year, 24-hour, Type II storm. The diversion swales and perimeter channels will be maintained with grassed channels. Areas of erosion will be noted and repaired as soon as possible to maintain the integrity of the cap. Downchutes and discharge areas will be inspected for foreign debris that may interfere with their proper functioning, and for areas of erosion which may degrade the integrity of the cap. The recharge basins will be kept free of litter, and foreign objects that would otherwise inhibit groundwater recharge and degrade the integrity of the sideslopes and basin floors. Vegetation species that would inhibit access for maintenance purposes will be removed. In addition, the accumulation of fines on the basin floors, which inhibit recharge, will be kept to a minimum by periodic scraping of the basin bottom.

The gravity storm water drain piping, catch basins, and manholes will be periodically inspected for debris, sedimentation, and visual settlement of the catch basin and manhole structures. Debris and sediment in the piping, catch basins, or manhole structures will be

promptly removed. The storm water gravity storm water drain piping, catch basins, and manholes will be periodically cleaned of debris and sediment that has collected in them. The cleaning will consist of rodding or flushing of the pipeline with appropriate sewer cleaning devices and hand or equipment excavation of the interiors of manholes and catch basins. If entry into any of the catch basins or manholes is required, continuous gas monitoring and ventilation of these structures with an explosion proof blower will be implemented, along with confined space entry procedures.

#### 3.1.4 Vegetative Cover

The vegetative (grass) cover of the Sonia Road Landfill will be maintained at a maximum height of eighteen (18) inches, or mowed seasonally, as required, to control the growth of wild and deep-rooted species and to minimize the potential for the introduction of vector habitats. The frequency of each mowing event will be determined by the site conditions. Undesirable species such as saplings or other vegetation with penetrating roots discovered during inspections will be removed if the TOIDEC determines that their presence poses a threat to the integrity of the final cover system. Application of herbicides and pesticides will not be used to control undesirable plant and/or animal species unless the non-chemical methods do not yield desired results. Areas of the cap with dead vegetation or lack of vegetation will be inspected by qualified Town personnel for possible causes of defoliation and devegetation. The Town personnel will maintain a report of the inspection findings. If the Town deems it appropriate, the bare areas of the cap will be seeded utilizing the seed mix specifications provided in Contract Documents for Contract No. IRRA 1-99.

#### 3.1.5 Regrading

The effects of landfill subsidence, vandalism, or gullyng from minor precipitation events (i.e., not causing extensive damage to the site) may result in the need to re-establish the affected areas of the cap system. The areas of erosion or landfill subsidence that affect the performance of the cap system will be brought back to the original grade to prevent surface ponding and further collection of water on the cap membrane. Deterioration of the perimeter access road will be repaired by regrading where possible, or by the placement of additional RCA, if necessary. If

vandalism such as off-road vehicle tracks is detected on the site, the Town will pursue additional efforts to further restrict access to the site.

#### 3.1.6 Vector Control and Aesthetics

Vectors common to active landfill operations are not expected to be a problem at the Sonia Road Landfill since it has been closed and has not received municipal waste for many years. However, suspected rodent or insect infestation will be responded to by contacting qualified licensed exterminators. Prior to initiating an extermination program, the Town will advise the NYSDEC of the situation and, if necessary, develop and submit to the NYSDEC an extermination work plan for review and approval. Details of the communication procedures for non-routine events are provided in Section 9 of this Manual.

#### 3.1.7 Perimeter Roads

Access to, and onto, the Sonia Road Landfill will be continually maintained. The perimeter roadway will be monitored for signs of subsidence, erosion, and other forms of degradation. Vehicular access will be limited to authorized personnel and will only be accomplished through the main site entrance off Corbin Avenue. The perimeter roadway will be inspected for foreign objects and vegetative growth that may degrade its integrity and prohibit access.

#### 3.1.8 Fencing

A ten-foot high chain link security fence surrounds the perimeter of the site. A 24 feet wide double leaf gate is located at the main entrance from Corbin Avenue. The Landfill Gas Management Compound is surrounded by an eight foot 6-inch high wooden fence on its north, west, and south sides (for sound attenuation purposes), and a 10-foot high chain link fence with access gates on its east side. Periodic inspections will be made of the fences to determine if it has been damaged by vandals or the weather. Routine repairs will be made to damaged sections using the same type and quality materials as were used in the original fence installation.

## 3.2 Repairs

This subsection details the procedures which could be used to perform non-routine repairs of the Sonia Road Landfill cap system and, as such, are considered to be outside of the scope of the normal maintenance procedures for the Sonia Road Landfill. These activities may include, but not be limited to, repair of gas recovery wells and gas collection piping and flares, storm water piping and structures, the condensate drainage system, the Reno mattresses and gabions, vegetative cover, and the geomembrane.

### 3.2.1 Storm Water Structures

Should settlement of the gravity storm water drain piping, manholes, or catch basins be observed during routine maintenance and cleaning of the pipeline and structures, the Town will monitor the area where the settlement has been suspected in order to determine the nature of the settlement and whether the geomembrane cap may have been damaged or disrupted.

### 3.2.2 Geomembrane

If the geomembrane cap has been damaged or disrupted, the Town will immediately notify the NYSDEC of the problem and propose a plan which the Town will follow to repair the liner. This proposed plan will incorporate the requirements for repair of the cap membrane. Upon approval by the NYSDEC of the Town's proposed repairs, the Town will proceed and implement the repairs as set forth in the proposal.

Once the geomembrane cap has been repaired, or if excavation reveals that the geomembrane cap has not been damaged, the Town will backfill the area of settlement with compacted backfill material. Proper construction procedures will be followed as set forth in the design documents and specifications for the Sonia Road Landfill Remediation.

With regular inspections and proper maintenance, the repairs over the 30 year maintenance period can be kept to a minimum.

### 3.2.3 Gas Collection and Treatment System

Landfill active gas extraction well system damage will most likely occur as a result of the settlement of the landfill surface caused by decomposition of the waste material below the cap. Vandalism is more likely to occur at the perimeter gas collection and perimeter gas monitoring wells located between the perimeter road and the property line. This is particularly likely to occur where the wells and valve manholes are exposed and not shielded by trees and shrubs. If damage occurs to the exposed piping of a valve manhole or a perimeter active gas collection well on the landfill, the valve and piping will be replaced according to the approved construction documents. Severe settlement in the vicinity of an active gas extraction well can damage the geomembrane beneath the cover soils, the water-tight seal around the pipe penetration, or the flashed seal where the geomembrane is sealed to the manhole. These areas will be examined thoroughly. The cover soils will be removed, and the geomembrane, pipe penetration boot, and flashing seal inspected for damage. If damage has not occurred, the soil layers around the active gas collection well will be replaced by hand and compacted to a minimum thickness of 30 inches. All repairs will be such that replacement layers will match and tie directly into the undisturbed portion of the cap. Damage to the geomembrane, the flashing seal, or the pipe penetration boot will be repaired.

Collected landfill gas is discharged to the flare candle through two blowers. Repairs to this portion of the landfill gas management system must be in accordance with the requirements and recommendations of the manufacturer/supplier of the blower/flare candle package.

### 3.2.4 Groundwater Monitoring Wells

The repairs required for groundwater monitoring wells may involve: 1) redevelopment of the well; 2) abandonment and replacement of the well or installation of a liner screen; or 3) the installation of a new monitoring well. The repair technique used will be determined by the extent of the damage observed. However, any remedial actions will be discussed with the NYSDEC prior to their implementation.

Damaged monitoring wells that cannot be rehabilitated should be decommissioned in a manner appropriate for the existing geologic conditions at the site. This will prevent potential contaminant migration downward through the monitoring well.

The monitoring well decommissioning procedure should follow NYSDEC protocol and comprise the following:

- Removal of surface protective casing and concrete slabs, as appropriate;
- Overboring and removal of the casing, if present, to the greatest extent possible (minimum 5 feet);
- Perforation of any casing remaining in the borehole;
- Pressure grouting of the borehole from the base of the borehole with cement-bentonite grout to a depth of 5 feet below the ground surface using the tremie method;
- Backfilling the remaining 5 feet with native soil and compacting to avoid settlement;
- Grouted area will be periodically inspected for possible settlement; and
- If subsequent settlement occurs, native material will be placed into the depression and repacked to grade level. If severe settlement occurs, the settled portion will be regouted and backfilled with native soil.

#### 3.2.5 Reno Mattress

The downchutes for the storm water drainage into both Recharge Basin No. 1 and Recharge Basin No. 2 consist of stone fill transition zones and Reno mattress sections. It is not anticipated that the gabions or the Reno mattress systems will be adversely affected by settlement during the landfill post-closure monitoring period since these systems have the ability to accommodate significant settlement. Nevertheless, during the 30-year post-closure monitoring period for the site, there is the possibility that damage could occur to components of the Reno mattress. As such, the damaged sections would be evaluated to determine the extent of the damage and the required repair techniques. Specifications for the Reno mattress can be found in the Contract Documents for Contract No. IRRA 1-99.

# Section 4



## **4.0 SAMPLING AND ANALYSIS PLAN FOR GROUNDWATER MONITORING**

### **4.1 Site Description**

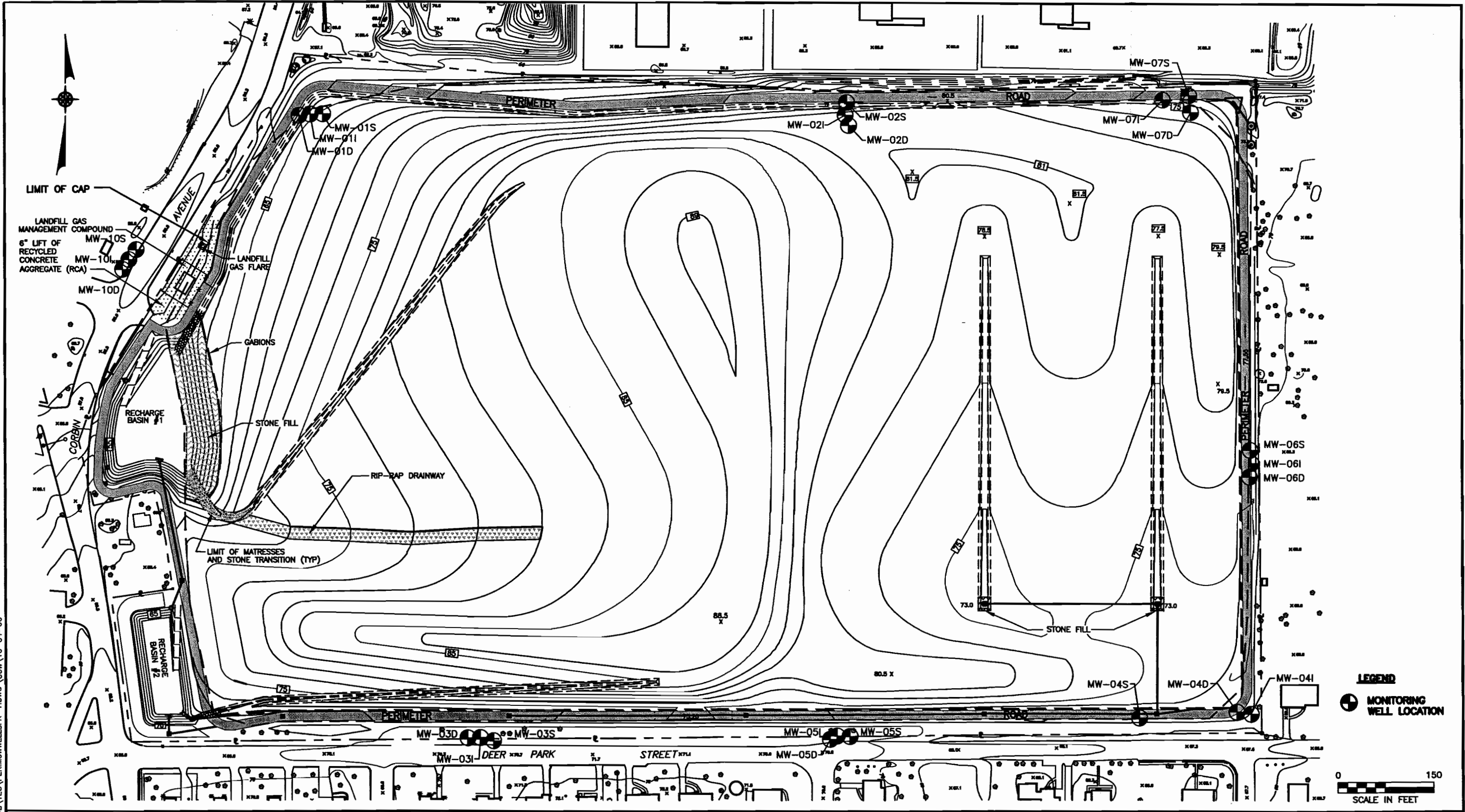
The groundwater monitoring well network was developed during the Remedial Investigation/Feasibility Study work performed for the landfill and incorporates wells that monitor the groundwater upgradient and downgradient of the landfill. The monitoring wells were installed in clusters with wells screened at shallow, intermediate, and deep depths.

The groundwater well network utilized for monitoring purposes at the Sonia Road Landfill consists of 42 groundwater monitoring wells that were installed as part of the RI/FS performed by Dvirka and Bartilucci consulting engineers (report April 1998) and earlier monitoring activities. The perimeter of the landfill is monitored by clusters MW1 to MW8 (see Figure 4-1). The upgradient and downgradient groundwater monitoring is covered by clusters MW9 through MW12 and MW13 – MW14 respectively (see Figure 4-2).

Initially, two baseline groundwater monitoring events will be conducted to re-establish the groundwater quality in the vicinity of the Sonia Road Landfill. These two baseline events will be performed in accordance with the NYSDEC approved Sampling and Analysis Plan (SAP) which was prepared for the Remedial Investigation/Feasibility Study (RI/FS), a copy of which is attached as Volume 3. Based upon the results of these two post closure baseline sampling events, as well as data from prior sampling events, recommendations will be made for establishing the Final Groundwater Monitoring Well Array for the Sonia Road Landfill site. As appropriate, the Post Closure Monitoring and Maintenance Plan, including the Sampling and Analysis Plan, will be amended to reflect the final monitoring array.



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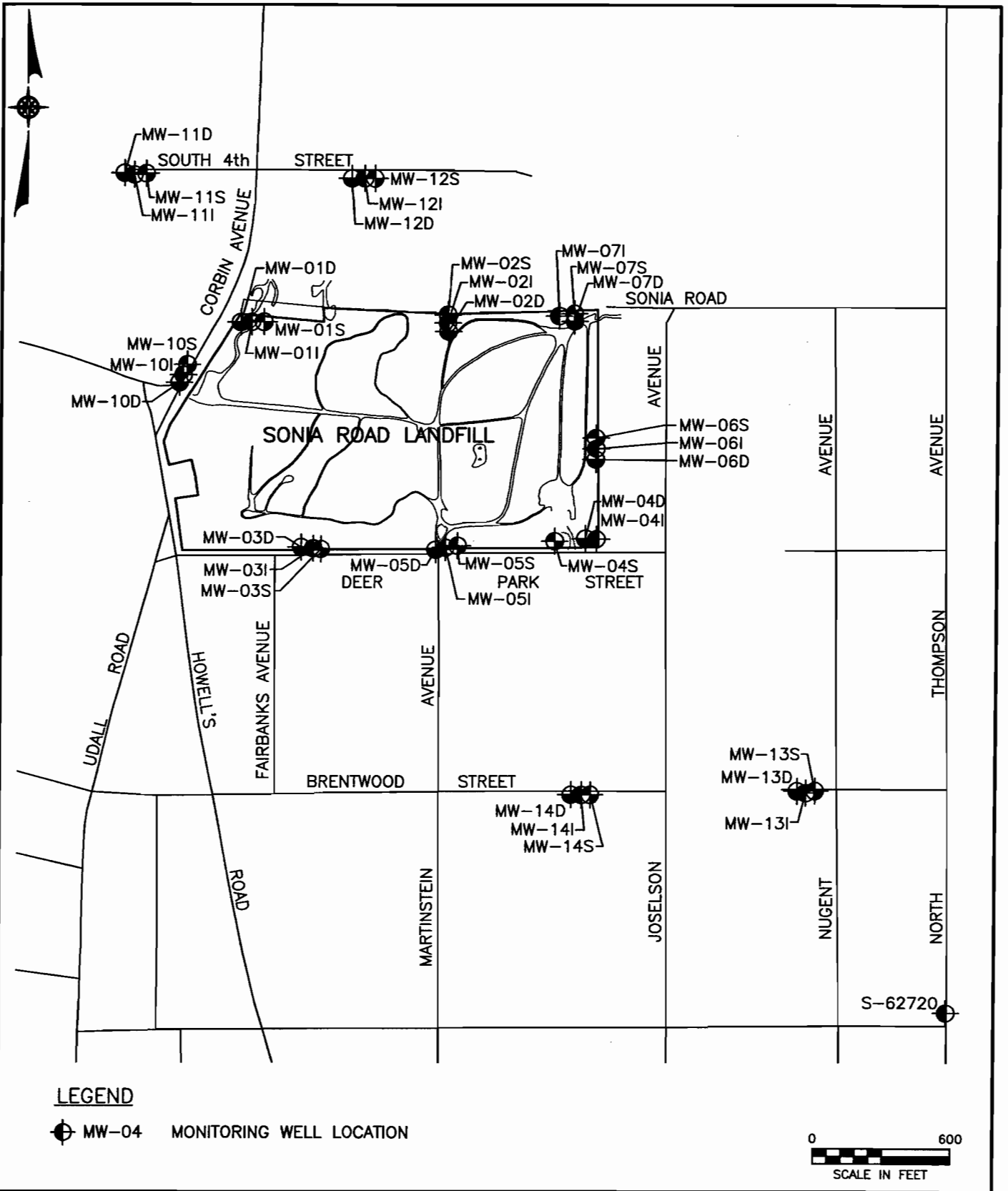
SONIA ROAD LANDFILL  
POST CLOSURE MONITORING AND MAINTENANCE

### PERIMETER GROUNDWATER MONITORING WELL LOCATIONS

ADAPTED FROM DESIGN DRAWINGS. SEE AS-BUILT DRAWINGS FOR ACTUAL DETAILS, DIMENSIONS, ELEVATIONS, ETC.

FIGURE 4-1

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**LEGEND**

⊕ MW-04 MONITORING WELL LOCATION



SONIA ROAD LANDFILL  
 POST CLOSURE MONITORING AND MAINTENANCE  
 PERIMETER AND OFF-SITE  
 GROUNDWATER MONITORING WELL LOCATIONS



Dvirka and Bartilucci  
 Consulting Engineers  
 A Division of William F. Cosulich Associates, P.C.

FIGURE 4-2

## 4.2 Sampling, Analysis, and Reporting Procedures

### 4.2.1 Groundwater Sampling Protocols

According to the NYCRR Part 360, quarterly samples are required for routine parameters and annual samples are required for baseline parameters. After landfill closure, two rounds of sampling for 6 NYCRR Part 360 baseline parameters will be conducted on all existing upgradient and downgradient wells to establish a new baseline. Once the new baseline has been established, the number of wells to be sampled will be tailored down to a smaller array for future sampling rounds for post-closure monitoring purposes. All sampling and analyses will be performed in accordance with the existing or amended SAP (see Volume 3 of this PCMMP), as appropriate.

# Section 5



## **5.0 GAS MONITORING PLAN**

The gas monitoring plan is implemented to ensure that explosive and hazardous gases do not migrate off-site or accumulate in nearby structures.

### **5.1 Existing Gas Recovery/Collection Locations**

The gas recovery system of the landfill cap includes subsurface landfill gas recovery wells. The recovery wells are linked by a subsurface collection manifold that is piped to the perimeter collection header (see Figure 5-1).

### **5.2 Existing Gas Monitoring Locations**

Seventeen perimeter landfill gas monitoring wells are positioned at or in the vicinity of the waste limits and property boundary (see Figure 5-1).

### **5.3 Sampling Schedule**

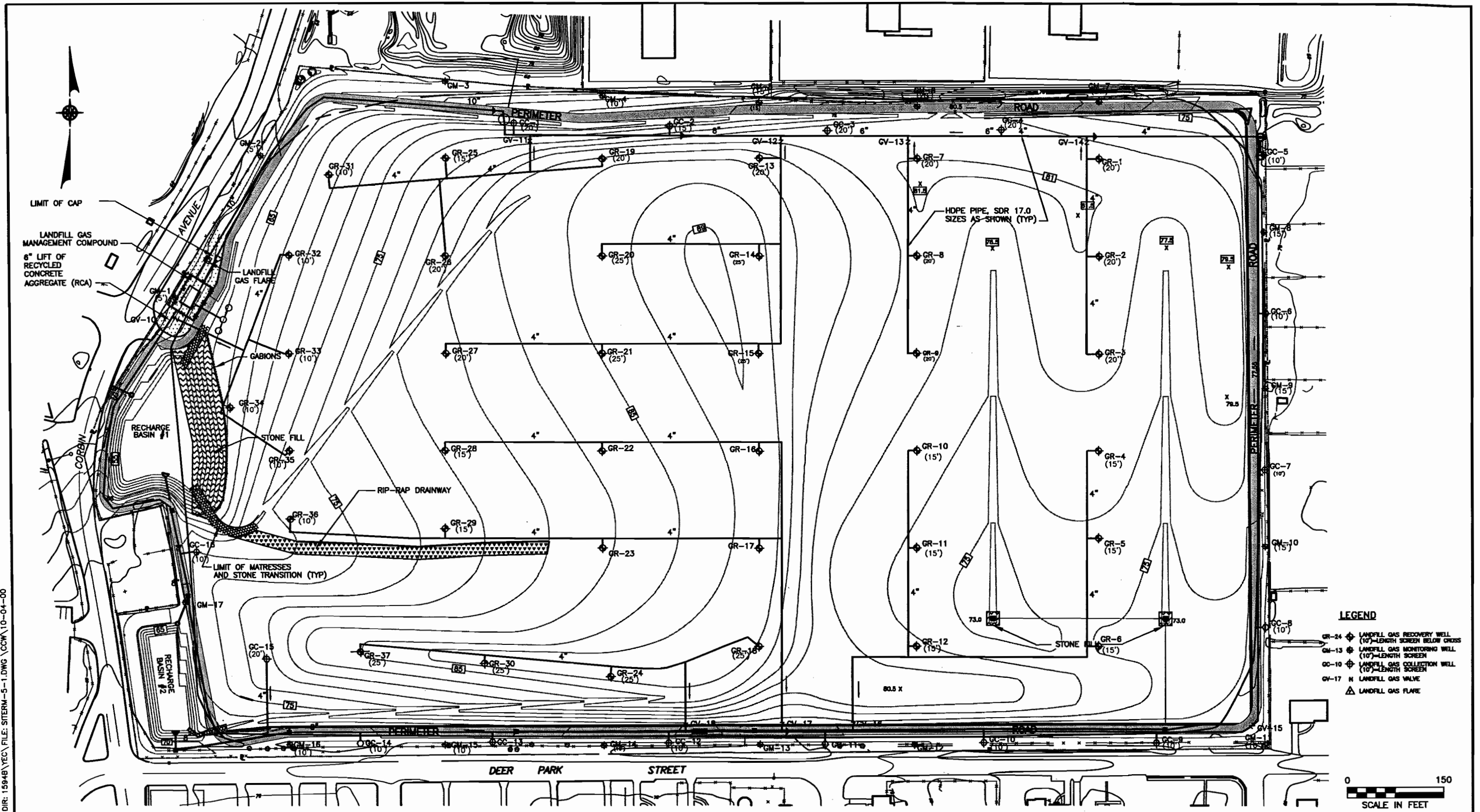
Gas samples should be taken a minimum of quarterly. Although failure of the gas recovery system is unlikely, the frequency of sampling should increase in areas where gas levels are elevated and it appears as though gas has managed to escape the collection system.

### **5.4 Sampling Procedures**

#### **5.4.1 Methane Gas Monitoring Program**

According to the NYCRR Part 360, methane gas levels must not exceed the lower explosive limit (LEL) at or beyond the property boundary and must not exceed 25% LEL in structures on or off-site. A description of methane gas can be found in Section 6.1.2 of this manual. Samples will be taken with a combustible gas meter capable of measuring both the LEL and gas scales for methane. Contingency plans are presented in Section 7.2 of this manual in the

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- LEGEND**
- GR-24 ◊ LANDFILL GAS RECOVERY WELL (10'-LENGTH SCREEN BELOW CROSS)
  - GM-13 ◊ LANDFILL GAS MONITORING WELL (10'-LENGTH SCREEN)
  - GC-10 ◊ LANDFILL GAS COLLECTION WELL (10'-LENGTH SCREEN)
  - GV-17 H LANDFILL GAS VALVE
  - △ LANDFILL GAS FLARE



SONIA ROAD LANDFILL  
POST CLOSURE MONITORING AND MAINTENANCE

**LANDFILL GAS COLLECTION AND CONTROL PLAN**

**db** Dvirka and Bartilucci  
Consulting Engineers  
A Division of William F. Cosulich Associates, P.C.

ADAPTED FROM DESIGN DRAWINGS. SEE AS-BUILT DRAWINGS FOR ACTUAL DETAILS, DIMENSIONS, ELEVATIONS, ETC.

**FIGURE 5-1**

event that these levels are exceeded. Procedures for gas monitoring well sampling are presented in Appendix C of this manual.

#### 5.4.2 Landfill Gas Condensate

Pursuant to the direction of the NYSDEC, the landfill gas condensate will be sampled and analyzed to establish the suitability of disposing the condensate on-site. A sampling protocol for the landfill gas condensate is attached as Appendix D. The initial sampling of condensate shall be performed at a frequency of twice per month for a period of 2 months and shall commence with the acceptance and operation of the landfill gas management system.

The need for subsequent sampling and analysis of the landfill gas condensate shall be determined based upon the results of the initial sampling.

#### 5.4.3 Landfill Gas

Pursuant to the direction of the NYSDEC, the landfill gas shall be sampled and analyzed for the concentrations of non-methane organic compounds (NMOCs) prior to combustion at the flare. A sampling protocol for the landfill gas is attached as Appendix E. The initial sampling of landfill gas shall be performed at a frequency of twice per month for a period of 2 months and shall commence with the acceptance and operation of the landfill gas management system.

The need for subsequent sampling and analysis of the landfill gas shall be determined based upon the results of the initial sampling.

# Section 6





## **6.0 PERSONNEL AND EQUIPMENT REQUIREMENTS**

The post-closure monitoring of the Sonia Road Landfill will be performed by the Town of Islip personnel or subcontractors retained for this purpose. Town personnel or subcontractors retained for this purpose will be responsible for the entire site's routine operation and maintenance. In the event that a component of the Sonia Road Landfill becomes damaged, inoperative, or requires routine repair, the procedures outlined in Section 3 will be followed. The personnel and equipment requirements described below represent an estimate of the time that will be required to maintain and repair the Sonia Road Landfill. This estimate assumes that major storm events (i.e., those causing extensive damage to the landfill site) will not occur during the post-closure period, and that other contingencies will not occur, as discussed in Sections 7 and 9 of this plan.

### **6.1 Staffing Plan**

The personnel required to conduct quarterly inspections and perform routine maintenance and repairs will be furnished on a part-time basis. Because the Sonia Road Landfill site is closed, the operations personnel will have to be assembled from the Town's staff on an as-needed basis to perform the required monitoring and maintenance during the post-closure period according to the guidelines described in Section 3 of this Manual. Periodic training will be provided to Town personnel to satisfy the health and safety plan requirements for the monitoring and maintenance activities at the Sonia Road Landfill. Equipment needed for operations and maintenance activities will have to be arranged for from Town resources on an as-needed basis during the post-closure monitoring period. For events occurring outside the scope of the routine maintenance and repair program, the guidance described in Sections 7 and 9 will be followed. Sections 6.1.1 and 6.1.2 provide a summary of the required training for the monitoring and maintenance staff. Records are routinely kept for the Town personnel and are described in Section 10.

#### **6.1.1 Staff Training**

Selected Town personnel should be OSHA 40 hour trained for HazMat situations, and have also been trained on specific duties at the site. They should be given additional training in the

recognition of, and response techniques to, hazardous and otherwise unacceptable waste materials, first aid, confined space entry, and basic firefighting. These training programs are updated annually and as newly developed techniques are implemented. These training programs appear to be adequate for the monitoring and maintenance of the post-closure Sonia Road Landfill. The Town's Department of Environmental Control (DEC) personnel training includes conducting comparative data (laboratory and field) analyses and identifying when significant changes occur in data from period to period, as well as identifying unusual occurrences. If unusual circumstances or conditions occur, the Commissioner of the Department of Environmental Control will make arrangements and acquire professional assistance.

Evaluations of alternatives, and implementation of solutions, will be directed by a TOIDEC representative.

#### 6.1.2 Safety Plan

The Sonia Road Landfill after closure is not expected to expose personnel to hazardous substances, and routine monitoring and maintenance activities are expected to be conducted using General Site Safety Equipment personal protective equipment (PPE) under normal conditions. Health and safety procedures for the performance of routine operations and maintenance of the site are outlined in this section. In addition, the Site Specific Health and Safety Plan for the Capping/Closure of the Sonia Road Landfill can be found as Volume 2 of this manual. The Site Specific Health and Safety Plan was prepared to address the conditions associated with the construction of the landfill capping system and appurtenances. The attached plan presents a more extensive health and safety program than may be required for routine operations and maintenance activities. The attached plan is provided as a reference document and as a resource in the event that extensive or invasive activities or repairs become necessary in the future. The document will then have to be updated to address the activities to be undertaken.

Personnel involved in the post closure monitoring, maintenance and operation of the facility should familiarize themselves with the health and safety program which was implemented during the construction of the landfill capping system but should recognize that it represents conditions

with heavy construction, earthwork and activities directly involving the excavation and re-landfilling of the waste mass.

Based upon available information, it appears that the Sonia Road Landfill contains the following potential chemical and physical hazards (the items listed below are not meant to be all inclusive but are a minimum listing of hazards which should be taken into consideration during the post-closure monitoring period, and which should be considered in the approach taken during post-closure activities in the Health and Safety Plan. The Town should include such other hazards as it determines appropriate):

- Hydrogen sulfide gas;
- Methane gas;
- Reno mattress on steep sideslopes;
- Limited ingress/egress;
- Open drainage/diversion swales;
- Large diameter drainage piping and manholes;
- Recharge Basin;
- Severe weather; and
- Deer ticks.

The landfill personnel must be mindful of these potential hazards, given special instructions as needed, and utilize issued safety equipment (as necessary), all in conformance with the Town's accepted Health and Safety Plan, and in conformance with the OSHA requirements.

#### Hydrogen Sulfide Gas

Neither the recent rounds of sampling, nor the history of landfill use for disposal of municipal solid wastes, would indicate that hydrogen sulfide would be a significant component of

the gases encountered at the Sonia Road Landfill site. It is raised here for consideration because of the construction of subsurface drainage structures on the landfill as part of the gravity drain system, and also the subsurface leaching system used for disposal of gas collection system condensate water.

Hydrogen sulfide is a colorless gas with a strongly disagreeable odor similar to that of rotten eggs. It is readily detectable by the human nose at less than 4 ppm, but has the ability to saturate the olfactory sense after initial exposure so that the nose can no longer detect presence of the gas. It acts systemically by saturating the sites on hemoglobin that normally bind oxygen atoms, thus greatly reducing the ability of the human blood to deliver oxygen to the human body. Concentrations in excess of 5 ppm (the Threshold Limiting Value) must be avoided and can lead swiftly to death.

Hydrogen sulfide is heavier than air, and thus tends to collect and accumulate in higher concentrations in low areas, such as manholes, buried piping, and leaching pits. A Gas Tech Model No. GX-82 triple range portable meter, or approved equal, should be used to sample for the presence of the gas prior to personnel entering any buried piping or structures on the landfill, or adjacent to the landfill. Whether or not the presence of hydrogen sulfide is detected, a forced air ventilation system must be installed and activated prior to any personnel entering these areas. This forced air ventilation system should include an explosion and spark proof fan with flexible duct for directing fresh air into the areas to be entered. This can be rented/leased as necessary should the Town not have such equipment readily available. No personnel should enter these areas until they have been thoroughly ventilated, and sample results show that concentrations of hydrogen sulfide are below 4 ppm.

Monitoring for hydrogen sulfide gas, and for methane gas (see below) should be done continuously within buried structures and piping while personnel are present within those areas. Confined space procedures should also be implemented in accordance with OSHA Regulation 29 CFR 1910.146.

## Methane Gas

Methane gas readings taken at the Sonia Road Landfill range from zero to the explosive range. Readings are taken using a Gas Tech NP-85 explosive gas/oxygen analyzer meter or equivalent. Personnel performing monitoring or maintenance work on the Sonia Road Landfill have the potential of being exposed to methane gas escaping from the landfill.

Methane (CH<sub>4</sub>), an odorless, colorless, and tasteless gas, is a simple asphyxiant, under high concentrations. There are no systemic effects, either at 5 percent concentration or for long-term exposure. Neither are there any Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL), National Institute of Occupational Safety and Health (NIOSH) recommended exposure limit, or American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit values. The prime concern associated with methane is the hazard of fire and explosion. The Lower Explosive Limit (LEL) for methane is 5 percent of air volume and the Upper Explosive Limit (UEL) is 15 percent of air by volume.

The post-closure monitoring personnel must be aware of: 1) the presence of methane gas on site; 2) the potential hazards associated with methane gas; and 3) the procedures to be followed to detect methane. Personnel must avoid generating arcs, sparks, or flames, in areas where methane gas is detected at levels of 10 percent of the LEL, or greater, and are prohibited from smoking on site. An explosive gas/oxygen analyzer will be used to detect the presence of methane gas and determine its concentration.

## Reno Mattress and Steep Slopes

Steep slopes are a physical hazard due to the potential risk of personnel falling or equipment and material sliding. The capped slopes of the Sonia Road Landfill are 3:1 or less in all areas except where the revetment matting (Reno Mattresses) have been placed on the west side of the landfill, on the slopes leading down to the recharge basins. The slopes in this area are steeper, and the footing for personnel will be awkward due to the nature of the Reno Mattresses. Personnel are cautioned to maintain proper footing when working in this area. The use of safety lines for personnel working on

these slopes is recommended. Equipment used on the sideslopes during the monitoring period must be placed, anchored, and operated appropriately to minimize the physical hazards associated with steep sideslopes.

#### Limited Ingress/Egress

All vehicles will enter the Sonia Road Landfill site from Corbin Avenue through the main gate located on the western side of the site. Access to the surface of the Sonia Road Landfill is obtained from the perimeter access road that completely encircles the landfill in close proximity to the property line. Because the Sonia Road Landfill is closed and inactive, there should be very little traffic entering the landfill and using the perimeter access road. The only traffic authorized to enter and travel upon the landfill and its perimeter access road involves Town authorized vehicles associated with post-closure operations and maintenance activities.

Since the Sonia Road Landfill is completely enclosed with a ten-foot high chain link fence, and there is only one entrance to the site, the gated entrance from Corbin Avenue, the ability to get onto or off of the landfill surface quickly is limited. Incomplete and impeded access to the plateau area on the Sonia Road Landfill could present a potential hazard, in that personnel and equipment may not be easily evacuated from the area should it become necessary, and emergency vehicles may not easily access the area. Site personnel will be advised of access conditions and of any precautions and procedures necessary to conduct inspection, maintenance, and repair work on the Sonia Road Landfill.

#### Open Drainage/Diversion Swales/Recharge Basin

In addition to the limited roadway access discussed above, there are several drainage swales, approximately 2.5 to 3.0 feet deep which run in a north to south direction on the eastern half of the landfill, and in an east to west direction on the west side on the landfill. Two recharge basins are located along the western property boundary of the site. Consistent with typical industry practice, the swales and recharge basins are not fenced and, therefore, could be a potential physical hazard to personnel traveling across the site. Personnel performing inspection, maintenance, or repair work

on the Sonia Road Landfill should be aware of this potential hazard and the necessary precautions needed to be taken to avoid it becoming a hazard.

### Large Diameter Drainage Piping and Manholes

The eastern half of the Sonia Road Landfill is drained by a series of open drainage swales which discharge into a buried 24- to 36-inch diameter gravity storm water drain. There are several catch basins and manholes in the buried gravity storm water drain system which provide access to the pipe system. It is expected that all of these buried structures will require periodic inspection, cleaning, and maintenance. Prior to entering any of these buried structures for any purpose, it is imperative that they be tested for the presence of gases, particularly methane and hydrogen sulfide. Confined space procedures should be implemented by personnel when entering or working in these areas.

### Severe Weather

The Sonia Road Landfill is open and exposed to both the sun and the wind, which can aggravate extremes of temperature. In the winter, there is little protection from the wind; and in summer, there is no screening of the sun. This can potentially contribute to physical hazards such as hypothermia, dehydration, and frostbite in the cold weather, and heat rash, heat cramps, heat exhaustion, and heat stroke in hot weather. Personnel performing inspections, maintenance, and repair work on the Sonia Road Landfill will be advised of the severe weather hazards and necessary precautions as part of the safety orientation program. A brief description of these is presented in this section. A more extensive discussion may be found in the Health and Safety Plan (Volume 2) of this Manual.

### Deer Ticks

Personnel working at the Sonia Road Landfill should take the precautions described below against possible deer tick bites. Deer ticks are carriers of the spirochete (*borrelia bergdorfi*), which

causes Lyme disease, that can be transmitted to humans when bitten (please note that the Town of Islip conducts an annual blood testing program to detect the presence of Lyme disease).

Signs and symptoms of Lyme disease may include the following:

- The most well-known warning sign is a rash, classically described as a small red area that starts at the site of a tick bite and gradually enlarges over several days. The rash, which does not appear until three to 30 days after the tick bite, may grow to several inches in diameter and is circular with a central clearing. It may be obvious or very faint. Multiple, usually smaller, rashes without central clearing may develop in some individuals.
- Flu-like symptoms may precede or accompany the onset of the rash. Symptoms may include chills and fever, headache, malaise and fatigue, stiff neck and, in some cases, pain in the joints.
- If Lyme Disease is diagnosed and treated early, the prognosis is excellent. If the initial stage is not discovered and treated promptly, later stages may develop. Chronic arthritis, and in some cases heart and nervous system disorders, may develop weeks to months after the tick bites.

Some infected individuals may not develop either rash or symptoms. Thus, anyone bitten or thought to be bitten by a deer tick, or developing signs or symptoms of Lyme disease is advised to see a physician promptly for an examination and possibly a blood test. Prophylaxis or treatment with antibiotics (tetracycline) may be a recommended course of action.

To prevent tick bites, personnel should wear long pants, made of light colored, tightly woven cloth; tuck pants legs inside of socks; use an insect repellent; check themselves frequently and wash themselves thoroughly at the end of each day. The site safety officer will advise personnel of the risk of deer tick bites, the initial symptoms, and the precautions to be taken.

## **6.2 Equipment**

The equipment utilized for the post-closure operation and maintenance of the Sonia Road Landfill will consist of standard construction equipment from the Town's inventory, or from that of subcontractors retained by the Town for monitoring and maintenance purposes. In addition, the



Town's standard maintenance equipment, such as mowers and trimmers, will be used to maintain the site following its closure. No heavy equipment will be stored or maintained at the site.

#### 6.2.1 Minimum Requirements for Maintenance

The principal operations to be performed by the Town on a regular basis during the post-closure period will be mowing of the vegetation and the repair of cover soil erosion. The mowing operations will require the use of a heavy equipment mower which can be operated safely on steep sideslopes. The soils repair will be accomplished with a front-end loader, a vibratory drum roller, and a grader, as necessary, depending upon the size and depth of the area which has been eroded. This equipment may be available in the Town's inventory or will be rented or leased, or provided by subcontractors retained by the Town for monitoring and maintenance purposes. The equipment must be outfitted with rollover protection cabs and backup alarms meeting the OSHA requirements for this type of machinery. The equipment will be maintained according to the Town's current maintenance schedule, and additional equipment for emergencies should be available from the inventory of subcontractors retained by the Town. Because the Town will utilize necessary additional equipment from its subcontractors, resources will not be designated solely for landfill post-closure activities at the Sonia Road Landfill.

#### 6.2.2 Firefighting Equipment

Fire extinguishers will be carried on all equipment used on the site for maintenance or repair work. In addition, the local fire company will provide assistance and/or equipment, as needed, to control any fires which may occur at the site.

### **6.3 Post Closure Safety Procedures**

#### 6.3.1 Personal Protective Equipment (PPE)

During the post closure monitoring and maintenance period, the capping system will mitigate the possibility of dermal contact with waste materials relative to the routine operation,

maintenance and monitoring of the facility. As such, there are no Exclusion Zones or Contaminant Reduction Zones required unless future remedial repairs require invasive work which may involve contact with waste materials.

The level of personal protective equipment (PPE) required for the normal performance of operation, maintenance and monitoring tasks shall be defined as General Site Safety Equipment, to be consistent with the Site-Specific Health and Safety Plan for the construction of the capping system which is included as Volume 2. The General Site Safety Equipment shall include:

- Coveralls – optional, may be disposable type.
- Boots/Shoes – Steel-toe work shoes or boots.
- Hard Hat (ANSI approved)
- Gloves – For materials handling operations.
- Safety Glasses with Side Shields – ANSI approved, as required by activity.
- Hearing Protection – If work is on or near noisy equipment.

Given that the Sonia Road Landfill site is no longer active and will, for all practical purposes, be unmanned other than the part-time presence of operations, maintenance or monitoring personnel, it is recommended that on-site personnel be provided with a portable means of communication and a first aid kit.

All personnel performing operations, maintenance or monitoring activities should be prepared to perform these duties under the extremes of weather which will prevail throughout the course of a year. Given the openness of the site and the lack of cover or protection, each person must be mindful of the potential for cold stress and heat stress.

### **Cold Stress:**

The purpose of this section is to make all personnel who may be on-site aware of the problems associated with cold weather operations. As with heat related emergencies, cold

weather injuries are progressive. That means that if the worker is aware of the problems beforehand, he may prevent further damage and remain working.

Cold related injuries may be divided into two types:

- Local Cooling affects the particular part of the body coming in direct contact with the cold air. This is commonly known as FROSTBITE.
- General Cooling affects the entire body and is known as HYPOTHERMIA. Hypothermia is a true medical emergency and should be recognized as such and treated immediately by trained medical personnel.

As stated, cold related injuries are progressive. The body loses heat either by CONDUCTION or direct transfer of body heat into the cold environment. An example would be an unprotected head allowing the surface area of the head to come in direct contact with the colder air. The other means by which the body loses heat is by CONVECTION. This occurs when colder air is allowed to pass over the body surface. When that air is also moist or the work garments become wet, a WATER CHILL or more commonly recognized WIND CHILL occurs. An example of wind chill would be a 20-mph wind during a 10-degree day would produce the same effect as -25 degree temperature. Proper work attire and safe work practices may easily prevent both of these conditions. Hardhat liners prevent the wind from blowing under the brim but will also affect your hearing ability. Loose layers of work clothes rather than bulky garments will allow the wearer to adapt to changing conditions. Use of rubber overboots will prevent leather work-boots from getting wet and are excellent for stationary work to stop cold penetration.

#### **Signs to Look for:**

FROSTNIP, the first stage of frostbite, occurs when a body part comes in direct contact with a cold object or cold air. This condition is not serious and can be remedied by warming of the region. The real problem is that a numbing effect can occur and keep the worker from realizing that he is going into the next stage, SUPERFICIAL FROSTBITE.

The skin and under layers become affected. If not treated, this can become a FREEZING condition in which the deeper structures of the body become affected.

<u>Condition</u>	<u>Skin Surface</u>	<u>Tissue under Skin</u>	<u>Skin Color</u>
frostnip	soft	soft	red-white
frostbite	hard	soft	white/waxy
freezing	hard	hard	white/gray

HYPOTHERMIA occurs when the body is unable to maintain its proper temperature of 98.6 degrees. It is important for the worker to realize that this can occur in temperatures of 50 degrees and below. Submersion of a body part in cold water will also cause hypothermia very quickly. Some early signs are:

1. Shivering
2. Numbness in extremities
3. Drowsiness
4. Slow breathing and pulse rates
5. Failing eyesight
6. Loss of coordination, inability to do easy tasks
7. Freezing of body parts

Proper treatment begins by activation of emergency medical service procedure. Hypothermia requires prompt qualified medical treatment. Initial site action would revolve around getting the affected worker out of the weather and begin the warming process. The most important thing to realize is that Hypothermia is a **MEDICAL EMERGENCY**.

Workers exposed to cool temperatures for an extended period of time can experience lesions in the form of red swollen areas that seem hot and itchy. These chronic lingering lesions are known as **CHILBLAINS**. Although not an emergency, the Chilblains indicate that the worker is not adequately protecting the affected area.

A common problem in wet work areas is **TRENCHFOOT**. The worker whose feet

remain unprotected by leather footwear in water close to freezing will have swollen limbs that appear waxy and mottled in color. The affected limb will appear cold to the touch. Basic treatment revolves around getting the worker to a warm place and slowly removing the wet footwear. The obvious way to prevent Trenchfoot is to wear rubber protective footwear.

Some suggestions to prevent cold weather operation problems:

1. Plan ahead as to the proper work clothes to be worn.
2. Avoid early overheating which dampens clothes and hastens the release of body heat by evaporation.
3. Use of windbreaks in the work zone.
4. Elimination of standing water or avoid prolonged immersion in that water.
5. Provision of heated rest area, i.e., trailer or vehicle.
6. Avoid overheating of the rest area. Extreme temperature differentials between the work area and the rest area will lead to chilling upon return to work.
7. Proper diet and eating habits.
8. Avoid or cut down smoking, which constricts the blood vessels.

**REMEMBER, YOU ARE THE BEST PROVIDER OF INFORMATION ABOUT HOW YOU FEEL. THE BEST WAY TO PREVENT INJURIES FROM COLD WEATHER OPERATIONS IS TO RECOGNIZE THE EARLY SIGNS AND PREVENT SERIOUS INJURY.**

### **Heat Stress:**

#### **Working Conditions as Related to Heat Stress:**

Since all operations will be conducted in some level of personal protection and operations will occur year-round, consideration of the effects of heat stress is in order.

## Personal Protective Clothing

The entire protective ensemble, especially if protective clothing is worn, does not lend itself to the release of body heat generated during work. With this in mind, the following will be taken into consideration during the work schedule so as to minimize the heat stress to all personnel:

- A. All personnel shall wear lightweight undergarments with short sleeves, under any protective outer garments that may be required.
- B. Personnel shall ensure that extra clothing is available on-site for use as the workday progresses due to the clothing becoming wet from perspiration.
- C. All personnel will be expected to drink liquids before and during each work cycle.

## Causes of Heat Stress

Wearing increased levels of protection on-site can put personnel at risk of developing heat stress. This section will discuss heat stress and what steps should be taken to monitor personnel for the signs of it.

The body's chemical activities take place in a limited temperature range. Heat is generated by these processes. Any heat not needed to sustain the activities must be lost from the body to maintain a balance. HYPERTHERMIA is an abnormally high body temperature. The three main avenues for the release of body heat are:

- A. Respiration is our breathing pattern. Care should be taken that the body is not fooled into believing it is cool based on skin temperature.
- B. Radiation is how heat is released from the skin. Blood will pool on the surface of the skin as body temperatures increase. Should a protective ensemble be required, it will significantly reduce or prevent this type of heat release.
- C. Evaporative Heat Loss normally allows a body to cool itself by the evaporation of perspiration. Protective ensembles stop any contact with moving air and the sweat coming off of the body will not evaporate.

If any of these release mechanisms are out of balance, the following conditions can occur and may be considered emergencies needing care:

- A. **Heat Rash** is a common occurrence in areas where body parts rub causing friction. The level of protection will heighten its effects. Proper treatment would be personal washing of the affected areas and administering powder to help healing.
- B. **Heat Cramps** occur when people are exposed to heat for extended periods of time. If a protective ensemble is required, this can be expected. The person will sweat heavily and drink large quantities of water. The more the person sweats, the more electrolytes are lost. If enough body salts are lost, the individual will begin to experience body cramps and pain in the extremities.

Proper treatment includes slow replenishment of body fluids augmented by a proper salt solution along with cooling the individual down, taking care not to expose the person to extreme cooling measures. The worker will not be allowed to return to work until he/she has been monitored and approved for the resumption of his/her duties.

- C. **Heat Exhaustion** occurs as the blood pools at the skin surface in an attempt to cool the body. Sweating is profuse, skin is moist and cool, and the patient will experience dizziness, nausea or fainting. This condition is an indicator of overwork in the environmental conditions. Treatment includes all for heat cramps with an extended rest period before resumption of activity. Depending on the worker's physical condition, rest periods may be from 30-60 minutes. After experiencing heat exhaustion, the worker should be closely monitored for symptoms reoccurring.
- D. **Heat Stroke** can occur if heat exhaustion is not cared for. This occurs when the body loses its ability to regulate its temperature. Sweating stops and, if not treated, can lead to death. Signs and symptoms include dry red skin with no perspiration along with nausea, dizziness and confusion. A strong, rapid pulse should be carefully monitored as this condition can lead to coma. Proper treatment begins by understanding that this is a true medical emergency and requires obtaining emergency medical treatment. When notifying the Emergency Medical Response organization, emphasis should be placed on the words HEAT STROKE and the need for rapid transportation to the medical facility (see Appendix A of the HASP). Emergency medical treatment in the field includes immediate cooling of the body with total body immersion preferable. Water temperature should be cool enough to absorb the high body heat but not cold. Ice packs can be applied to the person's head area and under the arms. Due to the personnel needed to treat the patient while awaiting emergency medical care, all work will stop and all attention will be devoted to the person in stress. All personnel should be evaluated after the patient is transported to determine if they also are showing signs of heat stroke.

**Remember: You are your own best indicator of signs of heat stress.**

The use of PPE in excess of the General Site Safety Equipment may place site workers at risk of developing heat stress. This can result in health effects ranging from transient heat fatigue to serious illness or death. Because heat stress is probably one of the most common illnesses associated with the use of PPE, regular monitoring and other preventative measures will be taken to protect site workers when increased levels of PPE are required. If circumstances arise which require the use of personal protective equipment in excess of the General Site Safety Equipment, a more formal program of on-site health and safety must be instituted. In such cases, the Site-Specific Health and Safety Plan for the construction of the capping system should be reviewed and implemented as appropriate.

### 6.3.2 Key Safety Rules

The following is a list of key safety rules which must be observed by all personnel for maximum safety:

- Never visit the site or perform any work alone.
- The ABCs of Safety: Always Be Careful! Do not use intoxicants.
- Do not light a match or smoke in the landfill gas management compound. Use only nonsparking explosion-proof safety electric lights and equipment in the presence of landfill gas.
- All underground manholes and structures are permit-required confined space entry areas.
- Thoroughly ventilate the manhole or structure before entering. Use a nonsparking, portable blower when necessary. Wear a hose mask or self-contained oxygen breathing apparatus if in doubt. Learn in advance how to use such equipment.
- Guard against live wires, slippery surfaces, open hatches, moving machinery.
- Keep all walks free from oil and grease.
- Insist on (1) protection against hazards; (2) safety equipment.
- Cleanse with water and apply antiseptic on every skin abrasion. Always wash hands thoroughly with soap and water before handling food.



### 6.3.3 Electrical Hazards

Ordinary 110v electricity may be fatal; however, lower voltage and low amperage electricity should not be underestimated. Extensive studies have shown that 0.005 amp will cause loss of muscle control and that 12 volts may cause injury.

Therefore, all voltages above 12 volts should be considered dangerous. Electrical systems at the Sonia Road Landfill operate at voltages from 120 to 240 volts or more. Sparking (ignition) devices associated with the flare operate at voltages in excess of 5,000 volts. All electricity should be treated cautiously and without guessing as to the nature of the electrical circuit.

Electricity kills by paralyzing the nervous system and stopping muscular action. Frequently, electricity may hit the breathing center at the base of the brain and interrupt the transmission of the nervous impulses to the muscles responsible for breathing. In other cases, the electrical current directly affects the heart, causing it to stop pumping blood. Death follows from lack of oxygen in the body. It cannot be determined which action has taken place, so it is essential that:

- The victim be freed from the live conductor promptly by use of a dry stick or other nonconductor. Never use bare hands to remove a live wire.
- Artificial respiration should be applied immediately and continued until breathing is restored or until a doctor arrives.

The following precautions should be observed when working with electrical equipment:

- Do not ground yourself inadvertently to piping or other metallic equipment when working on or in contact with electrical equipment or wiring. Do not pass tools to or otherwise touch a person who is grounded.
- Allow only qualified and authorized people to work on electrical equipment or perform electrical maintenance.
- Keep all electrical controls in safe working order, accessible, and well marked.
- Keep wires from becoming a tripping hazard.

- Never use metal ladders or metal tape measures around electrical equipment.
- Unless a wire is positively known to be dead and it is impossible for it to become accidentally live again, handle it as though it were a live wire.
- When working around electrical equipment keep your mind on the hazard at all times.
- Always work from a firm base. Loss of balance may cause a fall onto energized parts. When working over energized busses or parts, cover them with a good electrical insulator such as a rubber blanket.
- Work in pairs around electrical equipment.
- Place tagout signs and lock the switches when working on electrical equipment which another person can turn on.
- Handle breaker wires as though they were “live” wires.

#### 6.3.4 Mechanical Equipment Hazards

Physical injuries can occur due to mechanical equipment hazards caused by carelessness, defects in equipment or materials, a failure to follow recommended safety practices, or the improper use of tools. The operation and maintenance of the mechanical equipment will require the use of many types of tools and equipment. The tools and equipment have for all practical purposes, been designed to be safe when properly used, stored and maintained. When hand tools such as wrenches, pliers, screwdrivers, etc., become worn, they should be replaced immediately. The use of worn tools can result in the user or someone else being injured.

The following are some special precautions that should be observed for safety around mechanical equipment:

- All mechanical equipment should be properly guarded to protect personnel from moving parts such as wheels, belts, gears, etc. Any moving or stationary parts that present a potential hazard should be properly guarded. The guards should be maintained in good condition and replaced if necessary. If during equipment repair or maintenance operation, the machine guards are removed, they should be replaced correctly after the required work has been completed.

- Never service or make adjustments to equipment while it is in operation.
- Goggles should be worn when using grinders, any air chipping tools or welding equipment.
- Allow only authorized personnel to work on mechanical equipment or perform repairs.
- Protection against high noise levels should be practiced by wearing ear plugs, ear muffs, etc. The limit for 8 hours of exposure to a source of noise is 90 dBA. As the noise level increases, the acceptable exposure time decreases. A maximum exposure time of 15 minutes should be observed to a source of noise of 115 dBA.
- Maintain accessibility to all machinery controls. Make sure that they are well marked.
- Follow lockout/tagout procedures when working on mechanical equipment which another person can turn on.
- Work in pairs around mechanical equipment.
- Operators should exercise caution whenever checking any equipment. Be constantly aware of the hazards of the equipment.
- When checking equipment, the operator should be certain that all his clothing fits properly and does not hang loosely.
- First aid measures should be provided immediately for all cuts and scratches, and a report filled out.
- All new personnel should be properly trained so that they will be aware of all mechanical equipment hazards.

### 6.3.5 Explosion and Fire Hazards

The best insurance against explosion and fire hazards is prevention. The potential causes of these hazards should be determined before an accident occurs, not after. Preventive measures to avoid explosion and fire hazards must be taken. Explosion and fire hazards can occur when a combustible gas mixture is present in sufficient concentration.

The following are some special precautions that should be observed to prevent explosion and fire hazards:

- All personnel should be cautioned about the danger of smoking, lighted matches or using an open flame in areas that could contain flammable or explosive gases.
- Always store flammable or combustible liquids in approved tanks or closed containers.
- Check safety relief devices on flammable gas containers to see that they are not obstructed or damaged.
- Clearly label all portable containers of flammable materials to indicate their contents.
- Storage location for flammable materials should be permanently marked “Flammable Material - **NO SMOKING - NO OPEN FLAMES.**”
- Sources of ignition must be controlled near possible sources of flammable vapors. These sources could be open flames, smoking, sparks, cutting and welding or frictional heat.
- Leakage or spills of flammable materials must be immediately and properly cleaned up and disposed of.
- Fire extinguishers should be provided in locations where flammable materials are stored. Extinguishers for fires in ordinary combustible materials such as paper, wood, cloth, etc., fires of flammable liquids and grease; and electrical fires should be provided. The fire extinguishers are intended as a first line of defense to cope with fires of limited size. All fire extinguishers should be maintained in a fully charged and operable condition. They should be inspected and tested on a regular basis. General portable fire extinguisher detailed instructions are contained with **PORTABLE FIRE EXTINGUISHERS, NFPA NO. 10**, National Fire Protection Association, Boston, Massachusetts.
- The flare can be a source of extreme heat resulting from the combustion of landfill gas. No attempts should be made to service the flare while it is in operation or before it has had an opportunity to cool down. Even after the operation has been ceased, the landfill gas management piping, including the flare stack, may contain combustible concentrations of landfill gas.
- No attempt should be made to disable the flare controls or operate the flare without the presence of a flame when combustible concentrations of landfill gas are present.
- All new personnel should be made aware of the location of all flammable materials.

First aid measures should be provided immediately for all burns or other injuries suffered in an explosion or a fire and a report filled out.

### 6.3.6 Lockout/Tagout

**PURPOSE**—This program establishes procedures for de-energizing, isolating and ensuring the energy isolation of equipment and machinery. The program will be used to ensure that equipment and machinery is de-energized and isolated from unexpected energization by physical locking (Lockout) energy isolation devices or, in the absence of locking capabilities, tagout (Tagout) the device to warn against energization. These procedures will provide the means of achieving the purpose of this program, prevention of injury to Town employees from the unexpected energization or start-up of equipment and machinery, or from the release of stored energy.

**APPLICATION**—This program applies to the control of energy during the servicing and/or maintenance of equipment and machinery.

This program covers normal operations only if a guard or other safety device removed or bypassed, or any part of the body is placed into an area of the equipment or machinery where work is performed on the material, or a danger zone exists during the operating cycle. Minor tool changes, adjustments, and other minor servicing activities that take place during normal operations do not require isolation and lockout/tagout if they are routine and integral to the use of the equipment.

**SCOPE**—This program will include all employees whose duties require them to service, install, repair, adjust, lubricate, inspect or perform work on powered equipment or machinery that may also have the potential for stored energy

## DEFINITIONS

Affected personnel – A person 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 personnel – A person who locks or implements a tagout system procedure on machines or equipment to perform servicing or maintenance. An authorized person and an affected person may be the same person when the affected person's duties also include performing maintenance or service on a machine or equipment that must be locked or tagged out.

“Capable of being locked out” – An energy-isolating device will be considered to be capable of being locked out if it is designed with a hasp or other attachment or integral part to which, or through which, a lock can be affixed, or if it has a locking mechanism built into it. Other energy isolating devices will also be considered to be 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 electrical circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from all ungrounded 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. The term does not include a push button, selector switch and any other control circuit type devices.

Energy source – any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, or other energy.

Lockout – The placement of 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 positive means such as a lock, either key or combination type, to hold an energy isolating device in the safety position and prevent the energizing of a machine or equipment.

Normal procedure 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.

Stored energy – Energy that is available and may cause movement even after energy sources have been isolated. Stored energy may be in the form of compressed springs, elevated equipment components, hydraulic oil pressure, pressurized water, air, steam, or gas, or rotating flywheels, shafts or cams.

Tagout – The placement of a tagout device on 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.

Tagout device – A prominent warning device, such as a tag and a means of attachment, which can be securely fastened to an energy isolated device in accordance with an established

procedure. The tagout device will indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

### PROGRAM RESPONSIBILITIES

The TOIDEC will have the overall responsibility of the program to ensure that; authorized and affected employees (personnel) receive adequate training information, the program is evaluated annually, and the lockout/tagout equipment is properly used and the procedures of this program are followed.

The program evaluation will be conducted to ensure that the procedures and requirements of the program are being followed and will be utilized to correct any deviations or inadequacies that may be discovered. The evaluation will consist of one or more inspections or audits of actual lockout/tagout procedures being used to isolate equipment. A review of the authorized and affected person's responsibilities will be conducted at a time of the inspection/audit. Any authorized person, except the one(s) utilizing the energy isolation procedure being inspected may perform the inspection/audit. A record will be maintained of program evaluation inspections and will include:

1. The identities of the equipment or machine on which energy control procedures were being utilized.
2. The date(s) of the inspection(s).
3. The employee(s) included in the inspection(s).
4. The person performing the inspection.

Authorized personnel (persons who implement lockout/tagout procedures) will be responsible for following the procedures established by this program.

Affected personnel are responsible for understanding the significance of a lockout/tagout device and the prohibition relating to attempts to restart or energize equipment or machinery that is locked out or tagged out.



TRAINING – Appropriate Town employees will be provided instruction in the purpose and function of the energy control program to ensure that they understand the significance of locked or tagged out equipment and also have the knowledge and skill to correctly apply and remove energy controls. Training will include:

1. The recognition of applicable hazardous energy source(s), the type and magnitude of energy available, and the policies and procedures of the energy control program.
2. Affected personnel will be made aware of the purpose and use of energy control procedures and the prohibition relating to attempts to remove lockout or tagout.
3. Instruction in the limitations of tagout as sole means of energy control.
  - a. Tags are warning devices and do not provide the physical restraint that a lock would.
  - b. Tags may provide a false sense of security.
  - c. Tags may become detached during use.

Initial training will be provided to all authorized and/or affected personnel prior to energy control program implementation, when new employees are hired or when job responsibilities change to include utilization of energy control procedures.

Retraining will be conducted whenever there is a change in job assignments that require the personnel to utilize energy control procedures, a change in equipment that presents a new hazard, a change in the energy control procedures or when the program evaluation identifies inadequacies in the energy control program procedures.

Records of personnel training will be maintained and will include the personnel name and date(s) of training.

### STANDARD OPERATING PROCEDURES

General; TOIDEC will provide the necessary devices to effectively lockout or tagout energy isolating devices. Lockout/tagout devices will be the only devices used for controlling energy and shall not be used for other purposes. Any device used for lockout/tagout will be capable of

withstanding the environment to which they are expected to be exposed. The devices will be substantial enough to prevent removal without excessive force. Excessive force for a locking device would be bolt cutters or other metal cutting tools. Tagout devices will be attached by a non-reusable method, attachable by hand, and very difficult to remove by hand. Nylon cable tie or equivalent will be used.

Lockout/tagout devices will indicate the identity of the person who applied the device, and the tagout device will warn against the hazards if the equipment is energized. Lockout is the preferred method of energy isolation. When physical lockout is not possible, the energy isolation will be tagged out of service with a warning tag attached at the power source. In the case of plug-in power source, the tag will be attached at the male plug. To ensure full personnel protection using tagout instead of lockout, additional steps should be taken to guard against accidental or inadvertent energization. These steps may include, where applicable: removal of fuses, blocking switches, removal of a valve handle.

## STANDARD OPERATING PROCEDURES

### I. APPLICATION OF CONTROLS

#### A. Preparing to shut down of equipment

1. Prior to equipment shutdown, the authorized personnel must have knowledge of:
  - a. The type(s) and magnitude of power.
  - b. The hazards of the energy to be controlled (e.g. burns due to thermal energy).
  - c. The method(s) to control the energy.
  - d. The location and identity of all isolating devices that control or feed the equipment to be locked/tagged out.
2. Notify all affected persons that the lockout/tagout system will be in effect.
3. Assemble applicable lockout/tagout devices, i.e., padlocks, tags, multiple lock hasps, etc.

## B. Equipment Shutdown and Isolation

1. If equipment is in operation, shut it down by the normal stopping procedure (stop button, switch).
2. Operate disconnects, switches, valves, or other energy isolating devices so that the equipment is de-energized and isolated from its energy source(s).
3. Verify that operating equipment shuts down from the normal equipment operating location and any remote locations.

## C. Installation of Lockout/Tagout Device, Release of Stored Energy, and Verification

1. Attach individually assigned lock(s) or tag(s) to energy isolating device(s). Where it is not possible to lock a switch, valve, or other isolating device, electrical fuses must be removed, blank flanges installed in piping, lines disconnected, or other suitable methods used to ensure that equipment is isolated from energy sources. A tag must be installed at the point of power interruption to warn against energizing.
  - a. Each lock or tag must be positively identify the person who applied it and locks must be individually keyed.
  - b. If more than one person is involved in the task, each person will place his or her own lock and tag. Multiple lock hasps are available for this.
2. Release, restrain, or dissipate stored energy such as spring tension, elevated machine members, rotating flywheels, , hydraulic pressure, pistons and air, gas, steam, water pressure, etc. by repositioning, blocking, bleeding, or other suitable means.
3. Prior to starting work on equipment and after ensuring that no personnel are exposed, the authorized person will verify that isolation and de-energization have been accomplished by:
  - a. Attempting, through normal effort, to operate energy isolating devices such as switches, valves, or circuit breakers with locks or tags installed.
  - b. Attempting to operate the equipment or machinery that is locked or tagged out. This includes all sources of energy, i.e. electrical, hydraulic, gravity, air, water, stream pressure, etc.
  - c. Verifying the presence and effectiveness of restraint (blocking) and energy dissipation or release (bleeding).
4. If there is a possibility of re-accumulation of stored energy to a hazardous level, verification of isolation will be continued until the servicing or maintenance is completed, or until the possibility of such accumulation no longer exists.

#### D. Group Lockout/Tagout

1. When more than one individual is involved in locking or tagging equipment out of operation, each individual will attach their individual lock or tag, or the equivalent, to the energy isolating device(s).
  - a. An equivalent lockout device may be in the form of a group lockout device such as a multiple lock hasp or lock box.
  - b. Primary responsibility for a group of authorized persons working under a group lockout device will be vested in a designated authorized person.
  - c. Group lockout methods will provide a level of protection equal to that afforded by a personal lockout/tagout device.

## II. RETURNING EQUIPMENT TO SERVICE

### A. Restore Equipment to Normal Operating Status

1. Re-install all parts or subassemblies removed for servicing or maintenance.
2. Re-install all tools, rests, or other operating devices.
3. Re-install all guards and protective devices (i.e. limit switches).
4. Remove all blocks, wedges, or other restraints from the operating area of the equipment.
5. Remove all tools, equipment, shop towels from the operating area of the equipment.

### B. Verify Equipment Ready for Operation

1. Inspect area for non-essential items.
2. Ensure that all personnel are safely positioned clear of the operating areas of the equipment. Post a watch if energy isolation devices are not in line of sight of the equipment.

### C. Notify Affected Employees of Impending Start-up

1. The sudden noise of start-up may startle nearby employees.
2. Equipment may need to be tested to determine operational safety by a qualified operator.

#### D. Remove Energy Isolation Devices

Only by authorized personnel who installed it/them.

1. Remove line blanks, reconnect piping (if applicable), remove warning tag.
2. Close bleeder valves, remove warning tags.
3. Replace fuse(s), close circuit breaker(s), remove warning tag.
4. Remove lock and tag from control panel, valve, etc.
5. Exception to removal of lockout/tagout devices by personnel who installed it. If it is necessary to operate a piece of equipment that is locked/tagged out, every effort must be made to locate the person whose lock or tag is on the equipment. If the or she cannot be located and only after positive assurance is made that no one is working on the locked out equipment, the supervisor may personally remove the lock. The supervisor must assure that the equipment is once again locked out, or the person notified that the equipment has been re-energized, before the person resumes work.

Personnel will recheck locked out equipment if they have left the equipment (breaks, lunch, end of shift) to make sure it is still de-energized and locked out.

### III. TEMPORARY REMOVAL OF LOCKOUT/TAGOUT PROTECTION

- A. In situations where the equipment must be temporarily energized to test or position the equipment or its' components, the following steps will be followed:
  1. Clear the equipment of tools and materials that are non-essential to the operation.
  2. Ensure the equipment components are operationally intact.
  3. Remove personnel from the equipment area.
  4. Remove the lockout/tagout devices by the personnel who installed it/them.
  5. Energize and proceed with testing or positioning.
  6. De-energize all systems and re-install all energy control measures.
  7. Verify re-installed energy control measures are effective.

### IV. SHIFT OR PERSONNEL CHANGES

- A. The following steps will be followed to ensure continuity of employee protection during personnel changes.

1. All personnel involved in the maintenance or servicing activity will be notified that a transfer of personal locks/tags is about to occur.
2. Clear all personnel from hazardous area(s) of equipment.
3. Under the supervision of the shift supervisor or group designee, the off-going personnel will remove their locks/tags and the oncoming personnel will immediately install their locks/tags.
  - a. If an entire group or more than one employee will be transferring work responsibility, locks/tags will be removed and replaced one at a time in order of installation.
4. When the transfer of lockout/tagout devices is complete, the effectiveness of all energy isolation devices will be verified to the satisfaction of all personnel involved.
5. Once the effectiveness of energy isolation protection is confirmed, the service/maintenance operation may continue.

#### V. CONTRACTOR NOTIFICATION

- A. Whenever outside, third party personnel may be engaged in activities covered by this program, the authorized person will inform the contractor of applicable lockout/tagout procedures used to protect TOIDEC employees from the hazards of working near energized equipment.
  1. The contractor will be expected to ensure that his/her employees understand and comply with the restrictions and prohibitions of this program.
  2. TOIDEC will require, under these circumstances, the contractor to inform TOIDEC of their lockout/tagout procedures so that TOIDEC employees can comply with the restrictions and prohibitions of the contractor's program.
  3. TOIDEC will also require the contractor to notify the affected TOIDEC personnel prior to de-energizing, isolating and locking out equipment. Conversely, notification is also required when this equipment will be returned to service.

# Section 7



## **7.0 CONTINGENCY PLAN**

The objective of the contingency plan is to address the events which may occur outside of the scope of the routine maintenance program. The contingency plan will be implemented following the discovery of a condition at the landfill which cannot be covered by routine or otherwise scheduled maintenance and repair. Natural occurrences, such as storms, drought, and landfill settlement, are considered "expected occurrences" and have been addressed in the previous sections of this report. Other situations, such as war, an earthquake, or other catastrophic events cannot be reasonably expected to occur and, therefore, are not specifically addressed in this report.

The contingency plan which follows addresses new or continuing degradation of the groundwater quality, the migration of methane gas, and the possibility of a fire on the landfill. Contingencies for severe weather are presented in the Health and Safety Plan (Volume 2) of this Manual. The guidelines which follow will be used to determine when the contingency plan should be implemented and which corrective measures should be enacted. The appropriate regulatory agencies and other public officials will be notified for any emergency which is governed by this contingency plan.

### **7.1 Groundwater Contamination**

Groundwater will be monitored quarterly during the post-closure period according to the provisions of Section 4, and of the SAP (Volume 3), of this plan. In the event that a statistically significant change in the water quality of compounds emanating from the landfill via the groundwater pathway arises, the Town, and NYSDEC will be notified. As a result, the next round of sampling will include testing of the expanded list of parameters (see the SAP Volume 3) to determine specific constituents. An evaluation will also be made to determine if the constituents of concern may be emanating from an area off-landfill, to the north, which area the NYSDEC is currently preparing to make the subject of a separate work plan. At this point, should the elevated levels continue or if new solubilized compounds are discovered, the Town, and NYSDEC may request that a work plan be developed that investigates the nature, extent, and cause of the compounds. Upon acceptance of the plan and completion of the sampling, analysis and data



validation, a report will be prepared. The report will describe the findings of the investigation and make recommendations for corrective measures, if necessary. The Town, and NYSDEC will determine the specific corrective measure to be taken and make the necessary appropriations for implementation. At a minimum, any corrective action will be accomplished in accordance with 6 NYCRR 360-2.20.

## **7.2 Landfill Gas Migration**

Methane gas that is flared, then vented to the atmosphere, does not present a risk to human health since flare systems are typically capable of destroying greater than 98% of the gas constituents. However, a build-up of gas within a confined space at the landfill may create potential for an explosion hazard. If it is suspected that methane gas generation poses a human health hazard, the NYSDEC will be notified, and an investigation undertaken to determine whether the flare system is functioning properly. The possible responses to a gas emergency include replacing portions of the flare system.

Currently, a system of gas collection wells and a gas monitoring system exists around the perimeter of the landfill. The landfill gas monitoring wells are designed to detect the presence of methane, which would indicate that the gases are migrating off-site. A description of the routine gas monitoring plan is provided in Section 5 of this plan.

In the event that methane gas is detected at a level equal to, or greater than, 25 percent of the LEL (5 percent, by volume) during the routine, monthly monitoring schedule, the Town's Commissioner of DEC will be notified and will immediately undertake all steps necessary to ensure safety and protection of human health and notify NYSDEC officials. If deemed necessary, the following will be implemented:

- Within seven days of detection, the Town will submit to the NYSDEC a report of the methane gas levels detected and provide a description of the steps that will be taken to protect human health; and
- Within 45 days of detection, submit a plan to implement a remediation plan for the methane gas releases and a schedule for implementation of the plan within 60 days after

date of detection. The plan must assess the nature and extent of the gas release problem and describe the proposed remedy.

### **7.3 Fire and Explosion**

The Sonia Road Landfill has been inactive since 1977. As a result, the likelihood of an underground fire in the waste is relatively low. However, an aboveground (vegetation) fire is a possibility and will be reported to the local fire department immediately if it occurs. The appropriate response measure, including the safety of the personnel on the site, will be the responsibility of the fire department. Any damage to the Sonia Road Landfill closure system will be repaired according to the guidelines in Section 3, after extinguishing the fire.

### **7.4 Emergency Response**

Emergencies are events which fall outside of the reasonable range of occurrence and have not been included in the Post-Closure Contingency Plan. Such events may include, but not be limited to, a failure of one of the storm water control features, a failure of the landfill cap, or a fire caused by the release of high concentration of methane at the perimeter gas monitoring wells.

#### **7.4.1 Notification Procedure**

For emergencies that present an immediate danger or threat to human health and welfare, the Town's Commissioner of DEC, local Public Safety, and fire departments will be notified; the affected area(s) secured; and local residents warned or evacuated. For emergencies that do not present an immediate threat or danger to human health and welfare, the Town of Islip Public Safety, and Suffolk County Health Departments will be notified, as well as the NYSDEC. Telephone numbers for emergency response personnel are presented on the following page (Table 7-1).

**Table 7-1**

**Emergency Response Telephone Numbers**

Suffolk County Dept. of Health Services Administration	(631) 853-3081
Groundwater Resources	(631) 853-2251
Hospital (primary) Good Samaritan Hospital 1000 Montauk HWY West Islip, NY	(631) 376-3000
Hospital (secondary) Southside Hospital 301 E. Main Street Bay Shore, NY	Emergency: (631) 968-3314 General: (631) 968-3000
Suffolk County Police Dept.	(631) 968-3000
Local Emergency Response Resources	911
Fire	911
Ambulance	911
Medical Services	911
Town of Islip Public Safety	(631) 224-5300
NYSDEC Region I Hazardous Waste Remediation	(631) 444-0405
NYSDEC Albany Division of Environmental Remediation Bureau of Eastern Remedial Action	(518) 547-7924 402-9814
Poison Information Center Winthrop University Hospital	(516) 542-2323
Town of Islip Project Contact: Eric Hoffmeister Commissioner of Department of Environmental Control	Tel.: (631) 224-5645 Fax: (631) 224-5651
Town of Islip Hazmat Team	(631) 467-3219

# Section 8



## 8.0 POST-CLOSURE COST ESTIMATES

### 8.1 General

Implementation of the Sonia Road Post Closure Monitoring and Maintenance Plan may be performed through a combination of efforts by Town forces and third party consultants/vendors. Third party consultants/vendors would operate under the oversight and administration of the Town of Islip Department of Environmental Control. For the purpose of establishing an initial budget for the implementation of the PCMMP, it is assumed that the majority of the effort will be performed by third party consultants/vendors. Following the first year of post closure care, adjustments can more readily reflect the actual levels of participation enacted by the Town.

This cost estimate reflects both recurring and nonrecurring activities which will be required during the first year of post closure. Recurring activities are defined as those which are typically performed as a routine element of the post closure care of a capped and closed landfill. Nonrecurring activities are defined as those which are not routine or which may come to light pending the outcome of sampling, testing or analysis. Certain nonrecurring activities are required to be implemented at the initiation of the post closure period. Other nonrecurring activities may be required as the post closure period progresses and, therefore, cannot be defined at this time.

A cost estimate for the implementation of the Post Closure Monitoring and Maintenance Plan is presented below.

### 8.2 Recurring Activities

A. Quarterly site inspectors and preparation of annual maintenance cost estimates	\$20,000
B. Seasonal mowing (quarterly)	18,000

C. Groundwater monitoring (quarterly)	
• Inspection and report on existing groundwater monitoring wells	2,500
• Collection of groundwater samples	48,000
• Laboratory analysis of groundwater samples	45,000
• Data evaluation, validation, analysis and preparation of quarterly reports	12,000
• Preparation of annual report	5,000
• General consulting services regarding groundwater quality	<u>10,000</u>
	Subtotal \$122,500
D. Landfill gas monitoring wells (quarterly)	
• Collection of methane gas concentrations	\$9,600
• Data evaluation and analysis, and preparation of quarterly report	8,000
• Preparation of annual report	<u>3,000</u>
	Subtotal \$20,600
E. Landfill gas recovery wells, gas perimeter collection wells, header system(s) and appurtenances (weekly)	
• Collection of methane gas concentrations	\$9,600
• Adjustment on landfill gas perimeter collection wells, as necessary	9,600
• Data evaluation, validation, analysis and preparation of quarterly report	4,000
• Preparation of annual report	1,000
• General consulting services regarding LFG quality and operations	<u>5,000</u>
	Subtotal \$29,200
F. Landfill gas flare system and appurtenances (weekly/daily)	
• Electric, telephone, utilities (yearly)	\$20,000
• Operations, checking, troubleshooting and maintenance	38,400
• Preparation of quarterly reports	8,000
• Preparation of annual reports	<u>2,000</u>
	Subtotal \$68,400

G.	Sampling of landfill gas condensate (quarterly - if required)	
	• Collection of condensate samples, data evaluation, validation (quarterly)	\$2,400
	• Laboratory analysis of condensate samples	4,800
	• Preparation of quarterly report to NYSDEC	6,000
	• Preparation of annual report to NYSDEC	<u>2,000</u>
	Subtotal	\$15,200
H.	Sampling of landfill gas system for nonmethane organic compounds (quarterly - if required)	
	• Collection of gas samples at blowers and prior to flaring	\$2,400
	• Laboratory analysis of LFG samples	8,000
	• Data evaluation, validation, analysis and preparation of quarterly report to NYSDEC	6,000
	• Preparation of annual report to NYSDEC	<u>2,000</u>
	Subtotal	\$18,400
I.	Implementation of site work/maintenance required by inspection report	\$40,000
J.	Repair/replacement of site fencing	\$25,000
K.	Ongoing engineering and technical support services	<u>\$25,000</u>
	Total for Recurring Activities	\$402,300

### 8.3 Nonrecurring Activities

A.	Site mapping	
	• Aerial photography	\$2,000
	• Topographic mapping	<u>2,400</u>
	Subtotal	\$4,400

B. Sampling of condensate to confirm quality and acceptability for groundwater discharge (2 months - four sampling events)

• Prepare sampling and analytical plan	\$3,000
• Collection of condensate samples	2,500
• Laboratory analysis of condensate samples	6,000
• Data evaluation, validation and letter report	6,000
• Preparation of report to NYSDEC	5,000
• General consulting services regarding condensate disposal	<u>6,000</u>
Subtotal	\$28,500

The results of the NYSDEC-required landfill gas condensate characterization and analysis may result in the No-Action continued use of the on-site condensate disposal system or may necessitate the replacement of the on-site disposal system with holding tank(s) for storage and off-site disposal. The sampling protocol for the characterization and analysis of landfill gas condensate is attached as Appendix D.

C. Sampling of landfill gas system for concentrations of nonmethane organic compounds (2 months - four sampling events)

• Prepare sampling and analytical plan	\$5,000
• Collection of gas samples at blowers and prior to flaring	2,500
• Laboratory analysis of LFG samples	12,000
• Data evaluation, validation and letter report and preparation of report to NYSDEC	8,000
• General consulting services regarding LFG sampling and analysis	<u>10,000</u>
Subtotal	\$37,500

The results of the NYSDEC-required sampling and analysis of landfill gas for concentrations of nonmethane organic compounds (NMOCs) may necessitate modifications to the landfill gas flare system in order to obtain compliance with NYSDEC air regulations. The sampling protocol for sampling and analysis of the landfill gas is attached as Appendix E.



# Section 9



## 9.0 COMMUNICATION PROCEDURES

During the 30-year post-closure period at the Sonia Road Landfill, routine inspections will be performed quarterly as described in Section 2 of this plan or as otherwise approved by the NYSDEC. In addition to these scheduled inspections, non-routine inspections may be necessary as a result of extraordinary incidences which may occur at the site such as fires, natural disasters, or significant vandalism. Sections 2 and 3 of this plan identify the procedures to be followed for routine site inspections and scheduled for maintenance and repair. The procedures outlined in Sections 2 and 3 will also be followed in the event that a non-routine inspection is required. This section of the plan outlines the recommended communication procedures to be followed in the event that a component of the landfill site becomes damaged, inoperative, or requires non-routine repairs.

Table 7-1 lists the telephone numbers of the appropriate authorities to contact in case of emergencies.

### 9.1 Vandalism

Routine inspection of the soil cover will reveal if any unauthorized dumping or vandalism has occurred on site, as described in Section 2. Should this occur, inspection personnel will record evidence of such activity (e.g., vehicle tracks) or attempt to identify the source of the illegally placed waste, and immediately notify the Town DEC. The TOIDEC will notify the Town of Islip Department of Public Safety of the incident. One of the more prevalent forms of vandalism expected to occur on this site during the post-closure period will be the result of off-road vehicles using the area. These vehicles tend to damage vegetation and create ruts, possibly exposing the cap membrane and damaging it.

When vandalism, trespassing, or unauthorized dumping has occurred, the Town will evaluate site security procedures to identify the probable access route and will augment the security procedures to prevent such access, as needed. If the site cannot be secured through the use of existing resources and the Town determines that additional labor or materials are needed to protect the site, the Commissioner of DEC will obtain an appropriate commitment of specialty resources.

In addition, to determine if any of the landfill components have been damaged as the result of significant vandalism, an emergency site inspection will take place. The Commissioner of DEC will coordinate and direct all emergency repairs.

## **9.2 Fires**

All Town equipment, or equipment used by subcontractors retained by the Town, used for maintenance and/or repair work will be equipped with fire extinguishers, as described in Section 6. However, should a fire occur which cannot be contained by on-site personnel or equipment, the local fire department will be contacted. In addition, the Commissioner of DEC will be notified immediately so that he can coordinate the other on-site activities.

After a fire, the Commissioner of DEC will determine if any of the landfill components were damaged. A site investigation will be undertaken according to the procedures outlined in Section 2 of this plan. The Commissioner of DEC will coordinate and direct all emergency repairs and notify the appropriate agencies of any adverse conditions at the site.

## **9.3 Natural Disasters**

Some natural disasters that might occur at the site may include, but not be limited to, hurricanes, heavy rains, ice storms, lightening strikes, and/or floods. Other natural phenomena, such as tornadoes and seismic events, are unlikely to occur at the site due to its geographic location. Should one or more of these events take place at the site, Town personnel (or personnel of subcontractors retained by the Town) will follow emergency procedures to ensure protection and prevent personal injury during the event and will notify the Commissioner of DEC of any evident damage or threatening conditions that have been created as a result of the event. Damage that might occur as a result of such events includes erosion of the final cover system and clogging of storm water conveyance features. Lightening strikes to trees could result in trees falling across site roadways and fire.

If a severe storm event or other natural phenomena has caused significant damage to the landfill, or if the site has sustained significant damage, an emergency site inspection will be undertaken to determine the extent of such damage. When the Commissioner of DEC determines that conditions are safe to inspect the site, it will dispatch a team of qualified personnel to inspect the site as described in Section 2 of this Manual. The Commissioner of DEC will coordinate and direct all emergency repairs and notify the appropriate agencies of adverse conditions at the site.

#### **9.4 Vectors**

During routine and incidental site inspections, vector infestation may be evidenced by the presence of burrow holes or nests. Should infestation be discovered to pose a potential threat to the integrity of the landfill cover system or other site components, the Commissioner of DEC will be notified of these conditions. The Commissioner of DEC will contact an appropriate extermination service to eliminate rodents or insects, as needed.

#### **9.5 Methane**

The site is monitored quarterly for methane at 17 locations to determine the percent of methane accumulated within the landfill gas monitoring well's atmosphere. It is expected that these procedures will be followed throughout the 30-year post-closure period. In the event that the recorded methane levels exceed 25 percent of the lower explosive limit (LEL) contingency planning will be implemented. The Sonia Road Landfill currently has an active gas collection system consisting of thirty seven (37) gas extraction wells located on the plateau area of the landfill, and 17 gas collection wells located at relatively uniform intervals around the perimeter of the landfill. All of these are connected to a "stick" flare.

#### **9.6 Dust**

Prolonged dry periods are not expected to present the same problems at a closed landfill as at an operating landfill because of the presence of vegetative cover. To prevent blowing dust, the landfill cap must maintain complete vegetative cover. This will prevent the cap from desiccation

under prolonged dry conditions. However, during such periods, the use of areas that are not vegetated (e.g., access roads) will be minimized.

### **9.7 Storm Water Control System**

The storm water control system will be inspected to determine if siltation has occurred which would impede the flow of storm water through the system or recharge into the groundwater. In the event that siltation has occurred, it will be noted on the inspection form, and the Commissioner of DEC will be notified so that the appropriate action can be taken to clean the conveyance system or regrade the recharge basin.

Diversion swales and downchutes of the conveyance system will be noted for excessive build-up of silt; the gravity drain, manholes, and catch basins will be cleared of silt and other debris; and the recharge basins will be scraped to remove silt and other fine particles that would prevent or impede groundwater recharge.

### **9.8 Excessive Landfill Settlement**

The IRRA will periodically visually inspect for cap integrity and differential settlement to determine if a change has occurred which could indicate potential malfunction of one of the landfill components. If it is determined through the evaluation that certain areas have settled to the point where the integrity of the cap system may be jeopardized, the Commissioner of DEC will notify the appropriate agencies, and NYSDEC. Upon a physical examination of the site by the Commissioner of DEC, its engineer, and representatives from the NYSDEC, a work plan will be prepared to remediate any damage that may have been caused to the landfill cover system.

### **9.9 Groundwater Contamination**

Should there be a statistically significant increase in the level of contamination emanating from the site via the groundwater pathway, the NYSDEC will be notified; and the Town or its representatives will monitor the expanded list of parameters (see the SAP, Volume 3) during the

next round of sampling. Should the elevated levels continue, or if new contaminants are discovered, the Town (or a representative of the Town) will prepare a work plan to investigate the nature, extent, and cause of the contamination. The work plan will be submitted to the NYSDEC for approval. Following implementation of this work plan, the results will be evaluated and recommendations for corrective measures to the NYSDEC will be made.

# Section 10



## 10.0 RECORD KEEPING AND REPORTING

### 10.1 Record Keeping

The Town TOIDEC will maintain records of inspections, maintenance (routine and non-routine), and environmental monitoring of the landfill. Table 10-1 presents a schedule summary of the overall inspection, record keeping, and maintenance schedules for operations to be conducted at the landfill. This information will be recorded and maintained in the TOIDEC files. Some of the information will be reported to NYSDEC as presented in Section 10.2. The remaining information will be available in the files maintained at the DEC offices. Records also will be maintained regarding the results of the environmental monitoring plan as presented in Sections 4 and 5, and in the Health and Safety Plan (Volume 2) of this Manual. Such record information would include, but not be limited to: 1) personal information (name, address, date of birth, etc.); 2) length of employment, including start date; 3) landfill/site duties; and 4) history of health examinations.

### 10.2 Reporting

The Town TOIDEC will prepare and submit reports to NYSDEC on groundwater, and landfill gas, and an annual report to summarize the operation, maintenance, and monitoring of the landfill described below.

#### 10.2.1 Water Quality Reports

Water Quality Monitoring reports will be prepared and submitted to the Central Office of the NYSDEC quarterly. Summary groundwater quality data will be included as a component of the Annual Report and in special Water Quality Assessments as directed by the NYSDEC. These reports will contain the following information:

- Results of groundwater sampling events to be conducted quarterly; and
- An analytical review of the data to determine exceedances of applicable State water quality criteria, as well as discernable trends in data.



**Table 10-1**

**INSPECTION, RECORD KEEPING, AND  
MAINTENANCE SCHEDULES**

<b>Item</b>	<b>Activity Frequency</b>
Police entire landfill area, including buffer, for litter dumping and integrity of the perimeter fence	Weekly
Equipment Maintenance and Repairs Performed	As Required
Inspect portable fire extinguishers	Quarterly
Clean landfill access road	As Necessary
Maintain access road	As Necessary
Clean recharge basin to maintain design capacity	As Necessary
Maintain and resurvey vertical and horizontal control monuments	As Necessary
Perform topographic survey of landfill	As Necessary
Inspect other emergency equipment (first aid kits, personnel protective equipment, water truck, two-way radios, etc.)	As Required In Health and Safety Plan
Update Emergency Contingency Plan	As Necessary

Notes:

All site facilities, environmental controls, and monitoring systems to be checked for damage at least weekly, inspected prior to forecasted major storms, and after severe inclement weather.

### 10.2.2 Landfill Gas Reports

A Landfill Gas (Methane) Monitoring report will be prepared and submitted to the NYSDEC as a component of the Annual Report and will contain the following:

- A compilation of the quarterly methane monitoring reporting results;
- An analysis of trends observed; and
- An analysis of exceedances and a description of any special steps taken to respond to, or remediate, the exceedances.

### 10.2.3 Annual Report

An annual report for the Sonia Road Landfill will be submitted to the NYSDEC no later than 60 days after the first day of January of each year. This report will include:

- A summary of all routine operations and maintenance activities;
- A summary of all routine inspections of components of the landfill;
- A summary of all non-routine inspections of components of the landfill;
- A compilation and summary of all emergency activities;
- A compilation and summary of all groundwater quality data collected throughout the year;
- A compilation and summary of all landfill gas data collected during the year;
- A summary of all expenses incurred throughout the year, both routine and contingent; and
- Any changes from the approved reports, plans, and specifications will be listed, with justification for each change given.

# Section 11

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## 11.0 REFERENCES

6 NYCRR Part 360 Solid Waste Management Facilities Title 6 of the Official Compilation of Codes, Rules and Regulations, George E. Pataki, Governor, John P. Cahill, Acting Commissioner, Effective November 26, 1996, Reprinted January 1997

Final Closure Plan, Presumptive Remedy, Prepared by Dvirka and Bartilucci Consulting Engineers, Prepared for the Islip Resource Recovery Facility, January 1999

Sonia Road Landfill Site Remediation General Construction Contract Documents, NYSDEC Site Number 152013, Contract No. IRRA 1-99, General Construction

Remedial Investigation Report, Sonia Road Landfill, Prepared by Dvirka and Bartilucci Consulting Engineers, April 1998

Sampling Analysis Plan, Sonia Road Landfill, Prepared by Dvirka and Bartilucci Consulting Engineers, February 1997

Feasibility Study Report, Sonia Road Landfill, Prepared by Dvirka and Bartilucci Consulting Engineers, April 1998

# Appendix A

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**APPENDIX A**

**RECORD OF DECISION (ROD)**



Department of Environmental Conservation

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Division of Environmental Remediation

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**Record of Decision**  
**Sonia Road Landfill**  
**Town of Islip, Suffolk County**  
**Site Number 1-52-013**

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**July 1998**

New York State Department of Environmental Conservation  
GEORGE E. PATAKI, *Governor*                      JOHN P. CAHILL, *Commissioner*

# **DECLARATION STATEMENT - RECORD OF DECISION**

## **Sonia Road Landfill Inactive Hazardous Waste Site Town of Islip, Nassau County, New York Site No. 152013**

### **Statement of Purpose and Basis**

The Record of Decision (ROD) presents the selected remedial action for the Sonia Road Landfill inactive hazardous waste disposal site which was chosen in accordance with the New York State Environmental Conservation Law (ECL). The remedial program selected is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan of March 8, 1990 (40CFR300).

This decision is based upon the Administrative Record of the New York State Department of Environmental Conservation (NYSDEC) for the Sonia Road Landfill Inactive Hazardous Waste Site and upon public input to the Proposed Remedial Action Plan (PRAP) presented by the NYSDEC. A bibliography of the documents included as a part of the Administrative Record is included in Appendix B of the ROD.

### **Assessment of the Site**

Actual or threatened release of hazardous waste constituents from this site, if not addressed by implementing the response action selected in this ROD, presents a current or potential threat to public health and the environment.

### **Description of Selected Remedy**

Based upon the results of the Remedial Investigation/Feasibility Study (RI/FS) for the Sonia Road Landfill and the criteria identified for evaluation of alternatives the NYSDEC has selected capping and landfill gas control. The components of the remedy are as follows:

- A remedial design program to verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. Any uncertainties identified during the RI/FS will be resolved.
- Construction of a Part 360 landfill cap, featuring a geotextile layer, a 12" gas venting layer, geomembrane hydraulic barrier, geocomposite drainage layer, 24" barrier protection layer, and a 6" vegetative growth medium or 6" stone/recycled concrete layer.



- An active gas collection system consisting of gas collection wells around the perimeter and gas recovery wells within the interior of the landfill. Extracted gas will be treated using a flare, if necessary.
- Because the remedy results in untreated hazardous waste remaining at the site, a long term monitoring program will be instituted. This program will allow the effectiveness of the selected remedy to be monitored and will be a component of the operation and maintenance for the site. The monitoring program, which will monitor groundwater and landfill gas, will be developed in accordance with 6 NYCRR Part 360 regulations.

**New York State Department of Health Acceptance**

The New York State Department of Health concurs with the remedy selected for this site as being protective of human health.

**Declaration**

The selected remedy is protective of human health and the environment, complies with State and Federal requirements that are legally applicable or relevant and appropriate to the remedial action to the extent practicable, and is cost effective. This remedy utilizes permanent solutions and alternative treatment or resource recovery technologies, to the maximum extent practicable, and satisfies the preference for remedies that reduce toxicity, mobility, or volume as a principal element.

Date

7/7/98



Michael J. O'Toole, Jr., Director  
Division of Environmental Remediation

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## **SECTION 1: SITE LOCATION AND DESCRIPTION**

The Sonia Road Landfill is an inactive municipal solid waste landfill approximately 42 acres in size. The site is located in West Brentwood, in the Town of Islip, Suffolk County. As shown in Figure 1, the landfill is bordered on the south by Deer Park Street, on the west by Corbin Avenue, on the north by industrial properties and on the east by residential properties. The industrial area to the north includes properties which are also listed on the NYSDEC's registry of inactive hazardous waste sites.

Immediately to the southwest of the site along Udalls Road is the Brentwood West Middle School. The closest surface water is the headwater of Sampawams Creek located approximately 3,000 feet southwest of the landfill.

## **SECTION 2: SITE HISTORY**

### **2.1: Operational/Disposal History**

Prior to 1965 - The site was a sand and gravel mining facility. Sand and gravel was excavated below the water table, which created a groundwater lake at the site.

1965 - 1977 - The Town of Islip operated the site as a municipal solid waste landfill, with the most active period of disposal occurring between 1965 and 1974. During most of its operational period, the landfill accepted all types of municipal solid waste, however during the last few years of operation, the landfill accepted only refuse, rubbish, demolition material and yard waste, particularly leaves. Also, in the early years of operation, the site was used for disposal of junk automobiles.

1973 - 1974 - The landfill may have received approximately four hundred cubic yards of hazardous materials from Hooker Chemical Corporation. These wastes reportedly consisted of gravel containing polyvinyl chloride and gravel saturated with trimellitate plasticizer, 2-ethylhexanol, and other alcohols.

### **2.2: Remedial History**

1975 - A study by Holzmacher, McLendon and Murrell (H2M) was conducted which included three test borings within the landfill. The borings indicated the presence of 29 - 35 feet of refuse, of which 6 - 10 feet was below the water table. Refuse consisted of wood, roots, glass, plastic, metal, cardboard, concrete, household wastes, and general rubbish.

1979 - Suffolk County Department of Health Services installed 19 temporary groundwater exploration wells at various locations southeast and downgradient of the site. Based on groundwater samples tested for temperature and specific conductivity, a leachate plume was delineated and reported to extend a distance of 3,800 feet toward the southeast.

1980 - Sonia Road Landfill was listed on the NYSDEC's original registry of inactive hazardous waste sites, with a Class 2 designation. A Class 2 site represents a significant (though not imminent) threat to public health or the environment.

1994 - NYSDEC conducted an Immediate Investigation Work Assignment which involved the installation of eight temporary monitoring wells along the perimeter of the landfill to assess groundwater quality. Based on the results of the study, the Class 2 designation was not changed.

### SECTION 3: CURRENT STATUS

The Town of Islip, by order of the NYSDEC, initiated a Remedial Investigation/ Feasibility Study (RI/FS) in February 1997 to address contamination at the site.

#### 3.1: Summary of the Remedial Investigation

The purpose of the remedial investigation was to define the nature and extent of any contamination resulting from waste disposal activities at the site.

The Final Remedial Investigation (RI) Report, dated April 1998, describes the field activities and findings of the remedial investigation in detail. A summary of the RI Report follows:

The remedial investigation consisted of the following:

- ◆ A site-wide grid system was established based on a 300-foot grid spacing network.
- ◆ Thirty soil vapor screening points were installed at the above-mentioned grid locations. The soil gas survey was conducted to monitor for the presence of volatile organic compounds (VOCs) and explosive gas. Locations that exhibited elevated measurements were also screened for percent methane, percent carbon dioxide and hydrogen sulfide. The Town of Islip also periodically conducts methane gas monitoring by obtaining gas samples from wells around the perimeter of the landfill consisting of 2 inch PVC casing and screen installed to a depth of 30 feet.
- ◆ Four surface soil samples were collected on-site to address concerns regarding potential surficial contamination. Three surface soil samples were collected off-site to characterize background surficial soil quality in the industrial and residential areas bordering the site. Each sample was collected from 0-2 inches below ground surface and analyzed for target compound list (TCL) + 30 organic parameters, target analyte list (TAL) metals and cyanide.
- ◆ Four soil borings were constructed on-site to determine the thickness of waste in the landfill and the depth of waste below groundwater. The borings also characterized the waste at the water table and the soil below the waste. One sample was collected for analysis from each boring. Two of the samples were analyzed for TCL + 30 organic parameters and TAL metals and cyanide and two of the samples were analyzed for Toxicity Characteristic Leaching Procedure (TCLP) parameters.
- ◆ 20 test pits, each approximately 6 feet long, 6 feet wide and 6 feet deep, were constructed on-site to provide information on the thickness of existing cover material.
- ◆ Test trenches were constructed at 34 locations approximately 150 feet apart around the perimeter of the landfill within the property boundary. Test trenches were excavated typically to a depth of

10 feet and a width of 4-6 feet, with the length ranging from 10 to 55 feet. The objective of the trenches was to determine the lateral extent and thickness of waste at the landfill perimeter.

- ◆ 28 additional test trenches were constructed for further waste delineation.
- ◆ Seven Hydropunch screening points were installed along the southern property boundary at approximately 300 foot intervals in order to screen groundwater quality immediately downgradient of the landfill. Groundwater samples were collected from each of the screening points and analyzed for select VOCs. Results of this screening effort were used to establish the placement of permanent groundwater monitoring wells and selection of screen depths.
- ◆ Thirty-one groundwater monitoring wells were installed at twelve cluster locations to monitor upgradient, on-site and downgradient groundwater quality. Each cluster location included three wells; a shallow well screened at the water table, an intermediate well screened approximately 70 feet below ground surface, and a deep well with screen depths ranging from 94 to 119 feet. The deep wells were screened just above the Gardiners clay confining unit. Samples were collected from the new wells and the five existing wells and analyzed for TCL + 30 organic parameters, TAL metals and cyanide, and leachate parameters. A second round of samples was collected and analyzed for a modified select group of parameters based on the results of previous sampling.
- ◆ Two rounds of water level measurements were collected in all monitoring wells to determine groundwater flow directions.

### 3.2: Nature and Extent of Contamination

To determine which media (soil, groundwater, etc.) contain contamination at levels of concern, the remedial investigation analytical data was compared to environmental Standards, Criteria, and Guidance (SCGs). Groundwater, drinking water and surface water SCGs identified for the Sonia Road Landfill were based on NYSDEC Ambient Water Quality Standards and Guidance Values and Part V of the New York State Sanitary Code. For the evaluation and interpretation of soil analytical results, NYSDEC soil cleanup guidelines for the protection of groundwater, background conditions, and risk-based remediation criteria were used to develop remediation goals.

Based upon the results of the remedial investigation in comparison to the SCGs and potential public health and environmental exposure routes, certain areas and media of the site require remediation. These are summarized below. More complete information can be found in the RI Report.

Chemical concentrations are reported in parts per billion (ppb) and parts per million (ppm). For comparison purposes, SCGs are given for each medium.

**Soil Vapor / Explosive Gas** - No elevated levels of total VOCs were detected throughout the landfill. However, fourteen locations did indicate the presence of explosive gas. These fourteen locations, predominantly on the eastern side of the landfill, were screened again and indicated elevated concentrations of methane gas, as high as 58% methane gas by volume. Additional locations closest to the boundaries of the landfill were sampled and did not indicate the presence of methane gas and no methane has migrated off the property. The generation and presence of methane gas at solid waste landfills is not

unexpected and is the result of decomposition of organic materials such as grass clippings and food waste.

**Surface Soils** - Low levels of VOCs and pesticides were detected in on-site surface soil samples, although none were above soil cleanup objectives. Six of the seven samples indicated the presence of semivolatile compounds (SVOCs), specifically polycyclic aromatic hydrocarbons (PAHs), above the cleanup objective. PAHs are typically associated with incomplete combustion and are found in asphalt, cinder, coal and tar. Iron and zinc were also detected above cleanup objectives in all surface soil samples. Although on-site concentrations of SVOCs and metals were above the cleanup objectives for these parameters, on-site concentrations were consistent with off-site background samples. A summary of the compounds detected above soil cleanup objectives in surface soil is presented in Table 1.

Additionally, as part of a supplemental surface soil investigation to evaluate a limited area of stressed vegetation, which included a tar-like material, elevated levels of iron (29,100 ppm) and zinc (10,600 ppm) were detected. The soil cleanup objectives for these compounds are 2,000 ppm and 20 ppm respectively.

**Subsurface Soil** - Zinc was the only compound detected above the soil cleanup objective in the sample collected from subsurface soil. Sample SB-04 detected 54 ppm zinc. The NYSDEC soil cleanup objective is 20 ppm. Subsurface soil sample SB-04 was taken at a depth of forty-five feet below grade. The results of the TCLP analysis on subsurface soil showed non-detect for all compounds.

**Groundwater** - Upgradient and downgradient samples collected from the shallow, intermediate and deep groundwater indicate the presence of VOCs, metals, and leachate parameters that exceed groundwater standards. The most substantial contamination was found in the deep groundwater zone (approximately 110 feet below grade and atop the Gardiner's clay) at monitoring well location MW-06D. This location showed concentrations of the VOC tetrachloroethene as high as 1,600 ppb. Deep zone groundwater contamination at location MW-06D is believed to be from upgradient sources. A review of existing historical information and data regarding upgradient sites confirms similar contaminants and the potential for off-site migration towards the Sonia Road Landfill. In addition, both the shallow and intermediate depth wells at cluster 6 (MW-06S and MW-06I) had extremely low concentrations (less than 10 ppb), indicating the contamination in MW-06D did not originate from the landfill.

Table 2 summarizes the extent of contamination for the contaminants of concern in the groundwater and compares the data with the remedial action levels (SCGs) for the site.

Figure 2 shows the location of and corresponding contaminant concentrations detected in each groundwater monitoring well.

### 3.3 Ecological Assessment:

To evaluate potential site risks to ecological receptors, an overall Habitat Based Assessment (HBA) was performed as an element of the remedial investigation. The HBA was conducted to provide a description of major habitat types / vegetative cover for the Sonia Road Landfill with associated wildlife populations, and identify any other significant on-site sources.

### 3.4 Summary of Human Exposure Pathways:

This section describes the types of human exposures that may present added health risks to persons at or around the site. A more detailed discussion of the health risks can be found in the Qualitative Risk Assessment document, dated April 1998.

An exposure pathway is how an individual may come into contact with a contaminant. The five elements of an exposure pathway are 1) the source of contamination; 2) the environmental media and transport mechanisms; 3) the point of exposure; 4) the route of exposure; and 5) the receptor population. These elements of an exposure pathway may be based on past, present, or future events.

Potential human exposure pathways which may exist at the Sonia Road Landfill include:

1. **Ingestion of Contaminated Groundwater** - The groundwater is not expected to impact human health since all properties within approximately 1.5 miles downgradient of the landfill are supplied with public water (i.e., no private wells exist in this area). The distance to the nearest public water supply well is approximately two miles from the landfill and this supply well extracts drinking water from the Magothy aquifer, approximately 400 feet below grade and beneath the confining Gardiners clay unit. Given that the highest concentrations of groundwater contamination at the landfill were detected approximately 110 feet below grade and above the confining clay unit, this contamination is not expected to impact the nearest public water supply well. Therefore, the groundwater is not considered a pathway of concern.
2. **Dermal (skin) contact / Incidental Ingestion of Soil** - Surface soil sample results indicated concentrations of most contaminants that were consistent with background samples. There were however elevated levels of iron and zinc found in a limited area of stressed vegetation. Deeper (45 feet) soil samples obtained below the waste material showed only low levels of contaminants. Samples of the actual waste material indicated elevated concentrations of contaminants, typical of municipal solid waste. Since a cap will be installed on the landfill thereby preventing future contact with contaminated soils and waste material, this pathway is not considered a pathway of concern.
3. **Inhalation of Airborne Contaminants in Ambient Air** - Soil vapor screening for total volatile organic vapors and the analytical results of soil vapor samples did not indicate elevated levels of VOCs. Therefore, the release and subsequent inhalation of airborne contaminants is not a medium of concern for the Sonia Road Landfill.
4. **Inhalation of Airborne Contaminants in Indoor Air** - Based on perimeter methane monitoring results obtained during the investigation and previous methane monitoring conducted by the Town, landfill gas is being generated but is currently not moving laterally (or off site). However, experience suggests that the installation of a low permeability cap will enhance the potential for lateral movement of methane gas. Therefore, this is considered a potential human exposure pathway. However, the cap will include a gas collection system and monitoring program, along with a contingency plan which will prevent exposure to residents.

### 3.5 Summary of Environmental Exposure Pathways:

This section summarizes the types of environmental exposures which may be presented by the site.

No environmental exposure pathways have been identified at this time. There are no surface waters or mapped wetlands on or immediately adjacent to the landfill property. The Sampawams Creek is an environmental resource in close proximity to the site, located approximately 3,000 feet southwest of the landfill. The Creek is fed by groundwater discharge as well as storm water management systems for the surrounding areas.

Current site surface water drainage is accomplished by infiltration and percolation into the waste mass with ultimate discharge to the groundwater. Groundwater flow direction from the landfill was determined to be in a southeasterly direction, away from the Sampawams Creek. Therefore, the surface water and sediment of the Sampawams Creek is not expected to be impacted by the landfill and consequently was not sampled as part of this study.

### SECTION 4: ENFORCEMENT STATUS

The NYSDEC and the Town of Islip entered into a Consent Order on March 27, 1996. The Order obligates the Town to implement a full remedial program and allows reimbursement to the Town of up to 75 percent of the eligible remediation cost.

### SECTION 5: SUMMARY OF THE REMEDIATION GOALS

Goals for the remedial program have been established through the remedy selection process stated in 6 NYCRR Part 375-1.10. The overall remedial goal is to meet all Standards, Criteria, and Guidance (SCGs) and be protective of human health and the environment.

At a minimum, the remedy selected should eliminate or mitigate all significant threats to the public health and to the environment presented by the hazardous waste disposed at the site through the proper application of scientific and engineering principles.

The goals selected for the Sonia Road Landfill are:

- *Reduce, control, or eliminate to the extent practicable the contamination present within the soils/waste on site (generation of leachate within the fill mass).*
- *Eliminate the threat to surface waters by eliminating any future contaminated surface run-off from the contaminated soils on site.*
- *Eliminate the potential for direct human or animal contact with the contaminated soils on site.*
- *Mitigate the impacts of contaminated groundwater to the environment.*
- *Prevent, to the extent possible, migration of contaminants in the landfill to groundwater.*



- *Control landfill gas emissions to levels that are protective of on-site and off-site receptors.*

## SECTION 6: SUMMARY OF THE EVALUATION OF ALTERNATIVES

The selected remedy should be protective of human health and the environment, be cost effective, comply with other statutory laws and utilize permanent solutions, alternative technologies or resource recovery technologies to the maximum extent practicable. Potential remedial alternatives for the Sonia Road Landfill were identified, screened and evaluated in a Feasibility Study. This evaluation is presented in the report entitled "Final Feasibility Study Report", dated April 1998.

A summary of the detailed analysis follows. As used in the following text, the time to implement reflects only the time required to implement the remedy, and does not include the time required to design the remedy, procure contracts for design and construction or to negotiate with responsible parties for implementation of the remedy.

### 6.1: Description of Alternatives

The potential remedies are intended to address the contaminated soils and groundwater at the site.

#### **Alternative 1 - No Action**

The no action alternative is evaluated as a procedural requirement and as a basis for comparison. It requires continued monitoring only, allowing the site to remain in an unremediated state. This alternative would leave the site in its present condition and would not provide any additional protection to human health or the environment.

Present Worth:	\$450,000
Capital Cost:	\$ 0
Annual O&M:	\$ 30,000
Time to Implement:	3 months

#### **Alternative 2 - Shallow and Deep Groundwater Treatment, Landfill Gas Control and Capping**

Alternative 2 would address remediation of all media, including waste, subsurface soil, landfill gas, leachate impacted groundwater, and VOC-impacted groundwater.

Waste beyond the property line of the landfill would be excavated and placed within the boundary of the site and a low permeability cap would be installed over the entire landfill. The cap would consist of the following (from bottom to top): a geotextile layer, a twelve inch gas venting layer, a 60-mil High Density Polyethylene (HDPE) geomembrane, geocomposite drainage layer, 24 inch barrier protection layer, and a 6 inch vegetative growth medium or 6 inch stone / recycled concrete layer. An illustration of this cap is provided as Figure 3. The cap would prevent precipitation from migrating through the landfill and mitigate the generation of leachate and further contamination of the groundwater.

Remediation of landfill gas would be accomplished by placement of 4-inch PVC perimeter gas collection wells around the landfill and recovery wells within the interior of the landfill. If necessary to meet

emission standards or reduce odors, the extracted gas would be treated using a flare. This gas control system would prevent landfill gas from migrating off-site.

Groundwater contaminated by landfill leachate and VOCs from an upgradient source would be extracted and treated via aeration, sand filtration, and ion exchange. The treated effluent would be discharged to the Sampawams Creek or the Southwest Sewer District (SWSD).

Monitoring of groundwater and landfill gas for a 30 year period would be performed to determine the effectiveness of the remediation systems.

Present Worth:	\$18,600,000
Capital Cost:	\$14,300,000
Annual O&M:	\$400,000
Time to Implement:	12 months

#### **Alternative 3 - Shallow Groundwater Treatment, Landfill Gas Control, and Capping**

Alternative 3 is identical to Alternative 2 with the exception that the deep groundwater contaminated with VOCs would not be extracted and treated.

Present Worth:	\$18,250,000
Capital Cost:	\$13,950,000
Annual O&M:	\$400,000
Time to Implement:	12 months

#### **Alternative 4 - Landfill Gas Control and Capping**

Alternative 4 addresses remediation of waste, subsurface soil and landfill gas, but does not address remediation of groundwater.

The same low permeability cap and landfill gas collection system as described in Alternative 2 would be implemented. In addition, the same long term monitoring program would be conducted.

Present Worth:	\$12,400,000
Capital Cost:	\$11,050,000
Annual O&M:	\$115,000
Time to Implement:	12 months

## Alternative 5 - Capping

Alternative 5 addresses only remediation of the waste and subsurface soil.

A low permeability cap with passive vents would be installed and the same long-term groundwater monitoring program described in Alternatives 2 through 4 would be conducted.

Present Worth:	\$10,950,000
Capital Cost:	\$10,050,000
Annual O&M:	\$ 115,000
Time to Implement:	12 months

### 6.2 Evaluation of Remedial Alternatives

The criteria used to compare the potential remedial alternatives are defined in the regulation that directs the remediation of inactive hazardous waste sites in New York State (6NYCRR Part 375). For each of the criteria, a brief description is provided followed by an evaluation of the alternatives against that criterion. A detailed discussion of the evaluation criteria and comparative analysis is contained in the Feasibility Study.

The first two evaluation criteria are termed threshold criteria and must be satisfied in order for an alternative to be considered for selection.

1. Compliance with New York State Standards, Criteria, and Guidance (SCGs). Compliance with SCGs addresses whether or not a remedy will meet applicable environmental laws, regulations, standards, and guidance.

One applicable criterion for landfill closure is a cap with a continuous single or double impermeable layer, as specified in 6 NYCRR Part 360. Because the no action alternative does not provide this, Alternative 1 does not comply with this criterion.

NYSDEC believes that groundwater standards would be met by a combination of a landfill cap and groundwater extraction and treatment (Alternatives 2 and 3). Alternative 2 would treat groundwater for those contaminants which exceed groundwater standards in both the shallow and deep zones. Alternative 3 treats only the groundwater impacted by landfill leachate, i.e., the shallow zone. The deeper groundwater contamination is not expected to impact public water supply wells downgradient and there are no users of private wells within a distance of approximately 1.5 miles downgradient.

It is anticipated that a Part 360 cap alone without groundwater extraction and treatment (Alternatives 4 and 5) would significantly reduce and ultimately prevent generation of landfill leachate and further contamination of the groundwater. Alternatives 4 and 5 would not treat contaminated groundwater.

Air quality standards are expected to be met by those alternatives that provide active gas collection (Alternatives 2, 3, and 4).

2. Protection of Human Health and the Environment. This criterion is an overall evaluation of the health and environmental impacts to assess whether each alternative is protective.

Human health is protected by elimination of the routes of exposure identified in Section 4.4 as producing unacceptable health risks. Therefore, alternatives that prevent ingestion of contaminated groundwater, dermal (skin) contact / incidental ingestion of surface soils, and inhalation of airborne contaminants in ambient and indoor air are considered to be protective.

Alternatives that provide active landfill gas control and capping (Alternatives 2, 3, and 4) would eliminate all routes of exposure with the exception of ingestion of groundwater. But, as mentioned earlier, the groundwater is not expected to impact human health since no residents are drinking the contaminated groundwater. Alternative 2, which would extract and treat contaminated groundwater in the shallow and deep zones, would be completely protective of human health and the environment.

The next five "primary balancing criteria" are used to compare the positive and negative aspects of each of the remedial strategies.

3. Short-term Effectiveness. The potential short-term adverse impacts of the remedial action upon the community, the workers, and the environment during the construction and/or implementation are evaluated. The length of time needed to achieve the remedial objectives is also estimated and compared against the other alternatives.

Alternatives that provide for grading and capping the landfill will cause short term adverse impacts due to potential exposure to excavated wastes, contaminated runoff and airborne dusts and gases. Because the amount of waste regrading and time to implement is the same for the four capping options under consideration, short term impacts are similar for all alternatives.

4. Long-term Effectiveness and Permanence. This criterion evaluates the long-term effectiveness of the remedial alternatives after implementation. For each alternative wastes or treated residuals would remain on site after the selected remedy has been implemented. Therefore none of the alternatives is considered permanent and long term effectiveness is evaluated based on 1) the magnitude of the remaining risks, 2) the adequacy of the controls intended to limit the risk, and 3) the reliability of these controls.

Alternatives which provide groundwater extraction and treatment of contaminated groundwater would provide the highest degree of long term effectiveness. Groundwater extraction and treatment techniques have been proven effective and reliable. All of the technologies associated with the alternatives that provide for capping the landfill have also been proven effective and are reliable.

5. Reduction of Toxicity, Mobility or Volume. Preference is given to alternatives that permanently and significantly reduce the toxicity, mobility or volume of the wastes at the site. Because the alternatives under consideration generally involve containment technologies (capping), they reduce the mobility of contaminants by reducing leachate generation and restricting its flow.

Alternatives that include a Part 360 cap provide the greatest reduction in leachate generation. Alternatives that include groundwater treatment (Alternatives 2 and 3) provide the greatest reduction in contaminant mobility and do provide some reduction in volume because contaminated groundwater is extracted and

treated. However, the amount of contaminants treated would be a small percentage of the total amount of waste at the site.

6. Implementability. The technical and administrative feasibility of implementing each alternative are evaluated. Technical feasibility includes the difficulties associated with the construction and the ability to monitor the effectiveness of the remedy. For administrative feasibility, the availability of the necessary personnel and material is evaluated along with potential difficulties in obtaining specific operating approvals, access for construction, etc..

Technically, the technologies under consideration are well developed and reliable. The greatest technical difficulties for cap construction would be meeting Part 360 requirements of a 4% final slope. Also, accommodating surface water runoff would present a moderate design challenge.

7. Cost. Capital and operation and maintenance costs are estimated for each alternative and compared on a present worth basis. Although cost is the last balancing criterion evaluated, where two or more alternatives have met the requirements of the remaining criteria, cost effectiveness can be used as the basis for the final decision. The costs for each alternative are presented in Table 3.

This final criterion is considered a modifying criterion and is taken into account after evaluating those above. It is focused upon after public comments on the Proposed Remedial Action Plan have been received.

8. Community Acceptance - Concerns of the community regarding the RI/FS reports and the Proposed Remedial Action Plan have been evaluated. The "Responsiveness Summary" included as Appendix A presents the public comments received and the Department's responses to the concerns raised. In general the public comments received were supportive of the remedy. Several commentors disagreed with the proposed remedy, wanting to see groundwater contamination more actively addressed. DEC responded emphasizing the major conclusions of the RI/FS and providing commentors with information on remedial action planned for other area contaminant sources which contribute to this groundwater contamination more significantly than the Sonia Road Landfill. No change has been made to the proposed remedy in response to public comments.

## SECTION 7: SUMMARY OF THE SELECTED REMEDY

Based upon the results of the RI/FS, and the evaluation presented in Section 6, the NYSDEC has selected Alternative 4: Landfill Gas Control and Capping as the remedy for the Sonia Road Landfill.

The selection of a Part 360 cap is based on the need to comply with applicable regulations. A Part 360 cap will also provide long term effectiveness by minimizing leachate generation and migration to groundwater, will actively collect and control landfill gas, and prevent any potential for contact with contaminated soils and waste material.

Although groundwater was found to be contaminated above standards, the selected remedy will not address treatment of this medium. The remedy will, however, prevent further groundwater contamination by landfill leachate, and groundwater monitoring will be continued. As discussed earlier, the groundwater is not considered a human exposure pathway of concern since the surrounding community is served by

public water; i.e., no one will drink the contaminated groundwater. Contaminants noted in the shallow zone and presumably derived from landfill leachate will be degraded and/or dissipate over time to background levels after capping. The VOC contamination in the deep zone is considered to be originating from upgradient sources. In response, the NYSDEC plans to conduct additional area-wide groundwater investigations upgradient of the landfill.

**Conceptual Grading Plan:** The Final Feasibility Study presented a conceptual grading plan that included top slopes of a 2% grade. Part 360 regulations specify a 4% final grade for recently deactivated landfills that may be subject to on-going settlement.

NYSDEC intends to grant a variance from the 4% grading requirement for a number of reasons. Among those are: a.) Given the age of the Sonia Road Landfill, most of the anticipated settlement has already occurred; b.) Considering the construction of the landfill (excavation below grade) and the existing topography, a 2% slope will require far less cutting, filling and shaping operations. Preliminary design calculations estimate that grading to a minimum slope of 4% throughout the site would require an additional 150,000 cubic yards of fill material; and c.) A 4% slope would significantly increase the height of the cap, up to 20 feet in certain locations, and change the visual aesthetics of the area.

NYSDEC will also consider allowing inert waste materials to be brought in from off site for grading purposes. Such materials include alternative grading materials (AGM), which include crushed and sorted road construction debris and inert demolition debris. Any such material will be carefully specified and monitored to ensure that putrescible materials, such as gypsum wallboard, and other hazardous materials are not mixed in. The final grading plan may include a combination of waste regrading and Alternate Grading Material.

NYSDEC believes that a variance from the 4% grading requirement will be desirable due to the above-mentioned reasons. The details of the variance and grading plan will be developed during remedial design.

**Elements of the Selected Remedy:** The elements of the selected remedy are as follows:

1. A remedial design program to verify the components of the conceptual design and provide the details necessary for the construction, operation and maintenance, and monitoring of the remedial program. Any uncertainties identified during the RI/FS will be resolved.
2. Construction of a Part 360 landfill cap, featuring a geotextile layer, a 12" gas venting layer, geomembrane hydraulic barrier, geocomposite drainage layer, 24" barrier protection layer, and a 6" vegetative growth medium or 6" stone/recycled concrete layer.
3. An active gas collection system consisting of gas collection wells around the perimeter and gas recovery wells within the interior of the landfill. Extracted gas will be treated using a flare, if necessary.
4. Because the remedy results in untreated hazardous waste remaining at the site, a long term monitoring program will be instituted. This program will allow the effectiveness of the selected remedy to be monitored and will be a component of the operation and maintenance for the site.

The monitoring program, which will monitor groundwater and landfill gas, will be developed in accordance with 6 NYCRR Part 360 regulations.

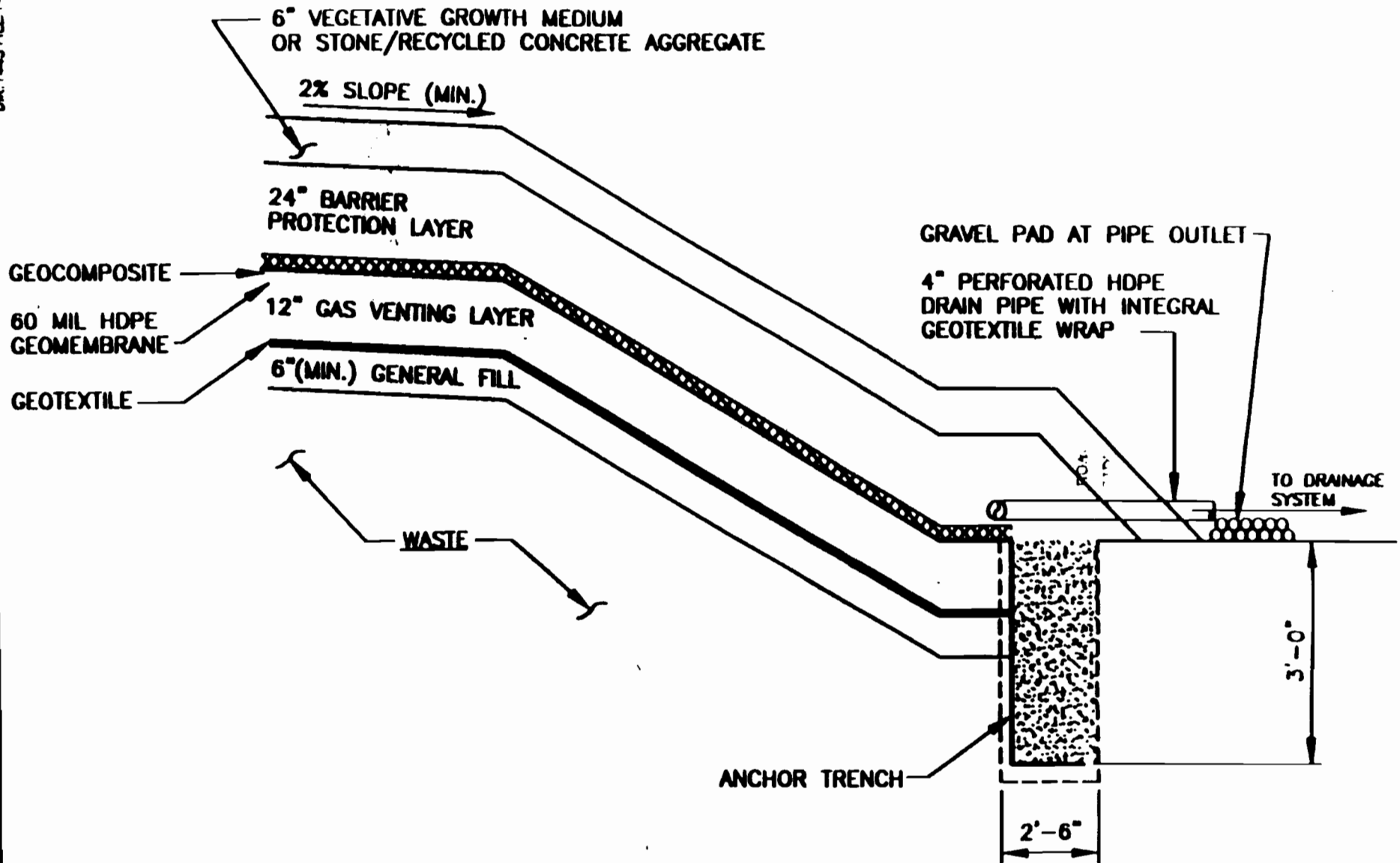
The estimated present worth cost to implement the remedy is \$12,400,000. The cost to construct the remedy is estimated to be \$11,050,000 and the estimated average annual operation and maintenance cost for 30 years is \$115,000.

## **SECTION 8: HIGHLIGHTS OF COMMUNITY PARTICIPATION**

As part of the remedial investigation process, a number of Citizen Participation (CP) activities were undertaken in an effort to inform and educate the public about conditions at the site and potential remedial alternatives. The following public participation activities were conducted for the site:

- A site-specific Citizen Participation Plan (CPP) was reviewed and approved by the Department.
- A local repository for documents pertaining to the site was established.
- A site mailing list was established which included nearby property owners; local political officials at various levels; local media; civic, environmental and economic groups; school and water district authorities; and other interested parties.
- A public informational meeting was held in March 1997 to present the Remedial Investigation/ Feasibility Study (RI/FS) Work Plan.
- A second public meeting was held in March 1998 to present findings of the Remedial Investigation.
- In May 1998, the Proposed Remedial Action Plan (PRAP) was issued. As mandated by 6NYCRR Part 375, a minimum thirty-day comment period was held for the PRAP from May 11 to June 11, 1998. On May 20, a third public informational meeting was held to present and receive comment on the PRAP.
- In July 1998, a Responsiveness Summary was prepared and made available to the public, to address the comments received during the public comment period for the PRAP.

DPR 1445 FILE 1445-38



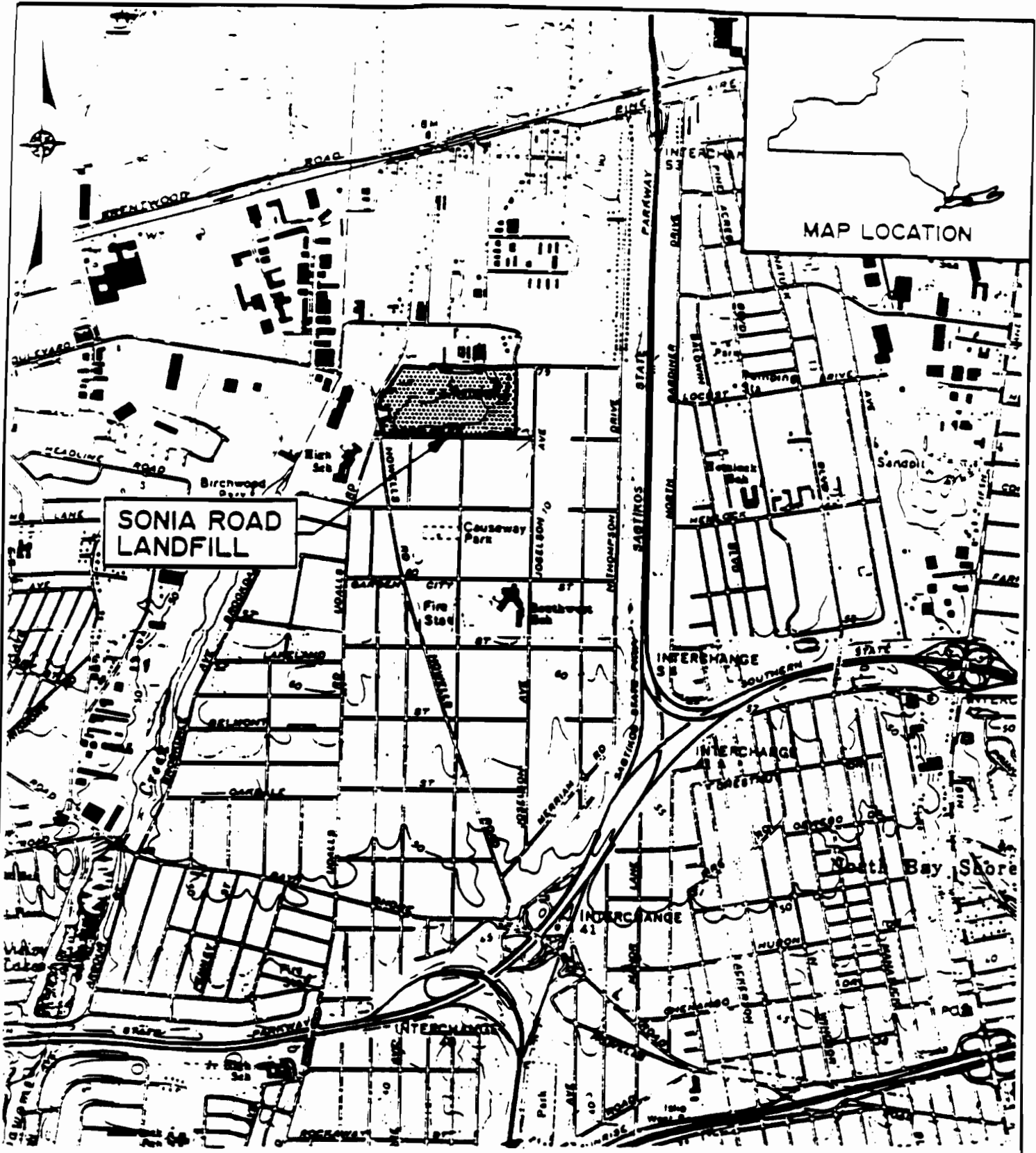
SONIA ROAD LANDFILL  
REMEDIAL INVESTIGATION/FEASIBILITY STUDY  
CAP CROSS-SECTION



Dvirka and Bartilucci  
Consulting Engineers  
A Division of William F. Coeulch Associates, P.C.

FIGURE 3





SOURCE: U.S.G.S. GREENLAWN, N.Y. AND BAY SHORE WEST, N.Y. QUADRANGLES

SCALE: 1" = 2000'

SONIA ROAD LANDFILL  
REMEDIAL INVESTIGATION/FEASIBILITY STUDY

SITE LOCATION MAP

**de** Dyke and Bartolucci  
Consulting Engineers  
A Division of William F. Casulich Associates, P.C.

FIGURE 1

MW-12				
COMPOUND	S	I	D	
NO EXCEEDANCES				

MW-11				
COMPOUND	S	I	D	
1,2 DCE	24/16	-/-	-/-	
TCE	12/8.5	-/-	-/-	
1,1 DCA	-/7.2	7/-	-/-	

MW-01				
COMPOUND	S	I	D	
1,1 DCE	-/-	-/-	-/15	
1,1 DCA	8/12	14/13	13/22	
1,1,1 TCA	-/-	22/3.1	68/170	
CT	-/-	-/-	-/20	

MW-10				
COMPOUND	S	I	D	
1,1 DCA	24/-	11/-	8/-	
4M, 2P	-/-	-/-	-/8.5	

MW-03				
COMPOUND	S	I	D	
1,1 DCE	-/-	-/-	8/-	
1,1 DCA	-/-	48/36	10/-	
1,1,1 TCA	-/-	18/8.8	81/18	

MW-05				
COMPOUND	S	I	D	
CA	8/8.1	-/-	-/-	

MW-14				
COMPOUND	S	I	D	
VC	-/-	-/-	14/-	
1,2 DCE	-/-	-/-	21/-	
CA	-/-	8/8.8	-/-	

MW-02				
COMPOUND	S	I	D	
NO EXCEEDANCES				

MW-07				
COMPOUND	S	I	D	
VC	-/-	-/-	-/7.8	
1,2 DCE	-/-	-/-	12/140	
TCE	-/-	-/-	-/90	
PCE	-/-	-/-	21/270	

MW-06				
COMPOUND	S	I	D	
VC	-/-	-/-	18/10	
1,2 DCE	-/-	-/-	488/360	
TCE	-/-	-/-	48/36	
PCE	-/-	-/-	1,208/1,800	
1,1,1 TCA	-/-	7/-	23/17	
BENZENE	-/4.1	-/-	-/-	
CHLOROBENZENE	-/6.2	-/-	-/-	

MW-04				
COMPOUND	S	I	D	
1,2 DCE	-/-	-/-	7/-	
CA	8/7.2	20/6.8	11/27	

MW-13				
COMPOUND	S	I	D	
VC	-/-	7/6.7	2/-	
1,2 DCE	-/-	73/53	31/34	
PCE	-/-	8/11	-/-	
BENZENE	-/-	-/-	-/2.7	

**LEGEND**

- VC VINYL CHLORIDE
- 1,1 DCE 1,1 DICHLOROETHENE
- 1,2 DCE 1,2 DICHLOROETHENE
- TCE TRICHLOROETHENE
- PCE TETRACHLOROETHENE
- 1,1 DCA 1,1 DICHLOROETHANE
- 1,1,1 TCA 1,1,1 TRICHLOROETHANE
- CA CHLOROETHANE
- CT CARBON TETRACHLORIDE
- 4M, 2P 4-METHYL 2-PENTHENE
- S SHALLOW
- I INTERMEDIATE
- D DEEP
- RESULT DOES NOT EXCEED STANDARDS
- 8/18 1st ROUND/2nd ROUND

**NOTE:**  
ALL CONCENTRATIONS IN ug/l



SONIA ROAD LANDFILL  
REMEDIAL INVESTIGATION/FEASIBILITY STUDY  
**CONCENTRATIONS OF VOLATILE ORGANIC COMPOUNDS EXCEEDING  
GROUNDWATER STANDARDS IN MONITORING WELLS**

FIGURE 2

SEE 148 FILE 148-2 UN725/88

**Table 1**  
**SONIA ROAD LANDFILL**  
**REMEDIAL INVESTIGATION/FEASIBILITY STUDY**  
**SURFACE SOIL RESULTS EXCEEDING SOIL CLEANUP OBJECTIVES**

Constituent	NYSDEC Soil Cleanup Objectives	SS-01 Off-Site	SS-02 Off-Site	SS-03 Off-Site	SS-04 On-Site	SS-05 On-Site	SS-06 On-Site	SS-07 On-Site
<b>Semivolatile Organics (units in ug/kg)</b>								
Bis(2-ethylhexyl)phthalate	50000	<b>78000</b>	140 B	140 B	1100 B	ND	130 B	360 B
Benzo(a)pyrene	61	ND	<b>62</b>	<b>140</b>	<b>120</b>	ND	<b>150</b>	<b>100</b>
Dibenzo(a,h)anthracene	14	ND	ND	<b>45</b>	<b>41</b>	ND	<b>29</b>	ND
<b>Metals (units in mg/kg)</b>								
Arsenic	7.5	7.5	3.3	3.9	3.4	2.4	2.2	1.5 B
Beryllium	0.16	<b>0.23 B</b>	<b>0.29 B</b>	ND	<b>0.29</b>	ND	ND	ND
Copper	25	<b>25.7</b>	8.5	10.6	7	8.9	9.4	15.6
Iron	2000	<b>8840</b>	<b>7620</b>	<b>9110</b>	<b>9620</b>	<b>6390</b>	<b>6380</b>	<b>5040</b>
Mercury	0.10	<b>0.31</b>	ND	ND	ND	ND	ND	ND
Zinc	20	<b>116</b>	<b>48.9</b>	<b>62.4</b>	<b>39.4</b>	<b>31.8</b>	<b>44.8</b>	<b>101</b>

Notes:

Concentrations in bold were detected above NYSDEC Soil Cleanup Objectives.

ND: Not detected.

B: Concentrations above instrument detection limit but below contract required detection limit.

**Table 2  
Nature and Extent of Contamination**

<b>MEDIA</b>	<b>CLASS</b>	<b>CONTAMINANT OF CONCERN</b>	<b>CONCENTRATION RANGE (ppm)</b>	<b>FREQUENCY of EXCEEDING SCG<sub>s</sub></b>	<b>SCG (ppm)</b>
Groundwater	Volatile Organic Compounds (VOCs)	Tetrachloroethene	ND to 1.6	6 of 72	0.005
		1,2 Dichloroethene	ND to 0.480	11 of 72	0.005
		1,1,1-Trichloroethane	ND to 0.170	11 of 72	0.005
		Trichloroethene	ND to 0.050	5 of 72	0.005
		1,1 Dichloroethane	ND to 0.046	14 of 72	0.005
	Leachate Parameters	Ammonia	0.02 to 9.3	8 of 36	2
		Iron	33 to 66,000	27 of 36	0.3
		Manganese	6 to 36,100	21 of 36	0.3

**Table 3**  
**Remedial Alternative Costs**

Remedial Alternative	Capital Cost	Annual O&M	Total Present Worth
No Action	\$0	\$450,000	\$450,000
Shallow and Deep Groundwater Treatment, Landfill Gas Control, and Capping	\$14,300,000	\$400,000	\$18,600,000
Shallow Groundwater Treatment, Landfill Gas Control, and Capping	\$13,950,000	\$400,000	\$18,250,000
Landfill Gas Control and Capping	\$11,050,000	\$115,000	\$12,400,000
Capping	\$10,050,000	\$115,000	\$10,950,000

APPENDIX A  
**RESPONSIVENESS SUMMARY**

Sonia Road Landfill  
Proposed Remedial Action Plan  
Town of Islip, Suffolk County  
Site No. 152013

The Proposed Remedial Action Plan (PRAP) for the Sonia Road Landfill was prepared by the New York State Department of Environmental Conservation (NYSDEC) and issued to the local document repository on May 11, 1998. This Plan outlined the preferred remedial measure proposed for the Sonia Road Landfill. The preferred remedy is a combination of a final landfill cover (cap), landfill gas migration control, and long-term monitoring of groundwater.

The release of the PRAP was announced via a notice to the mailing list, informing the public of the PRAP's availability, and a press notice was distributed to the media.

A public meeting was held on May 20, 1998 which included a presentation of the Remedial Investigation (RI) and the Feasibility Study (FS) as well as a discussion of the proposed remedy. The meeting provided an opportunity for citizens to discuss their concerns, ask questions and comment on the proposed remedy. This Responsiveness Summary records comments received at this meeting for inclusion in the Administrative Record for this site. Written comments were received from two individuals who attended the public meeting; their comment letters are included in the Administrative Record (see Index in Appendix B).

The public comment period for the PRAP officially closed on June 11, 1998. This Responsiveness Summary responds to all questions and comments raised at the May 20, 1998 public meeting and to the written comments received.

The following are the comments received at the public meeting, with the NYSDEC's responses:

**COMMENT 1:** Will the landfill cap extend over whole site?

**RESPONSE 1:** Yes - all 42 acres of the municipal waste.

**COMMENT 2:** Will final zoning be industrial? Is this compatible with the landfill cap?

**RESPONSE 2:** The site is zoned Industrial - "I1", and "I2" - suitable for outdoor equipment storage. The Town of Islip is reviewing an application to install a mobile phone transmission tower on the site also. Deed restrictions will not allow any activities which might damage the cap, and will require the approval of NYSDEC for any proposed new uses.

**COMMENT 3:** Will these deed restrictions only apply to the landfill property or to other properties as well?

**RESPONSE 3:** The deed restrictions can only apply to the Sonia Road Landfill property.

**COMMENT 4:** Why were no monitoring wells installed southwest of the site? There are private wells in that direction. You assume regional groundwater flow patterns apply, but the RI should have verified this true for this site.

**RESPONSE 4:** The data obtained from wells surrounding the site clearly show a south-southeasterly plume of landfill-related contamination, based on leachate indicators such as conductivity and alkalinity. This plume moves with the regional flow of groundwater toward the Great South Bay. A groundwater table mound can be created within a landfill, causing radial flow (flow in all directions away from the mound). Radial flow effects, however, would only be noticed in very close proximity (within a few hundred feet), and would not reach the homes with private wells to the southwest. The Sonia Road Landfill, furthermore, is not a large topographic mound and the groundwater table is relatively high. These factors diminish the water table mounding and the radial effect on groundwater flow from this site. Therefore, the regional flow pattern dominates in the off-site area of concern, including residential neighborhoods.

**COMMENT 5:** Surface drainage into Sampawams Creek from Corbin Avenue is a serious problem.

**RESPONSE 5:** The drainage into Sampawams Creek from Corbin Avenue comes from many sources in addition to the landfill. Because of its mostly flat topography, the landfill does not now greatly contribute to area-wide drainage into the Creek. Regardless, one of the major functions of the landfill cap will be to control and direct surface drainage. A properly designed and maintained cap will protect surface runoff from contact with wastes and minimize off-site drainage.

**COMMENT 6:** The selected remedy is not truly a "remedy". Wastes are not permanently destroyed.

**RESPONSE 6:** NYSDEC recognizes the cap is not a permanent treatment, but also that capping is the only feasible and the most protective way to address a large quantity of municipal waste that contains some hazardous waste. It should be kept in mind that any type of removal or treatment of this volume of waste could actually cause more environmental problems.

**COMMENT 7:** Are the contaminants in MW-11 caused by nearby industries?

**RESPONSE 7:** Yes. MW-11 results, especially for volatile organic compounds such as trichloroethylene, illustrate the impacts to groundwater from industrial sources upgradient (upstream in terms of groundwater flow) of the landfill.

**COMMENT 8:** The remedy is not a complete containment. You do not address groundwater already contaminated from plume in the past.

**RESPONSE 8:** While the remedy will prevent future impact to groundwater quality from the landfill, it does not actively address past contamination. As explained in the Feasibility Study, the landfill contaminants - primarily iron, manganese and ammonia - can be expected to naturally dissipate or degrade

before reaching any public or private wells or surface water. In any event, everyone in the plume area receives public water.

**COMMENT 9:** Industry should be held responsible for contaminant plumes also, not just sources. Plumes are the real problem.

**RESPONSE 9:** This point is well taken. NYSDEC, however, must consider due process and determining who is responsible when there are multiple sources impacting groundwater. The Town of Islip cannot be required to take care of a plume caused by others (namely, the VOC plume). NYSDEC must enforce cleanup source by source or if possible, get multiple polluters to work out cooperative agreements to address plumes with multiple sources. In a feasibility study, plume cleanup is always considered as well as actions to clean up the source.

Commentors are encouraged to keep in contact with NYSDEC regarding future actions for industrial sources north of the landfill. A plume investigation is planned for this year. Contact Mr. Daniel Eaton, Bureau of Hazardous Site Control, NYSDEC-DER, for more information (address: 50 Wolf Road, Albany, NY 12233-7010 or call toll-free (800) 342-9296).

**COMMENT 10:** The cost difference (\$8 million) between Alternative 2, which includes groundwater treatment, and 4 (the state's preferred alternative) is not that large - and \$18 million for Alternative 2 is comparable to a school budget. Why not spend the extra \$8 million to "do it right?"

**RESPONSE 10:** While these costs might not seem significant next to a Long Island school budget, they represent a significant percentage increase when comparing one alternative to another, versus the environmental and health benefits derived from that increased expenditure. NYSDEC must always consider the benefit from these limited monies, and the majority of the cost of the groundwater treatment alternatives would go toward removing iron and manganese - low-hazard contaminants - from groundwater.

**COMMENT 11:** You are influenced by location of site (NYSDEC shows favoritism toward certain communities).

**RESPONSE 11:** The record of NYSDEC's remedy choices throughout the state shows that remedies are developed and selected based on the hazards presented by the site and the potential for harm to communities. Objective factors are considered, not favoritism.

**COMMENT 12:** Was the private property that extends onto the landfill site investigated? The Town should condemn this property!

**RESPONSE 12:** The Town of Islip has been in contact with the property owner not about condemnation, but to keep the residents informed of progress of the landfill remedial program. The family receives public water, and the Town measured soil gas on their perimeter. The landfill cap and gas control system will be designed to be protective of this family.

**COMMENT 13:** In regard to the Town using "clean fill" (alternative grading materials to contour the landfill before capping), what is "clean fill"? How will these materials be screened and tested?



**RESPONSE 13:** "Clean fill" refers to uncontaminated soil or alternative materials such as stone, brick, or any demolition material that will not decompose and cause odors or excessive settlement. The Town must submit a written plan for use of any fill materials to NYSDEC for review. Minimum practices the NYSDEC will require will include a full-time monitor on the site during filling, documentation of the source of fill, and chemical screening and testing.

**COMMENT 14:** The State Superfund may run out by the year 2000. If this happens, how will the Town of Islip fund the remedy?

**RESPONSE 14:** The Town of Islip Engineer responded that the Town is making every effort to complete the project before that time. An aggressive design and construction schedule has been proposed to NYSDEC. The Town of Islip is under an Order on Consent to complete the site remedy regardless of the availability of State monies; if the Superfund were to run out, the Town would be obligated to raise money from other sources.

**COMMENT 15:** Are heavy metals such as arsenic associated with the landfill? What are the environmental and health impacts from these metals?

**RESPONSE 15:** The Remedial Investigation reports the more toxic heavy metals such as arsenic, lead, mercury and cadmium have not been detected at most well locations. Where detected, levels are below method detection limits and/or within limits of state groundwater quality and drinking water standards. Iron, manganese and sodium, in contrast, exceed groundwater standards at various locations, especially in the landfill plume zone. Standards for iron and manganese are based on taste, odor and the potential for laundry staining, pipe scaling and other nuisances. Sodium standards are based on dietary recommendations. All are naturally occurring in Long Island aquifers, though landfill leachate can cause them to be dissolved and move in groundwater as a plume.

**COMMENT 16:** Private wells on King Street (southwest of the landfill) have been impacted by high levels of manganese. This could have resulted from southwesterly plume movement from the landfill.

**RESPONSE 16:** The landfill is an unlikely source for the manganese in this area, since as explained in the response to Comment 4, regional groundwater flow carries the landfill plume to the southeast.

**COMMENT 17:** Public water supply wells have been shut down in the past due to landfill contamination.

**RESPONSE 17:** No area public wells have been shut down due to the landfill. Historically, a few wells have been shut down because of other problems, such as cesspool contaminants from surrounding houses and businesses.

**COMMENT 18:** NYSDEC has known about these plumes for a long time; why hasn't something been done sooner?

**RESPONSE 18:** As previously discussed, one reason the cleanup process is so time-consuming is the need to identify sources and compel responsible parties to perform source cleanups. The technical complexity of these plumes, and any potential solutions, add to the time needed to develop effective remedies. Plumes which present a more immediate health threat are dealt with quickly using State or federal Superfund monies.

**Written Comments Received from Elsa Ford, June 11, 1998:**

Remedial Investigation has not investigated the full extent of the plumes from the Sonia Landfill. This site was used for dumping since 1965 beginning with junked cars. NYSDEC reports site known to have received Hooker Chemical Company waste including vinyl chloride. Vinyl chloride found three-quarters of a mile south in 1982, but the full extent of that plume not plotted at that time or since to the point of zero. In 33 years the original Sonia plume has continued to move probably to the bay. While there might be some contaminant breakdown in movement, considerable VOCs persisted in the Servall plume just east of Sonia and could here. Heavy metals would be more likely to persist. Since the 1970s Islip Town's clam harvests have sharply fallen. The Sonia plume could be part of that problem, and if allowed to continue could well impact the Towns plans to reseed the bay with clams from the fish hatchery. Effect on clams could be early warning that canaries in the mines present for signs of human exposure to those swimming in the bay, etc. (Enclosed Newsday and Suffolk Life articles)

The Sonia contribution to the deep contamination plume cannot be ruled out, since it is an old site open to rainfall with refuse 35 feet deep. There need to be monitoring wells southwest of the landfill to determine specific water directions at the site rather than rely on estimates. This site borders on Long Island Hydrogeologic Zone I so that water can flow in more than one direction. A Suffolk County Water Authority report notes that the clay is not continuous; water may move around lenses, and that buried underground valleys allow the water to laterally enter the Magothy directly from glacial deposits (see enclosed report). More needs to be known of surface and groundwater connections. Depending on the time of year and rainfall, the water table can be at 7 feet or higher. People say Lake Street to the west often floods. The 1979 Phase I Sorenson Report notes that the surface water flows southwest except close to the Sampawams Creek where the land slopes creekward. Surface water drainage trends generally southwest toward the creek (report pages enclosed). Since the creek is not full all year water direction changes are indicated - this has implications for people with private wells in the area (King Street), the Sampawams Creek and the Guggenheim Lakes. Since the three homes on King Street have only recently been discovered, there may be other homes with private wells in the plume paths. Note that the King Street contamination is similar to Sonia contamination. At the public meeting background levels of iron and manganese were said to be high, but that was not the case in the 1971 Suffolk County Water Authority report (enclosed p. 25). There are also public wells in the plume paths that could be affected by drawing in contaminated water.

Community people reported cesspool truck dumping in Sonia. What tests for infectious organisms have been done?

The study has shown upgradient sources that need to be addressed, many of which are likely contributors of contamination to the plume. The NYSDEC has known about these problems for many years, but the plume continues. Addressing possible sources one at a time will only result in a circle of finger-pointing

with little remedy in sight. We must have a whole community environmental quality approach that deals with all of the matters together as in the New Cassel Industrial Area. It will take serious commitment of the NYSDEC, the NYS Department of Health, the United States Environmental Protection Agency, NYS Department of Law, Town of Islip and the people of the community working together to protect the health of the people in this long-impacted community.

**RESPONSE:** Refer to responses to previous comments. It is indeed likely that the landfill, over its period of operation (1965 - 1977) has released contamination to the aquifer that is not visible now, but has impacted the quality of groundwater. The feasible approach at the present time is to address the source (by capping the landfill) to prevent future contamination, and address potential users of groundwater at the points of use (through routine sampling of public supply wells, surveys and monitoring of private wells as appropriate). The RI did not include testing for organisms associated with septic waste because the hazardous waste remediation program focuses primarily on chemical contamination. These organisms are typically filtered out by movement of groundwater a sufficient distance through the soil and sand of an aquifer.

The flow direction of groundwater can reliably stated to be southeastward in the environs of the landfill. The hydrogeologic zone boundary mentioned lies approximately 3000 feet north of the landfill, and in any case is not a divide (where groundwater can flow in different directions) but a representation of how the aquifer is receiving or discharging water.

The more pressing environmental problem clearly is the VOC plume (or plumes) emanating from source(s) north of the landfill. People concerned about groundwater quality in the area are encouraged to keep in contact with NYSDEC regarding investigation and remedial action for this industrial area. It is true that for an effective plume cleanup, the Department must coordinate investigations of individual sources and keep in mind the whole area in any enforcement or remedial strategy.

**Written Comments of John McHugh, June 10, 1998:**

I am writing to object to the Proposed Remedial Action Plan at the Sonia Road Landfill Site, Islip, NY. Fact Sheet enclosed from May 20, 1998 Meeting ID No. 152013. Also enclosed is the report of groundwater sampling from August 1994.

I am also including parts of Dvirka and Bartilucci's report pages 3-23 and 3-24. Figure 3-1 and 4-3 speak for themselves. MW-8 well in the report is missing from 4-3. Also included is a hydrology report from the 1960s. Groundwater flow could parallel Sampawams Creek where there are a number of Suffolk County Water wells. One well field, the Harvest Lane well field, recently had carbon filters installed at a cost of millions of dollars to taxpayers.

Alternative 4 is not acceptable. Groundwater must be treated; our children and grandchildren must be protected.

**RESPONSE:** The Proposed Remedial Action Plan weighs the benefit, cost and feasibility of groundwater collection and treatment for Sonia Road Landfill. In view of the contaminants specific to the landfill, collection and treatment of groundwater would do little to protect public health or the environment. The State and County Departments of Health have determined that the selected remedy is

protective of public health including children. An effective remedy for the VOC contamination must focus on the sources north of the landfill. According to the Remedial Investigation Report, monitoring well cluster MW-8 was never installed because analysis of groundwater quality in the proposed location (the southwest corner of the landfill) showed very little contamination (see page 2-21).

**APPENDIX B**  
**ADMINISTRATIVE RECORD INDEX**

Sonia Road Landfill, Site No. 152013

July 1998

1. Letter from Elsa Ford to Kathleen McCue, New York State Department of Environmental Conservation (NYSDEC), June 11, 1998. Comments on the Proposed Remedial Action Plan for the Sonia Road Landfill.
2. Letter from John McHugh to Kathleen McCue, NYSDEC, June 10, 1998. Comments on the Proposed Remedial Action Plan for the Sonia Road Landfill.
3. Meeting Invitation/ Fact Sheet for the Public Information Meeting held on May 20, 1998, and the public comment period held from May 11, 1998 to June 11, 1998.
4. NYSDEC, April 1998. Proposed Remedial Action Plan for the Sonia Road Landfill, Site No. 152013.
5. Dvirka and Bartilucci Consulting Engineers for the Islip Resource Recovery Agency, April 1998. Feasibility Study Report for the Sonia Road Landfill, West Brentwood, New York.
6. \_\_\_\_\_, April 1998. Remedial Investigation Report. Three volumes: Report, Appendices A-R, and Appendix S.
7. \_\_\_\_\_, April 1998. Qualitative Risk Assessment.
8. \_\_\_\_\_, February 1997. Work Plan for the Sonia Road Landfill Remedial Investigation/ Feasibility Study. Four volumes:  
Volume I: Work Plan  
Volume II: Sampling/ Analysis Plan  
Volume III: Health and Safety Plan (December 1996)  
Volume IV: Citizen Participation Plan
9. Order on Consent Index No. W1-0741-95-11 between NYSDEC and the Town of Islip, executed March 29, 1996. Subject: Development and Implementation of a Remedial Program for the Sonia Road Landfill.
10. NYSDEC Division of Hazardous Waste Remediation, August 1994. Report for the Immediate Investigation Work Assignment: Groundwater Investigation of the Sonia Road Landfill.

# Appendix B

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**APPENDIX B**

**STANDARD INSPECTION REPORT FORM**

**Site Inspection Checklist**

Date: \_\_\_\_\_  
 Inspected By: \_\_\_\_\_

Site Name: \_\_\_\_\_  
 Cell No.: \_\_\_\_\_

Item	Acceptable	Not Acceptable	Present	Not Present	Location	Remarks
1) Vegetative Cover:						
a) Landfill Site:						
bare spots						
dead areas						
undesirable growth						
b) Drainage Structures:						
bare spots						
dead areas						
undesirable growth						
2) Revetment Matting:						
a) Sideslopes:						
cracking						
vandalism						
vector infestation						
holes						
missing concrete articulating blocks						
exposed geomembrane						
b) Anchor Trenches:						
cracking						
holes						
3) Ground Water Monitoring Wells:						
damage/vandalism						
settlement						
vector infestation						

ADDITIONAL COMMENTS:

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Site Inspection Checklist (Cont.)

Date: \_\_\_\_\_  
 Inspected By: \_\_\_\_\_

Site Name: \_\_\_\_\_  
 Cell No.: \_\_\_\_\_

Item	Acceptable	Not Acceptable	Present	Not Present	Location	Remarks
4) Soil Cover:						
slope movement and condition						
erosion damage						
settlement						
holes						
vector infestation						
waste breakthrough						
leachate breakthrough						
vandalism						
unauthorized dumping						
litter						
5) Access Roads:						
potholes/burrow holes						
erosion gullies						
loss of stone cover						
obstructions						
6) Gas Venting System:						
odor						
damage/vandalism						
settlement						
vector infestation						
passive gas venting system efficiency						

ADDITIONAL COMMENTS:

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Site Inspection Checklist (Cont.)

Date: \_\_\_\_\_  
 Inspected By: \_\_\_\_\_

Site Name: \_\_\_\_\_  
 Cell No.: \_\_\_\_\_

7) Storm Water Collection						
a) Diversion Swales:						
silt accumulation						
ponded water						
wash outs						
vegetative cover						
b) Perimeter Swales:						
silt accumulation						
ponded water						
vegetative cover						
erosion control matting						
c) Energy Dissipators:						
damage/instability						
soil erosion around						
d) Downchutes:						
damage/instability						
soil erosion beneath						
loose ties						
slippage of gabion						
e) Culvert Outlets:						
damage/instability						
soil erosion beneath						
loose ties						
slippage of gabion						

ADDITIONAL COMMENTS:

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# Appendix C



**APPENDIX C**

**STANDARD OPERATING PROCEDURE FOR GAS MONITORING**

## STANDARD OPERATING PROCEDURE FOR GAS MONITORING

The following procedure is to be followed for monitoring landfill gas wells:

1. Unlock well protective casing.
2. Place magnehelic pressure gauge (0-100" W.C.) on well sample port, open sample valve and record pressure on a landfill gas monitoring form.
3. Close sample valve; remove pressure gauge.
4. Purge combustible gas meter with ambient air to obtain a zero reading.
5. Attach hose to well sample port.
6. Open sample valve and, using a combustible gas meter (methane), record lower explosive limit or percent gas concentrations, as appropriate.
7. Close sample valve and repeat Steps 2 through 6 on other probes in well cluster.
8. Close and lock well protective casing.
9. Weather conditions (i.e., temperature, ambient barometric pressure and direction – rising or falling) shall also be recorded on the monitoring forms for each well.

Note: Instruments should be calibrated prior to each sampling event.

# Appendix D



**APPENDIX D**

**SAMPLING PROTOCOL FOR  
LANDFILL GAS CONDENSATE**

**TOWN OF ISLIP  
SONIA ROAD LANDFILL  
NYSDEC SITE NO. 152013**

**SAMPLING PROTOCOL  
LANDFILL GAS CONDENSATE**

***Purpose:*** To provide analytical data for the landfill gas condensate generated by the Landfill Gas Management System for the purpose of determining whether the condensate can be discharged to the waste mass.

***Arrangements:*** Make arrangements with the analytical laboratory under contract with the Town of Islip/Islip Resource Recovery Agency to obtain coolers, sample bottles, blue ice, chain of custody forms, trip blank, etc. for analysis of two landfill gas condensate samples. Field blanks are not required. Analysis to include:

- 6 NYCRR Part 360-2.11 Expanded Parameters NYSDEC ASP Protocol. See attached Table Nos. 1 and 2.

***Supplies:*** The Sampling of landfill gas condensate from the two barometric drains associated with the Landfill Gas Management System is comparable to the sampling of groundwater monitoring wells with the exception that purging or pumping is not required.

Samples will be retrieved using disposable balers.

The procedures for sampling, field testing, sample preservation, holding times, quality assurance/quality control, etc., shall be as prescribed for the sampling of groundwater monitoring wells in the site specific Sampling and Analysis Plan for the Sonia Road Landfill, dated February 1997 or as amended.

Hand tools may be required to remove the 4-inch diameter vented PVC caps from the atmospheric leg of each of the two barometric drains to allow retrieval of the samples.

***Frequency:*** Sample each barometric drain twice per month for 2 months for a total of four sampling events. Each sampling event will provide two grab samples of landfill gas condensate; one from the barometric drain located on the western side of the blower pad and the second from the barometric drain located on the eastern side of the blower pad.



The barometric drain located in the southwest corner of the property (adjacent to the southeast corner of Recharge Basin No. 2) will not be sampled. This barometric drain only services a low point in the header piping of the Southern Landfill Gas Collection System to prevent the accumulation of condensate at the low point. The condensate associated with the Southern Landfill Gas Collection System is more appropriately represented by the sampling of the barometric drain located on the eastern side of the blower pad discussed above.

***Procedures:***

- 1) The Landfill Gas Management System must be in operation for at least two hours prior to the retrieval of condensate samples in order to provide representative samples. If the Landfill Gas Management System is not in operation at the time of sampling, the system must be placed in operation and allowed to operate for at least two hours.
- 2) The Landfill Gas Management System must be shut down at the time of retrieval of landfill gas condensate samples.
- 3) The condensate sample containers for the barometric drain located on the west side of the blower pad should be labeled "Northern Landfill Gas Collection System – Landfill Gas Condensate."
- 4) The condensate sample containers for the barometric drain located on the east side of the blower pad should be labeled "Southern Landfill Gas Collection System – Landfill Gas Condensate."
- 5) The condensate samples will be retrieved from the atmospheric (downstream) leg of each barometric drain. Remove the 4-inch diameter vented cap (not glued) to expose the 4-inch diameter PVC vertical leg (pipe) of the barometric drain.
- 6) Lower a disposable baler into the pipe to retrieve the condensate sample. There is no need to purge the barometric drain or to dispose of any of the collected liquid.
- 7) Take field measurements for pH, temperature, turbidity and conductivity.
- 8) Fill the sample containers, preserve, store and deliver in accordance with the procedures of the Sampling and Analysis Plan.
- 9) Refill each barometric drain by pouring approximately 10 gallons of clean water down each 4-inch diameter pipe and reinstall the vented cap (no glue).

- 10) If appropriate, restart the Landfill Gas Management System and return it to operation.

***Analysis of Results:***

- 1) Arrange for delivery of condensate samples to the Town of Islip/Islip Resource Recovery Agency's contracted analytical laboratory and preserve the chain of custody.
- 2) Analysis to include 6 NYCRR Part 360-2.11 Expanded Parameters - NYSDEC ASP Protocol. See attached Table Nos. 1 and 2.
- 3) Analytical reports will be forwarded by the laboratory to the Town of Islip/Islip Resource Recovery Agency after which the reports will be provided to Dvirka and Bartilucci Consulting Engineers for data validation and evaluation in accordance with the Sampling and Analytical Plan.

***Evaluation of Results:***

- 1) Perform data validation and data usability analysis.
- 2) Compare condensate data to the groundwater effluent limitations for Class GA groundwater as defined by 6 NYCRR Part 703.6 and other appropriate groundwater data.

***Reporting of Results:***

- 1) Compile analytical data for the four sampling events in one report.
- 2) Provide interpretation of data as appropriate.
- 3) Submit report to Town of Islip/Islip Resource Recovery Agency.
- 4) Town of Islip/Islip Resource Recovery Agency submission of report to NYSDEC - Central Office.

**Table 1**  
**SONIA ROAD LANDFILL**  
**SUMMARY OF MONITORING PARAMETERS**  
**FOR SAMPLING OF LANDFILL GAS CONDENSATE**

<u>Sample Location</u>	<u>Sample Type</u>	<u>Sample Matrix</u>	<u>Sample Fraction</u>	<u>Number of Samples per Event</u>	<u>Frequency</u>	<u>Container Type/Size/No.</u>	<u>Sample Preservation</u>	<u>Maximum Holding Time*</u>	<u>Analytical Method</u>
Landfill Gas Management System Atmospheric leg of two barometric drains.	Grab	LFG Condensate	Volatile Organics	2	Twice per month for 2 months	Glass, clear/40 mL/3 ICHEM 300 series or Equivalent	Cool to 4°C	7 days for analysis	10/95 NYSDEC ASP Method 95-1
	Grab	LFG Condensate	Base Neutral and Acid Extractable Organics	2	Twice per month for 2 months	Glass, amber/1 L/2 ICHEM 300 series or equivalent	Cool to 4°C	5 days for extraction, 40 days after extraction for analysis	10/95 NYSDEC ASP Method 95-2
	Grab	LFG Condensate	Pesticides/PCBs	2	Twice per month for 2 months	Glass, amber/1 L/2 ICHEM 300 series or equivalent	Cool to 4°C	5 days for extraction, 40 days after extraction for analysis	10/95 NYSDEC ASP Method 95-3
	Grab	LFG Condensate	Total Metals***	2	Twice per month for 2 months	Plastic/1 L/1 ICHEM 300 series or equivalent	HNO <sub>3</sub> to pH <2 Cool to 4°C	26 days for Hg analysis, 6 months for analysis of others	10/95 NYSDEC ASP Method 200.7**
	Grab	LFG Condensate	Cyanide	2	Twice per month for 2 months	Plastic/1 L/1 ICHEM 300 series or equivalent	NaOH to pH >12 Cool to 4°C	12 days for analysis	10/95 NYSDEC ASP Method 335.2
	Grab	LFG Condensate	Leachate Parameters	2	Twice per month for 2 months	See Table 2	See Table 2	See Table 2	1995 NYSDEC ASP See Table 2

\*Holding times based upon VTSR (Verified Time of Sample Receipt).

\*\*and SW-846 Methods for:  
Mercury Method 7470

\*\*\*Dissolved metals may be required if the turbidity of the samples is >50 NTUs.

Table 2

**SONIA ROAD LANDFILL  
SUMMARY OF MONITORING PARAMETERS  
FOR SAMPLING OF LANDFILL GAS CONDENSATE**

**LEACHATE PARAMETERS  
METHOD OF ANALYSIS, PRESERVATION AND HOLDING TIMES\***

<u>Parameter</u>	<u>Method of Analysis</u>	<u>Preservation</u>	<u>Container</u>	<u>Holding Time**</u>
Ammonia	Method 350.3	H <sub>2</sub> SO <sub>4</sub> to pH <2; Cool to 4°C	Plastic or Glass	26 days
Total Organic Carbon	Method 415.1	H <sub>2</sub> SO <sub>4</sub> to pH <2; Cool to 4°C	Plastic or Glass	26 days
Total Dissolved Solids	Method 160.1	Cool to 4°C	Plastic or Glass	5 days
Alkalinity	Method 310.1	Cool to 4°C	Plastic or Glass	12 days
Chloride	Method 325.3	Cool to 4°C	Plastic or Glass	26 days
pH	Method 150.1	None Required	Glass	Field Measurement
Specific Conductance	Method 120.1	None Required	Glass	Field Measurement
Total Kjeldahl Nitrogen	Method 351.3	H <sub>2</sub> SO <sub>4</sub> to pH <2; Cool to 4°C	Plastic or Glass	26 days
Nitrate	Method 352.1	H <sub>2</sub> SO <sub>4</sub> to pH <2; Cool to 4°C	Plastic or Glass	26 days
BOD (5-day)	Method 405.1	Cool to 4°C	Plastic or Glass	24 hours
COD	Method 410.1	H <sub>2</sub> SO <sub>4</sub> to pH <2; Cool to 4°C	Plastic or Glass	26 days
Sulfate	Method 375.4	Cool to 4°C	Plastic or Glass	26 days

**Table 2 (continued)**

**SONIA ROAD LANDFILL  
SUMMARY OF MONITORING PARAMETERS  
FOR SAMPLING OF LANDFILL GAS CONDENSATE**

**LEACHATE PARAMETERS  
METHOD OF ANALYSIS, PRESERVATION AND HOLDING TIMES\***

<b><u>Parameter</u></b>	<b><u>Method of Analysis</u></b>	<b><u>Preservation</u></b>	<b><u>Container</u></b>	<b><u>Holding Time**</u></b>
Chromium (hexavalent)	Method 218.5	Cool to 4°C	Plastic or Glass	24 hours
Color	Method 110.2	Cool to 4°C	Plastic or Glass	24 hours
Hardness (total)	Method 130.2	HNO <sub>3</sub> to pH <2;	Plastic or Glass	6 months
Turbidity	Method 180.1	None required	Plastic or glass	Field measurement
Boron	Method 212.3	None required	Plastic	26 days
Eh	---	None required	Glass	Field Measurement
Phenol	Method 420.1	H <sub>2</sub> SO <sub>4</sub> to pH <2 Cool to 4°C	Glass	26 days
Bromide	Method 320.1	Cool to 4°C	Plastic or Glass	26 days

\*Taken from the 1995 NYSDEC ASP.

\*\*Holding Times based on VTSR (Validated Time of Sample Receipt)

# Appendix E



**APPENDIX E**

**SAMPLING PROTOCOL FOR  
LANDFILL GAS**

**TOWN OF ISLIP  
SONIA ROAD LANDFILL  
NYSDEC SITE NO. 152013**

**SAMPLING PROTOCOL  
LANDFILL GAS**

***Purpose:***

To provide analytical data for the landfill gas extracted by the Landfill Gas Management System for the purpose of determining the concentrations of Non-Methane Organic Compounds (NMOC) prior to the combustion process.

***Arrangements:***

Make arrangements with the analytical laboratory under contract with the Town of Islip/Islip Resource Recovery Agency to obtain four certified 6-liter (6 L) sample canisters, four pressure gauges, four filters, 1/4 inch Teflon tubing, chain of custody forms, etc. (three of the canisters and appurtenances are required for sampling, one canister and appurtenances are spare). Field blanks and trip blanks are not required. Analysis to include:

- EPA Method TO-12 Determination of Non-Methane Organic Compounds (NMOCs) in Ambient Air Using Cryogenic Preconcentration and Direct Flame Ionization Detection, with CLP-like data validatable package.
- EPA Method TO-14A Determination of Volatile Organic Compounds (VOCs) in Ambient Air Using Summa Passivated Canister Sampling and Gas Chromatographic Analysis, with CLP-like data validatable package.

EPA Method TO-12 will provide a single value for Total NMOCs. EPA Method TO-14A will provide values for targeted VOCs, the sum of which will approximate the Total NMOCs.

The laboratory which performs the analysis must be recognized (certified) by New York State for the determination of VOCs in air.

***Supplies:***

The sampling of landfill gas from three sampling ports associated with the Landfill Gas Management System will be performed as grab sampling using certified clean and evacuated 6-liter stainless steel Summa canisters. The vacuum pressures present in the canisters will make the canisters self-filling during the sample retrieval process.



Canisters must be obtained from the laboratory. Canisters should be ordered, received and used for sampling as quickly as possible. In no event should an evacuated canister be stored more than 30 days (from date of evacuation).

Hand tools will be required to assemble canisters, filters, pressure gauges, Teflon tubing and hose connections. Hand tools may also be required to remove pressure gauges or plugs from the designated sampling port/pressure gauge connections.

The canisters are evacuated at the laboratory to a high vacuum (>28" Hg). Each canister must contain at least 26" Hg vacuum at the time of sampling. If the canister vacuum is less than 26" Hg, the canister should not be used, and it should be exchanged for another canister.

***Frequency:***

Sample each sample port twice per month for 2 months. Each sampling event will provide three grab samples of landfill gas; one from the 1/2 inch diameter sampling port/pressure gauge connection located on the suction side of the west blower (Blower 1) prior to the inlet water separator, one from the 1/2 inch diameter sampling port/pressure gauge connection located on the suction side of the east blower (Blower 2) prior to the inlet water separator, and one from the 1/2 inch diameter sampling port/pressure gauge connection located at the 10-inch diameter tee on the combined discharge from both blowers. See attached figure.

***Procedures:***

- 1) The Landfill Gas Management System must be in operation for at least two hours prior to the retrieval of landfill gas samples in order to provide representative samples. If the Landfill Gas Management System is not in operation at the time of sampling, the system must be placed in operation and allowed to operate for at least two hours.
- 2) The Landfill Gas Management System must be shut down at the time of retrieval of landfill gas samples. Sampling shall be performed from one sample location at a time.
- 3) The landfill gas sample canister for the sample port located on the west side of the blower pad should be labeled "Northern Landfill Gas Collection System – Landfill Gas." Record canister tag data and serial number.
- 4) The landfill gas sample canister for the sample port located on the east side of the blower pad should be labeled "Southern Landfill Gas Collection System – Landfill Gas." Record canister tag data and serial number.

- 5) The landfill gas sample canister for the sample port located at the 10-inch diameter stainless steel tee located on the discharge side of the blowers should be labeled "Combined Landfill Gas Sample." Record canister tag data and serial number.
- 6) Remove pressure gauges or plugs from the designated sampling port/pressure gauge connections and install brass or PVC 1/2" NPT x 1/4" hose barb fittings into each connection.
- 7) Remove brass shipping plug from canister. DO NOT OPEN VALVE.
- 8) Assemble canister and canister pressure gauge and install brass shipping plug in gauge connection.
- 9) Open canister valve then close to test canister vacuum. If vacuum is  $\geq 26$ " Hg, continue. If vacuum is  $< 26$ " Hg, do not use canister for sampling and use spare canister instead or obtain a replacement canister, as appropriate. Record canister tag data and vacuum reading on Chain of Custody forms.
- 10) Remove plug, assemble filter to pressure gauge and Teflon tubing to filter. (Do not use tygon tubing.) Position canister as close to sampling port as possible to minimize length of Teflon tubing. Connect tubing to hose barb fitting at sampling port/pressure gauge connection. Swage lock fittings are finger-tight plus 1/16 turn.
- 11) Open 1/2" sample port valve then open valve on canister to retrieve sample from landfill gas management system piping. Estimated time to fill: 30 seconds to 1 minute.
- 12) Close valve on canister when canister pressure drops to 5" Hg. Do not allow canister to achieve ambient pressure. Record ending canister pressure on Chain of Custody form. Close sample port valve.
- 13) Disassemble canister, pressure gauge, filter, tubing, etc., and **INSTALL BRASS SHIPPING PLUG IN CANISTER. MAKE CERTAIN CANISTER VALVE IS CLOSED.**
- 14) Repeat Steps 8 through 13 for each sampling location using a dedicated canister, pressure gauge, filter, tubing, hose barb, etc.

- 15) Package canisters, pressure gauges, filters, etc., in shipping carton and deliver/ship to laboratory. There are no preservation or storage requirements for the canisters. Return all canisters, including spares and unused canisters.
- 16) Holding times should not exceed 14 days.
- 17) Reinstall pressure gauges or plugs into designated sampling port/pressure gauge connections on landfill gas management system piping.
- 18) If appropriate, restart the Landfill Gas Management System and return it to operation.

***Analysis of Results:***

- 1) Arrange for delivery of sample canisters to the Town of Islip/Islip Resource Recovery Agency's contracted analytical laboratory and preserve the chain of custody.
- 2) Analysis of each sample canister to include:
  - EPA Method TO-12 Determination of Non-Methane Organic Compounds (NMOCs) in Ambient Air Using Cryogenic Preconcentration and Direct Flame Ionization Detection. Results to be provided with CLP-like data validatable package.
  - EPA Method TO-14A Determination of Volatile Organic Compounds (VOCs) in Ambient Air Using Summa Passivated Canister Sampling and Gas Chromatographic Analysis. Results to be provided with CLP-like data validatable package.
- 3) Analytical reports will be forwarded by the laboratory to the Town of Islip/Islip Resource Recovery Agency after which the reports will be provided to Dvirka and Bartilucci Consulting Engineers for data validation and evaluation.

***Evaluation of Results:***

- 1) Perform data validation and data usability analysis.
- 2) Compare data to appropriate regulations to be discussed with NYSDEC.

***Reporting of Results:***

- 1) Compile analytical data for the four sampling events in one report.
- 2) Provide interpretation of data as appropriate.
- 3) Submit report to Town of Islip/Islip Resource Recovery Agency.

- 4) Town of Islip/Islip Resource Recovery Agency submission of report to NYSDEC - Central Office.

Table 1

**SONIA ROAD LANDFILL  
SUMMARY OF MONITORING PARAMETERS  
FOR SAMPLING OF LANDFILL GAS**

<u>Sample Location</u>	<u>Sample Type</u>	<u>Sample Matrix</u>	<u>Sample Fraction</u>	<u>Number of Samples per Event</u>	<u>Frequency</u>	<u>Container Type/Size/No.</u>	<u>Sample Preservation</u>	<u>Maximum Holding Time</u>	<u>Analytical Method</u>
Landfill Gas Management System (see attached figure)	Grab	Landfill Gas	Non-Methane Organic Compounds (NMOCs)	3	2/month for 2 months	6-liter stainless steel Summa canister	None	14 days for analysis	EPA Method TO-12
	Grab	Landfill Gas	Volatile Organic Compounds (VOCs)	3	2/month for 2 months	6-liter stainless steel Summa canister	None	14 days for analysis	EPA Method TO-14A

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**KOP-103A/B**

LANDFILL GAS INLET SEPARATOR  
BURGESS MANNING  
MODEL VSVT-8

**B-101A/B**

LANDFILL GAS BLOWER  
MD 6024-46L2

**FA-104A/B/C**

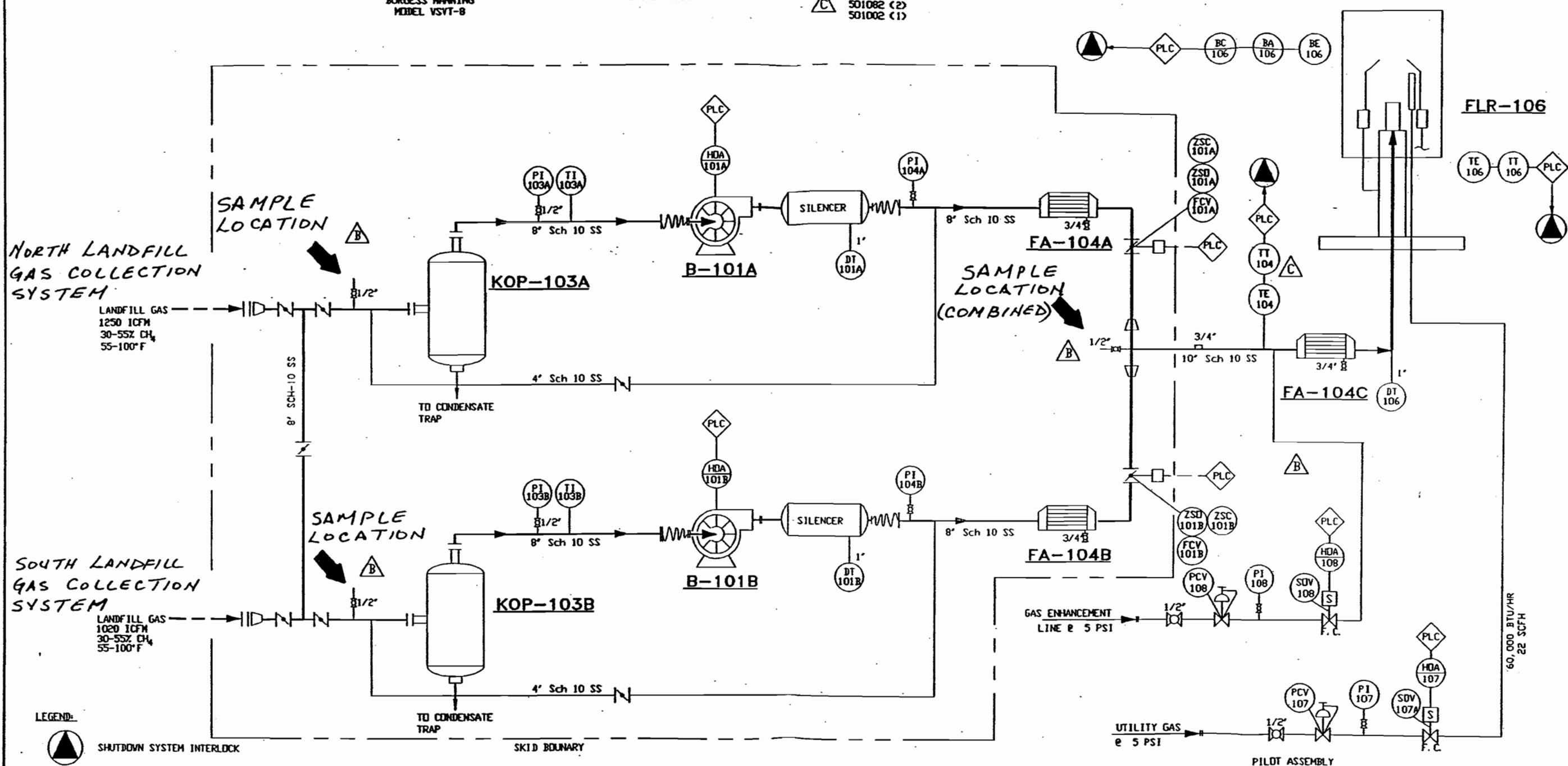
FLAME ARRESTORS (3)  
WHESSIDE VAREC  
SERIES 5010  
5010B2 (2)  
5010D2 (1)

**BC-106**

FLAME SAFETY SYSTEM  
HONEYWELL RM7890A

**FLR-106**

LFG&E TRITON FLARE  
MODEL CF-2000



**NORTH LANDFILL GAS COLLECTION SYSTEM**  
LANDFILL GAS  
1250 ICFM  
30-55% CH<sub>4</sub>  
55-100°F

**SOUTH LANDFILL GAS COLLECTION SYSTEM**  
LANDFILL GAS  
1020 ICFM  
30-55% CH<sub>4</sub>  
55-100°F

**LEGEND:**

- SHUTDOWN SYSTEM INTERLOCK
- PROGRAMMABLE LOGIC CONTROLLER
- CONTROL PANEL
- FIELD MOUNTED
- LG LEVEL GAUGE
- PCV PRESSURE REGULATOR
- LS LEVEL SWITCH
- SOV SOLENOID VALVE
- HDA HAND/OFF/AUTO
- PI PRESSURE GAUGE
- BC BURNER CONTROLLER
- ZS LIMIT SWITCH
- SP SURGE PROTECTOR
- FE FLOW ELEMENT
- TE TEMPERATURE ELEMENT
- BE BURNER ELEMENT
- TI TEMPERATURE INDICATOR
- HV HAND VALVE
- FT FLOW TRANSMITTER
- FCV FLOW CONTROL VALVE
- BA FLAME FAIL ALARM
- DPI DIFFERENTIAL PRESSURE INDICATOR
- TT TEMPERATURE TRANSMITTER
- FT FLOW TRANSMITTER
- VS VIBRATION SWITCH
- AE ANALYZER
- TP BLOWER THERMAL PROTECTION CIRCUIT
- DT DRIP TRAP

REV.	DESCRIPTION	DATE	APPROVED
C	REVISED PER CUSTOMER COMMENTS	12/7/99	JH
B	REVISED PER CUSTOMER COMMENTS	11/8/99	JH
A	REVISED PER CUSTOMER COMMENTS - 497-	10/7/99	JH

**LFG&E**  
LANDFILL GAS & ENVIRONMENTAL PRODUCTS INC.  
9855 PROSPECT AVE., SANITIER, CA 92071  
TEL: (619)596-9083, FAX: (619)596-9088

**TRITON™ FLARE**  
CF-2000

SCALE: \_\_\_\_\_ APPROVED BY: \_\_\_\_\_  
DATE: \_\_\_\_\_  
SHEET DESCRIPTION: **PIPING AND INSTRUMENTATION DIAGRAM**  
**LANDFILL GAS FLARE SYSTEM**  
PROJECT LOCATION: **SONIA ROAD LANDFILL**  
**TOWN OF ISLIP**

DRAWN BY: V.B.  
REVISED: \_\_\_\_\_  
REV. NO.: \_\_\_\_\_  
SHEET 1 OF 1  
DRAWING NO.: **70048-M01**

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