

Attachment 15

Landfill Closure Plan



LANDFILL CLOSURE PLAN

**IESI PA BETHLEHEM LANDFILL CORPORATION
NORTHAMPTON COUNTY, PENNSYLVANIA**

**IESI BETHLEHEM LANDFILL
PADER PERMIT NO. 100020**



**APPLICATION FOR
PERMIT MODIFICATION
PHASE IV MODIFICATION**



IESI BETHLEHEM LANDFILL
APPLICATION FOR PERMIT MODIFICATION
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ATTACHMENT 28-1

CLOSURE PLAN

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CLOSURE PLAN

Introduction

The purpose of this closure plan is to provide steps to develop a low permeability cap over areas containing municipal solid waste at the IESI Bethlehem Landfill. At a minimum, the cap system shall 1.) reduce rain infiltration into the municipal solid waste, 2.) reduce leachate production, 3.) minimize and prevent erosion, and 4.) control runoff. The concepts within this closure plan include the design of an impermeable cap and closure activities which comply with state regulations.

This closure plan identifies and describes the activities that will be necessary to complete closure activities at the IESI Bethlehem Landfill. The closure plan includes generalized discussions of the final cover and vegetative system, surface drainage run-on and runoff control, groundwater monitoring system and sampling program, landfill gas management system, leachate collection and management system, facility access control, and other measures necessary to accomplish site work to integrate the site into the surrounding area.

It is the intent of this document to describe an integrated plan for closing the Phase IV area. In support of this plan, drawings for the Phase IV landfill design show existing topography and fill grades as well as the typical landfill cap cross-section.

1.0 Schedule/Staging

The staging sequence is based upon reaching final elevations in areas of the Phase IV cells. The size of each closure area will be such that the closure stage can be completed within one construction season and to be able to control stormwater. Before any closure activities are scheduled to begin, drainage controls will first be constructed in a sequential manner starting at low elevations to control stormwater.

Premature Closure Procedure

The design and sequencing of the Phase IV disposal area has been conceptualized to allow for proper stormwater drainage to exist during the entire operating life of this disposal area. In the event that the landfill must close prior to reaching its total design height, placement of solid waste will cease and the existing grades will be adjusted to achieve good drainage and to reduce the potential for erosion. A revised closure plan will be prepared-at such time to address premature closure.

Final Closure

It is anticipated that one or more areas of the landfill will receive intermediate cover during each yearly construction season. The construction will include earthwork to accomplish final grading. Installation of the final cover system may proceed at approximately the same time as construction of landfill cells, if possible, to take advantage of economics of scale. The work includes seeding of the barren soil, and road removal and reconstruction on the final grade. Removal of structures and support equipment will also be performed during this time as their usefulness ends, unless the equipment or structures are needed to support post closure activities or subsequent landfill expansion.

Equipment that is removed from the site will be transported to the lined containment area surrounding the leachate storage tank and steam cleaned prior to leaving the site. The equipment will either be reused, salvaged or disposed of off-site at a facility(ies) permitted to accept the material(s).

The scalehouse will be removed from the site after closure of the landfill, if not being used for a citizen convenience center. The office and maintenance buildings will remain onsite at least through the post closure care period. Structures to be removed after the post closure period will be either relocated off-site or demolished and disposed of off-site at facility(ies) permitted to accept the material(s). Utilities will be disconnected and removed per utility supplier recommendations concurrent with the removal of the structures.

Final closure of the site is estimated for the year 2048, thirty-one (31) years after the last closure stage is implemented. This estimate is based on allowing one year to complete construction of the capping system and erosion and sediment controls and for final inspections by authorities, and allowing a thirty year post closure care period as required by federal regulations (40 CER 258).

2.0 Closure Components

For the purpose of this closure plan, closure activities will include construction of the final cover system (including vegetation), construction of structures to control surface run-on and runoff, installation of the final landfill gas (LFG) management system and measures to be implemented to ensure site compatibility with surrounding areas.

The plan ensures that closure will be completed in a manner that minimizes the need for future maintenance. This plan includes the following closure activities:

- constructing final sideslopes with E&S control to reduce soil erosion;
- use of a multi-layered final cover system to reduce groundwater recharge via infiltration of rainfall and to reduce soil erosion due to surface runoff;
- selection of a shallow rooted vegetative cover to reduce erosion and provide evapotranspiration;

- construction of site access control systems;
- plan for periodical sampling and analyzing samples from groundwater monitoring wells and LFG monitoring wells as described in Form 7, Hydrogeologic Information and Form K, Gas Management to this Permit Application; and
- providing a plan for performing periodic scheduled facility inspections to observe the performance of closure systems.

2.1 Final Cover System

Closure activities for the lined areas of the landfill will include construction of a final cover system. The closure activities include capping of areas in which municipal solid waste disposal activities have taken place.

Final Cover System Design

The cover system for the landfill phases will consist of the following from bottom to top:

- existing on-site fill as intermediate cover;
- geotextile;
- 40 mil HDPE geomembrane liner;
- geonet between two layers of non-woven geotextile or an equivalent geosynthetic system
- 18 inches of common fill;
- 6 inches of topsoil or equivalent soil to support vegetation;
- vegetative cover as proposed in Form H of this Application.

The total depth of the proposed cover system from the top of the initial layer of intermediate cover will be about 2 feet.

The cover system is designed to minimize the potential infiltration and/or percolation of rainfall and run-on/runoff and provide a layer of soil material that will support vegetative growth. The system will also minimize erosion of the cover and minimize maintenance activities related to the final cover.

The final cover system has been designed with surface grading that will promote surface runoff, even given the probability that minor settlement will continue to occur as deposited municipal

wastes consolidate and degrade. The final cover system is also designed to minimize possible adverse effects as a result of freeze/thaw cycles.

Vegetative growth is an important aspect of the final cover system for the facility because the vegetative cover increases soil stability and helps control erosion caused by surface runoff and wind. Information regarding the specific types of vegetation to be planted at the site is described in Form H, Revegetation.

2.2 Drainage Controls

Surface run-on and runoff controls to be implemented during closure will include controlling the final cover surface slopes to reduce erosion. Sideslopes of the lined fill areas are designed at a maximum of 3 horizontal to 1 vertical. These grades will be maintained to minimize fill material for grade adjustments required for drainage. These slopes, combined with drainage structures and erosion control benches, will minimize infiltration of rainfall/runoff and limit excessive erosion of the cover system.

~~Other surface drainage structures considered appropriate for installation include drainage ways and ditches to intercept runoff on sideslopes and to convey runoff away from completed sections of the landfill. These structures control surface runoff by directing it into perimeter drainage courses that channel runoff to the sedimentation basins. Sequencing the closure to begin at the lower elevations is crucial to the success of the final closure. The construction of the impermeable cover will generate runoff that must be diverted to control down slope erosion.~~

The cap system will employ a drainage layer (geonet) above the impermeable membrane to remove precipitation that has infiltrated the vegetative layer. Revegetation of the final cover system should result in improved drainage control. The vegetative root structure increases soil stability and reduces soil erosion resulting from runoff. In addition, the vegetative growth increases evapotranspiration, particularly in summer months, thus reducing infiltration of rainfall and the potential for leachate generation.

A summary discussion of overall stormwater management and control practices is presented with Form I of this Permit Application.

2.3 Groundwater Monitoring System

A detailed groundwater monitoring program for the landfill is described in Form 7 of this permit application. The annual and quarterly sampling program will continue throughout the closure period for chemical parameters to be approved by PaDEP. Samples will be taken from all PaDEP approved monitoring points and analyzed for the required parameters. Continual sampling is necessary to provide data on the integrity of the liners and leachate collection system. The sampling of monitoring wells will continue throughout the post closure care period.

2.4 Landfill Gas Control and Monitoring System

Landfill gas (LFG) control will be accomplished to prevent migration, explosion and fire hazards at on or off-site structures, to prevent damage to the vegetative growth on and off-site, and to minimize the potential for odors being released off-site. LFG control and monitoring will be conducted as described in Form K, Gas Management.

2.5 Leachate Collection and Treatment System

The entire liner and leachate collection system, including all appurtenances such as leachate sumps, pumps, force mains, and storage lagoons, will be constructed prior to final site closure. After closure, access to manholes, and other leachate collection system components, will be restricted to allow only authorized personnel access to the leachate collection system. Since the entire system, except for the slope riser pumps, is designed to function under gravity flow, maintenance should consist of occasional inspections for pipe blockage and cleaning.

The closure of the landfill will result in the construction of the final cover system over the entire area of landfilling. This cover system should substantially reduce leachate generation because it is designed to minimize infiltration of precipitation into the disposed refuse. As a result, the quantity of leachate requiring treatment after the landfill is closed will be reduced below the peak generation rates anticipated during actual operations.

Construction documents will provide details and locations of pipe cleanouts. Cleanouts will be located at locations and distances adequate to maintain sufficient access to the leachate collection and conveyance piping. Immediately prior to final capping, the leachate collection piping will be flushed clean.

2.6 Access Control

Closure of the landfill, if the Phase IV disposal area is the final phase, will result in the elimination of municipal waste landfilling operations at the site. During the period of landfilling operations, site access control will be primarily achieved by the existing 8-foot chain link fence surrounding the site. Locking gates at access points will be used to minimize unauthorized entry onto the site. At closure, however, the requirement to control access will most likely be reduced. If additional areas are permitted for solid waste disposal, then the site will continue per the Operation and Maintenance Plan.

Future use of the site will require that access to leachate collection components (sumps, manholes and storage tank) and LFG wells be restricted to authorized personnel only. Options for access control include installation of fencing around leachate collection system components and locking cover mechanisms for leachate collection manholes and groundwater and gas monitoring wells.

2.7 Soil Erosion and Sedimentation Control

The control of soil erosion will be an on-going activity during the construction and operating life of the landfill. With the implementation of final closure, the emphasis will change to permanent soil and erosion control measures. Form I, Erosion and Sedimentation Control, contains a detailed plan for soil erosion and sediment control.

The staged schedule of closure has been developed to demonstrate a concern for erosion and sediment control. Post-Closure runoff will be controlled by construction of diversions and stabilization of slopes by vegetation. Therefore, land areas following installation of drainage diversions will generally be limited in size to an area that can be constructed in one season. This will allow the new grasses to become established prior to the next stage of construction up slope. This staged construction will continue up slope until the entire designated landfill acreage is capped and closed.

2.8 Financing

Costs of closure construction and post closure maintenance are summarized in the attached bond worksheets.

2.9 Post-Closure Contact

The contact during the post-closure period will be the site general manager at the time of closure.

Date Prepared

10/14

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

I.D. Number

100020

BONDING WORKSHEET A DECONTAMINATING THE FACILITY

Project Summary¹:

Dispose of minor volumes of waste and contaminated soils at an off-site location. Decontaminate all equipment and treat decontamination liquid on-site. Refer to Attachment A for the calculations with assumptions.

- | | |
|--|-------------------------|
| 1. Maximum volume of solid waste required to be moved or disposed as part of closure (includes cost for solidification). | <u>20 cy</u> |
| 2. Estimated volume of contaminated soils or materials (from accidents, spills, prior remediations). | <u>20 cy</u> |
| 3. Total volume of waste (line 1 + line 2). | <u>40 cy</u> |
| 4. Unit cost to dispose off-site (include any analyses or transportation cost). | <u>\$32.50/cy</u> |
| 5. Total cost to dispose of waste (line 3 x line 4). | <u>\$1,300</u> |
| 6. Estimated volume of contaminated liquid generated during decontamination. | <u>4,000 gal</u> |
| 7. Unit cost to treat/dispose of contaminated liquids (including any transportation) | <u>\$1.45/1,000 gal</u> |
| 8. Total cost to dispose of contaminated liquids (line 6 x line 7). | <u>\$5.80</u> |
| 9. Estimated volume of fill material | <u>N/A</u> |
| 10. Unit cost of acquiring, transporting, placing and stabilizing (i.e. revegetating) fill material (include costs for off-site purchase if soil not available on-site). | <u>N/A</u> |
| 11. Total cost to fill (line 9 x line 10). | <u>N/A</u> |
| 12. Equipment decontamination cost | <u>\$1,521</u> LS |

Total cost – all Worksheet A

\$ 2,827
(Put final total on summary cost sheet – line 1)

¹ List the areas/equipment that will need to be decontaminated and include any assumptions made. Multiple sheets should be used to estimate the costs for different areas.

Date Prepared

10/14

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**BONDING WORKSHEET B
CAP AND FINAL COVER PLACEMENT**

How do I start? Select a likely "worst case" scenario where you would have a maximum amount of the facility open and in need of closure. Provide a description of the scenario with references to site development stages.

My approved cap and final cover design consists of (top to bottom):

24 inches (min.) Final Cover Soil
 Drainage Composite (Geonet with Nonwoven Geotextile Heat Bonded to Both Sides)
 40-mil Textured Flexible Membrane
 Nonwoven Geotextile (Optional)
 12 inches (min.) Intermediate Cover Soil

1. Volume of fill required for area not at final/intermediate grade, but would require filling prior to capping: 16,130 CY
2. Maximum area to be capped and covered (this should include all areas at final grade and not capped, intermediate grades and areas to be filled to get to intermediate grades then capped): 18.3 acres
3. Closure design, surveying and development of construction drawings (use \$750.00/acre of number 2). \$ 13,725
 - a. Construction and maintenance of access roads. \$included in capping bid LS

Material Volumes/Areas:

4. Earthen Materials
 - a. Structural Fill N/A CY (Specification¹) N/A
 - b. Intermediate Cover N/A CY (Specification¹) N/A
 - c. Clay Cap Material N/A CY (Specification¹) N/A
 - d. Final Cover Soil 59,036 CY (Specification¹) 6-inch max; 40% <#10
 - e. Sand/Stone N/A CY (Specification¹) N/A
 - f. Other Cap Tie in CY (Specification¹) N/A
5. Synthetic Materials
 - a. Geotextile 797,148 Sq.Ft. (Type) Nonwoven
 - b. FML 797,148 Sq.Ft. (Type) 40-mil Textured
 - c. Drainage Layer 797,148 Sq.Ft. (Type) Double Composite
 - d. Other N/A Sq.Ft. (Type) N/A
6. Cap Penetrations: Estimate the number of cap penetrations that will need to be installed for closure of the facility including, but not limited to gas extraction wells, cleanouts, valve pits, etc. 16

¹ Provide a brief description of the material specification (i.e. ¾" minus, 12" minus - 12" lifts, etc.)

Material Unit Costs:

7. Unit cost to place or regrade material to reach final grades (this may include additional waste placement to reach grade) \$5.08 \$/CY

Are sufficient soils available in permitted on-site borrow areas to complete job? Yes-Top soil to be off-site
 (Attach maps that identify sources and stockpiles)

	Stockpile	Borrow	Onsite	Offsite	Processing Req'd	
					Yes	No
8. Earthen Materials						
a. Structural Fill	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Unit cost to place ²	<u>N/A</u>		\$/CY			
b. Intermediate Cover	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Unit cost to place ²	<u>\$5.08</u>		\$/CY			
c. Clay Cap Material	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Unit cost to place ²	<u>N/A</u>		\$/CY			
d. Final Cover Soil	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Unit cost to place ²	<u>\$7.86</u>		\$/CY			
e. Sand/Stone	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Unit cost to place ²	<u>N/A</u>		\$/CY			
f. Other	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Unit cost to place ²	<u>\$7,209/ac(cap tie in)</u>		\$/CY			

9. Synthetic Materials

a. Geotextile	Unit cost to place ³	<u>\$0.163</u>	\$/sq. ft.
b. FML	Unit cost to place ³	<u>0.271</u>	\$/sq. ft.
c. Drainage Layer	Unit cost to place ³	<u>0.401</u>	\$/sq. ft.
d. Other	Unit cost to place ³	<u>N/A</u>	\$/sq. ft.

² The unit costs should include all associated costs including, but not limited to cost of material, excavation, transportation, processing and placement.

³ The unit price should include the material cost, transportation cost, handling cost and installation cost.

10. Cap Penetration Unit Cost

List the unit cost to fabricate and install each cap penetration

Unit cost to place \$200 \$/each11. Unit cost to construct E & S structures
(i.e. channels, letdowns, etc.)\$11,272 \$.acre

12. Revegetation Cost

(Seeding rate used: 58 lbs/acre)(Lime rate used: Not specified tons/acre)(Fertilizer rate used: Not specified tons/acre)(Mulch rate used: +/- 1 1/2 tons/acre)Unit cost to revegetate³ \$1,818 \$/acre

13. Cost Summary

a. Fill (line 1 x line 7)	\$ <u>81,940</u>
b. Construction Drawings (line 3)	\$ <u>13,725</u>
c. Construction Roads (line 3a)	\$ <u>N/A</u>
d. Structural Fill (line 4a x line 8a)	\$ <u>N/A</u>
e. Intermediate Cover (line 4b x line 8b)	\$ <u>in 13g</u>
f. Clay Cap Material (line 4c x line 8c)	\$ <u>N/A</u>
g. Final Cover (line 4d x line 8d)	\$ <u>464,023</u>
h. Sand/Stone (line 4e x line 8e)	\$ <u>N/A</u>
i. Other (line 4f x line 8f)	\$ <u>129,762</u>
j. Geotextile (line 5a x line 9a)	\$ <u>in 13k</u>
k. FML (line 5b x line 9b)	\$ <u>665,619</u>
l. Drainage Layer (line 5c x line 9c)	\$ <u>in 13k</u>
m. Other (line 5d x line 9d)	\$ <u>N/A</u>
n. Penetrations (line 6 x line 10)	\$ <u>in 13k</u>
o. E & S Structures (line 2 x line 11)	\$ <u>206,278</u>
p. Revegetation (line 12 x line 2)	\$ <u>33,269</u>
Subtotal	\$ <u>1,594,616</u>
CQA costs (use 5% of subtotal)	\$ <u>79,731</u>

Total \$ **1,674,347**

(Place this total on Summary Cost Worksheet – line 2)

Date Prepared

10/14

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

I.D. Number

100020

**BONDING WORKSHEET D
SURFACE WATER MONITORING****Solid Waste Surface Water Sampling**

- | | |
|--|-------------------------------|
| 1. Number of surface points monitored for Solid Waste Permit | <u>2</u> |
| 2. Unit cost to sample a surface point (record keeping and shipping) | <u>100</u> \$/point |
| 3. Unit cost to analyze sample(s) | |
| a. Quarterly (25 PA Code §273.284 or §288.254) | <u>175</u> \$/point |
| b. Annually (25 PA Code §273.284 or §288.254) | <u>350</u> \$/point |
| 4. Unit cost to analyze data (includes review of lab QA/QC data, database input, form completion, and data review) | <u>included in 3</u> \$/point |
| 5. Cost to sample and analyze – quarterly
(line 2 + line 3a + line 4) | <u>275</u> \$/point |
| 6. Cost to sample and analyze – annually
(line 2 + line 3b + line 4) | <u>450</u> \$/point |
| 7. Number of years of sampling (30 + time to close) | <u>31</u> years |

NPDES Surface Discharge Sampling

- | | |
|---|--------------------------|
| 8. Number of outfalls monitored | <u>5</u> |
| 9. Monitoring frequency (i.e. monthly, quarterly, etc) | <u>Semi-annual</u> |
| 10. Number of samples to be taken per point/year | <u>2</u> |
| 11. Unit cost to sample a surface point (record keeping and shipping) | <u>\$90</u> \$/point |
| 12. Unit cost to analyze sample(s) (including data review and completing DMR) | <u>\$170</u> \$/point |
| 13. Number of years of sampling (30 + time to close) | <u>31</u> years |
| 14. Cost Summary –Surface Water Monitoring | |
| a. Cost of Quarterly Surface Water Monitoring
(line 1 x "4" x line 5 x line 7) | \$ <u>51,150</u> |
| b. Cost of Annual Surface Water Monitoring
(line 1 x line 6 x line 7) | \$ <u>27,900</u> |
| c. Cost of NPDES Monitoring
(line 8 x line 10 x [line 11 + line 12] x line 13) | \$ <u>80,600</u> |
| d. NPDES renewals over post-closure period
(includes application development, fees, etc.)
use 10% of line 14c | \$ <u>8,060</u> |
| Subtotal\$ | \$ <u>167,710</u> |

Adjustment for resampling, assessments, etc.

- a. Use 0% of subtotal if no assessments in last 2 yrs.
- b. Use 5% of subtotal if assessment in last 2 yrs.
- c. Use 10% if in assessment, abatement or increased monitoring

\$ 16,771

Total \$ 184,481

(Place this total on Summary Cost Worksheet – line 4)

Date Prepared

10/14

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**BONDING WORKSHEET F
GAS MONITORING SYSTEM**

- | | | | |
|----|--|------------------|------------------|
| 1. | Number of probes in the approved monitoring plan. | _____ | 17 |
| a. | Shallowest probe depth | _____ +/- 15 ft. | |
| b. | Deepest probe depth | _____ +/- 55 ft. | |
| c. | Average probe depth | _____ +/- 35 ft. | |
| d. | Number of probes installed | _____ 10 | |
| 2. | Unit cost to install a probe (including, drilling, and installation) | _____ | \$1,575 \$/probe |
| 3. | Number of probes to be installed (probes in the approved plan that haven't been installed) | _____ | 4 |
| 4. | Number of probes to be replaced over the life of the monitoring period (use 5% of line 1 and round up) | _____ | 1 |
| 5. | Unit cost to monitor a probe (include record keeping) | _____ | 50 \$/probe |
| 6. | Number of probes and structure monitoring events per year | _____ | 4 |
| 7. | Number of years of monitoring (30 + time to close) | _____ | 31 years |
| 8. | Cost Summary –Gas Monitoring System | | |
| a. | System completion (line 3 x line 2) \$ | \$ _____ | 6,300 |
| b. | Probe replacement (line 2 x line 4) \$ | \$ _____ | 3,150 |
| c. | Probe Monitoring (line 1 x line 5 x line 6 x line 7) | \$ _____ | 105,400 |
| | Subtotal | \$ _____ | 114,850 |

Adjustment for resampling, assessments, etc.

- Use 0% of subtotal if no assessments in last 2 yrs.
- Use 5% of subtotal if assessment in last 2 yrs.
- Use 10% if in assessment or increased monitoring

Total \$ 114,850

(Place this total on Summary Cost Worksheet – line 6)

Date Prepared

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**BONDING WORKSHEET G
GAS COLLECTION SYSTEM**

1. Number of wells in the approved monitoring plan. 150
- a. Shallowest well depth 30 ft.
- b. Deepest well depth 120 ft.
- c. Average well depth 75 ft.
- d. Number of wells installed 69
- e. Number of pumping wells 69
2. Cost for flare or other control device installation \$ 0 (already installed) LS
3. Unit cost to install a well (including, drilling, installation, and connection to active system) \$10,875 \$/well
-
4. Unit cost to install a gas well requiring liquid removal (including, drilling, installation, and connection to active system) N/A \$/well
5. Number of wells to be installed (wells in the approved plan that haven't been installed) 30
6. Number of gas wells requiring liquid removal to be installed 0
7. Estimate the length of collection piping to be installed 10,000 LF
8. Unit cost to install collection piping (include excavation, pipe bedding, pipe, backfilling, regrading, revegetating, surveying and QA/QC) \$26.50 \$/LF
9. Number of wells to be replaced/repaired over the life of the monitoring period (use 10% of line 1 and round up) 15
10. Unit cost to monitor well and balance system monthly (include monitoring of methane, oxygen, carbon dioxide or nitrogen, temperature, pressure, and NSPS record keeping) \$24 \$/well
11. Unit cost to conduct surface monitoring (NSPS) \$3,400 \$/event
12. Control System Information Existing
- a. number and size of blowers 2-50HP estimate
- b. flare dimensions and capacity 50' x 11' (4,000cfm)
- c. current flow rate 2,500
- d. other features None (PPL utilities gas for elect generation)
13. Cost of electricity to run system \$25,000 \$/year
14. Cost to maintain system (including daily check, weekly charts, maintenance, etc.) \$17,500 \$/year
15. Cost of annual blower maintenance (including greasing, bearing check and alignment) \$5,000 \$/year

16. Cost of stack testing (once per five years)	<u>\$13,000</u> \$/event
17. Estimate the volume of condensate generated per year	<u>N/A</u> gallons
18. Cost of condensate management (including pumping, testing and treatment/disposal)	<u>N/A</u> \$/year
19. Number of years to run system (30 + time to close)	<u>21</u> years
20. Cost Summary –Gas Collection System	<u>See below</u>

System Installation

a. Additional well installation (line 5 x line 3)	\$ <u>326,250</u>
b. Additional pumping well installation (line 4 x line 6)	\$ <u>0</u>
c. Cost of collection piping (line 7 x line 8)	\$ <u>265,000</u>
d. Well replacement (line 3 x line 9)	\$ <u>163,125</u>
e. Enclosed ground flare system (line 2)	\$ <u>0</u>

System Installation Subtotal \$ 754,375
(sum lines a to e)

f. Cost of monitoring/balancing (line 1 x "12" x line 10 x line 19)	\$ <u>907,200</u>
g. Cost of surface monitoring (line 11 x "1.5" x line 19)	\$ <u>107,100</u>
h. Electric Cost (line 13 x line 19)	\$ <u>525,000</u>
i. System maintenance cost (line 14 x line 19)	\$ <u>376,500</u>
j. Blower maintenance cost (line 15 x line 19)	\$ <u>105,000</u>
k. Stack testing cost (line 16 x [line 19/5])	\$ <u>54,600</u>
l. Condensate management cost (line 18 x line 19)	\$ <u>N/A</u>

System Monitoring and Maintenance Subtotal \$ 2,074,900
(sum lines f to l)

Adjustment for miscellaneous maintenance items (including; knockout pot maintenance, thermocouple replacement, flame detector replacement, flame arrester maintenance, flare maintenance, enrichment/startup gas replacement, pneumatic valve maintenance, sump maintenance, panel board maintenance, etc.)

- a. Use 0% of subtotal if system¹ < 2yrs old
- b. Use 5% of subtotal if system¹ is > 2 yrs old, but < 5yrs old
- c. Use 10% if system¹ is > 5 yrs old

\$xc= 103,745

Total (Installation subtotal + M & M subtotal + Misc. Maintenance) \$ 2,933,020

(Place this total on Summary Cost Worksheet – line 7)

¹ The age of the system would be considered from the date that the active system went on-line. Expansions of the systems are assumed to occur, however, this does not change the age of the system unless a majority of the existing system is replaced/upgraded.

Date Prepared

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COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
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I.D. Number

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**BONDING WORKSHEET H
OTHER MONITORING AND REPORTING**

Please list the annual costs to maintain the following permits/registrations that apply. Additional space is provided for items applicable to your facility, but not listed.

- 1. Title V or other air permit (include the annual permit fee, cost to complete emissions inventory and emissions fees) \$ 1,400
- 2. NSPS Annual Report preparation cost \$ N/A
- 3. Local permit or Host Agreement requirements \$ N/A
- 4. UST/AST registration \$ N/A
- 5. Other _____ \$ _____
- 6. Other _____ \$ _____
- 7. Other _____ \$ _____
- 8. Other _____ \$ _____
- 9. Other _____ \$ _____
- 10. Number of years of monitoring/maintenance (30 + time to close) 31 years

Total (sum of lines 1 to 9 x line 10) \$ 43,400

(Place this total on Summary Cost Worksheet – line 8)

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**BONDING WORKSHEET I
LEACHATE MANAGEMENT**

Leachate Management System Narrative: Provide a detailed description of the leachate management system. You need to include all features of the system including but not limited to landfill sumps (with number and size of pumps and controllers), length of conveyance system, number and type of storage facilities, and treatment/disposal method. A schematic should be attached as back up.

1. Number of years of leachate management (30 years + closure period) 31
2. Annual leachate volume generated 14,300,000 gallons
3. Annual cost to manage leachate volume (include pump and pipe maintenance, electricity and monitoring)¹ \$ 15,250

Discharge to POTW

4. Unit cost to discharge leachate to a POTW \$1.45/1000 gallon \$/gal

On-site Treatment (including pretreatment)

5. Unit cost for treatment of leachate (include equipment maintenance, electricity, personnel, chemicals, sludge disposal, etc.) 0 \$/gal
6. Annual cost to maintain NPDES permit (include sampling, analysis, report preparation, and factor in five year renewal application preparation and fees) \$ 1,500

Interim Trucking of Leachate

7. Unit cost to transport and dispose of leachate N/A \$/gal
8. NPDES Permit (cost to prepare application, fees and sampling/analysis) \$ N/A
9. Cost to construct on-site treatment or pretreatment system or connection to POTW \$ N/A
10. Unit cost for treatment of leachate (include equipment maintenance, electricity, personnel, chemicals, etc.) N/A \$/gal
11. Annual cost to maintain NPDES permit (include sampling, analysis, report preparation, and factor in five year renewal application preparation and fees) \$ N/A

¹ Does not include storage of leachate which is contained on Worksheet K

12. Cost Summary:

a. Cost to manage/convey leachate
(line 1 x line 3) \$ 472,750

If discharge to POTW

b. Discharge to POTW cost (line 1 x line 2 x line 4) \$ 642,785

If have on-site treatment

c. Treatment cost (line 1 x line 2 x line 5) \$ N/A

d. NPDES maintenance cost (line 1 x line 6) \$ 46,500 city testing

If you currently truck leachate

e. Cost of trucking leachate for three years
(line 1 x "3" x line 10 x line 12) \$ N/A

f. NPDES permit (line 8) \$ N/A

g. Cost to construct on-site treatment system or connection to
POTW (line 9) \$ N/A

h. Treatment cost ((line 1 - 3] x line 2 x line 10) \$ N/A

i. NPDES maintenance cost ((line 1 - 3] x line 11) \$ N/A

If you currently store leachate in impoundments

j. Size of pond(s) N/A acres

k. Estimate volume of material to be removed (including liner
system and minimum of 12" of soil) N/A CY

l. Unit cost to dispose of materials (Worksheet A, line 4) N/A \$/CY

m. Cost to dispose of materials (line k x line l) \$ N/A

n. Volume of structural backfill N/A CY

o. Cost for backfill (line n x Worksheet B, line 8a) \$ N/A

p. Revegetation cost \$ N/A LS

Subtotal \$ 1,162,035
(sum of a - i) +m+o+p)

Adjustment for maintenance, equipment replacement and contingencies, etc. Please note that these are cumulative and you must add all of the percentages that apply to arrive at the final adjustment percentage. The minimum adjustment is 10%.

- a. Add 10% of subtotal if pumps are used to convey leachate.
- b. Add 5 % of subtotal if flow volume to POTW is restricted.
- c. Add 10% of subtotal if leachate is stored in ponds
- d. Add 10% of subtotal if onsite treatment
- e. Add 15% if trucking leachate
- f. Add 10% if current leachate generation exceeds 5MG/year

Final adjustment factor: 20 %

g. Adjustment (subtotal x factor) \$ 232,407

Total (subtotal + adjustment) \$ 1,394,442

(Place this total on Summary Cost Worksheet - line 9)

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**BONDING WORKSHEET J
BORROW AREA CLOSURE**

How do I start? Select a likely "worst case" scenario where you would have a maximum amount of the borrow area open and in need of closure. Provide a description of the scenario with references to site development stages.

- 1. Size of borrow area _____ 20 acres
- 2. Volume of material required for regrading: _____ 32,260 CY
- 3. Unit cost to regrade (provide equipment and rates) _____ 0.42 \$/CY

Are sufficient soils available to complete job?
(list deficit amount and attach maps that identify sources and stockpiles)

4. Earthen Materials							Processing Req'd		
			Stockpile	Borrow	Onsite	Offsite	Yes	No	
a.	Structural Fill	N/A	CY	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b.	Unit cost to place ¹	N/A	\$/CY						
c.	Topsoil	8,065	CY	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
d.	Unit cost to place ¹	\$9.16	\$/CY						

5. Revegetation Cost

- (Seeding rate used: _____ 58 lbs/acre)
- (Lime rate used: _____ Not specified tons/acre)
- (Fertilizer rate used: _____ Not specified tons/acre)
- (Mulch rate used: _____ +/- 1 1/2 tons/acre)

Unit cost to revegetate _____ \$1,818 \$/acre

- 6. E & S Controls _____ N/A\$/acre
- 7. Bond Maintenance Cost (required if off-site borrow area) \$ _____ N/A LS
- 8. Other costs (provide detail) \$ _____ N/A

¹ The unit costs should include all associated costs including, but not limited to cost of material, excavation, transportation, processing and placement.

9. Cost Summary

a. Fill/Regrading (line 2 x line 3)	\$	<u>13,549</u>
b. Structural Fill (line 4a x line 4b)	\$	<u>N/A</u>
c. Topsoil (line 4c x line 4d)	\$	<u>73,875</u>
d. Revegetation (line 1 x line 5)	\$	<u>36,360</u>
e. E & S Controls (line 6)	\$	<u>0</u>
f. Bond maintenance (line 7)	\$	<u>N/A</u>
g. Other (line 8)	\$	<u>N/A</u>

Subtotal \$ 122,784

CQA/Project Management costs (use 5% of subtotal) \$ 6,139

Total \$ **128,923**

(Place this total on Summary Cost Worksheet – line 10)

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BONDING WORKSHEET K FACILITY MAINTENANCE COSTS

1. Size of facility	<u>201 permitted</u> acres
2. Size of waste placement footprint	<u>+/-133</u> acres
3. Size of borrow areas on site	<u>20</u> acres
4. Size of leachate ponds on site	<u>N/A-tanks</u> acres
5. Size of sedimentation ponds on site	<u>6</u> acres
6. Length of stormwater conveyance ditches	<u>11,000</u> LF
7. Number of years of site management (30 years + closure period)	<u>31</u> years
8. Annual Cost to repair cap and final cover ¹	
a. Acres (use 1% of line 2)	<u>1.33</u> acres
b. Unit cost ² to repair final cover	<u>\$3,846</u> \$/acre
c. Unit cost ² to repair cap	<u>\$3,000</u> \$/acre
d. Unit cost ² to repair vegetation	<u>\$100</u> \$/acre
e. Total unit cost (line b + line c + line d)	<u>\$6,946</u> \$/acre
9. Annual Cost to repair and maintain E&S facilities ¹	
a. Channel repair length (use 3% of line 6)	<u>330</u> LF
b. Sedimentation pond repair volume (use 20% of line 5)	<u>1.2</u> acres
c. Unit cost ² to repair channels	<u>\$15</u> \$/LF
d. Unit cost ² to repair ponds	<u>\$2,498</u> \$/acre
e. Total annual cost (line a x line c) + (line b x line d)	<u>7,950</u> \$/YR
10. Annual Cost to repair and maintain leachate ponds ¹	
a. Leachate pond repair volume (use 20% of line 4)	<u>N/A</u> acres
b. Unit cost ² to repair leachate pond(s)	<u>N/A</u> \$/acre
11. Annual cost to repair and maintain leachate tanks	
a. Number and size of tanks	<u>1 - +/- 380,000</u> gallons
b. Annual unit cost ¹ to maintain tanks	\$ <u>1,000</u>
12. Annual cost to repair fences and gates (attach details)	\$ <u>3,000</u> \$/YR

¹ After the site is stabilized, the Department may allow a reduction in these requirements.

² Please refer to the instructions. This estimate should reflect unit costs to bring in a contractor to complete the work and should include mobilization, equipment cost, operator costs, material costs and clean-up and inspection costs.

13. Annual cost to maintain site roads

a. Length of site roads ²	<u>6,000</u> LF
b. Annual length of site roads to be repaired (2% of line 13a)	<u>120</u> LF
c. Unit cost to repair roads ¹	<u>\$7.08</u> \$/LF

14. Cost Summary – Facility Maintenance

a. Cost to repair cap/cover (line 7 x line 8a x line 8e)	\$ <u>286,384</u>
b. Cost to maintain E&S facilities (line 7 x line 9e)	\$ <u>246,450</u>
c. Cost to maintain leachate ponds (line 7 x line 10a x line 10b)	\$ <u>0</u>
d. Cost to maintain leachate tanks (line 7 x line 11a x line 11b)	\$ <u>31,000</u>
e. Cost to repair fences and gates (line 7 x line 12)	\$ <u>93,000</u>
f. Cost to maintain site roads (line 7 x line 13b x line 13c)	\$ <u>26,338</u>
g. Cost to maintain MSE Berm (31 x \$10,000/yr.)(4F+SE)	\$ <u>310,000</u>
Subtotal	\$ <u>993,172</u>

1. Please refer to the instructions. This estimate should reflect unit costs to bring in a contractor to complete the work and should include mobilization, equipment cost, operator costs, material costs and clean-up and inspection costs. Costs not incurred annually should be determine and divided among the years between events. The costs should also include replacements of pumps and meters, electricity used (pumps, heat tracing, etc.) valve replacement and sludge disposal.
2. This should include access to all maintenance and monitoring areas including but not limited to the disposal area, ponds, leachate conveyance system, tanks, discharge locations, gas extraction system wells, gas probes, groundwater monitoring system and surface water monitoring points.

Adjustment for maintenance, equipment replacement and contingencies, etc. Please note that these are cumulative and you must add all of the percentages that apply to arrive at the final adjustment percentage. The minimum adjustment is 10%.

- a. Add 5% of subtotal if final slopes or benches have been modified from what is specified in 25 PA Code §273.234(f)
- b. Add 5% of subtotal if more than 30 % stormwater channels are unlined
- c. Add 5% of subtotal if the length of site access roads exceeds 5 miles
- d. Add 10% for mowing

Final adjustment factor: 10 %

e. Adjustment (subtotal x factor) \$ 99,317

Total (subtotal + adjustment) \$ 1,092,481

(Place this total on Summary Cost Worksheet – line 11)

¹ After the site is stabilized, the Department may allow a reduction in these requirements.

² Please refer to the instructions. This estimate should reflect unit costs to bring in a contractor to complete the work and should include mobilization, equipment cost, operator costs, material costs and clean-up and inspection costs.

**CALCULATION BRIEF
BONDING WORKSHEET K
IESI BETHLEHEM LANDFILL**

OBJECTIVE: Determine the total bond amount required for Southeastern Expansion

MSE Berm Maintenance

The Subtotal includes a lump sum for the Cell 4F MSE Wall plus the Southeastern Realignment wall. The following is a summary of the estimated costs, based on those approved for the 4F, MSE Wall.

MSE Wall inspection = \$1,000/year x 2 = \$2,000

MSE Wall maintenance and repairs (includes removing saplings, filling animal burrows and correcting potential drainage issues including silted channels, etc.) = \$4,000/year x 2 = \$8,000/year

Total Cost for MSE Wall Inspection/Maintenance/Repair = (\$2,000/year + \$8,000/year)
X 31 years = \$310,000

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**BONDING WORKSHEET L
SUMMARY COST WORKSHEET****Cost Summary - Landfills**

1. Decontaminating the Facility	\$	<u>2,827</u>
2. Capping/Closure	\$	<u>1,674,347</u>
3. Groundwater Monitoring System	\$	<u>1,624,115</u>
4. Surface Water Monitoring	\$	<u>184,481</u>
5. Private Water Supply Monitoring	\$	<u>435,240</u>
6. Gas Monitoring	\$	<u>114,850</u>
7. Gas Collection and Maintenance	\$	<u>2,933,020</u>
8. Other Monitoring	\$	<u>43,400</u>
<hr/>		
9. Leachate Management	\$	<u>1,394,442</u>
10. Borrow Area Closure	\$	<u>128,923</u>
11. Maintenance Costs	\$	<u>1,092,489</u>
12. Other Costs ¹ _____	\$	<u>N/A</u>
13. Other Costs ¹ _____	\$	<u>N/A</u>
Subtotal	\$	<u>9,628,332</u>

Inflation

14. Inflation rate (projected inflation for the next three years based on the inflation for the prior three years).		<u>5.73 %</u>
15. Inflation cost for facility (subtotal x line 14)	\$	<u>551,703</u>

Contingency and administrative fees

16. Administrative fees (5%) (subtotal x 0.05)	\$	<u>481,417</u>
17. Project Management (5%) (subtotal x 0.05)	\$	<u>481,417</u>
18. Contingency fee amount (subtotal x rate of contingency fee from Table 1)	\$	<u>962,833</u>

Total (subtotal + line 15 + line 16 + line 17 + 18) **\$ 12,105,702**

¹ You should include any costs that would be incurred by the Department, but were not included in these sheets. Provide separate sheets for documentation.