BONDING WORKSHEETS
FOR
Landfills and Disposal Impoundments

Revised November 2012

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF AND WASTE MANAGEMENT

General Information

Permits: Please list all permits, approvals, licenses, registrations, other bonds, etc. for this facility.

I.D.#[1]	Authority[2]	Summary[3]
101247	PaDEP Bureau of Solid Waste Wilkes-Barre, PA 570-826-2511	Solid Waste Disposal Permit
PAR 502203	PaDEP Bureau of Water Management Wilkes-Barre, PA 570-826-2553	NPDES Eddy Creek One Point Source
122-TH	LRBSA Throop, PA 570-489-7563	Industrial Discharge
2000-007	SSA Scranton, PA 570-348-5337	Industrial Discharge
0005-8722-13	FCC Washington D.C.	Radio License
90-35-82-8-01	PaDEP Soil and Water Conservation Harrisburg, PA 717-787-5267	Earth Disturbance
E35-282	PaDEP Water Management Wilkes-Barre, PA 570-826-5485	Chapter 105 Permit Wetlands
5056	PaDEP Mine Reclamation	Mining License
212056	PaDEP Land Recycling Management Harrisburg, PA	Attached List
D35-151	PaDEP Dams and Waterways Management Harrisburg, PA	Basin No. 3
D35-152	PaDEP Dams and Waterways Management Harrisburg, PA	Basin No. 4
35-024021	PaDEP Pottsville, PA	Blasting Activity Permit

1. *List the permit I.D. number, registration number, etc. If there is no number, put in "none".*
2. *List the issuing authority's name, address and telephone number*
3. *List any closure features or monitoring requirements. As examples: For storage tanks, list the number, type and size of tanks. For NPDES permits list the number of outfalls to be monitored and ponds/plants to be maintained and/or closed.*

Commonwealth of Pennsylvania
Department of Environmental Protection

Bureau of Environmental Cleanup and Brownfields
Division of Storage Tanks
Rachel Carson State Office Building
P.O. Box 8762
Harrisburg, Pennsylvania 17105-8762
In Pa: 1-800-42-TANKS
Outside Pa: 717-772-5599

All tank owners shall have the current valid Storage Tank Registration/Permit Certificate available, at the facility where the tank(s) is located, for inspection by the Department, certified storage tank inspector or installer and product distributor. At Retail Sales Facilities, the certificate (or copy) shall be publicly displayed at the facility where the tank(s) is located.

VERIFY PRESENCE OF WATERMARKED HOLD TO LIGHT TO VIEW

Commonwealth of Pennsylvania
Department of Environmental Protection
Bureau of Environmental Cleanup and Brownfields

STORAGE TANK REGISTRATION/PERMIT CERTIFICATE
EXPIRATION: APR-04-2014

TANK ID	SEQ#	CAPACITY	SUBST	PERMIT TYPE	PERMIT STATUS	INSPECTION TYPE	LAST INSP DATE	NEXT INSP DUE BY
655235	001A	2,000	NMO	PBR	Approved	**********	**********	**********
655237	002A	1,500	NMO	PBR	Approved	**********	**********	**********
655239	003A	1,500	NMO	PBR	Approved	**********	**********	**********
655241	004A	1,000	HZSUB	PBR	Approved	**********	**********	**********
964616	006A	12,000	DIESL	PBR	Approved	IN-SERVICE	**********	03/01/2018
964785	007A	10,000	DIESL	PBR	Approved	IN-SERVICE	**********	03/01/2018
655234	001	6,000	NMO	PBR	Approved	OPERATIONS	02/14/2013	02/14/2016
655236	002	8,000	NMO	PBR	Approved	OPERATIONS	02/14/2013	02/14/2016
655240	004	3,000	GAS	PBR	Approved	OPERATIONS	02/14/2013	02/14/2016

Client ID: 114622
Owner Type: PACOR
114622
DENAPLES AUTO PARTS INC
249 DUNHAM ST
DUNMORE PA 18512

Site ID: 452485
Facility Kind: TRANS
Facility Id: 35-23334
KEYSTONE SANI LDFL
249 DUNHAM DR
DUNMORE PA 18512

WARNING: THIS DOCUMENT IS PRINTED ON SECURITY WATERMARK PAPER AND CONTAINS SECURITY FIBERS. DO NOT ACCEPT WITHOUT VERIFYING THE PRESENCE OF THE WATERMARK.

Date Prepared		I.D. Number
03/2014	COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF WASTE MANAGEMENT	101247

BONDING WORKSHEET A
DECONTAMINATING THE FACILITY

Project Summary[1]: Refer to attached narrative.

1.	Maximum volume of solid waste required to be moved or disposed as part of closure (includes cost for solidification).	0
2.	Estimated volume of contaminated soils or materials (from accidents, spills, prior remediation's).	0
3.	Total volume of waste (line 1 + line 2).	0
4	Unit cost to dispose off-site (include any analyses or transportation cost).	20.00 (See narrative)
5	Total cost to dispose of waste (line 3 x line 4).	0
6	Estimated volume of contaminated liquid generated during decontamination.	See narrative
7.	Unit cost to treat/dispose of contaminated liquids (including any transportation)	See narrative
8.	Total cost to dispose of contaminated liquids (line 6 x line 7).	8,641.72
9.	Estimated volume of fill material	N/A
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).	N/A
11.	Total cost to fill (line 9 x line 10).	N/A
12.	Equipment decontamination cost	5000.00 LS

Total cost – all Worksheet A **$ 13,641.72**
(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.*

CECO ASSOCIATES, INC.
P.O. BOX 995
SCRANTON, PENNSYLVANIA 18501

Keystone Sanitary Landfill
PaDEP Municipal Solid Waste Permit 101247
Bonding Worksheet A
Decontaminating the Facility Narrative

The estimated volume of contaminated soils (Item 2) was included in Worksheet I (Item 12 k.) The $20.00 placed in Item 4 was sited here for the reference called out on Worksheet I (Item 12 l.)

Upon completion of closure of initiation of the Long Term Monitoring Program, all equipment and vehicles to be removed from the site will be cleaned. Presently we would project that a maximum of fifty (50) units would be involved in the cleaning process. We would estimate that the price to clean these units would average $100 each or 50 units at $100 each = $5,000.00.

The unit clean up would be performed on the on-site maintenance Facility with wastewater conveyed to on-site Treatment Plant for processing prior to being pumped to SSA facilities for final treatment.

Prior to taking the on-site Treatment Plant out of service the lagoons will be drained, processed and conveyed to the SSA Collection and Treatment System. At the end of the post closure long term monitoring period, the volume of flow to the lagoons will be limited. However, a residual amount of untreated wastewater would remain in the lagoons that will be required to be drained and processed as noted above. For the purposes of establishing an amount for the bonding we would assume the residual volume to 10% of the lagoons capacity i.e. 5,502,064 gallons * 2 * 0.10 or 1,100,413 gallons.

Based upon using a high pressure cleaning unit at 5 gpm * 30min/unit * 50 units = 7,500 gallons thus the total flow associated with decontamination amounts to 7,500 gallons + 1,100,413 gallons or 1,107,913 gallons at the current SSA average rate per gallon of $0.0078, the amount for Item No. 8 becomes $8,641.72.

$21,748.38 / 2,805,500 gallons = $0.0078/gal

Scranton Sewer Authority

Account No	Billing Date	Type Account	Dwell
801-990-01	07-Jan-13	Commercial	

CUSTOMER
Keystone Landfill
249 Dunham Drive
Dunmore PA 18512

Property Location
Trucking Discharge

Water Service

From: 01-Dec-12 To: 31-Dec-12

Billing Period
Meter Reading: 0

Gallons Used: 2,805,500

Current Charge:	$21,748.38
Prior Balance:	$0.00
Penalty:	$0.00
Interest:	$0.00
Total Due	$21,748.38

Messages: **December 2012 Billing**

Date Prepared: 03/2014

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

I.D. Number: 101247

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):

Vegetation, Final Cover 2'-0" Min.; 4-2OZ Geo Composite with Drainage Net; 40Mil HDPE Liner: Refer to attached Liner Detail, Sheet No. 43 & 45 (Exhibit B-4).

1. Volume of fill required for area not at final/intermediate grade, but would require filling prior to capping: 0 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): 43.50 acres
3. Closure design, surveying and development of construction drawings (use $750.00/acre of number 2). $ 32,625.00

   a. Construction and maintenance of access roads. $ N/A LS

Material Volumes/Areas:

4. Earthen Materials

a.	Structural Fill	N/A CY	(Specification[1])	
b.	Intermediate Cover	N/A CY	(Specification[1])	
c.	Clay Cap Material	N/A CY	(Specification[1])	
d.	Final Cover Soil	140,360 CY	(Specification[1])	PaDEP 273.234
e.	Sand/Stone	11,697 CY	(Specification[1])	Max. Part size 1/4"
f.	Other	N/A CY	(Specification[1])	

5. Synthetic Materials

a.	Geotextile	1,894,860	Sq.Ft.	(Type)	
b.	FML	1,894,860	Sq.Ft.	(Type)	
c.	Drainage Layer	1,894,860	Sq.Ft.	(Type)	
d.	Other	1,894,860	Sq.Ft.	(Type)	

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. 10

[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) N/A $/CY

Are sufficient soils available in permitted on-site borrow areas to complete job? (Attach maps that identify sources and stockpiles) Yes, Refer to attached narrative

8. Earthen Materials	Stockpile	Borrow	Onsite	Offsite	Processing Req'd Yes	Processing Req'd No
a. Structural Fill	☐	☒	☒	☐	☒	☐
Unit cost to place[2] 7.50 $/CY						
b. Intermediate Cover	☐	☐	☐	☐	☐	☐
Unit cost to place[2] N/A $/CY						
c. Clay Cap Material	☐	☐	☐	☐	☐	☐
Unit cost to place[2] N/A $/CY						
d. Final Cover Soil	☐	☒	☒	☐	☒	☐
Unit cost to place[2] 1.50 $/CY						
e. Sand/Stone	☐	☒	☒	☐	☒	☐
Unit cost to place[2] 3.00 $/CY						
f. Other	☐	☐	☐	☐	☐	☐
Unit cost to place[2] N/A $/CY						

9. Synthetic Materials

a. Geotextile
Unit cost to place[3] 0.33 $/sq. ft.

b. FML
Unit cost to place[3] 0.29 $/sq. ft.

c. Drainage Layer
Unit cost to place[3] Included in 9a. $/sq. ft.

d. Other
Unit cost to place[3] 0.02 $/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 153.00 $/each

11. Unit cost to construct E & S structures (i.e. channels, letdowns, etc.) 750.00 $.acre

12. Revegetation Cost

(Seeding rate used: 60 lbs/acre)

(Lime rate used: 1 tons/acre)

(Fertilizer rate used: 0.06 tons/acre)

(Mulch rate used: 3.0 tons/acre)

Unit cost to revegetate[3] 500 $/acre

13. Cost Summary

a.	Fill (line 1 x line 7)		$ N/A
b.	Construction Drawings (line 3)		$ 32,625.00
c.	Construction Roads (line 3a)		$ N/A
d.	Structural Fill (line 4a x line 8a)		$ N/A
e.	Intermediate Cover (line 4b x line 8b)		$ N/A
f.	Clay Cap Material (line 4c x line 8c)		$ N/A
g.	Final Cover (line 4d x line 8d)		$ 210,540.00
h.	Sand/Stone (line 4e x line 8e)		$ 35,091.00
i.	Other (line 4f x line 8f)		$ N/A
j.	Geotextile (line 5a x line 9a)		$ 625,303.80
k.	FML (line 5b x line 9b)		$ 549,509.40
l.	Drainage Layer (line 5c x line 9c)		$ Included in (J)
m.	Other (line 5d x line 9d)		$ 37,897.20
n.	Penetrations (line 6 x line 10)		$ 1,530.00
o.	E & S Structures (line 2 x line 11)		$ 32,625.00
p.	Revegetation (line 12 x line 2)		$ 21,750.00
		Subtotal	**$ 1,546,871.40**
	CQA costs (use 5% of subtotal)		$ 77,343.57
		Total	**$ 1,624,214.97**

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

CECO ASSOCIATES, INC.
P.O. BOX 995
SCRANTON, PENNSYLVANIA 18501

Keystone Sanitary Landfill
PaDEP Municipal Solid Waste Permit 101247
Bonding Worksheet B
Cap and Final Cover Narrative

Item No 2:

The maximum uncapped "worst case" area for the initial 10 years of construction would be the Pad 6 Closure plan, which is a combination of portions of the last four pads of Phase III, as shown on sheet No. 12 (Exhibit B-1). This area described would consist of 43.50 acres of active closure area.

Item No. 3:

43.50 acres * $750.00/acre = $32,625.00 Design Cost

Item No. 4:

d.) Final Cover: $\frac{43.50\ acres * 43{,}560\ sf/acre * 2\ ft}{27 cf/cy}$ = 140,360 CY Final Cover Soil

e.) Sand/Stone: $\frac{43.50\ acres * 43{,}560\ sf/acre * 2\ in}{27 cf/cy}$ = 11,697 CY Sand

Item No. 5:

a.) Geotextile
b.) FML
c.) Drainage Layer
43.50 acres * 43,560 sf/acre = 1,894,860 SF

Item No. 6:

Cap penetrations closure program requires continual installation of methane gas collection wells. Thus the maximum expose in a worst case scenario would be to install the wells to complete the final closure plan as shown on sheet No. 26 (Exhibit B-1). There would be 10 wells to be installed, therefore requiring (10) miscellaneous cap penetrations.

Item No. 7:

Based upon the updated Ph. III material flow chart on sheet No. 5 (Exhibit B-2) there is sufficient material on site.

CECO ASSOCIATES, INC.
P.O. BOX 995
SCRANTON, PENNSYLVANIA 18501

Item No. 8:

Structural Fill will be utilized for the closure of the leachate ponds as described in Worksheet I, the price given here is simply for reference to Worksheet I (Item 12 o.) For this reason it is listed as N/A on this worksheet (Item 4.) as it is already accounted for in the subsequent sections.

Final cover soil cost is based on current unit prices from earthwork projects in the area. Cost assumes that the material is available on site and basically needs to be placed. A unit cost of $1.50/cy will be used.

Sand/ Stone unit cost will include the cost to process on site at the existing crusher therefore a unit cost of $3.00/cy will be used.

Item No. 9&10:

Refer to attached invoicing from American Environmental Group Ltd. (See Exhibit B-3) and the Liner Details on sheet No. 43 & 45. (See Exhibit B-4)

Item No. 11:

Based upon a current large earth moving project the unit bid prices to complete E&S controls averaged $750.00/acre.

Item No. 12:

Refer to Exhibit B-5 sheet No. 68 Ph. III for rates. Average cost current projects $500.00/acre.

Item No. 13:

g.) Final Cover: 140,360cy * $1.50/cy = $210,540.00
h.) Sand: 11,697cy * $3.00/cy = $35,091.00
j.) Geotextile: 1,894,860sf * 0.33/sf = $625,303.80
k.) FML: 1,894,860sf * 0.29/sf = $549,509.40
l.) Drainage Layer: Included in item j.
m.) Other Costs:
Allowance for Keystone to provide labor and equipment for installation.
Installation Time: 30 days
Labor: 5 Laborers @ $100.00/day * 30days = $15,000.00
Loaders: 1 Loaders @ $5,000/month * 1month = $5,000.00
Total: $20,000.00
$20,000.00/1,000,000sf (average rate) = $0.02/sf
$0.02/sf * 1,894,860sf = $37,897.20
n.) Penetrations 10 ea. @ $153.00 = $1,530.00
o.) E&S Structures 43.50 acres * $750.00/acre = $32,625.00
p.) Re-vegetation 43.50 acres * $500.00/acre = $21,750.00


PH II PAD 6
24.1 AC
PH II PAD 5
PH II PAD 1
22.7 AC
PH II PAD 2
19.4 AC
PH II PAD 3
13.5 AC
PH II CLOSURE INCREMENT 3
23.2 AC
PH II CLOSURE INCREMENT 2
27.9 AC
PH II CLOSURE INCREMENT 1
23.2 AC
PH II PAD 4
34.5 AC
PH II CLOSURE INCREMENT 4
14.1 AC
WASHWOOD ROAD
DURHAM DRIVE
BOROUGH OF THROOP
BOROUGH OF DUNMORE
LACKAWANNA VALLEY INDUSTRIAL HIGHWAY
DUNMORE RESERVOIR NO. 1
W.L. 1208.0
LEGEND
ACTIVE DISPOSAL AREA
ACTIVE CLOSURE AREA
TEMPORARY CAP
FINAL CAPPED AREA
PROP. PHASE III GAS WELL
GRAPHIC SCALE
(IN FEET)
1 inch = 200 ft.
DAVID J. OSBORNE, P.E.
REGISTRATION # 32210-E
PAD 6 CLOSURE
KEYSTONE SANITARY LANDFILL
SITE DEVELOPMENT - PHASE III
DUNMORE BOROUGH , THROOP
BOROUGH PENNSYLVANIA
REVISIONS
12-01-05
2/10/14
A.J.M.
S.R.
consulting engineers
p.o. box 966, scranton, pa. 18501 570-347-3501
eceo associates inc.
a labella company
35
EXHIBIT B-1

KEYSTONE SANITARY LANDFILL, INC.
SITE DEVELOPMENT – PHASE III
PAD CONSTRUCTION, CELL FILLING SCHEDULE & CLOSURE INCREMENT SEQUENCE TABLE
7/1/2011 – AVERAGE DAILY VOLUME = 7,250 T/D = 184,875 T/MO. = 2,218,500 T/YR.

KEYSTONE SANITARY LANDFILL – PHASE III

PAD CONSTRUCTION & M.S.W. CELL FILLING SCHEDULE							CLOSURE				
CELL No.	PAD CONSTRUCTION & CLOSURE INCREMENT Nos.	AREA (Ac.)	M.S.W. VOLUME (Tons)	PERIOD (Mon.)	DATES OF CONSTRUCTION	APPROX. DATES OF OPERATION	COMMENCEMENT DATE (Mon.)	PAD CONSTRUCTION & CLOSURE INCREMENT Nos.	ACTIVE DISPOSAL AREA (Ac.)	ACTIVE CLOSURE AREA (Ac.)	TEMP. LINER CAP AREA (Ac.)	PERM. LINER CAP AREA (Ac.)
1	Pad No. 1	Pad No.1 22.7	366,243.9	2.0	1/15 – 9/15	4/16 – 6/16	7/16 – 10/16	Pad No.1–Certification	28.6	17.6	0	120.1
2	Pad No. 1		204,534.8	1.1		6/16 – 7/16						
3	Pad No. 1&2		446,967.1	2.4		7/16 – 9/16						
4	Pad No. 1&2	Pad No.2 19.4	873,853.7	4.7	7/15 – 3/16	9/16 – 2/17	3/17 – 10/17	Pad No.2–Certification	17.0	28.6	0	137.7
5	Pad No. 1&2		698,669.0	3.8		2/17 – 6/17						
6	Pad No. 2&3		556,806.2	3.0		6/17 – 9/17						
7	Pad No. 2&3	Pad No.3 13.5	849,941.4	4.6	4/16 – 12/16	9/17 – 2/18	3/18 – 1/19	Pad No.3–Certification	13.1	23.1	28.6	137.7
8	Pad No. 2&3		1,202,718.6	6.5		2/18 – 9/18						
9	Pad No. 2&3		548,216.5	3.0		9/18 – 12/18						
10	Pad No. 2&3		20,780.1	0.1		12/18 – 12/18						
11	Pad No. 4&C1	Pad No.4 34.5	921,275.1	5.0	1/17 – 6/18	12/18 – 5/19	6/19 – 4/20	Pad No.4–Certification	17.5	9.3	49.1	140.3
12	Pad No. 4,C1&C2		1,923,290.3	10.4		5/19 – 3/20						
13	Pad No. 4,C1&C2	Closure Inc. No.C1 22.2	2,706,914.8	14.6	N/A	3/20 – 6/21	7/21 – 7/23	Closure Increment–C1	43.4	17.3	41.9	141.6
14	Pad No. 4,C1&C2		2,089,643.2	14.5		6/21 – 7/22						
15	Pad No. 4,C1,C2&C3		2,024,691.4	10.9		7/22 – 6/23						
16	Pad No. C4	Closure Inc. No.C2 27.9	107,470.8	0.6	N/A	6/23 – 7/23	8/23 – 12/23	Closure Increment–C2	39.9	16.7	28.5	143.8
17	Pad No. C4&C3		240,080.6	1.3		7/23 – 8/23						
18	Pad No. C4,C3,C2&C1		560,885.9	3.0		8/23 – 11/23						
19	Pad No. C4,C3&C2	Closure Inc. No.C3 23.7	530,002.9	2.9	N/A	11/23 – 2/24	3/24 – 3/25	Closure Increment–C3	34.3	39.9	33.4	128.1
20	Pad No. C4,C3&C2		618,008.2	3.3		2/24 – 5/24						
21	Pad No. 4,C1,C2,C3&C4		1,735,331.0	9.4		5/24 – 2/25						
22	Pad No. 4,C1,C2,C3&C4	Closure Inc. No.C4 23.3	432,399.9	2.3	N/A	2/25 – 4/25	5/25 – 5/25	Closure Increment–C4	38.3	21.6	33.4	168.0
23	Pad No. C3		6,066.3	0.03		4/25 – 4/25						
24	Pad No.5	Pad No.5 25.6	175,928.8	0.9	7/18 – 12/19	4/25 – 5/25	6/25 – 12/25	Pad No.5–Certification	43.5	17.3	33.4	171.7
25	Pad No.5		263,229.0	1.4		5/25 – 6/25						
26	Pad No.5		206,173.8	1.1		6/25 – 7/25						
27	Pad No.5		208,674.0	1.1		7/25 – 8/25						
28	Pad No.5		288,182.7	1.6		8/25 – 10/25						
29	Pad No.5&6		89,971.4	0.5		10/25 – 11/25						
30	Pad No.5&6	Pad No.6 24.1	181,332.1	1.0	1/20 – 6/21	11/25 – 12/25	1/26 – 4/26	Pad No.6–Certification	24.0	43.5	33.4	189.0
31	Pad No.5&6		368,360.4	2.0		12/25 – 2/26						
32	Pad No.5&6		170,549.7	0.9		2/26 – 3/26						
33	Pad No.6		59,960.0	0.3		3/26 – 4/26	5/26 – 8/26	Pad No.6–Closure	24.0	29.5	70.9	194.9
34	Pad No.6		377,010.3	2.0		4/26 – 6/26						
35	Pad No.6		180,408.9	1.0		6/26 – 7/26						
TOTALS		236.9	22,854,573	123 Mon. = (10 Years–3 Months)								

Pad No. 4,1,2,3&4
Pad No. C4 — 22,185,000 – 120 Mon. = (10 Years)

NOTE: THE APPROX. CONSTRUCTION OPERATION DATES HAVE BEEN ROUNDED UP AND DO NOT REFLECT ACTUAL M.S.W.

TOTAL
** COMPLETED PAD MSW VOLUME
* PARTIALLY COMPLETED PAD MSW VOLUME
NOTE: TONNAGE BASED ON .7363 COMPACTION RATIO.

EXHIBIT B-2

CONSTRUCTION/OPERATION /CLOSURE FLOWCHART

KEYSTONE SANITARY LANDFILL
SITE DEVELOPMENT – PHASE III
DUNMORE BOROUGH , THROOP BOROUGH PENNSYLVANIA

DAVID J. OSBORNE, P.E. REGISTRATION # 32210-E

REVISIONS | DRAWN A.J.M. | CHECKED | JOB NO. | DATE 12-01-05 | SCALE NTS | DATE 2/10/11

consulting engineers
cecо associates inc.
a labella company

12

Install only.

American Environmental Group, Ltd.
Keystone Landfill – 5 Acre Cap
Pricing Summary

Cost per Sq Ft

1	40 mil HDPE textured Geomembrane	217,800	SF	$ 0.097	$ 21,126.60
2	FabriCap Geocomposite with 4 oz	217,800	SF	$ 0.060	$ 13,068.00
3	AEG Labor, Equipment, and Operators	9	DY	$ 1,000.00	$ 9,000.00
4	Tie-In Welding	TBD	LF	$ 7.65	
5	Pipe Penetration Liner Boots	TBD	EA	$ 153.00	
		Estimated Install Price			$ 43,194.60

Note:

- AEG estimates geomembrane work to be completed in approximately 9 good weather work days.
- The installation unit prices above are based upon net lined area. Net lined area is defined to be the true area of all surfaces to be lined plus designed burial in all anchor trenches, rubsheets, and sacrificial layers.
- AEG will provide all technicians/labor required.
- Keystone Sanitary Landfill shall provide and maintain deployment equipment as required for the duration of the project for AEG's use.
- No drawings provided...quantities listed provided by Keystone.

PO# K37074

EXHIBIT B-3

- Material Supply -

QUOTATION REVISED

Dominick DeNaples
Keystone Landfill
249 Dunham Drive
Dunmore, PA 18512

ksldominick@frontier.com

Project Number: 130816181
Project Name: Commonwealth Environmental Systems Cell
Location: Dunmore, PA
Application:
Bid Date: September 9, 2013
Terms: TBD

PRODUCT	QUANTITY (SF)	ROLL SIZE	F.O.B.	UNIT PRICE (/SF)	TOTAL PRICE	WARRANTY
40 mil HDPE	244,950	23 x 710	Dunmore	0.2353	$ 57,638.74	Agru Standard
Microspike	15 rolls	12 rls/Trk	0.0145	0.2208	$ 54,084.98	
60 mil HDPE	2,973,440	23 x 505	Dunmore	0.3409	$ 1,013,645.70	Agru Standard
Microspike	256 rolls	12 rls/Trk	0.0145	0.3264	$ 970,530.82	
8-200-12 DS	1,482,190	14.5 x 190	Dunmore	0.3537	$ 524,250.60	Agru Standard
Geocomposite	538 rolls	27 rls/Trk	0.0272	0.3265	$ 483,935.04	
4-200-4 DS	240,120	14.5 x 240	Dunmore	0.2277	$ 54,675.32	Agru Standard
Geocomposite	69 rolls	27 rls/Trk	0.0272	0.2005	$ 48,144.08	
12 oz 121 Agru	436,500	15 x 300	Dunmore	0.1122	$ 48,975.30	Agru Standard
Geotextile	97 rolls	60 rls/Trk	0.0138	0.0984	$ 42,951.60	
24 oz 241 Agru	1,482,750	15 x 150	Dunmore	0.2193	$ 325,187.08	Agru Standard
Geotextile	659 rolls	60 rls/Trk	0.0138	0.2055	$ 304,705.13	
Agru Geoclay 6	1,482,000	19 x 150	Dunmore	0.3581	$ 530,704.20	Agru Standard
200 NW GCL	520 rolls	15 rls/Trk	0.0481	0.3100	$ 459,420.00	
			Miles to Job Site from SC	714		
			Number of Trucks	94		
			Est. Cost Per Truck		$ 2,034.90	
			Est. Freight Cost		$ 191,280.60	
			Material Cost		$ 2,363,771.60	
			Project Cost		$ 2,555,052.20	

Note: Prices are valid for 30 days from date of quotation. Freight prices are estimates only. Customers will be charged actual freight costs at time of shipping.

Exceptions/Clarifications and Special Requirements: GM13 Specification will apply

Comments:

- Unless otherwise specified, Agru America standard material specification values and testing will apply for this quotation and the Customer agrees that Agru America standard values will be acceptable according to this quote.
- Interface friction testing is a site specific requirement. Agru America cannot commit to meeting any project specific interface requirements prior to the testing of project specific materials. Agru will make available any sample material requested for project testing.
- Agru America General Terms and Conditions will apply.
- If the material quantity changes from the above square footage, a revised quotation must be issued
- Agru America reserves the right to pass along any verifiable resin increases from the resin supplier up to time of material shipme
- Shipping dates are estimates only and Agru America will not be held liable for any delays due to shipping.
- Any costs associated with third party testing will be the responsibility of the customer.
- Interest will accrue on unpaid balances at 1 ½% per month and Purchaser is responsible for collection costs and attorney fees.

Customer Acknowledgment

O. No.:_____ Signature:_____

ate:_____ Title:_____

Please return to:
Gerri Ortiz
Fax: 843-527-2738
Your material supplier – not your competition!

EXHIBIT B-3

2.02 SOIL BACKFILL

The soil placed by the Installer adjacent to the geogrid (identified on the drawings "subgrade") shall have the properties of structural fill as specified. In addition, the fill shall have a minimum friction angle of 35 degrees when tested as described in Section 1.04 (B) above.

2.03 TRANSPORTATION, HANDLING AND STORAGE

C. Transportation of the geosynthetic reinforcement is the responsibility of the Manufacturer. The Manufacturer shall be liable for all damages to the materials incurred prior to and during transportation to the site.

D. Handling, storage and care of the geosynthetic reinforcement prior to and following installation at the site, is the responsibility of the Installer. The Installer shall handle, store, and care for the geosynthetic reinforcement in accordance with he Manufacturer's recommendation. The Owner shall provide adequate storage space at the site. The Installer shall be liable for all damages to the materials incurred prior to conditional acceptance by the Owner.

E. Material shall be received at the site at least 14 days before the scheduled date of deployment to allow the CQA Consultant time to collect samples and to perform conformance testing.

2.04 MANUFACTURING QUALITY CONTROL

A. Conformance testing shall be performed as part of the manufacturing process. If the Manufacturer has an established Quality Control program, then documentation describing the program shall be submitted to the Engineer for review. If the Quality Control Program is unacceptable or does not exist, then all materials shall be tested, at the Installer's expense at a minimum, once every 40,000 square feet to evaluate the pertinent characteristics for quality control. As a minimum, the manufacturer shall be measure the tensile strength in accordance with ASTM D 4595. This testing shall be performed by the Manufacturer. Samples not satisfying the specifications shall result in the rejection of the applicable rolls at no cost to the Owner. At the Manufacturer's discretion and expense, additional testing of individual rolls may be performed to more closely identify the non-complying rolls.

B. The Manufacturer shall certify the quality of the rolls of geosynthetic reinforcement. As a minimum, the Manufacturer shall provide quality control certificates for each batch of resin and each shift's production. These quality control certificates shall be signed by responsible parties employed by the Manufacturer (such as the production manager), and supplied to the Owner.

C. The quality control certificate shall include:
1. roll numbers and identification;
2. sampling procedures; and
3. results of quality control tests, including a description of test methods used.

PART 3 EXECUTION

3.01 FOUNDATION MATERIAL PREPARATION

This foundation soil (beneath the reinforced slope) shall be excavated to the lines and grades shown on the Drawings or as directed by the CQA Consultant. The foundation soil shall be examined by the CQA Consultant to assure that the actual foundation conditions meets requirements for subgrade materials specified. Excavated areas shall be filled with compacted structural fill material at no additional cost to the Owner. The foundation material shall be proofrolled prior to placement of fill or any geosynthetics.

3.02 GEOSYNTHETIC REINFORCEMENT INSTALLATION

A. A dual layer of geosynthetic reinforcement shall be placed with its roll direction perpendicular to each layer, in areas delineated on the Hazard Identification Map.

B. Reinforcements shall be placed side by side. No overlap or connection shall be required for joints aligned on the abutting rolls ends.

C. All geosynthetic reinforcement material shall be restrained from moving out of alignment during and after placement and backfilling. Alignment can be maintained by securing each soil reinforcement strip to the ground with stakes or anchoring by hand placing a small quantity of fill on top of the soil reinforcement prior to general backfilling.

D. When laying the soil reinforcement strips, the Installer shall pull the slip as taut as possible in order to "prestress" the reinforcement. While holding the main strip taut, stakes should be driven through the soil reinforcement apertures, or fill should be placed on top of the strips, in order to hold the soil reinforcement in place and maintain the "prestress" until general backfilling permanently anchors the soil reinforcement in place.

E. The Installer shall handle all geosynthetic reinforcement material such that it is not damaged in any way. The geosynthetic reinforcement material shall be cut using a method approved by the CQA Consultant.

3.03 FILL PLACEMENT

A. Backfill material (i.e., Structural Fill Material) shall be placed as described on specification sheets.

B. The structural fill shall be placed, spread, and compacted in such a manner that minimizes the development of wrinkles in and/or movement of the geosynthetic reinforcement. At the end of each day's work, the fill shall be worked such that drainage is kept away from the slope face.

C. Structural fill shall be placed beginning at the bottom of the slope and pushed upslope. The Installer shall nevertheless maintain geogrid in a taut position.

D. Tracked construction equipment shall not be operated directly upon the geosynthetic reinforcement. A minimum fill thickness of 6 inches is required prior to operation of tracked vehicles over the geosynthetic reinforcement. Turning of tracked vehicles should be kept to a minimum to prevent tracks from displacing the fill and damaging the geosynthetic reinforcement.

E. Rubber tire equipment may pass over geosynthetic reinforcement at slow speeds, less than 5 miles per hour. Sudden braking and sharp turning shall be avoided.

END OF SECTION

KEYSTONE SANITARY LANDFILL, INC. PHASE III SITE DEVELOPMENT
CONTROLLED FILL SPECIFICATION

CONSTRUCTION

To ensure that the design objectives for the foundations are met, continuous third party inspection activities during construction of the foundation should include the following:

a.) Observations of soil and rock surfaces for adequate filling of rock joints, fractures, or depressions, and removal and filling of sand seams.

b.) Review survey data of the approved subgrade elevations to ensure that it meets design requirements.

c.) Tests and observations to ensure the quality of dry compacted fill placed.

d.) Observations of stripping and excavation to ensure that there are no moisture seeps and that all soft, organic, and otherwise undesirable materials are removed.

e.) Observations and tests to ensure that the surface is properly compacted, smooth, uniform, and consistent with designed grades.

f.) Surveying provided by Keystone will be necessary as required to verify facility dimensions, side slopes, and bottom slopes specified in the design.

g.) Compacting testing will be done on each lift of fill placed prior to the placement of any additional fill. Refer to Construction Quality Assurance Program for subbase compaction and density requirements and for subgrade preparation.

h.) Compacting tests will be performed in accordance with the requirements of the Construction Quality Assurance Program. The QA Inspector can perform additional tests to verify suspected areas of poor compacting. In areas where controlled engineered fill is required to achieve subgrade elevation, the following procedures are to be employed:

(1) Rock Fill to Subgrade. A rock fill may be used where acceptable by the geotechnical engineer up to subgrade. The rock materials must be clean, hard, and durable. The maximum material size cannot exceed 24 inches in its longest dimension. Adequate fines must be present to assure the void space between the large pieces are filled.

(2) Soil Fill to Subgrade. If a soil is used, the soil fill must comply with the material requirements of Item No. 2. The engineered fill shall contain no particles larger than 1 inch and contain no less than 12% finer than the #200 Sieve. The material shall be non-plastic. Acceptable gradations are GW-WM, GP-GM, GM, SW-WM, SP-SM, SM as determined by the Unified Soil Classification System. A minimum in-place total unit weight of 127 pcf will be required. The final 6 inches of fill shall conform to the requirements of PaDEP for Subbase.

PLACEMENT

(1) Rock Fill: Beginning in the deepest sections, horizontal lifts may be placed with a loose lift thickness not-to-exceed 2 feet. The fill shall be adequately choked to fill up the remaining void space. The fill shall be initially compacted with a D-8 High Track Class Bulldozer with a minimum 1-1/2" inch grouser. A minimum of two (2) complete perpendicular coverages should be made. Upon completion of the bulldozer compaction, ironing passes should be made by a smooth drum roller capable of exerting a minimum dynamic force of 80,000 lbf. A minimum of four (4) complete coverages will be required with each coverage at right angles to the previous coverage. Any surface void that develops in the fill shall immediately be choked and re-rolled.

(2) Soil Fill: Materials shall be placed in horizontal lifts beginning within the deepest portion of the site. Each lift shall not exceed 12 inches in loose thickness. Each lift shall be rolled a minimum of four (4) coverages with each coverage at right angles to the previous coverage. Prior to the placement of each successive lift, the preceding lift surface shall be scarified to ensure lift-to-lift bonding.

COMPACTION REQUIREMENTS

(1) Rock Fill: The fill should be visually stable and adequately choked under the continuous inspection of a qualified geotechnical inspector. (Rock fill only. If soil fill is used, Item 2 applies.)

(2) Soil Fill: An engineering fill shall be rolled the minimum number of passes such that the in-place density is at least 95% of ASTM D1577 or 88% of the relative density, ASTM D2847. A minimum in-place total density of 127 pcf will be required regardless of the results of ASTM D1557 or the Relative Density Test ASTM D2847.

TESTING FREQUENCY

(1) Soil Fill: A minimum of two (2) compaction tests per lift per day, not-to-exceed 10,000 square feet per test as required by Appendix 28.

(2) Rock Fill Continuous Visual Observation.

SUBSURFACE TEST BORING PROGRAM/ PROPOSED AIR ROTARY TESTING LOCATIONS BEYOND YEAR No. 1-10

TEST LOCATION NUMBER	NORTHING	EASTING	SUBGRADE ELEVATION	MINIMUM BOTTOM ELEVATION	REMARKS
AR-338	9617.64	9602.03	1009	939	
AR-340	9718.86	9744.10	1021	951	
AR-341	9339.98	9849.48	1016	946	
AR-342	9188.58	9838.32	1022	952	
AR-343	8985.81	9801.41	1008	938	
AR-344	8533.26	9753.66	1021	951	
AR-345	8188.37	10093.85	1023	953	
AR-346	8132.37	9583.82	1010	940	
AR-347	8023.06	9374.19	1033	963	
AR-348	8856.46	9472.81	1029	959	
AR-349	8950.79	9773.94	1018	948	
AR-350	8895.13	10033.29	1014	944	
AR-351	8057.28	10293.73	1038	968	
AR-352	8481.84	10314.52	1030	960	
AR-353	8673.85	10145.04	1020	950	
AR-354	8807.86	9887.21	1018	948	
AR-355	8634.66	9678.83	1020	950	
AR-356	8686.18	9393.70	1029	959	
AR-357	8682.84	9380.10	1024	954	
AR-358	8635.96	9804.02	1023	953	
AR-359	8735.85	10055.81	1019	949	
AR-360	8716.84	10277.08	1025	955	
AR-361	8705.80	10495.01	1054	984	
AR-362	8480.34	10613.13	1073	1003	
AR-363	8703.45	10804.40	1081	1011	
AR-364	8805.17	11107.95	1086	1039	
AR-365	8825.72	9765.01	1031	961	
AR-366	8609.81	9473.98	1026	956	
AR-367	8488.48	9686.46	1038	958	
AR-368	8434.82	9855.75	1078	958	
AR-369	8598.50	10122.83	1022	952	
AR-370	8644.94	10340.34	1028	958	
AR-371	8571.11	10565.84	1040	970	
AR-372	8531.19	10738.84	1047	977	
AR-373	8508.84	10838.81	1048	978	
AR-374	8634.18	11115.32	1058	988	
AR-375	8733.95	11291.31	1093	1025	
AR-376	8408.01	10180.15	1027	957	

Based on proposed subgrade, verify prior to drilling program.
Min. bottom elevation is 70 feet below subgrade, or 10 feet below the Dunmore No. 3 Coal Vein, whichever is greater.

TEST LOCATION NUMBER	NORTHING	EASTING	SUBGRADE ELEVATION	MINIMUM BOTTOM ELEVATION	REMARKS
AR-353	4305.61	9787.44	1050	990	
AR-354	4263.19	9876.97	1071	1001	
AR-355	4313.66	10071.60	1095	1073	
AR-356	4250.61	10326.10	1142	1073	
AR-357	4117.93	10513.97	1189	1129	
AR-358	4108.08	9486.72	1068	998	
AR-360	4152.91	9630.83	1068	998	
AR-361	4100.28	9871.33	1093	1073	
AR-362	4089.32	10091.79	1126	1056	
AR-363	4033.49	10299.95	1177	1107	
AR-364	3908.80	10478.04	1232	1187	
AR-365	3831.16	9587.13	1086	1026	
AR-366	3938.66	9785.80	1120	1050	
AR-367	3888.53	9915.28	1146	1076	
AR-368	3861.53	10179.07	1173	1103	
AR-369	3817.53	10313.62	1217	1147	
AR-370	3712.55	9567.78	1126	1056	
AR-371	3705.40	9786.44	1172	1102	
AR-372	3692.36	10008.27	1202	1132	
AR-373	3658.46	10175.30	1276	1158	

TEST LOCATION NUMBER	NORTHING	EASTING	SUBGRADE ELEVATION	MINIMUM BOTTOM ELEVATION	REMARKS
AR-277	8351.96	10458.33	1026	916	
AR-278	8351.98	10817.78	1040	970	
AR-279	8343.41	10784.52	1047	977	
AR-280	8338.78	11005.67	1086	996	
AR-281	8612.03	11182.17	1037	987	
AR-282	8632.79	11376.81	1089	1019	
AR-283	8294.06	11176.18	1088	1028	
AR-284	8361.62	11368.80	1117	1047	
AR-285	8408.73	9821.73	1034	964	
AR-286	8330.61	9329.54	1034	964	
AR-287	8310.85	9560.69	1034	964	
AR-288	8290.40	9778.26	1033	963	
AR-289	8181.81	9947.85	1033	965	
AR-290	8272.61	10085.04	1033	963	
AR-291	8172.90	10298.87	1033	963	
AR-292	8151.89	10515.71	1033	963	
AR-293	8072.39	10733.99	1084	984	
AR-294	8188.08	10802.13	1078	1008	
AR-295	8136.71	11014.29	1130	1050	
AR-296	8102.43	11272.04	1148	1038	
AR-297	8038.86	11460.89	1189	1119	
AR-298	8225.85	11540.43	1180	1110	
AR-299	8068.53	11676.08	1228	1158	
AR-300	8330.73	8814.33	1038	968	
AR-301	8231.73	9156.98	1038	988	
AR-302	8131.48	9401.06	1040	970	
AR-303	8110.61	9630.77	1039	969	
AR-304	8084.61	9845.93	1039	969	
AR-305	8019.24	10136.18	1039	968	
AR-306	8183.87	10358.37	1038	968	
AR-307	8145.58	10557.08	1083	995	
AR-308	8188.18	10785.48	1106	1036	
AR-309	8015.40	10868.08	1117	1047	
AR-310	8014.46	11152.88	1190	1100	
AR-311	7885.98	11308.77	1188	1128	
AR-312	7872.80	11588.46	1244	1174	
AR-313	7901.85	8718.80	1042	972	
AR-314	7958.81	8861.68	1041	971	

TEST LOCATION NUMBER	NORTHING	EASTING	SUBGRADE ELEVATION	MINIMUM BOTTOM ELEVATION	REMARKS
AR-315	8031.90	8863.84	1045	975	
AR-316	8002.33	9084.31	1045	975	
AR-317	8053.71	9273.84	1044	974	
AR-318	8024.83	9508.85	1045	975	
AR-319	8018.05	9704.81	1044	974	
AR-320	8089.35	10043.96	1043	973	
AR-321	8026.77	10187.63	1044	974	
AR-322	8007.05	10307.97	1081	991	
AR-323	8751.27	10088.39	1110	1040	
AR-324	8074.07	10773.37	1151	1081	
AR-325	8792.91	10970.41	1156	1086	
AR-326	8585.89	10983.18	1199	1129	
AR-327	8586.28	11189.02	1213	1143	
AR-328	8743.41	11417.63	1248	1171	
AR-329	8841.63	8847.11	1051	981	
AR-330	8801.88	9165.31	1050	980	
AR-331	8817.57	8378.58	1048	978	
AR-332	8787.82	9875.02	1048	978	
AR-333	8700.93	9848.10	1048	978	
AR-334	8574.40	10070.14	1048	979	
AR-335	8638.30	10253.93	1081	991	
AR-336	8589.45	10430.40	1107	1037	
AR-337	8518.04	10801.55	1153	1083	
AR-338	8456.59	10808.45	1202	1132	
AR-339	8388.29	10988.74	1238	1188	
AR-340	8818.45	9885.10	1056	986	
AR-341	8841.13	9727.47	1054	984	
AR-342	8883.04	9468.24	1051	981	
AR-343	8954.36	9242.07	1058	988	
AR-344	8901.24	9446.25	1057	987	
AR-345	8588.72	9805.32	1054	984	
AR-346	8481.87	9875.60	1055	985	
AR-347	8408.20	10047.83	1056	986	
AR-348	8456.56	10285.47	1086	1026	
AR-349	8345.75	10482.53	1158	1088	
AR-350	8308.25	10634.41	1184	1124	
AR-351	8293.26	8405.75	1083	993	
AR-352	8367.25	9081.26	1080	990	

COMPONENT	FACTORS TO BE INSPECTED	INSPECTION METHOD	SAMPLE FREQUENCY AND LOCATION	TEST METHOD REFERENCE	ACCEPTANCE CRITERIA
Structural Fill to Subgrade (Minus 6")	Material Type Soil or Rock	Visual Observation	Soil: 1/acre or on 200 foot centers 2± 12" lift Rock: 1/acre or on 200 foot centers per 24" lift	Soil: ASTM D422 Rock: N/A	Soil: 100% less than 2" and containing no less than 12% passing the No. 200 sieve Rock: 100% less than 24", contain sufficient shape fines
	Compaction	Visual Observation and Density Tests	Soil: A minimum of two (2) tests/lift/day. Not to exceed 10,000 square feet Rock: Continuous visual observation	Soil: ASTM 1557 ASTM D2847 Rock: N/A	Soil: 95% of ASTM 1557 or 88% of relative density, ASTM D2847 maximum in-place density shall be 95% Rock: N/A
	Proofrolling of Subgrade and Filling of Voids	Visual Observation and Tests	Soil and Rock - Continuous Minimum one per 10,000 square feet/layer	ASTM D1556 ASTM D2922	Non-yielding stable surface within less than 1/2" adjacent depressing. Minimum 100 psi tire pressure or vibratory roller 10 ton static weight, 80,000 lb/ dynamic force.
	Removal of Unsuitable Material	Visual Observation	Continuous	N/A	Approved by geotechnical engineer.
Subgrade Fill to Subbase	Density and Material Stability	Visual Observation and Tests	All emplaced subgrade material and prepared subgrade shall be compacted to a minimum of 95% Modified Proctor. One compaction test/moisture determination for each 500 c.y., or each one acre, whichever frequency is greater. Minimum determinations shall be four (4) per eight (8) hour shift	Soil: ASTM D1556 ASTM D1557 ASTM D442 ASTM D2847 ASTM D2922 Rock: N/A	All emplaced subgrade material shall be spread and compacted in progressive layers not to exceed 6" per lift, after compaction. A minimum of one 6" compacted layer shall be in place prior to then excavation. All emplaced material shall be hard, uniform, smooth, and free of cracks, seams, rocks, peat matter and other foreign materials.

COMPONENT	FACTORS TO BE INSPECTED	INSPECTION METHOD	SAMPLE FREQUENCY AND LOCATION	TEST METHOD REFERENCE	ACCEPTANCE CRITERIA
Daily Cover	Physical Properties and Coal Content	Visual Observation USDA Soil Classification	Stockpiles - 1 composite per 1,000 c.y. Placed Material - 1/acre per 6" lift	ASTM D422 FemDOT 703. 2(c) &	100% passing 6" sieve and 40% passing No. 10 sieve with coal/combustion content 12% by weight. Be capable of controlling fines.
	Thickness 6" minimum	Final Survey, visual observations	Placed material - 1/acre or 200 foot centers - minimum 1/day	N/A	± 0.1 ft.
Intermediate & Final Cover	Physical Properties and Coal Content	Visual Observation USDA Soil Classification	Stockpiles - 1 composite per 1,000 c.y. Placed Material - 1/acre per 6" lift	ASTM 422 FemDOT 703. 2(c) &	100% passing 8" sieve and 40% passing No 10 sieve with coal/combustion content 12% by weight. Texture shall be USDA sandy loam, loam sand clay loam, silty clay loam, loamy sand or silt loam
	Thickness Int. Cover 12" Final Cover 24"	Final Survey, visual observations	Placed material - 1/acre or 200 foot centers - minimum 1/day	N/A	± 0.1 ft.
	Fertility Analysis	Laboratory Tests	Placed material - 1 composite of top 12" /10 acre area		Fertilizer and soil supplements to be added based on test results
Revegetation	Physical Properties	Visual Observations Supplier Certification	Each shipment delivered	N/A	Conformance with Project Specifications

COMPONENT	FACTORS TO BE INSPECTED	INSPECTION METHOD	SAMPLE FREQUENCY AND LOCATION	TEST METHOD REFERENCE	ACCEPTANCE CRITERIA
Subbase No emplaced structural fill	Material Suitability 6" minimum depth Slope - 2% to 25%	Visual and Tests	Continuous Observation of Foundation Material minimum 1/acre/6" lift	ASTM D488 ASTM D427 ASTM D422 ASTM D4318	100% passing 2" sieve - 12% passing 200" sieve. Material to be hard, uniform, smooth, and free of debris, rock, peat material and other foreign matter
	Density/Moisture	Tests	Placed material 1/acre/6" lift or on 200 foot centers/6" lifts/Borrow Area 1/10,000 sq. ft	ASTM D1557 ASTM D2922 ASTM D 3017 and ASTM D698	≥ 95% compaction - +2% to +4% of optimum moisture (Modified Proctor)
	Bearing Capacity	Tests	Place materials 1/acre on 200 foot centers/6" lifts	ASTM D4429-84 ASTM D1194	Site Specific total applied load plus K,500 lbs/sq. ft.
	Depth	Final Survey and Sand Core	Daily/2 per day	N/A - ASTM D-5584 ASTM D2922	Tolerance ± 0.1 feet at 6" depth
	Permeability	Lab Testing	1/5,000 Ton delivered	ASTM D434	≤ 1x10-5 cm/sec
Protective Cover and Leachate Detection/Collection Granular Materials	Depth	Visual Observation and Final Survey	Daily with minimum at one field survey measurement every 10,000 sq. ft.	N/A	± 0.1"
	Material Index Properties	Visual Observation and Tests	Stockpiles (See Note A) Placed materials 1/acre or 1/3,000 Ton delivered	ASTM D422	Gradation w/100% passing 3/8" sieve and 2% passing 200 sieve
	Carbonate Content	Lab Testing	Stockpiles (See Note A) Placed materials 1/acre or 1/3,000 Ton delivered	ASTM D3042	Maximum 15% carbonate
	Permeability	Lab Testing	Stockpiles (See Note A) Placed materials at 1/5000 Ton delivered	ASTM D2434	Minimum 1 x 10-3 cm/sec
	Sound/Proof	Lab Testing	1/5,000 Ton Placed	ASTM C88	12% loss Maximum

A. Stockpile samples to be composite (consisting of a minimum of 12 subsamples) analyzed at a frequency of 1 composite sample and analyses per 5,000 cubic yards.

EXHIBIT B-4

CONTROLLED FILL MATERIAL SPECIFICATIONS & TESTING PROGRAM

KEYSTONE SANITARY LANDFILL
SITE DEVELOPMENT - PHASE III
DUNMORE BOROUGH, THROOP BOROUGH PENNSYLVANIA

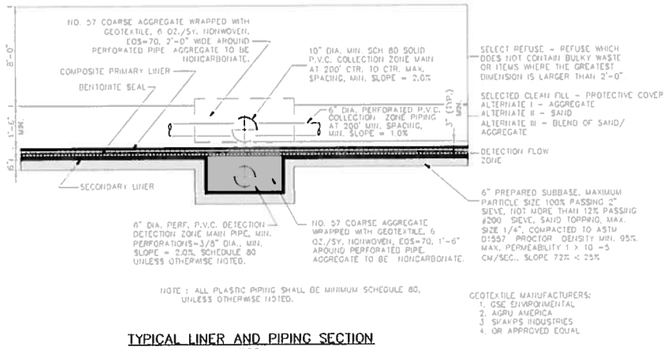
P. RICHARD SCHELLER, P.E. REGISTRATION # 037539-E

DAVID J. GISBORNE, P.E. REGISTRATION # 32210-E

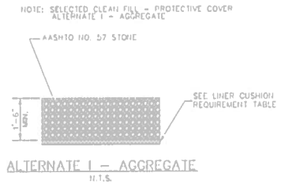
REVISIONS	DATE
DRAWN A.J.M.	CHECKED A.J.M.
APPROVED	SCALE N.T.S.
JOB NO. 12-01-05	DATE 2/10/14

ceco associates inc. a ubella company
consulting engineers
p.o. box 806, scranton, pa. 18501 570-342-3181

SHEET NO. CSE 8



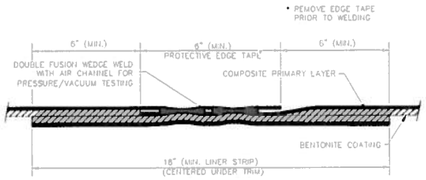
TYPICAL LINER AND PIPING SECTION
N.T.S.



ALTERNATE I - AGGREGATE
N.T.S.

WASTE HEIGHT (ft)	CUSHION GEOTEXTILE (oz/sy)	FACTOR OF SAFETY
500	56	3.0
410	48	3.0
310	36	3.0
230	24	3.0

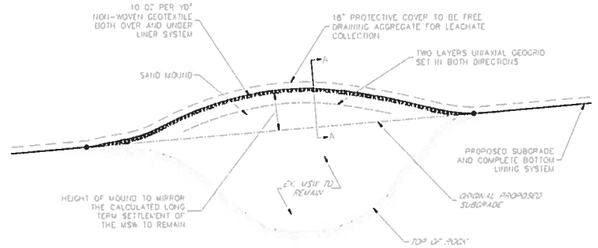
LINER CUSHION REQUIREMENT TABLE
N.T.S.



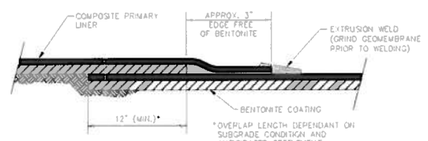
WEDGE WELDED SEAM FOR PRIMARY LINER
(GEOMEMBRANE SIDE UP)
N.T.S.

NOTE:

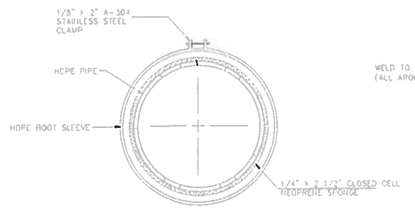
ALL PRIMARY LINER INSTALLATION SHALL CONFORM WITH MANUFACTURERS SPECIFICATIONS.



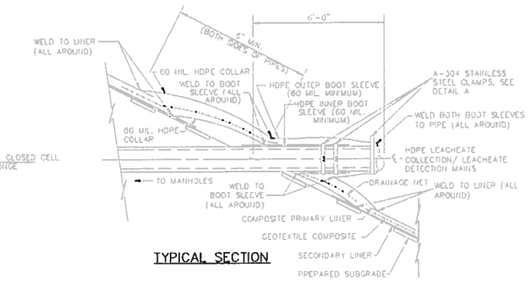
KEYSTONE/DUNMORE PIT REMEDIATION
N.T.S.



EXTRUSION WELDED SEAM FOR PRIMARY LINER
N.T.S.

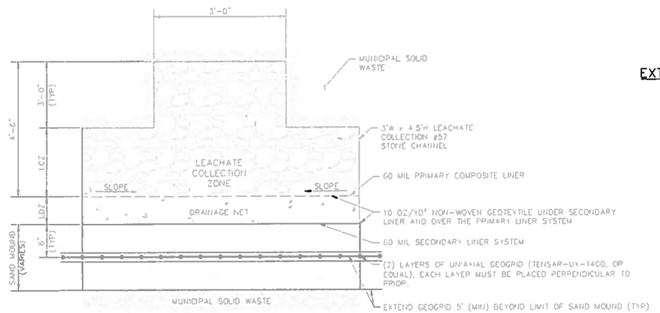


DETAIL A



TYPICAL SECTION

LEACHATE COLLECTION / LEACHATE DETECTION MAINS AT LINER PENETRATION
N.T.S.



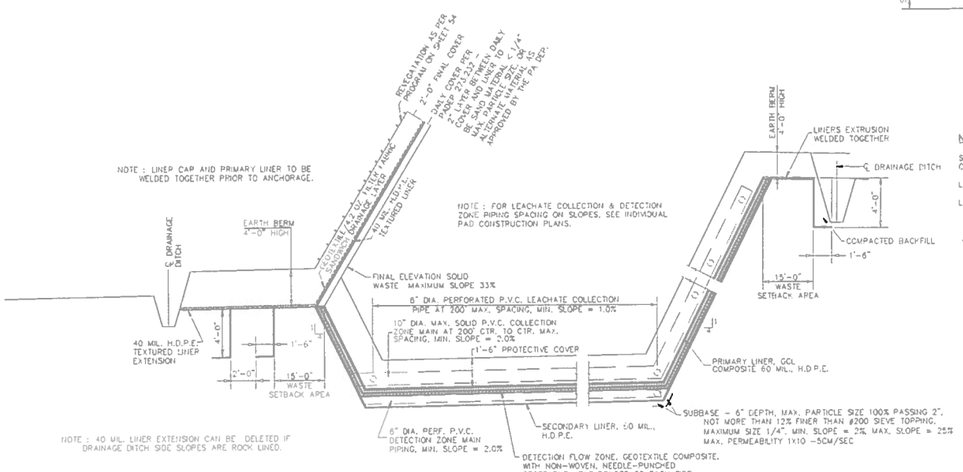
SECTION A-A (TYP)
KEYSTONE/DUNMORE RELOCATION
OVER MUNICIPAL SOILD WASTE
N.T.S.

NOTE:

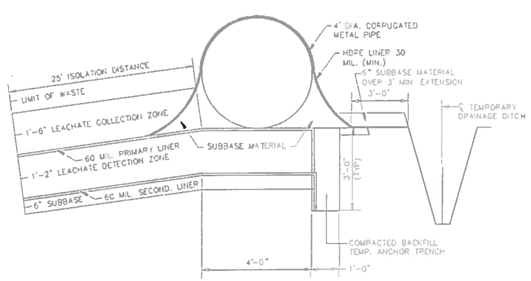
SAND SHALL HAVE A MINIMUM ⅜" PARTICLE SIZE W/ A MINIMUM 0.7 ROUNDNESS AND 0.5 MINIMUM SPHERICITY CLASSIFICATION.

LDZ = LEACHATE DETECTION ZONE

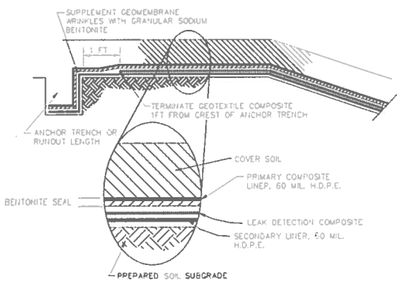
LCZ = LEACHATE COLLECTION ZONE + 18" PROTECTIVE COVER



TYPICAL SECTION - LINED INCREMENT
N.T.S.



TEMPORARY BERM DETAIL
N.T.S.



PROPOSED ANCHOR TRENCH CONFIGURATION
N.T.S.

NOTE REVISION NO 2:
1. ADDED = PROTECTIVE COVER ALTERNATIVES
2. REMOVED OVERLAP SEAM
3. CLARIFIED TYPICAL LINER SECTION POTENTIAL SUBSIDENCE AREAS
4. REVISED TYPICAL SECTION

EXHIBIT B-4

DAVID J. OSBORNE P.E.
REGISTRATION # 32210-E

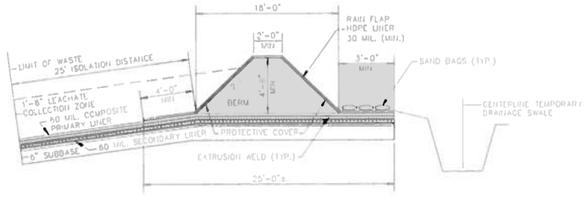
REVISIONS	DATE
DESIGNED A.J.M.	DRAWN A.J.M.
CHECKED	SCALE NO SCALE
JOB NO. 12-01-03	DATE 2/10/14

LINER CONSTRUCTION DETAILS 1

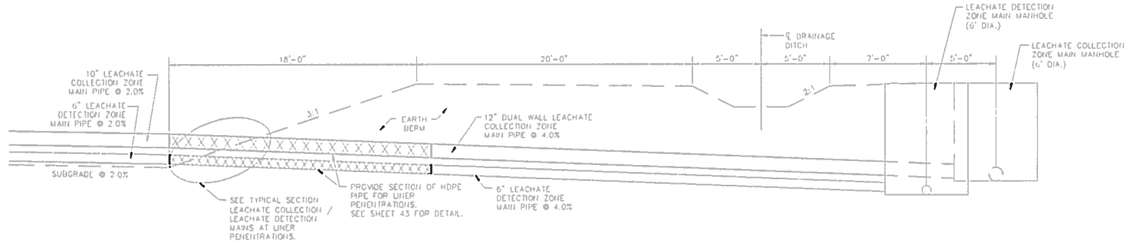
KEYSTONE SANITARY LANDFILL
SITE DEVELOPMENT - PHASE III
DUNMORE BOROUGH , THROOP
BOROUGH PENNSYLVANIA

consulting engineers
ecco associates inc.,
a labella company

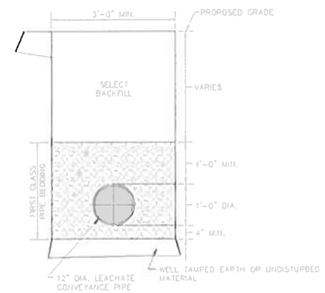
SHEET NO. 43



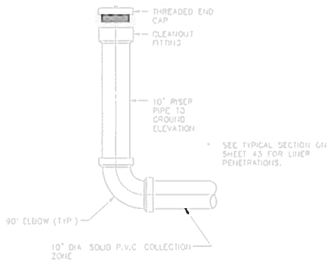
TEMPORARY EARTH BERM & RAIN FLAP DETAIL
N.T.S.



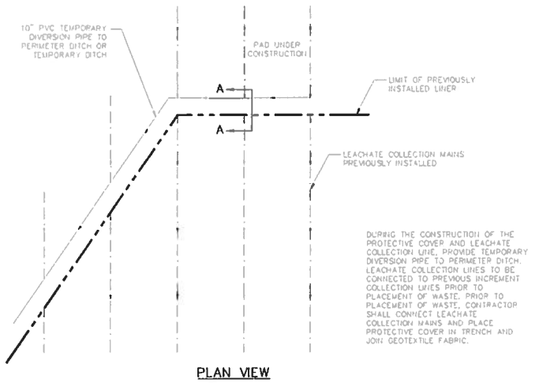
TEMPORARY LEACHATE COLLECTION & LEACHATE DETECTION ZONE MAIN PIPING SECTION
REFER TO SHEET NO. 45 FOR HYDRAULIC PROFILE
N.T.S.



TYPICAL LEACHATE CONVEYANCE LINE PIPE TRENCH DETAIL
N.T.S.

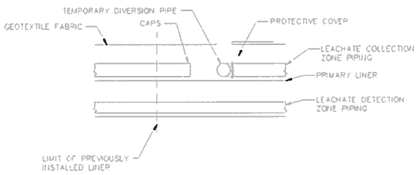


TYPICAL LEACHATE COLLECTION ZONE PIPING CLEANOUT DETAIL
N.T.S.

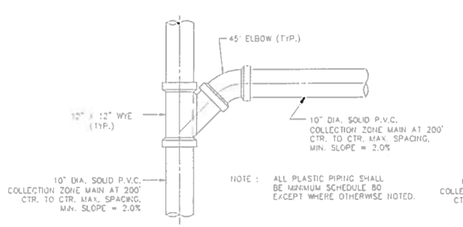


PLAN VIEW

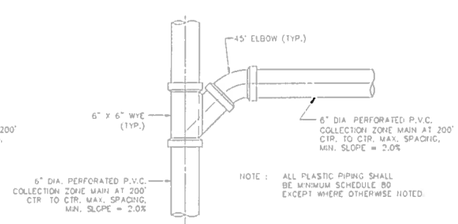
TEMPORARY LEACHATE DIVERSION PIPE FOR USE PRIOR TO PLACEMENT OF WASTE
N.T.S.



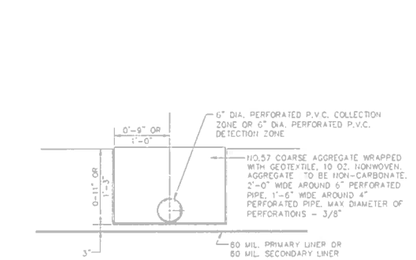
SECTION A–A



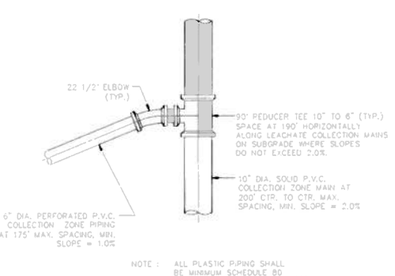
TYPICAL LEACHATE COLLECTION MAIN TO MAIN CONNECTION
N.T.S.



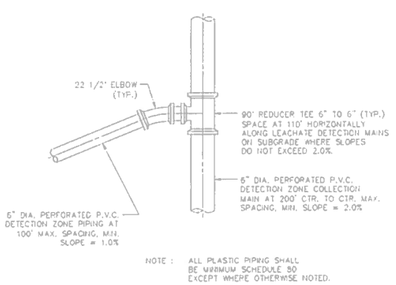
TYPICAL LEACHATE DETECTION MAIN TO MAIN CONNECTION
N.T.S.



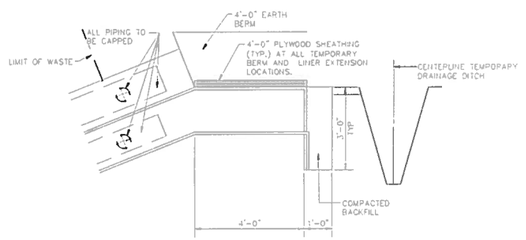
TYPICAL LEACHATE COLLECTION & DETECTION ZONE PIPE TRENCH DETAIL
N.T.S.



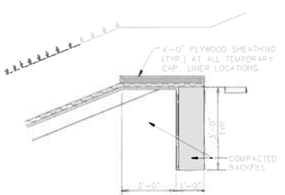
TYPICAL LEACHATE COLLECTION PIPING CONNECTION TO LEACHATE COLLECTION MAIN
N.T.S.



TYPICAL LEACHATE DETECTION PIPING CONNECTION TO LEACHATE DETECTION MAIN
N.T.S.



TEMPORARY LINER ANCHOR DETAIL
N.T.S.



TEMPORARY CAP LINER ANCHOR DETAIL
N.T.S.

EXHIBIT B-4

DAVID J. OSBORNE, P.E.
REGISTRATION # 32210-E

REVISIONS	DATE
DESIGNED R.J.M.	DRAWN R.J.M.
CHECKED	SCALE 1:0 SCALE
JOB NO. 12-01-05	DATE 2/10/14

LINER CONSTRUCTION DETAILS 2

KEYSTONE SANITARY LANDFILL
SITE DEVELOPMENT – PHASE III
DUNMORE BOROUGH , THROOP
BOROUGH PENNSYLVANIA

consulting engineers
p.o. box 865, scranton, pa. 18501 570-343-3101
cecco associates inc. , a labella company

sheet no. 44

KEYSTONE LANDFILL, INC. SITE DEVELOPMENT – PHASE III
FORM I – SOIL EROSION AND SEDIMENTATION CONTROLS

KEYSTONE LANDFILL, INC.
SITE DEVELOPMENT – PHASE III
EROSION AND SEDIMENT POLLUTION CONTROL NARRATIVE

PROJECT DESCRIPTION

THE PROJECT WILL CONSIST OF EXPANDING AND OPERATING A DOUBLE LINED MUNICIPAL SOLID WASTE LANDFILL ON APPROXIMATELY 455 ACRES IN DUNMORE AND THROOP BOROUGHS. IN ADDITION TO THE LINED PORTIONS OF THE LANDFILL BEING DEVELOPED AT THIS TIME, THE FOLLOWING COINCIDENTAL WORK WILL ALSO BE INVOLVED:

A.) CONSTRUCTION OF AN EXTENSION TO THE SITE ACCESS ROAD.
B.) ENLARGEMENT OF SEDIMENTATION/RETENTION BASIN NOS. 1 AND 5.
C.) ADDITION OF SEDIMENTATION/RETENTION BASIN NO. 6 AND REMOVAL OF SEDIMENTATION/RETENTION BASIN NO. 3.
D.) CONSTRUCTION OF TEMPORARY AND PERMANENT DRAINAGE DITCHES AND OTHER STORMWATER CONTROL MEASURES.
E.) EXCAVATION OF THE LANDFILL FOOTPRINT AREA FOR COVER MATERIAL.
F.) RELOCATION OF EXISTING MATERIAL PROCESSING FACILITY AND RAW PRODUCT STOCKPILE AREAS.

THE MAJOR ALTERATIONS TO THE SITE THAT WILL TAKE PLACE WILL BE IN THE AREAS WHERE THE PROPOSED LINED SITES ARE LOCATED. THESE AREAS WILL BE EXCAVATED AND SHAPED TO ACCEPT THE MEMBRANE LINER AND THEN FILLED WITH SOLID WASTE TO THE LIMITS SHOWN ON THE PLANS.

ALL STRUCTURES, SERVICE ROADS, AND PAVED AREAS ARE SHOWN ON THE PLANS.

STORMWATER COLLECTION/RETENTION SYSTEM

THE STORMWATER FALLING ONTO THE SITE WILL BE HANDLED BY A SERIES OF DRAINAGE DITCHES. PERMANENT DRAINAGE DITCHES WILL BE CONSTRUCTED THROUGHOUT THE SITE TO INTERCEPT THE RUNOFF AND CONVEY IT TO SEDIMENTATION/RETENTION BASIN NOS. 1, 4, 5, AND 6. SEDIMENTATION/RETENTION BASIN NOS. 1 AND 5 WILL BE ENLARGED, SEDIMENTATION/RETENTION BASIN NO. 6 WILL BE ADDED, SEDIMENTATION/RETENTION BASIN NO. 3 WILL BE REMOVED, AND SEDIMENTATION/RETENTION BASIN NO. 4 WILL REMAIN AS IS. THE STORMWATER WILL THEN BE CONVEYED FROM THE BASINS TO EDDY CREEK VIA A SERIES OF CLEAN WATER OUTLET CHANNELS. THE EXISTING STORMWATER MANAGEMENT FACILITIES (I.E., DRAINAGE DITCHES AND SEDIMENTATION/RETENTION BASIN NOS. 1, 4, AND 5) WILL REMAIN IN SERVICE.

IN ADDITION TO THE PERMANENT DRAINAGE DITCHES, ADDITION OF SEDIMENTATION/RETENTION BASIN NO. 6, AND ENLARGEMENT OF SEDIMENTATION/RETENTION BASIN NOS. 1 AND 5, THERE WILL ALSO BE NUMEROUS TEMPORARY DIVERSION DITCHES CUT TO DIRECT THE RUNOFF TO THE PERMANENT DITCHES AS THE LANDFILL IS BEING OPERATED. SEDIMENTATION/RETENTION BASIN NO. 3 WILL BE REMOVED IN THE PHASE III – SITE DEVELOPMENT.

EROSION AND SEDIMENT CONTROL/STABILIZATION MEASURES

THE EROSION AND SEDIMENTATION CONTROL MEASURES THAT WILL BE IMPLEMENTED AT THE SITE WILL CONSIST OF PRIMARILY TEMPORARY MULCHING AND SEEDING, AS NOTED ON THE PLANS. AREAS SHALL BE STABILIZED IMMEDIATELY UPON COMPLETION OF THE FINAL GRADING OF THE PERMANENT DRAINAGE STRUCTURES AND AREAS ADJACENT TO THE PROPOSED LANDFILL. THE SITE WILL BE STABILIZED BY USING STONE FOR DITCH LINING AND FINAL SEEDING AND SOIL SUPPLEMENTS ON OTHER DISTURBED AREA. ANY OF THESE AREAS THAT CANNOT BE IMMEDIATELY STABILIZED WILL BE TEMPORARILY MULCHED UNTIL CONDITIONS ALLOW FOR STABILIZATION OF THE EXPOSED SOILS.

THE LANDFILL AREAS THEMSELVES WILL BE COVERED ON A DAILY BASIS WITH A SIX (6) INCH COMPACTED LAYER OF SUITABLE MATERIAL THAT FALLS WITHIN THE USDA TEXTURAL CLASSES OF SANDY LOAM, SANDY CLAY LOAM, SILTY CLAY LOAM, AND SILT LOAM WITH COARSE FRAGMENTS NOT PASSING A NO. 10 MESH SIEVE NOT–TO–EXCEED 75% BY VOLUME, AND THE COMBUSTIBLE AND/OR COAL CONTENT SHALL NOT EXCEED 12% BY VOLUME.

IMMEDIATE COVER OF ONE (1) FOOT OF SELECTED COVER MATERIAL SIMILAR TO THAT DETAILED ABOVE SHALL BE PLACED ON COMPLETE LIFTS IN AREAS WHERE THERE IS A CLEAR INTENTION TO PLACE ANOTHER LIFT ON TOP WITHIN ONE (1) YEAR.

FINAL COVER SHALL CONSIST OF A 2 (TWO) FOOT COMPACTED LAYER OF SUITABLE MATERIAL WITH COARSE FRAGMENT CONTENT NOT EXCEEDING 60% BY VOLUME. THE FINAL SOIL COVER SHALL COMPACT WELL, NOT CRACKING EXCESSIVELY WHEN DRY, AND SHALL SUPPORT A VEGETATIVE COVER.

THE SEDIMENTATION THAT MAY BE GENERATED BY HAVING EXPOSED SOILS DURING THE CONSTRUCTION PHASES AND DURING THE OPERATION OF THE LANDFILL WILL BE HANDLED BY SEDIMENTATION/RETENTION BASIN NOS. 1, 4, 5, AND 6, AND BY COMPOST FILTER SOCKS. COMPOST FILTER SOCKS WILL BE PLACED ALONG THE TOES OF ALL EXPOSED SLOPES WHERE RUNOFF IS NOT BEING INTERCEPTED BY DRAINAGE DITCHES. THIS PROCEDURE WILL TRAP ANY SEDIMENT PRIOR TO IT BEING CONVEYED OFF OF THE SITE. COMPOST FILTER SOCKS SHALL BE INSPECTED AFTER EVERY SIGNIFICANT RAINFALL EVENT, AND ANY REPAIRS REQUIRED SHALL BE MADE IMMEDIATELY. UPON STABILIZATION OF THE UPSLOPE SOILS, ALL TEMPORARY CONTROLS, SUCH AS THE COMPOST FILTER SOCKS, CAN BE REMOVED.

THE SEDIMENT THAT WILL BE GENERATED WILL BE CONVEYED VIA THE PERMANENT DRAINAGE DITCHES TO SEDIMENTATION/RETENTION BASIN NOS. 1, 4, 5, AND 6. HERE, THE SEDIMENT WILL BE ALLOWED TO SETTLE OUT OF THE RUNOFF PRIOR TO THE FLOW BEING CONVEYED VIA EXISTING CLEAN WATER DITCH NO. 10 TO EDDY CREEK. THESE BASINS WILL BE CLEANED WHEN THE ELEVATION OF SEDIMENT REACHES THE CLEANOUT STRAP ON THE RISER PIPES WITHIN EACH BASIN. THESE ELEVATIONS HAVE BEEN CALCULATED TO BE THE ELEVATION WHERE 1,000 CUBIC FEET PER CONTRIBUTING DRAINAGE AREA WOULD BE.

AS NOTED PREVIOUSLY, THE TEMPORARY CONTROL MEASURES WILL CONSIST OF COMPOST FILTER SOCKS AND TEMPORARY MULCHING AND SEEDING, AS SHOWN ON THE PLANS.

COMPOST FILTER SOCKS SHALL BE CONSTRUCTED AS DETAILED. THE MAXIMUM SLOPE LENGTH ABOVE ANY SOCK SHALL NOT EXCEED THAT SHOWN ON FIGURE 4.2 IN THE PADEP EROSION AND SEDIMENT POLLUTION CONTROL MANUAL, MARCH 2012. SEEDING AND MULCHING SHALL BE APPLIED AS NOTED IN THE SEEDING SCHEDULE. SEDIMENTATION/RETENTION BASINS WERE SIZED TO ACCOMMODATE 5,000 CUBIC FEET PER ACRE OF CONTRIBUTING DRAINAGE AREA PLUS AN ADDITIONAL 1,000 CUBIC FEET PER ACRE OF CONTRIBUTING DRAINAGE AREA WHICH IS FOR THE SEDIMENT STORAGE ZONE.

THE PURPOSE OF THE PERMANENT CONTROL MEASURES THAT WILL BE CONSTRUCTED DURING THE PHASE III SITE DEVELOPMENT PROJECT WILL BE TO CONTROL ANY SEDIMENTATION AND TO ELIMINATE ANY EROSION FROM OCCURRING DURING THE TIME THAT THE DISTURBED SOILS ARE BARE. THESE SAME MEASURES WILL CONTROL THE STORMWATER ONCE THE PROJECT AREA HAS BEEN RECLAIMED AND STABILIZED. ALL DRAINAGE DITCHES SHOWN ON THE PLANS WILL BE PERMANENT CONVEYANCES FOR STORMWATER ONCE THE PROJECT IS COMPLETED. SEDIMENTATION/RETENTION BASIN NOS. 1, 4, 5, AND 6 WILL ALSO REMAIN AND SERVE AS RETENTION PONDS TO CONTROL THE AMOUNT OF FLOW TO EDDY CREEK.

THE PERMANENT CONTROL MEASURES FOR THE PHASE III SITE WILL CONSIST OF THE FOLLOWING:
1. FINAL VEGETATIVE COVER AS CALLED FOR ON THE REVEGETATION SCHEDULE.
2. THE GRASS LINED OR ROCK LINED DRAINAGE DITCHES.
3. SEDIMENTATION/RETENTION BASIN NOS. 1, 4, 5, AND 6.
4. THE EXISTING CONTROL MEASURES FOR THE PHASE I AND PHASE II SITE WILL REMAIN IN PLACE.

ALL PERMANENT CONTROL FACILITIES WERE DESIGNED TO MEET THE REQUIREMENTS OF THE DEPARTMENT OF ENVIRONMENTAL PROTECTION'S CHAPTER 102, EROSION AND SEDIMENT CONTROL. SEDIMENTATION/RETENTION BASIN NOS. 1, 4, 5, AND 6 WERE DESIGNED TO SAFELY CONVEY THE 2, 10, 25, 50, AND 100 YEAR STORM EVENTS, AND TO REDUCE THE RATES TO BELOW PRE–DEVELOPMENT CONDITIONS. THE PERMANENT DRAINAGE DITCHES WERE DESIGNED TO SAFELY CONVEY THE 10 YEAR STORM EVENT WITH 0.5 FEET OF FREE BOARD. THE ENLARGEMENT OF THE BASINS WILL BE IN CONFORMANCE WITH THE STANDARDS OF THE BUREAU OF WATERWAYS ENGINEERING, DAM SAFETY, OF THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

TOPOGRAPHY

THE LOCATION OF THE LANDFILL RELATIVE TO HIGHWAYS AND MUNICIPALITIES IS SHOWN ON THE PLANS BY MEANS OF A GENERAL LOCATION MAP. CONTOURS, BOUNDARY LINES, AND OTHER FEATURES OF INTEREST ARE SHOWN ON THE PROJECT DRAWINGS, ALONG WITH THE BOUNDARY OF THE PHASE III PROJECT. THERE ARE NO LAKES, PONDS, STREAMS, OR OTHER BODIES OF WATER WITHIN THE PROJECT AREA (OTHER THAN THE SEDIMENTATION/RETENTION BASINS). LITTLE ROARING BROOK AND THE PENNSYLVANIA AMERICAN WATER COMPANY'S RESERVOIR NO. 1 ARE LOCATED APPROXIMATELY 1,200 FEET AND 900 FEET FROM THE PROJECT SITE, RESPECTIVELY. HOWEVER, THE PROJECT SITE DOES NOT DRAIN TO THESE WATERS. EDDY CREEK IS THE RECEIVING WATER/WATERSHED AND IS APPROXIMATELY 3,000 FEET FROM THE PROJECT SITE. AS LISTED IN CHAPTER 93, "WATER QUALITY STANDARDS", FROM THE DEPARTMENT OF ENVIRONMENTAL PROTECTION, EDDY CREEK IS CLASSIFIED AS WARM WATER FISHES, MIGRATORY FISHES (WWF, MF).

SOILS

SOIL CHARACTERISTICS AND LIMITATIONS CAN BE FOUND FROM: "SOIL SURVEY OF LACKAWANNA AND WYOMING COUNTIES, PENNSYLVANIA," SOIL CONSERVATION SERVICE, UNITED STATES DEPARTMENT OF AGRICULTURE, MARCH 1982. THE EXISTING SOILS ARE SHOWN ON THE PLANS. THE MAIN SOIL TYPES ON THIS SITE ARE:

ARC – ARNOT VERY CHANNERY SILT LOAM, VERY ROCKY, 3 TO 15 PERCENT SLOPES (NOT HYDRIC)
ASB – ARNOT–ROCK OUTCROP COMPLEX, 0 TO 8 PERCENT SLOPES (NOT HYDRIC)
ASD – ARNOT–ROCK OUTCROP COMPLEX, 8 TO 25 PERCENT SLOPES (NOT HYDRIC)
ASE – ARNOT–ROCK OUTCROP COMPLEX, STEEP (NOT HYDRIC)
BBD – BATH EXTREMELY STONY SILT LOAM, 8 TO 25 PERCENT SLOPES (NOT HYDRIC)
DA – DUMPS, MINE (NOT HYDRIC)
DYD – DYSTROCHREPTS AND ROCK OUTCROP, MODERATELY STEEP (HYDRIC)
DYE – DYSTROCHREPTS AND ROCK OUTCROP, STEEP (NOT HYDRIC)
NXB – NORWICH AND CHIPPEWA EXTREMELY STONY SILT LOAMS, 0 TO 8 PERCENT SLOPES (HYDRIC)
SXB – SWARTSWOOD EXTREMELY STONY LOAM, 3 TO 8 PERCENT SLOPES (NOT HYDRIC)
SXD – SWARTSWOOD EXTREMELY STONY LOAM, 8 TO 25 PERCENT SLOPES (NOT HYDRIC)
UA – UDORTHENTS, STRIP MINE (NOT HYDRIC)
UR – URBAN LAND (NOT HYDRIC)
VKB – VOLUSIA EXTREMELY STONY SILT LOAM, 0 TO 8 PERCENT SLOPES (HYDRIC)
WKB – WURTSBORO CHANNERY LOAM, 3 TO 8 PERCENT SLOPES (HYDRIC)
WXB – WURTSBORO EXTREMELY STONY LOAM, 3 TO 8 PERCENT SLOPES (HYDRIC)
WXD – WURTSBORO EXTREMELY STONY LOAM, 8 TO 25 PERCENT SLOPES (HYDRIC)
L – LANDFILL (NOT HYDRIC)
R – SURFICIAL REFUSE DUMPS, STOCKPILES OF RAW AND PROCESSED MATERIALS (NOT HYDRIC)

HYDROLOGY

THE PROGRAM HYDRAFLOW WAS UTILIZED, USING THE SCS METHOD, TO SIZE THE STORMWATER FACILITIES (I.E., DRAINAGE DITCHES, TERRACES, SEDIMENT/RETENTION BASIN NO. 6, ENLARGEMENT OF SEDIMENT/RETENTION BASIN NOS. 1 AND 5) ON THE SITE.

THE FACTORS CONSIDERED IN THE CALCULATIONS WERE THE PRESENT SOIL TYPES AND LAND USE, PROPOSED LAND USE, GRADES, AND ANY ADDITIONAL RUNOFF FROM THE ADJOINING PROPERTIES.

THE PROJECT WILL HAVE NO ADVERSE IMPACTS ON THE EROSION RESISTANCE OF THE DOWNSTREAM WATERCOURSES.

EROSION AND SEDIMENT CONTROL MAINTENANCE

DURING CONSTRUCTION OF THE FACILITY, ALL TEMPORARY CONTROL MEASURES WILL BE MAINTAINED BY THE OPERATOR. ONCE THE BASIC FACILITY IS COMPLETED AND THE LANDFILL OPERATION BEGINS, THE OPERATOR, "KEYSTONE SANITARY LANDFILL, INC." WILL BE RESPONSIBLE FOR THE MAINTENANCE AND DISPOSAL OF TEMPORARY MEASURES. KEYSTONE SANITARY LANDFILL, INC. WILL ALSO BE RESPONSIBLE FOR THE MAINTENANCE OF ALL PERMANENT CONTROL MEASURES ONCE INSTALLED.

THE EROSION AND SEDIMENTATION CONTROL MEASURES, BOTH TEMPORARY AND PERMANENT, SHALL BE REGULARLY INSPECTED AND SHALL BE CLEANED OF TRAPPED SEDIMENT OR REPAIRED IF NECESSARY BY KEYSTONE SANITARY LANDFILL, INC.

SEDIMENTATION/RETENTION BASINS SHALL BE INSPECTED REGULARLY BY KEYSTONE SANITARY LANDFILL, INC., AND CLEANED OF ALL SEDIMENT WHEN THE SEDIMENT REACHES THE CLEANOUT ELEVATION(S).

ONCE THE ITEMS NOTED ABOVE ARE INSTALLED AND DISTURBED AREAS ARE STABILIZED OR TEMPORARILY MULCHED, THE SITE PREPARATION FOR THE LINED SITE AREAS WILL BEGIN. THE EXCAVATION, SUBGRADE PREPARATION, SOIL WATER INTERCEPT PIPE SYSTEM, DOUBLE LINER SYSTEM WITH LINER MONITORING, AND LEACHATE COLLECTION SYSTEM WILL COMMENCE AT THE PHASE III SITE DEVELOPMENT AREA. THIS WORK WILL FOLLOW THE CONSTRUCTION/OPERATION AND CLOSURE SCHEDULE.

EARTH MOVING ACTIVITIES

PRIOR TO THE COMMENCING OF SANITARY LANDFILLING IN THE DESIGNATED AREAS, THE FOLLOWING WILL BE COMPLETED:

A.) INSTALLATION OF ALL TEMPORARY AND PERMANENT EROSION AND SEDIMENTATION CONTROL MEASURES DESCRIBED IN THIS NARRATIVE AND AS DEPICTED ON THE PLANS.
B.) CONSTRUCTION OF ALL DIVERSION DITCHES, ADDITION OF SEDIMENTATION/RETENTION BASIN NO. 6, AND ENLARGEMENT OF SEDIMENTATION/RETENTION BASIN NOS. 1 AND 5 AS SHOWN ON THE PLANS.
C.) CONSTRUCTION OF THE ACCESS ROADWAY EXTENSION AND THE LEACHATE AND GAS MANAGEMENT FACILITIES. THE PLACEMENT OF THE METHANE GAS COLLECTION WELLS AND PIPING WILL BE PERFORMED SEQUENTIALLY DURING THE RESPECTIVE CLOSURE INCREMENTS.
D.) THE ENTRANCE GATE, SECURE FENCING, AND SIGNAGE ARE ALREADY IN PLACE.
E.) IN CONJUNCTION WITH THE ABOVE DESCRIBED ITEMS OF CONSTRUCTION, THE SITE PREPARATION FOR THE LINED SITE AREAS WILL BEGIN. THE CONSTRUCTION FOR EACH OF THE LINED INCREMENT PADS WILL CONSIST OF THE FOLLOWING CONSTRUCTION PROCEDURES:

1.) EXCAVATE TO PROPOSED SUBGRADE ELEVATIONS.
2.) INSTALL TEMPORARY DIVERSION DITCH.
3.) PREPARE SUBGRADE FOR LINER PLACEMENT.
4.) REMOVE TEMPORARY DIVERSION DITCH FROM PRIOR PAD.
5.) INSTALL SECONDARY LINER WITH DETECTION ZONE MATERIAL AND PIPING.
6.) INSTALL PRIMARY LINER WITH COLLECTION ZONE MATERIAL AND COLLECTION PIPING.
7.) INSTALL GEO–FABRIC AND BEGIN WASTE PLACEMENT OPERATION.
8.) START EXCAVATION ON NEXT PAD.
9.) UPON REACHING THE PROPOSED ELEVATION OF SOLID WASTE, INSTALL CAP AND PLACE FINAL COVER ON RESPECTIVE INCREMENT.
10.) STABILIZE FINAL COVER.

THIS WORK SEQUENCE WILL BE FOLLOWED FOR EACH LINED INCREMENT PAD CONSTRUCTION AS SHOWN ON THE PLANS.

CONSTRUCTION SCHEDULE

THE PROJECT CONSTRUCTION IS EXPECTED TO BEGIN IN THE YEAR 2018 AND WILL BE AN ONGOING OPERATION FOR SOME FORTY (40) YEARS.

PLAN PREPARER

THIS PLAN WAS PREPARED BY CECO ASSOCIATES, INC., MR. ANTHONY C. BERNARDI, P.E. MR. ANTHONY C. BERNARDI, P.E. HAS BEEN A PROFESSIONAL ENGINEER SINCE 2011.

KEYSTONE LANDFILL, INC. SITE DEVELOPMENT – PHASE III
FORM H – REVEGETATION

KEYSTONE SANITARY LANDFILL, INC.
SITE DEVELOPMENT – PHASE III
REVEGETATION

B: SOIL TEST PLAN

THE KEYSTONE SANITARY LANDFILL STAFF WILL OBTAIN THE REQUIRED DATA AND SOIL SAMPLES FOR THE "SOIL TEST INFORMATION FORM" ST–1 AND SUBMIT SAME TO THE PENNSYLVANIA STATE UNIVERSITY C/O NERKLE LABORATORY OF AGRICULTURE FOR RECOMMENDATIONS ON LIME AND FERTILIZATION RATES ASSOCIATED WITH ESTABLISHING TEMPORARY AND FINAL COVER.

C(A): TEMPORARY COVER – SEED MIXTURE AND QUALITY

SEED MIXTURE		SEED QUALITY		
SPECIES	LBS/ACRE	MIN % GERM.	MIN % PURITY	SEEDING DATES
ANNUAL RYEGRASS	40	85	95	JANUARY 1ST
OR				THROUGH
SPRING OATS	96	90	85	JUNE 15TH
SUDANGRASS	40	85	98	JUNE 16TH
OR				THROUGH
ANNUAL RYEGRASS	40	85	95	AUGUST 15TH
ANNUAL RYEGRASS	40	85	95	
OR				AUGUST 16TH
WINTER RYE	168	85	98	THROUGH
OR				DECEMBER 31ST
WINTER WHEAT	180	85	98	

AFTER SEEDING, MULCH WITH HAY OR STRAW AT A RATE OF 2.5 TONS TO 3 TONS PER ACRE.

C(B)

THE TEMPORARY COVER WILL BE PLACED ON ALL DISTURBED AREAS NOT AT FINAL GRADE WHICH WILL BE WITHOUT SIGNIFICANT ACTIVITY FOR MORE THAN 20 DAYS. ANY AREA REQUIRING TEMPORARY SEEDING WHICH WILL BE INACTIVE FOR A PERIOD LONGER THAN ONE (1) YEAR SHALL BE RE–VEGETATED USING PERMANENT SEEDING MIXTURES AND PROCEDURES.

C(C)

ALL AREAS TO BE TEMPORARILY SEEDED SHALL BE PREPARED BY APPLYING ONE (1) TON OF AGRICULTURAL GRADE LIMESTONE PER ACRE PLUS FERTILIZER AT THE RATE OF 50–50–50 PER ACRE. HYDROSEEDING TECHNIQUES WILL BE EMPLOYED TO PLACE SEED BED PREPARATION MATERIALS.

C(D)

TEMPORARY RE–VEGETATION SEEDING WILL BE PLACED BY HYDROSEEDING TECHNIQUES.

C(E)

AFTER SEEDING, MULCH WILL BE APPLIED MECHANICALLY AT A RATE OF 3 TONS PER ACRE. THE TYPE OF MULCH TO BE USED WILL BE HAY OR STRAW.

C(E)

THE STANDARDS TO ESTABLISH SUCCESSFUL RE–VEGETATION SHALL BE AS FOLLOWS:

- A MINIMUM OF 70% GROUND COVER
- NO MORE THAN 1% OF THE TOTAL AREA SHALL HAVE LESS THAN 30% GROUND COVER
- NO SINGLE OR CONTIGUOUS AREA EXCEEDING 3,000 SQUARE FEET SHALL HAVE LESS THAN 30% GROUND COVER
- NO TREES, WOODY SHRUBS OR DEEP ROOTED PLANTS SHALL BE PLACED OR ALLOWED TO GROW ON THE RE–VEGETATED AREA

C(G)

DURING THE SPRING AND FALL OF EACH YEAR, KEYSTONE SANITARY LANDFILL PERSONNEL WILL CONDUCT AN INSPECTION OF ALL TEMPORARILY SEEDED AREAS. ALL SETTLEMENTS SHALL BE RE–GRADED AND RE–VEGETATED. IF NECESSARY, SOIL CONDITIONERS WILL BE APPLIED DURING THE GROWING SEASON.

D(A): PERMANENT COVER – SEED MIXTURE AND QUALITY

SEED MIXTURE		SEED QUALITY		
SPECIES	LBS/ACRE	MIN % GERM.	MIN % PURITY	SEEDING DATES
BIRDSFOOT TREFOIL	10	80	98	AUGUST 15TH
CROWN VETCH	20	70	98	THROUGH
TALL FESCUE	30	80	95	DECEMBER 31ST

D(B)

THE PERMANENT REVEGETATION MATERIALS WILL BE PLACED DURING FINAL CLOSURE OPERATIONS AND ON ANY AREA HAVING RECEIVED TEMPORARY SEEDING THAT HAS REMAINED INACTIVE FOR A PERIOD LONGER THAN ONE (1) YEAR.

D(C)

SEEDBED PREPARATION AND LIME/FERTILIZER SHALL BE AS NOTED IN THE SOIL TEST PLAN, SECTION B. OF THIS EXHIBIT.

D(D)

AT SEEDING TIME, THE LIME, FERTILIZER, SEEDING MIXTURE, AND INOCULANTS SHALL BE APPLIED VIA HYDROSEEDING TECHNIQUES WITH THE SLURRY MIXTURE APPLIED AT A RATE OF 1,000 GALLONS PER ACRE.

D(E)

MULCH SHALL BE HAY OR STRAW APPLIED TO PRODUCE A LAYER 1 INCH TO 1 ½ INCHES THICK, OR APPROXIMATELY 3 TONS PER ACRE.

D(F)

THE STANDARDS FOR SUCCESSFUL REVEGETATION SHALL BE SIMILAR TO SECTION C(F) OF THIS EXHIBIT.

D(G)

KEYSTONE STAFF WILL CONTINUALLY MONITOR THE REVEGETATION GROWTH AND IMMEDIATELY REGRADE AND RESEED ANY SETTLEMENTS OR UNSUCCESSFUL REVEGETATION AREAS. EACH SUMMER, AN ON–SITE INSPECTION WILL BE CONDUCTED BY KEYSTONE PERSONNEL WITH REPRESENTATIVES OF THE SOIL CONSERVATION SERVICE AND PADEP, IF DESIRED, TO DETERMINE COMPLIANCE WITH THE REVEGETATION STANDARDS ESTABLISHED IN SECTION C(F) OF THIS EXHIBIT, AND ESTABLISH A REMEDIATION RESEEDING PROGRAM, IF REQUIRED.

EXHIBIT B–5

DAVID J. OSBORNE, P.E.
REGISTRATION # 32210–E

REVISIONS	DATE
DESIGNED BY: A.J.M.	A.J.M.
DRAWN BY: A.C.B.	SCALE: NO SCALE
DATE: 12–01–05	2–10–14

SOIL EROSION CONTROL NARRATIVE
KEYSTONE SANITARY LANDFILL
SITE DEVELOPMENT – PHASE III
DUNMORE BOROUGH , THROOP BOROUGH PENNSYLVANIA

consulting engineers
ceco associates inc.,
a labella company
p.o. box 865, scranton, pa. 18501 570–343–3101

SHEET NO. 68

Date Prepared: 03/2014

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

I.D. Number: 101247

BONDING WORKSHEET C
GROUNDWATER MONITORING SYSTEM

1.	Number of wells in the approved monitoring plan.		28
	a. Shallowest well depth	79 ft.	
	b. Deepest well depth	486 ft.	
	c. Average well depth	283 ft.	
	d. Number with dedicated pumps	28	
2.	Unit cost to upgrade an existing well with a dedicated pump		1,500.00 $/well
3.	Unit cost to install a well (assume average well depth, and include drilling, installation, developing and pump installation)		($12.50/ft) - 5,037.50 $/well
4.	Number of wells to be installed (wells in the approved plan that haven't been installed)		0
5.	Number of wells to be replaced over the life of the monitoring period (use 10% of line 1 and round up)		4
6.	Number of pumps to be replaced/repaired (use 25% of line 1 over the monitoring period)		9
7.	Unit cost to purge and sample a well (assume average well depth, and include methane monitoring, record keeping and shipping)		150.00 $/well
8.	Unit cost to analyze sample(s)		
	a. Quarterly (25 PA Code §273.284, §277.284 or §288.254)		185.50 $/well
	b. Annually (25 PA Code §273.284, §277.284 or §288.254)		350.00 $/well
9.	Unit cost to analyze data (includes review of lab QA/QC data, database input, form completion, statistical analysis and data review)		250.00 $/well
10.	Cost to purge, sample and analyze – quarterly (line 7 + line 8a + line 9)		585.50 $/well
11.	Cost to purge, sample and analyze – annually (line 7 + line 8b + line 9)		750.00 $/well
12.	Number of years of sampling (30 + time to close)		31 years

13. Cost Summary –Groundwater Monitoring System

a.	System upgrade ([line 1 – line 1d] x line 2)	$ 0
b.	Wells to be Installed (line 3 x line 4)	$ 0
c.	Wells to be replaced (line 3 x line 5)	$ 20,150.00
d.	Pumps to be replaced (line 2 x line 6)	$ 13,500.00
e.	Cost of Quarterly Monitoring (line 1 x "4" x line 10 x line 12)	$ 2,032,856.00
f.	Cost of Annual Monitoring (line 1 x line 11 x line 12)	$ 651,000.00
	Subtotal	**$ 2,717,506.00**

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 currently in assessment, abatement or increase monitoring **(MW-15A Increased Monitoring)**	$ 271,750.60

Total **$ 2,989,256.60**

(Place this total on Summary Cost Worksheet – line 3)

CECO ASSOCIATES, INC.
P.O. BOX 995
SCRANTON, PENNSYLVANIA 18501

Keystone Sanitary Landfill
PaDEP Municipal Solid Waste Permit 101247
Bonding Worksheet C
Groundwater Monitoring System Narrative

1. Cost data provided by Keystone Landfill, Inc. whose trained personnel purge/sample the wells.

2. Laboratory fees provided by Hawk Mtn. Labs, which picks up, analyses, and reports the results to Hydro-Geo Services, Inc.

3. Professional fees provided by Hydro-Geo Services, Inc., who reviews analytical data, submits the Form 19's and performs an annual groundwater assessment.

4. Drilling and pump installation fees provided by Casey-Kassa Well Drilling of Laflin, Pennsylvania.

Date Prepared	COMMONWEALTH OF PENNSYLVANIA DEPARTMENT OF ENVIRONMENTAL PROTECTION BUREAU OF WASTE MANAGEMENT	I.D. Number
03/2014		101247

BONDING WORKSHEET D
SURFACE WATER MONITORING

Solid Waste Surface Water Sampling

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

NPDES Surface Discharge Sampling

8.	Number of outfalls monitored	1	
9.	Monitoring frequency (i.e. monthly, quarterly, etc)	Semi Annually	
10.	Number of samples to be taken per point/year	2	
11.	Unit cost to sample a surface point (record keeping and shipping)	400.00	$/point
12.	Unit cost to analyze sample(s) (including data review and completing DMR)	150.00	$/point
13.	Number of years of sampling (30 + time to close)	31 years	
14.	Cost Summary –Surface Water Monitoring		
	a. Cost of Quarterly Surface Water Monitoring (line 1 x "4" x line 5 x line 7)	$ N/A	
	b. Cost of Annual Surface Water Monitoring (line 1 x line 6 x line 7)	$ N/A	
	c. Cost of NPDES Monitoring (line 8 x line 10 x [line 11 + line 12] x line 13)	$ 34,100.00	
	d. NPDES renewals over post-closure period (includes application development, fees, etc.) use 10% of line 14c	$ 3,410.00	
	Subtotal$	**$ 37,510.00**	

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 $\$$ 37,510.00

Total $\$$ **37,510.00**

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

Date Prepared: 03/2014

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

I.D. Number: 101247

BONDING WORKSHEET E
PRIVATE WATER SUPPLY MONITORING

1. Number of private water supplies monitored. 0
2. Unit cost to sample a well (include methane monitoring, record keeping and shipping) N/A $/well
3. Unit cost to analyze sample(s) quarterly (Act 101 Section 1103) N/A $/well
4. Unit cost to analyze data (includes review of lab QA/QC data, database input, form completion, and data review) N/A $/well
5. Total cost for quarterly sampling (line 2 + line 3 + line 4) N/A $/well
6. Number of years of sampling (30 + time to close) N/A years
7. Cost Summary –Private Water Supply Monitoring
   a. Cost of quarterly monitoring (line 5 x 4 x line 6) $ 0

Total $ 0
(Place this total on Summary Cost Worksheet – line 5)

Date Prepared: 03/2014

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

I.D. Number: 101247

BONDING WORKSHEET F
GAS MONITORING SYSTEM

1. Number of probes in the approved monitoring plan. Refer to Note below
   a. Shallowest probe depth _____ ft.
   b. Deepest probe depth _____ ft.
   c. Average probe depth _____ ft.
   d. Number of probes installed _____
2. Unit cost to install a probe (including, drilling, and installation) _____ $/probe
3. Number of probes to be installed (probes in the approved plan that haven't been installed _____
4. Number of probes to be replaced over the life of the monitoring period (use 5% of line 1 and round up) _____
5. Unit cost to monitor a probe (include record keeping) _____ $/probe
6. Number of probes and structure monitoring events per year
7. Number of years of monitoring (30 + time to close) _____ years
8. Cost Summary –Gas Monitoring System
   a. System completion (line 3 x line 2) $ $_____
   b. Probe replacement (line 2 x line 4) $ $_____
   c. Probe Monitoring (line 1 x line 5 x line 6 x line 7) $_____

Subtotal $_____

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 or increased monitoring

Total $ **0.00**
(Place this total on Summary Cost Worksheet – line 6)

Note:

Quarterly gas monitoring costs associated with perimeter and building monitoring referenced in Worksheet F are included in monitoring costs on Worksheet G.

Date Prepared: 03/2014

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

I.D. Number: 101247

BONDING WORKSHEET G
GAS COLLECTION SYSTEM

1. Number of wells in the approved monitoring plan. 460
   a. Shallowest well depth 15 ft.
   b. Deepest well depth 130 ft.
   c. Average well depth 70 ft.
   d. Number of wells installed 368
   e. Number of pumping wells 7
2. Cost for flare or other control device installation $ 0 LS
3. Unit cost to install a well (including, drilling, installation, and connection to active system) 5,250 $/well
4. Unit cost to install a gas well requiring liquid removal (including, drilling, installation, and connection to active system) 7,250 $/well
5. Number of wells to be installed (wells in the approved plan that haven't been installed) 94
6. Number of gas wells requiring liquid removal to be installed 0
7. Estimate the length of collection piping to be installed 30,600 LF
8. Unit cost to install collection piping (include excavation, pipe bedding, pipe, backfilling, regrading, revegetating, surveying and QA/QC) 40 $/LF
9. Number of wells to be replaced/repaired over the life of the monitoring period (use 10% of line 1 and round up) 46
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) 13.40 $/well
11. Unit cost to conduct surface monitoring (NSPS) 3,250.00 $/event
12. Control System Information
    a. number and size of blowers (6) 50 HP, (5) 75 HP, (2) 250 HP
    b. flare dimensions and capacity (3) 5000 12x50, (1) 4000 11x40, (1) 800 7x30
    c. current flow rate 10,800 SCFM
    d. other features 5.2MW Powerplant,Compressor Station
13. Cost of electricity to run system 20,000.00 $/year
14. Cost to maintain system (including daily check, weekly charts, maintenance, etc.) 20,000.00 $/year
15. Cost of annual blower maintenance (including greasing, bearing check and alignment) 3,500.00 $/year

16. Cost of stack testing (once per five years) 7,500.00 $/event
17. Estimate the volume of condensate generated per year 4,192,755 gallons
18. Cost of condensate management (including pumping, testing and treatment/disposal) 15,000.00 $/year
19. Number of years to run system (30 + time to close) 31 years
20. Cost Summary –Gas Collection System

System Installation

a.	Additional well installation (line 5 x line 3)	$ 493,500.00
b.	Additional pumping well installation (line 4 x line 6)	$ 0.00
c.	Cost of collection piping (line 7 x line 8)	$ 1,224,000.00
d.	Well replacement (line 3 x line 9)	$ 241,500.00
e.	Enclosed ground flare system (line 2)	$ installed
	System Installation Subtotal (sum lines a to e)	$ 1,959,000.00
f.	Cost of monitoring/balancing (line 1 x "12" x line 10 x line 19)	$ 2,293,008.00
g.	Cost of surface monitoring (line 11 x "1.5" x line 19)	$ 151,125.00
h.	Electric Cost (line 13 x line 19)	$ 620,000.00
i.	System maintenance cost (line 14 x line 19)	$ 620,000.00
j.	Blower maintenance cost (line 15 x line 19)	$ 108,500.00
k.	Stack testing cost (line 16 x [line 19/5])	$ 46,500.00
l.	Condensate management cost (line 18 x line 19)	$ 465,000.00
	System Monitoring and Maintenance Subtotal (sum lines f to l)	$ **4,304,133.00**

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 system[1] < 2yrs old
b. Use 5% of subtotal if system[1] is > 2 yrs old, but < 5yrs old
c. Use 10% if system[1] is > 5 yrs old

$ 430,413.00

Total (Installation subtotal + M & M subtotal + Misc. Maintenance) $ **6,693,546.00**
(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.*

Keystone Sanitary Landfill
PADEP Municipal Solid Waste Permit 101247
Bonding Worksheet G
Gas Collection System

WELL INSTALLATION COST

Average Well Depth	=	70 LF / well
Drilling/Construction Cost	=	$75 / LF
	=	$5,250 / well
Well Pumping Equipment	=	$2,000
Liquid Removal Well	=	$7,250

COLLECTION PIPING COST

Open Acres (for Bond)	=	102
Gas Piping Per Acre (Avg.)	=	300 LF
	=	30,600 LF
Pipe Materials / Install / Backfill /		
Piping, Valves & Fittings	=	$15.00 / LF
Install and Revegetation	=	$15.00 / LF
Surveying / CQA	=	$10.00 / LF
	=	$40.00 / LF

Keystone Sanitary Landfill
PADEP Municipal Solid Waste Permit 101247
Bonding Worksheet G
Gas Collection System

GAS Well MONITORING COST

Number of Wells	=	460
Monitoring Time	=	8 min / well
	=	62 hrs / event
NSPS Follow-up Monitoring (20% of wells, 2 events)	=	24 hrs / month
NSPS Recordkeeping	=	10 hrs / month
Total Monthly Gas Monitoring Time	=	96 hrs / month
Gas Technician	=	$65 / hr
	=	$6,240 / month
	=	$13.56 / well (460 wells total)

NSPS SURFACE AND QUARTERLY PERIMETER/BUILDING MONITORING

Initial SEM Event	=	50 hrs / event
Perimeter and Building	=	10 hrs / quarter
Follow-up Monitoring	=	25 hrs / quarter (0.5* Initial)
Total Monitoring Time	=	85 hrs / quarter
Gas Technician	=	$65 / hr
	=	$3,250 / initial event
	=	$5,525 / quarter

Keystone Sanitary Landfill
PADEP Municipal Solid Waste Permit 101247
Bonding Worksheet G
Gas Collection System

OPERATIONS AND MAINTENANCE COST

Landfill gas collected onsite will be primarily sold to 3rd party end-users with a remaining portion flared onsite. Revenue from gas sold will exceed the electrical operating cost to operate the landfill gas blower systems that delivery gas to the end-users and flares. Therefore, for the purpose of bonding the blower operating cost is not included in the operations and maintenance cost. The anticipated electrical cost included in the bonding worksheet covers general electrical costs associated with pumps, controls and instrumentation.

The following calculations are provided for reference to show the electrical demand associated with flaring the portion of gas onsite. These costs will be offset by gas sales.

Electrical Rate = $0.0694 / kWh (US EIA - 2013 Rates for PA Industrial)

LFG Blower Capacities	**HP**	**FLOW RATE**	
(6) 50 HP @ 100% Duty Cycle	= 300 HP	9,000 SCFM	(6 running)
(1) 100 HP @ 100% Duty Cycle	= 100 HP	3,000 SCFM	(1 running)
(2) 75 HP @ 100% Duty Cycle	= 150 HP	5,000 SCFM	(2 running)
(2) 75 HP @ 50% Duty Cycle	= 75 HP	2,000 SCFM	(1 running, 1 as backup)
(2) 200 HP @ 50% Duty Cycle	= 200 HP	6,000 SCFM	(1 running, 1 as backup)
Total HP Required	800 HP	25,000 SCFM	

Flare Design Capacities

(3) 5000 SCFM (12x50')	=	15,000 SCFM
(1) 4000 SCFM (11x40')	=	4,000 SCFM
(1) 800 SCFM (10x30')	=	800 SCFM
(3) 500 SCFM (Open Flares)	=	1,500 SCFM
Total Enclosed Flare Capacity	=	20,300 SCFM

Blower Design HP/SCFM	=	Design HP / Design Flow
	=	0.0320 HP / SCFM
LFG Flared (SCFM)	=	Total LFG generated as per EPA LandGEM Model – LFG Sold to 3rd Party End-Users
30-Yr Average LFG Flared	=	5,368 SCFM
HP Required	=	(HP/SCFM) * LFG Flared
	=	0.0320 * 5,368 SCFM

	=	171.8 HP
kW Required	=	(HP) * 0.7456 (1HP = 0.7456 kW)
	=	128.1 kW
$/kW-hr	=	kW Required * $0.0694 /kW-hr
	=	$8.89/ hr
Annual Electrical Cost ($)	=	$/kW-hr * 24 * 365
	=	$77,876 / YR

Date Prepared: 03/2014

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

I.D. Number: 101247

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)	$ 43,609.00
2.	NSPS Annual Report preparation cost	$ 10,000.00
3.	Local permit or Host Agreement requirements	$ 600.00
4.	UST/AST registration	$ 300.00
5.	Other Greenhouse Gas (GHG) Emissions Reporting	$ 7,000.00
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) **$ 1,906,779.00**

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

Keystone Sanitary Landfill
PADEP Municipal Solid Waste Permit 101247
Bonding Worksheet H
Other Monitoring and Reporting

Item 1 & 2:

Keystone Sanitary Landfill (KSL) contracts with EarthRes Group, Inc. to assist in completing the annual air emission inventory (AIMS), and quarterly collection efficiency form and reporting. KSL compiles the New Source Performance Standards (NSPS) forms and reporting and provides the NSPS, AIMS and collection efficiency certified reports to the Pennsylvania Department of Environmental Protection (PADEP) and where applicable the Environmental Protection Agency (EPA).

The AIMS Emission Fee is based on 2012 emission data and the new Title V emission fee. Per 2013 approval order changing the emission fees, the PADEP the amended Title V annual emission fee from $57.50 per ton to $85.00 per ton of regulated pollutant for emissions up to 4,000 tons of regulated pollutant. The fee is to be paid in 2014 for emissions released in 2013. Based on 2012 actual emission rates and the increase emission fee the 2013 projected fee is $32,309.00

Item 3:

Industrial Pre-treatment permits for both SSA and LRBSA are each $600/2-yr. period. Therefore, the annual cost is $600.00

Item 5:

The U.S. EPA published the final Mandatory Greenhouse Gas (GHG) Reporting Rule (GHG Reporting Rule) on October 30, 2009 in the Federal Register under 40 CFR Part 98. The GHG Reporting Rule became effective December 29, 2009. Affected facilities were required to begin monitoring and recording data January 1, 2010 for the first annual GHG report due on September 30, 2011 (extended from March 31, 2011). KSL contracts with EarthRes Group to assist in completing the GHG Report. Reports are due by March 31st for the previous calendar year and are submitted by KSL through the eGGRT reporting software to the Environmental Protection Agency (EPA).

Keystone Sanitary Landfill, Inc. Air Emission Fee Determination

2012 PADEP Air Emissions =

2013 RATE
$ 85.00 per ton of actual emissions of NOx, SOx, PM, VOC, Lead, and HAPs

CO	137.43	tons/year	NOT FEE APPLICABLE		
NOx	33.67	tons/year			
SO2/SOx	8.97	tons/year			
VOC minus VOC HAPs	30.61	tons/year	VOC	46.17	tons/year
			VOC HAPs	15.56	tons/year
PM	257.99	Tons/year			
Ammonia	25.80	tons/year			
Total HAPs(includes hydrogen sulfide)	23.07	tons/year			
Total Fee Applicable Emissions:	**380.11**	**tons/year**			

2013 Projected Air Emission Fee = $ 32,309

Total Criteria Pollutant Emissions:	**346.80**	**tons/year**

Date Prepared: 03/2014

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

I.D. Number: 101247

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 years
2.	Annual leachate volume generated	42,600,245 gallons
3.	Annual cost to manage leachate volume (include pump and pipe maintenance, electricity and monitoring)[1]	$ 2,650

Discharge to POTW

4.	Unit cost to discharge leachate to a POTW	0.0078 $/gal

On-site Treatment (including pretreatment)

5.	Unit cost for treatment of leachate (include equipment maintenance, electricity, personnel, chemicals, sludge disposal, etc.)	0.0144 $/gal
6.	Annual cost to maintain NPDES permit (include sampling, analysis, report preparation, and factor in five year renewal application preparation and fees)	$ 26,500

Interim Trucking of Leachate

7.	Unit cost to transport and dispose of leachate	0.00 $/gal
8.	NPDES Permit (cost to prepare application, fees and sampling/analysis)	$ 0.00
9.	Cost to construct on-site treatment or pretreatment system or connection to POTW	$ 0.00
10.	Unit cost for treatment of leachate (include equipment maintenance, electricity, personnel, chemicals, etc.)	0.00 $/gal
11.	Annual cost to maintain NPDES permit (include sampling, analysis, report preparation, and factor in five year renewal application preparation and fees)	$ 0.00

[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) $	$ 82,150	
	If discharge to POTW		
b.	Discharge to POTW cost (line 1 x line 2 x line 4)	$ 10,300,739	
	If have on-site treatment		
c.	Treatment cost (line 1 x line 2 x line 5)	$ 19,016,749	
d.	NPDES maintenance cost (line 1 x line 6)	$ 821,500	
	If you currently truck leachate		
e.	Cost of trucking leachate for three years (line 2 x "3" x line 7)	$ 0	
f.	NPDES permit (line 8)	$ 0	
g.	Cost to construct on-site treatment system or connection to POTW (line 9)	$ 0	
h.	Treatment cost ([line 1 – "3"] x line 2 x line 10)	$ 0	
i.	NPDES maintenance cost ([line 1 – "3"] x line 11)	$ 0	
	If you currently store leachate in impoundments		
j.	Size of pond(s)	3.3	acres
k.	Estimate volume of material to be removed (including liner system and minimum of 12" of soil)	5,256	CY
l.	Unit cost to dispose of materials (Worksheet A, line 4)	20	$/CY
m.	Cost to dispose of materials (line k x line l)	$ 105,120	
n.	Volume of structural backfill	27,171	CY
o.	Cost for backfill (line n x Worksheet B, line 8a)	$ 203,783	
p.	Revegetation cost	$ 3,924	LS
	Subtotal	**$ 30,533,965.00** (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: 30 %

g. Adjustment (subtotal x factor) $ 9,160,190

Total (subtotal + adjustment) **$ 39,694,155.00**

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

KEYSTONE SANITARY LANDFILL, INC

Assumptions and Supporting Calculations For:
Bonding Worksheet I – Leachate Management

Line 1: **31 years**

Line 2: **$42,600,245 gallons** based on attached sheets from Form 25.

Line 3: **$2,650 /year** based on estimate provided by Keystone Landfill, Inc. in 2009 that was adjusted for inflation by 6%.

Line 4: **$0.0078 /gallon** based on fees paid to Scranton Sewer Authority in 2013, provided by Keystone Landfill, Inc.

Line 5: **$0.0144 /gallon** based on 2009 cost estimates provided by Keystone Landfill, Inc. that was adjusted for inflation by 6%.

KEYSTONE SANITARY LANDFILL, INC

Assumptions and Supporting Calculations For:
Bonding Worksheet I – Leachate Management

Line 6: **$26,500 /year** based on estimate provided by Keystone Landfill, Inc. in 2009 that was adjusted for inflation by 6%.

FORM 25
LEACHATE MANAGEMENT
PHASE III EXPANSION
ATTACHMENT 25-2

Leachate Quality and Quantity

Data showing the quality of the Keystone Sanitary Landfill's untreated leachate is included with this attachment. The data was prepared from the last quarter of 2011 and four quarters of 2012 of untreated leachate analyses submitted to the PaDEP under their Form 50 (Municipal Waste Landfill – Leachate Analyses).

Version 3.07 of the Hydrologic Evaluation of Landfill Performance (HELP) Model, which was developed by the U.S. Army Corps of Engineers for the Environmental Protection Agency, was used to calculate the leachate generation quantities. The HELP Model is a computer model, which estimates quantities of runoff, drainage, and leachate, based upon inputs of climatologic, soil, and design data for the facility. BAI Group Inc. has used the HELP Model for estimating leachate quantities at several other Pennsylvania landfill facilities and has found the results of the model to produce relative accurate results.

In order to estimate leachate generation quantities for the Keystone Sanitary Landfill facility, as a result of the proposed Phase III Expansion, the proposed operating conditions at the site must be considered, i.e. starting with the existing conditions, through all intermediate phases of operation and capping, and finally to site closure. As stated in the permit documentation, the site will be developed using a phased approach, with capping occurring as final contours are achieved. Small areas, or increments, will be developed sequentially to minimize the quantity of leachate produced. The total quantity of leachate at any phase of development is equal to the sum of the quantities of leachate generated by each contributing increment at various stages of operation. Enclosed Drawing No.'s 14 through 36 shows the existing conditions and proposed phases of Phase III Disposal Area development.

Experience has shown that leachate generation rates vary over the life of the increment and are typically greatest during the initial stages of filling. At this time in the increment development, little, if any runoff occurs from the increment as all precipitation falling onto the increment is generally handled as leachate. In addition, since only a small quantity of refuse is in place, little buffering capacity exists for moisture retention. As the thickness of refuse increases and intermediate contours are achieved, additional buffering capacity for moisture retention exists. Thus, runoff increases and the rate of leachate generation decrease. During the final stages of the increment development, capping will further reduce leachate generation rates. Once the cap is in place, near steady-state conditions are achieved and leachate generation levels out to a nearly constant rate.

Based on the aforementioned variation in leachate generation for an increment and on the design information for the proposed landfill, Version 3.07 of the HELP Model was run for five critical stages of increment development: (1) a newly opened increment with one lift of refuse and daily cover, (2) an increment at intermediate contours with 100 feet of waste, (3) an increment at intermediate contours with 150 feet of waste, (4) an increment at intermediate contours with 200 feet of waste; and (6) an increment at final contours with a cap. See the enclosed data for the HELP Model output for each of the previously mentioned runs.

After performing the HELP Model runs, each phase of the Phase III Disposal area were evaluated to determine the corresponding acreage at each stage of development that contributes to leachate generation. Based on this information, the total quantity of leachate generated at each landfill phase is calculated.

The maximum daily leachate flow that is predicted to be generated during operation of the Phase III Disposal Area will be approximately 116,713 gallons/day. Adjusting the peak daily volume to monthly basis indicates a leachate production rate of approximately 3,501,390 gallons/month. A summary of the anticipated leachate generation rates and the HELP Model results are included with this section.

Please note that these peak leachate quantities associated with operation of Phase III Disposal Area are based on the assumption that proper phasing and site development will occur, including scheduled capping of areas at final contours, in order to minimize leachate production.

Keystone Sanitary Landfill - Phase III Expansion

Form 25 - Leachate Management
Leachate Generation Rate Estimates

I. HELP Model Estimates

Newly Opened Cell w/8' Waste	2231.5	gpad
Intermediate Contours w/100' Waste	1090.2	gpad
Intermediate Contours w/150' Waste	819.5	gpad
Intermediate Contours w/200' Waste	625.5	gpad
Capped Areas	1 0	gpad

II. Leachate Production Estimates

Phase	Landfill	New Cell (acres)	Areas Where Stormwater Can be Diverted (acres)	Intermediate Contours w/100' Waste (acres)	Intermediate Contours w/150' Waste (acres)	Intermediate Contours w/200' Waste (acres)	Temporary Cap (acres)	Cap (acres)
Pad 1 Construction / Pad 1 Certification Requirement - Refer to Sheet No. 14/15	Tabor							83.4
	Logan							50.2
	Proposed Conditions (Pad 1)	12.5	10.2					
	Proposed Conditions (Pad 2)							
	Proposed Conditions (Pad 3)							
	Proposed Conditions (Pad 4)							
	Proposed Conditions (Pad 5)							
	Proposed Conditions (Pad 6)							
	Proposed Conditions (Other)			35.9		17.6		120.1
	Leachate Production	27,894	10	39,140	0	11,008	0	254
	Total Leachate Production (gallons/day)	**78,306**						

Phase	Landfill	New Cell (acres)	Areas Where Stormwater Can be Diverted (acres)	Intermediate Contours w/100' Waste (acres)	Intermediate Contours w/150' Waste (acres)	Intermediate Contours w/200' Waste (acres)	Temporary Cap (acres)	Cap (acres)
Pad 2 Construction / Pad 2 Certification Requirement - Refer to Sheet No. 16/17	Tabor							83.4
	Logan							50.2
	Proposed Conditions (Pad 1)	3.4	2.3	17.0				
	Proposed Conditions (Pad 2)	12.2	7.2					
	Proposed Conditions (Pad 3)							
	Proposed Conditions (Pad 4)							
	Proposed Conditions (Pad 5)							
	Proposed Conditions (Pad 6)							
	Proposed Conditions (Other)			35.9				137.7
	Leachate Production	34,812	10	57,674	0	0	0	271
	Total Leachate Production (gallons/day)	**92,766**						

Keystone Sanitary Landfill - Phase III Expansion

Form 25 - Leachate Management
Leachate Generation Rate Estimates

I. HELP Model Estimates

Newly Opened Cell w/8' Waste	2231.5	gpad
Intermediate Contours w/100' Waste	1090.2	gpad
Intermediate Contours w/150' Waste	819.5	gpad
Intermediate Contours w/200' Waste	625.5	gpad
Capped Areas	1.0	gpad

II. Leachate Production Estimates

Phase	Landfill	New Cell (acres)	Areas Where Stormwater Can be Diverted (acres)	Intermediate Contours w/100' Waste (acres)	Intermediate Contours w/150' Waste (acres)	Intermediate Contours w/200' Waste (acres)	Temporary Cap (acres)	Cap (acres)
Pad 3 Construction / Pad 3 Certification Requirement - Refer to Sheet No. 18/19	Tabor							83.4
	Logan							50.2
	Proposed Conditions (Pad 1)	3.3	1.8		17.6			
	Proposed Conditions (Pad 2)	0.7		13.2	5.5			
	Proposed Conditions (Pad 3)	11.7	1.8					
	Proposed Conditions (Pad 4)							
	Proposed Conditions (Pad 5)							
	Proposed Conditions (Pad 6)							
	Proposed Conditions (Other)							
	Leachate Production	35,035	4	14,391	18,931	0	35.9	137.7
	Total Leachate Production (gallons/day)	**68,668**					36	271

Phase	Landfill	New Cell (acres)	Areas Where Stormwater Can be Diverted (acres)	Intermediate Contours w/100' Waste (acres)	Intermediate Contours w/150' Waste (acres)	Intermediate Contours w/200' Waste (acres)	Temporary Cap (acres)	Cap (acres)
Pad 4 Construction / Pad 4 Cetification Requirement - Refer to Sheet No. 20/21	Tabor							83.4
	Logan							50.2
	Proposed Conditions (Pad 1)	3.3	1.8				17.5	0.1
	Proposed Conditions (Pad 2)	0.7		3.7		9.5	3.1	2.4
	Proposed Conditions (Pad 3)	0.2		13.3				
	Proposed Conditions (Pad 4)	34.5						
	Proposed Conditions (Pad 5)							
	Proposed Conditions (Pad 6)							
	Proposed Conditions (Other)							
	Leachate Production	86,361	2	18,534	0	5,942	35.9	137.7
	Total Leachate Production (gallons/day)	**111,169**					57	274

Keystone Sanitary Landfill - Phase III Expansion

Form 25 - Leachate Management
Leachate Generation Rate Estimates

I. HELP Model Estimates

Newly Opened Cell w/8' Waste	2231.5	gpad
Intermediate Contours w/100' Waste	1090.2	gpad
Intermediate Contours w/150' Waste	819.5	gpad
Intermediate Contours w/200' Waste	625.5	gpad
Capped Areas	1.0	gpad

II. Leachate Production Estimates

Phase	Landfill	New Cell (acres)	Areas Where Stormwater Can be Diverted (acres)	Intermediate Contours w/100' Waste (acres)	Intermediate Contours w/150' Waste (acres)	Intermediate Contours w/200' Waste (acres)	Temporary Cap (acres)	Cap (acres)
Closure Increment 1 - Refer to Sheet No. 28/29	Tabor							83.4
	Logan							50.2
	Proposed Conditions (Pad 1)	3.3	1.8				17.5	0.1
	Proposed Conditions (Pad 2)	0.7			3.7		11.2	3.8
	Proposed Conditions (Pad 3)	0.1		13.4				
	Proposed Conditions (Pad 4)	1.1		33.4				
	Proposed Conditions (Pad 5)							
	Proposed Conditions (Pad 6)							
	Proposed Conditions (Other)			10.4	12.1		13.4	137.7
	Leachate Production	11,604	2	62,362	12,948	0	42	275
	Total Leachate Production (gallons/day)	**87,233**						

Phase	Landfill	New Cell (acres)	Areas Where Stormwater Can be Diverted (acres)	Intermediate Contours w/100' Waste (acres)	Intermediate Contours w/150' Waste (acres)	Intermediate Contours w/200' Waste (acres)	Temporary Cap (acres)	Cap (acres)
Closure Increment 2 - Refer to Sheet No. 30/31	Tabor							83.4
	Logan							50.2
	Proposed Conditions (Pad 1)	3.3	1.8				17.5	0.1
	Proposed Conditions (Pad 2)	0.7			1.7		11.2	5.8
	Proposed Conditions (Pad 3)	0.1		3.1				10.3
	Proposed Conditions (Pad 4)			34.5				
	Proposed Conditions (Pad 5)							
	Proposed Conditions (Pad 6)							
	Proposed Conditions (Other)	1.3			17.4	28.8	0.2	127.2
	Leachate Production	12,050	2	40,993	15,653	18,013	29	277
	Total Leachate Production (gallons/day)	**87,017**						

Keystone Sanitary Landfill - Phase III Expansion

Form 25 - Leachate Management
Leachate Generation Rate Estimates

I. HELP Model Estimates

Newly Opened Cell w/8' Waste	2231.5	gpad
Intermediate Contours w/100' Waste	1090.2	gpad
Intermediate Contours w/150' Waste	819.5	gpad
Intermediate Contours w/200' Waste	625.5	gpad
Capped Areas	1.0	gpad

II. Leachate Production Estimates

Phase	Landfill	New Cell (acres)	Areas Where Stormwater Can be Diverted (acres)	Intermediate Contours w/100' Waste (acres)	Intermediate Contours w/150' Waste (acres)	Intermediate Contours w/200' Waste (acres)	Temporary Cap (acres)	Cap (acres)
Closure Increment 3 - Refer to Sheet No. 32/33	Tabor							83.4
	Logan							50.2
	Proposed Conditions (Pad 1)	3.3	1.8				17.5	0.1
	Proposed Conditions (Pad 2)	0.7					12.9	5.8
	Proposed Conditions (Pad 3)			0.2			3.1	10.2
	Proposed Conditions (Pad 4)				22.7			11.8
	Proposed Conditions (Pad 5)							
	Proposed Conditions (Pad 6)							
	Proposed Conditions (Other)	1.3		1.3	17.5	56.3		99.8
	Leachate Production	11,827	2	1,635	32,945	35,213	34	261
	Total Leachate Production (gallons/day)	**81,917**						

Phase	Landfill	New Cell (acres)	Areas Where Stormwater Can be Diverted (acres)	Intermediate Contours w/100' Waste (acres)	Intermediate Contours w/150' Waste (acres)	Intermediate Contours w/200' Waste (acres)	Temporary Cap (acres)	Cap (acres)
Closure Increment 4 - Refer to Sheet No. 34/35/36	Tabor							83.4
	Logan							50.2
	Proposed Conditions (Pad 1)	3.3	1.8				17.5	0.1
	Proposed Conditions (Pad 2)			0.7			12.9	5.8
	Proposed Conditions (Pad 3)			0.1			3.1	10.3
	Proposed Conditions (Pad 4)							34.5
	Proposed Conditions (Pad 5)							
	Proposed Conditions (Pad 6)							
	Proposed Conditions (Other)	1.2		2.6	20.9	53.5		99.2
	Leachate Production	10,042	2	3,707	17,128	33,462	34	283
	Total Leachate Production (gallons/day)	**64,657**						

Keystone Sanitary Landfill - Phase III Expansion

Form 25 - Leachate Management
Leachate Generation Rate Estimates

I. HELP Model Estimates

Newly Opened Cell w/8' Waste	2231.5	gpad
Intermediate Contours w/100' Waste	1090.2	gpad
Intermediate Contours w/150' Waste	819.5	gpad
Intermediate Contours w/200' Waste	625.5	gpad
Capped Areas	1.0	gpad

II. Leachate Production Estimates

Phase	Landfill	New Cell (acres)	Areas Where Stormwater Can be Diverted (acres)	Intermediate Contours w/100' Waste (acres)	Intermediate Contours w/150' Waste (acres)	Intermediate Contours w/200' Waste (acres)	Temporary Cap (acres)	Cap (acres)
Pad 5 Construction - Refer to Sheet No. 22/23	Tabor							83.4
	Logan							50.2
	Proposed Conditions (Pad 1)		1.8	3.3			17.5	0.1
	Proposed Conditions (Pad 2)			0.7			12.9	5.8
	Proposed Conditions (Pad 3)						3.2	10.3
	Proposed Conditions (Pad 4)							34.5
	Proposed Conditions (Pad 5)	25.6						
	Proposed Conditions (Pad 6)							
	Proposed Conditions (Other)			3.8		53.5		120.1
	Leachate Production	57,127	2	8,504	0	33,462	34	304
	Total Leachate Production (gallons/day)	**99,433**						

Phase	Landfill	New Cell (acres)	Areas Where Stormwater Can be Diverted (acres)	Intermediate Contours w/100' Waste (acres)	Intermediate Contours w/150' Waste (acres)	Intermediate Contours w/200' Waste (acres)	Temporary Cap (acres)	Cap (acres)
Pad 6 Construction - Refer to Sheet No. 24/25/26	Tabor							83.4
	Logan							50.2
	Proposed Conditions (Pad 1)		1.8	3.3			17.5	0.1
	Proposed Conditions (Pad 2)					0.7	12.9	5.8
	Proposed Conditions (Pad 3)						3.2	10.3
	Proposed Conditions (Pad 4)							34.5
	Proposed Conditions (Pad 5)	2.4		23.2				
	Proposed Conditions (Pad 6)	24.1						
	Proposed Conditions (Other)					44.6		132.8
	Leachate Production	59,136	2	28,891	0	28,333	34	317
	Total Leachate Production (gallons/day)	**116,713**						

Keystone Sanitary Landfill - Phase III Expansion

Form 25 - Leachate Management
Leachate Generation Rate Estimates

I. HELP Model Estimates

Newly Opened Cell w/8' Waste	2231.5	gpad
Intermediate Contours w/100' Waste	1090.2	gpad
Intermediate Contours w/150' Waste	819.5	gpad
Intermediate Contours w/200' Waste	625.5	gpad
Capped Areas	1.0	gpad

II. Leachate Production Estimates

Phase	Landfill	New Cell (acres)	Areas Where Stormwater Can be Diverted (acres)	Intermediate Contours w/100' Waste (acres)	Intermediate Contours w/150' Waste (acres)	Intermediate Contours w/200' Waste (acres)	Temporary Cap (acres)	Cap (acres)
Pad 5/6 Closure - Refer to Sheet No. 27	Tabor							83.4
	Logan							50.2
	Proposed Conditions (Pad 1)		1.8				20.8	0.1
	Proposed Conditions (Pad 2)						13.6	5.8
	Proposed Conditions (Pad 3)						3.2	10.3
	Proposed Conditions (Pad 4)							34.5
	Proposed Conditions (Pad 5)	2.4		23.2				
	Proposed Conditions (Pad 6)	2.6		21.5				
	Proposed Conditions (Other)						33.5	143.9
	Leachate Production	11,158	2	48,734	0	0	71	328
	Total Leachate Production (gallons/day)	**60,292**						

Date Prepared: 03/2014

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

I.D. Number: 101247

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 _____ N/A acres

2. Volume of material required for regrading: _____ N/A CY

3. Unit cost to regrade (provide equipment and rates) _____ N/A $/CY

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

4. Earthen Materials			Stockpile	Borrow	Onsite	Offsite	Processing Req'd Yes	Processing Req'd No
a. Structural Fill	N/A	CY	☐	☐	☐	☐	☐	☐
b. Unit cost to place[1]	N/A	$/CY						
c. Topsoil	N/A	CY	☐	☐	☐	☐	☐	☐
d. Unit cost to place[1]	N/A	$/CY						

5. Revegetation Cost

(Seeding rate used: _____ N/A lbs/acre)
(Lime rate used: _____ N/A tons/acre)
(Fertilizer rate used: _____ N/A tons/acre)
(Mulch rate used: _____ N/A tons/acre)

Unit cost to revegetate _____ N/A $/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)	$ N/A
b.	Structural Fill (line 4a x line 4b)	$ N/A
c.	Topsoil (line 4c x line 4d)	$ N/A
d.	Revegetation (line 1 x line 5)	$ N/A
e.	E & S Controls (line 6)	$ N/A
f.	Bond maintenance (line 7)	$ N/A
g.	Other (line 8)	$ N/A
	Subtotal	$ N/A
	CQA/Project Management costs (use 5% of subtotal)	$ N/A
	Total	**$ 0**

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

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Keystone Sanitary Landfill
PaDEP Municipal Solid Waste Permit 101247
Bonding Worksheet J
Borrow Area Closure Narrative

The previous borrow area that was utilized for material has been removed to allow for the Phase II Westerly Expansion. As shown on Exhibit B-1, the area depicted shows the general vicinity where the original stockpile was, which is now inside the limits of the future Phase III Pad layout.

Currently, the required cover/fill materials are borrowed on-site from the areas that will in any case require further future excavation to reach the sub-grade for the final Pads of Phase III.

Date Prepared: 03/2014

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

I.D. Number: 101247

BONDING WORKSHEET K
FACILITY MAINTENANCE COSTS

1.	Size of facility	714	acres
2.	Size of waste placement footprint	150	acres
3.	Size of borrow areas on site	N/A	acres
4.	Size of leachate ponds on site	3.3	acres
5.	Size of sedimentation ponds on site	20.9	acres
6.	Length of stormwater conveyance ditches	47,157	LF
7.	Number of years of site management (30 years + closure period)	31	years
8.	Annual Cost to repair cap and final cover[1]	See narrative	
	a. Acres (use 1% of line 2)	1.5	acres
	b. Unit cost[2] to repair final cover	4,840.00	$/acre
	c. Unit cost[2] to repair cap	27,878.40	$/acre
	d. Unit cost[2] to repair vegetation	500	$/acre
	e. Total unit cost (line b + line c + line d)	33,218.40	$/acre
9.	Annual Cost to repair and maintain E&S facilities[1]		
	a. Channel repair length (use 3% of line 6)	1415	LF
	b. Sedimentation pond repair volume (use 20% of line 5)	4.20	acres
	c. Unit cost[2] to repair channels	10.00	$/LF
	d. Unit cost[2] to repair ponds	500.00	$/acre
	e. Total annual cost (line a x line c) + (line b x line d)	16,250	$/YR
10.	Annual Cost to repair and maintain leachate ponds[1]		
	a. Leachate pond repair volume (use 20% of line 4)	0.66	acres
	b. Unit cost[2] to repair leachate pond(s)	14,157	$/acre
11.	Annual cost to repair and maintain leachate tanks		
	a. Number and size of tanks	N/A	
	b. Annual unit cost[1] to maintain tanks	$ N/A	
12.	Annual cost to repair fences and gates (attach details)	$ 1,000.00	LS

[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]	46,055	LF
b.	Annual length of site roads to be repaired (2% of line 13a)	921	LF
c.	Unit cost to repair roads[1]	5.00	$/LF

14. Cost Summary – Facility Maintenance

a.	Cost to repair cap/cover (line 7 x line 8a x line 8e)	$	1,540,470.60
b.	Cost to maintain E&S facilities (line 7 x line 9e)	$	503,750.00
c.	Cost to maintain leachate ponds (line 7 x line 10a x line 10b)	$	289,652.00
d.	Cost to maintain leachate tanks (line 7 x line 11a x line 11b)	$	N/A
e.	Cost to repair fences and gates (line 7 x line 12)	$	31,000.00
f.	Cost to maintain site roads (line 7 x line 13b x line 13c)	$	142,755.00
	Subtotal	**$**	2,507,627.60

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) $ 250,726.76

Total (subtotal + adjustment) **$ 2,758,354.36**

(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.*

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Keystone Sanitary Landfill
PaDEP Municipal Solid Waste Permit 101247
Bonding Worksheet K
Facility Maintenance Costs Narrative

Item 2: Size of waste placement footprint:
Measured from Pad 6 Construction (Worst Case)

Ph III 150 acres

Item 3: Size of borrow area on site:
The previous borrow area has been removed and therefore there is no additional stockpile that would require any re-grading.

Item 4: Size of leachate ponds on site:
Refer to worksheet I
Item 12(j) 3.3 acres

Item 5: Size of sedimentation ponds on site:

Pond 1	250 * 400	100,000
Pond 3	300 * 500	150,000
Pond 4	1000 * 500	500,000
Pond 5	200 * 300	60,000
Pond 6	500 * 200	100,000
	Total =	910,000 SF

Item 6: Length of stormwater conveyance ditches:
Ph III site 47,157ft

Item 7: Number of Years of site management:
30yrs + 1yr for Ph III

Item 8: Annual Cost to repair cap and final cover:

a.) 1% * 150 = 1.50 Ph III

b.) $\frac{43{,}560\ sf/acre * 2\ ft}{27 cf/cy}$ = 3,227cy/acre * $1.50/cy = $4,840.00/acre

c.) Refer to worksheet B for unit cost
Unit Cost – .33sf + .29sf + .02sf = .64sf
$0.64/sf * 43,560sf/acre = $27,878.40

d.) Unit cost to repair vegetation
$500.00/acre refer to worksheet B

e.) Total Unit Cost
$4,840.00 + $27,878.40 + $500.00 = $33,218.40

Item 9: Annual cost to repair and maintain E&S facilities:

a.) Channel repair length
Ph III – 47, 157 * 3% = 1,414.7lf

b.) Sedimentation pond repair volume
910,000sf * .20/43,560 = 4.20acres

e.) Total cost
Ph III – (1415ft * $10.00) + (4.20acres * $500.00) = $8,050.00

Item 13: Annual cost to maintain site roads:

a.) Length of site roads
Ph III – 46,055lf

b.) Length of roads to be maintained
Ph III – 46,055 * 0.02 = 921ft

c.) Unit cost to repair roads $5.00/ft

KEYSTONE SANITARY LANDFILL, INC.
SITE DEVELOPMENT – PHASE II MODIFIED
PAD CONSTRUCTION & CLOSURE INCREMENT SEQUENCE TABLE
7/1/2011 – AVERAGE DAILY VOLUME = 7,250 T/D = 184,875 T/MO. = 2,218,500 T/YR.

LINER CONSTRUCTION						CLOSURE			
PAD No.	AREA (Ac.)	MSW VOLUME (Tons)	PERIOD (Mon.)	DATE CONSTRUCTION	OPERATION	INC No.	AREA (Ac.)	COMMENCEMENT DATE (Mon.)	NOTES
**1	13.52	0 **	0	4/03 – 3/05	5/05 – 9/05	1	9.10	6/09	
**2	19.18	0 **	0	6/03 – 9/05	6/05 – 12/11	2	16.12	12/12	
** 3	10.20	0 **	0	4/05 – 12/06	10/06 – 6/12	3	8.31	6/13	
* 4	11.55	448,055 *	2	4/06 – 10/07	12/06 – 9/12	4	9.92	9/13	
* 5	11.90	1,310,067 *	7	4/07 – 10/08	2/08 – 1/13	5	11.30	1/14	
* 6	13.20	1,955,378 *	11	8/09 – 9/10	1/11 – 12/13	6	12.50	12/14	
7	13.83	2,577,143	14	10/10 – 7/12	10/12 – 4/14	7	13.14	4/15	
8	14.80	3,030,738	16	8/12 – 12/13	1/14 – 4/17	8	14.06	5/18	
9	15.60	3,163,799	17	5/14 – 3/15	4/15 – 9/18	9	14.82	9/19	
10	15.47	3,231,870	18	9/15 – 9/16	10/16 – 3/20	10	14.70	3/21	
11	15.18	2,813,012	15	1/17 – 3/18	4/18 – 5/21	11	21.70	5/22	
12	15.19	2,025,600	11	8/18 – 6/19	11/19 – 2/22	12	23.95	2/23	
TOTAL	169.62	20,555,662	111 = (9 Years–3 Mo.)***			TOTAL	169.62		

** COMPLETED PAD MSW VOLUME
* PARTIALLY COMPLETED PAD MSW VOLUME
NOTE: TONNAGE BASED ON .7363 COMPACTION RATIO.

*** MSW VOLUME & PERIOD CALCULATED BASED ON MSW VOLUME AT END OF MONTH – 6/12.

* FROM Sh. 5 on Exhibit B-2

Exhibit K-1

Date Prepared: 03/2014

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF WASTE MANAGEMENT

I.D. Number: 101247

BONDING WORKSHEET L
SUMMARY COST WORKSHEET

Cost Summary - Landfills

1.	Decontaminating the Facility	$ 13,641.72
2.	Capping/Closure	$ 1,624,214.97
3.	Groundwater Monitoring System	$ 2,989,256.60
4.	Surface Water Monitoring	$ 37,510.00
5.	Private Water Supply Monitoring	$ 0.00
6.	Gas Monitoring	$ Included in Item 7
7.	Gas Collection and Maintenance	$ 6,693,546.00
8.	Other Monitoring	$ 1,906,779.00
9.	Leachate Management	$ 14,157,692.00
10.	Borrow Area Closure	$ 0.00
11.	Maintenance Costs	$ 2,758,354.36
12.	Other Costs[1] _____	$ 0.00
13.	Other Costs[1] _____	$ 0.00
	Subtotal	**$** 30,180,994.65

Inflation

14.	Inflation rate (projected inflation for the next three years based on the inflation for the prior three years).	5 %
15.	Inflation cost for facility (subtotal x line 14)	$ 1,509,049.73

Contingency and administrative fees

16.	Administrative fees (5%) (subtotal x 0.05)	$ 1,509,049.73
17.	Project Management (5%) (subtotal x 0.05)	$ 1,509,049.73
18.	Contingency fee amount (subtotal x rate of contingency fee from Table 1)	$ 1,509,049.73

Total (subtotal + line 15 + line 16 + line 17 + 18) **$ 36,217,193.58**

[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.

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Keystone Sanitary Landfill
PaDEP Municipal Solid Waste Permit 101247
Bonding Worksheet L
Inflation Rate Calc

Item 14: Inflation Rate Calc

Information obtained from the U.S. Department Commerce – Bureau of Economic Analysis

Table 1.1.9 – Implicit Price Deflators for Gross Domestic Product

Base Year - 2009 → 100.000
- 2010 → 101.211
- 2011 → 103.199
- 2012 → 105.002

$$\text{Inflation Rate} = \frac{105.002-103.199}{103.199} + \frac{103.199-101.211}{101.211} + \frac{101.211-100.000}{100.000}$$

$$= \quad 0.0175 \quad + \quad 0.0196 \quad + \quad 0.0121$$

$$= 0.0492 \rightarrow \underline{\textbf{Use 5\%}}$$

Bureau of Economic Analysis

Table 1.1.9. Implicit Price Deflators for Gross Domestic Product

[Index numbers, 2009=100]

Last Revised on: December 05, 2013 - Next Release Date December 20, 2013

Line		2009	2010	2011	2012
1	**Gross domestic product**	**100.000**	**101.211**	**103.199**	**105.002**
2	**Personal consumption expenditures**	**100.000**	**101.654**	**104.086**	**106.009**
3	Goods	100.000	101.637	105.345	106.666
4	Durable goods	100.000	98.621	97.649	96.467
5	Nondurable goods	100.000	103.084	109.128	111.765
6	Services	100.000	101.663	103.463	105.689
7	**Gross private domestic investment**	**100.000**	**99.076**	**100.336**	**101.608**
8	Fixed investment	100.000	99.179	100.506	101.852
9	Nonresidential	100.000	99.069	100.524	101.977
10	Structures	100.000	98.843	101.748	103.732
11	Equipment	100.000	98.009	98.928	100.187
12	Intellectual property products	100.000	100.539	101.788	103.167
13	Residential	100.000	99.644	100.392	101.246
14	Change in private inventories	---	---	---	---
15	**Net exports of goods and services**	**---**	**---**	**---**	**---**
16	Exports	100.000	104.415	111.140	112.185
17	Goods	100.000	105.034	113.013	113.508
18	Services	100.000	103.096	107.039	109.312
19	Imports	100.000	106.008	114.273	114.862
20	Goods	100.000	106.742	116.178	116.855
21	Services	100.000	102.849	105.713	105.895
22	**Government consumption expenditures and gross investment**	**100.000**	**102.673**	**105.560**	**106.882**
23	Federal	100.000	102.614	105.344	106.184
24	National defense	100.000	102.365	105.191	106.252
25	Nondefense	100.000	103.064	105.624	106.077
26	State and local	100.000	102.714	105.710	107.371
	Addendum:				
27	Gross national product	100.000	101.321	103.322	105.126

TABLE 1: CONTINGENCY FEE RATE

Bond	Contingency Fee
Cost < $5 million	12.5%
$5 million < Cost < $10 million	10.0%
$10 million < Cost < $20 million	7.5%
Cost > $20 million	5.0%

Administrative Costs

Also, an additional cost of either 5% or 10 % must be added to the total bond amount for administrative costs and cost overruns.

Project Management Costs

A cost of 5% must be added to the total bond amount to account for the use of a project manager to complete any facility closure.

Conversion Factors and Densities

This section contains conversion factors (Table 2) and densities (Table 3). You may use these to change the units of an item given in a facility's application to the units required on the unit cost worksheets, or to change units between worksheets. The densities listed will help you to determine the appropriate density of a substance and should be consulted if you do not have site specific information for a specific substance. The following is an example using both a conversion factor and density.

Example: To convert 1 ton of soil to ft^3 of soil,

$$1 \text{ ton of soil} \times 2000 \frac{\text{lbs}}{\text{ton}} \div \text{density of soil in lb/ft}^3$$

TABLE 2. CONVERSION FACTORS

Quantity			Equivalent Values
Volume	1 m^3	=	1000 liters = 35.315 ft^3 = 264.17 gallons
	1 ft^3	=	7.481 gallons = 0.02832 m^3 = 28.317 liters
	1 gallon	=	3.785 m^3 = 0.1337 ft^3 = 3.785 liters
	1 CY	=	27 ft3
Length	1 m	=	100 cm = 39.37 in = 3.28 ft = 1.094 yards
		=	6.219 x 10-4 miles
	1 ft	=	12 in = 0.333 yards = 0.3048 m = 30.48 cm
Area	1 ft^2	=	0.111 yd^2 = 2.296 x 10^{-5} acres = 0.0929 m^2
	1 yd^2	=	9 ft^2 = 2.066 x 10^{-4} acres = 0.836 m^2
	1 acre	=	4840 yd^2 = 43,560 ft^2 = 4046.8 m^2
	1 m^2	=	10.764 ft^2 = 1.196 yd^2 = 2.471 x 10^{-4} acre
Mass	1 kg	=	1000g = 0.001 metric ton = 2.20 lb = 35.2 oz
		=	1.10 x 10^{-3} tons
	1 lb	=	16 oz = 5 x 10^{-4} ton = 453.59 g = 0.45359 kg
	1 ton	=	2000 lb = 907.18 kg
	1 metric ton	=	1000 kg = 1.10 tons