SOUTH CAROLINA ELECTRIC & GAS

SCANA®
POWER FOR LIVING

RUN-ON & RUN-OFF CONTROL PLANS

FOR THE

COPE STATION CLASS THREE LANDFILL

ORANGEBURG COUNTY, SOUTH CAROLINA

JULY 2016

SOUTH CAROLINA
GARRETT AND MOORE, INC.
No. C3371
CERTIFICATE OF AUTHORIZATION

GARRETT & MOORE
Engineering for the Power and Waste Industries

SOUTH CAROLINA
REGISTERED PROFESSIONAL ENGINEER
22411
7/15/16
J. STEFAN BRAY

1 OVERVIEW

The EPA Administrator, Gina McCarthy, signed the Disposal of Coal Combustion Residuals from Electric Utilities final rule on December 19, 2014, and it was published in the Federal Register (FR) on April 17, 2015. The regulations provide a comprehensive set of requirements for the safe disposal of coal combustion residuals (CCRs), commonly known as coal ash, from coal-fired power plants. The rule will be administered as part of the Resource Conservation and Recovery Act [RCRA, 42 United States Code (U.S.C.) §6901 et seq.], using the Subtitle D approach.

South Carolina Electric & Gas (SCE&G) is subject to the CCR Rule. Based on SCE&G's review of the rule, the **Class Three Landfill at SCE&G Cope Station** has been determined to be an existing CCR landfill subject to the CCR rule requirements.

2 PURPOSE

The purpose of this report is to document that the Cope Station Class Three Landfill run-on and run-off controls meet the requirements of CCR rule §257.81 – *Run-on and Run-off Controls for CCR Landfills.*

3 APPLICABLE REGULATIONS

CCR rule §257.81 - *Run-on and Run-off Controls for CCR Landfills* states the following:

> (a) The owner or operator of an existing or new CCR landfill or any lateral expansion of a CCR landfill must design, construct, operate, and maintain:
>
> > (I) A run-on control system to prevent flow onto the active portion of the CCR unit during the peak discharge from a 24-hour, 25-year storm; and
> >
> > (II) A run-off control system from the active portion of the CCR unit to collect and control at least the water volume resulting from a 24-hour, 25-year storm.
>
> (b) Run-off from the active portion of the CCR unit must be handled in accordance with the surface water requirements under § 257.3–3.
>
> (c) Run-on and run-off control system plan—
>
> (1) *Content of the plan.* The owner or operator must prepare initial and periodic run-on and run-off control system plans for the CCR unit according to the timeframes specified in paragraphs (c)(3) and (4) of this section. These plans must document how the run-on and run-off control systems have been designed and constructed to meet the applicable requirements of this section. Each plan must be supported by appropriate engineering calculations.

4 LANDFILL DESCRIPTION

Cope Station is coal-fired electric generation plant located in Orangeburg County near Cope, South Carolina. Within the boundary of the Cope Station property, SCE&G owns and operates Phase 1, consisting of Cell 1 through Cell 4, of the Class Three Landfill. The Phase 1 disposal unit was constructed

in accordance with the construction permit (permit LF3-00028) issued from the South Carolina Department of Health and Environmental Control (DHEC) on September 30, 2008 and modified on March 22, 2013. The Phase 1 disposal unit was placed into operation in accordance with an operation approval issued by DHEC on November 12, 2014. The receiving Wastewater Pond #1 was constructed in accordance with construction permit number 19640-IW issued on February 19, 2013.

The ultimate development of the Class Three landfill is comprised of 26 landfill cells, planned for development in multiple phases. Phase 1 and all future phases of the Class Three landfill have been designed to control run-on and run-off from the 24-hour, 25-year storm.

5 Run-on Control Plan

§ 257.81 (a)(I) requires a run-on control system to prevent flow onto the active portion of the CCR unit during the peak discharge from a 24-hour, 25-year storm.

Sheet EP-2 from the solid waste permit to construct drawings (Attachment 1) illustrates the ultimate development of the Cope Class Three Landfill. Grades shown on Sheet EP-2 represent landfill subgrade.

As constructed, the active Phase 1 Class Three Landfill is elevated between 4-feet and 18-feet relative to existing natural topography (See Attachment 2). Future phases of landfill development are elevated between 4-feet and 24-feet relative to existing natural topography (as reflected in Sheet EP-2 in Attachment 1). Stormwater runoff from upgradient of the landfill is conveyed around the perimeter of the landfill by a series of natural and manmade swales and channels. Additionally, a ditch is located immediately along the outside perimeter of the landfill cells. This ditch collects and conveys runoff away from the landfill to the landfill runoff pond. Permanent perimeter ditch performance is demonstrated in Section 5.

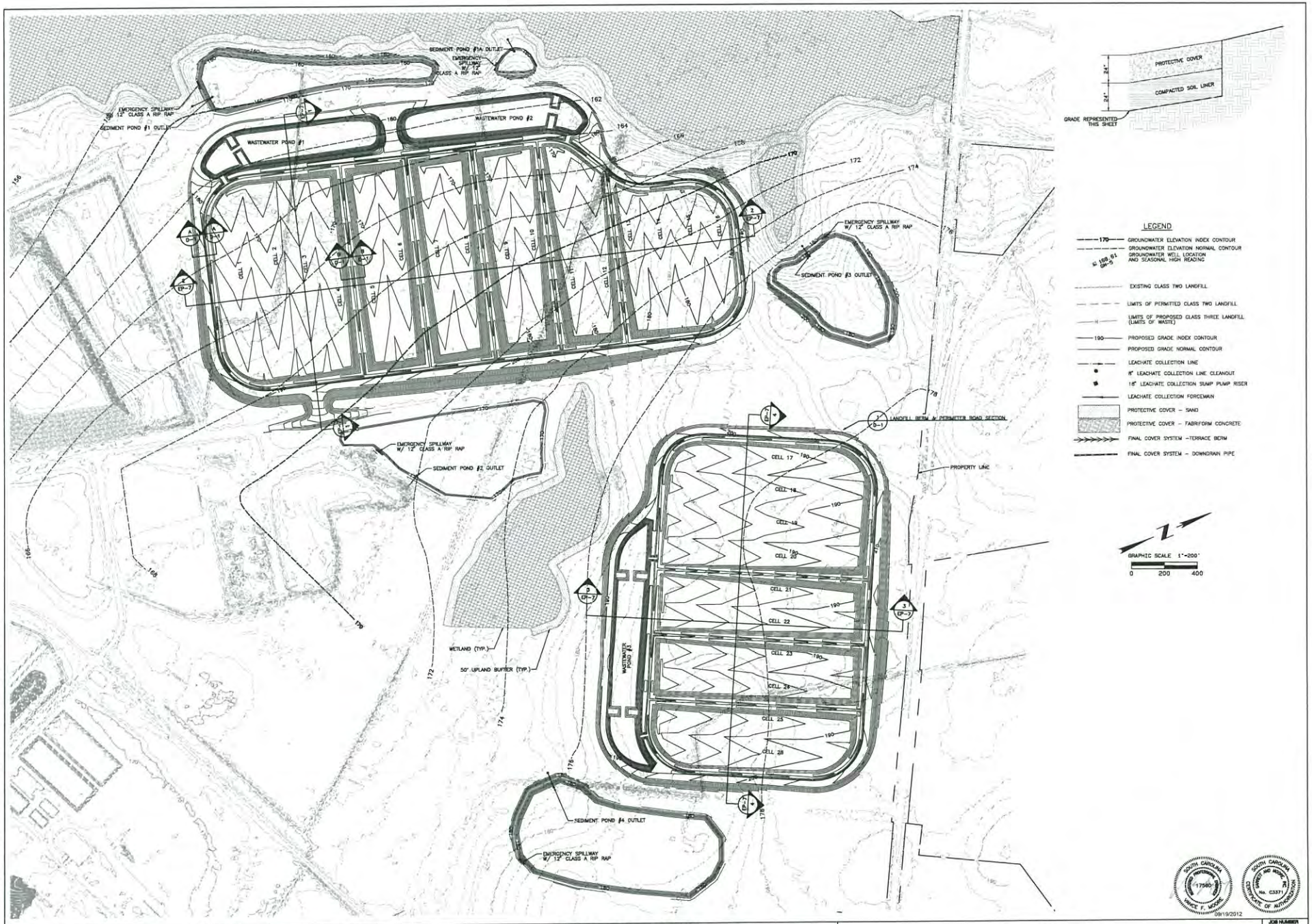
Given the combination of the landfill's built-up construction, existing drainage features and perimeter ditches, run-on will not occur onto the active portion of the CCR unit during the peak discharge from a 24-hour, 25-year storm.

5 Run-off Control Plan

§ 257.81 (a)(II) requires a run-off control system from the active portion of the CCR unit to collect and control at least the water volume resulting from a 24-hour, 25-year storm.

Run-off from the currently active portion of the landfill and all future phases of development is managed by composite-lined perimeter ditches. Perimeter ditch details are shown on Sheet D-1 of the solid waste permit to construct drawings (Attachment 3). Perimeter ditches discharge to adjacent downgradient, lined wastewater ponds. All perimeter ditches and wastewater ponds are designed to manage the volume resulting from the 24-hour, 25-year storm. Relevant engineering calculations for the stormwater management system are included as Attachment 4 and summarized as follows:

ATTACHMENT 1



REVISION	DATE
1	
2	
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5	

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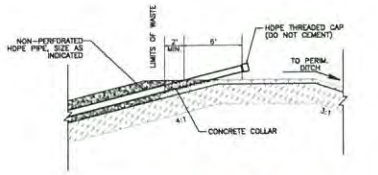
SCE&G - COPE STATION
CLASS THREE LANDFILL

SUBGRADE PLAN

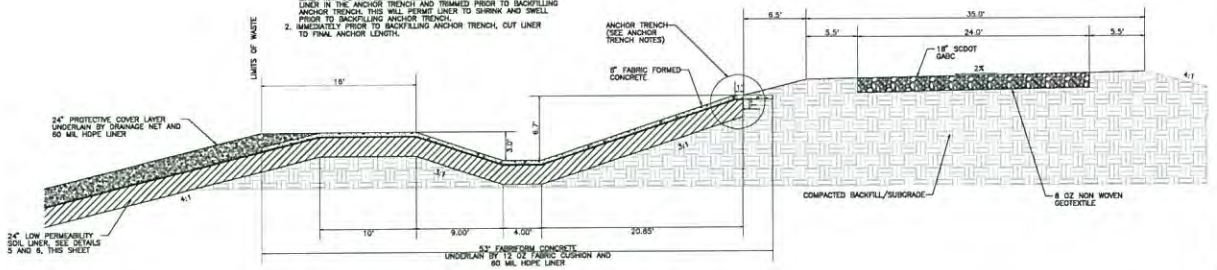
JOB NUMBER
SHEET
SP-2

ATTACHMENT 2



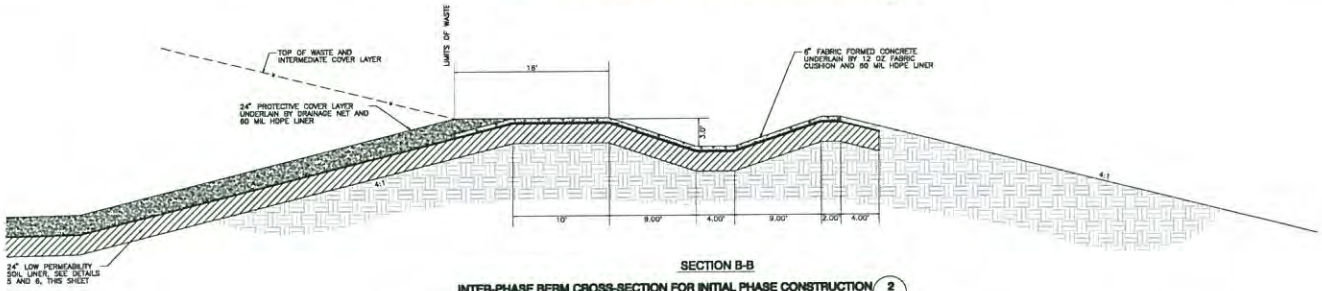
LEACHATE COLLECTION LINE CLEANOUT (4 / D-1)
N.T.S.

ANCHOR TRENCH NOTES:
1. THE DETAIL REPRESENTS FINAL ANCHOR TRENCH CONSTRUCTION. LINER MAY BE INITIALLY INSTALLED WITH MORE THAN ONE FOOT LINER IN THE ANCHOR TRENCH AND TRIMMED PRIOR TO BACKFILLING ANCHOR TRENCH. THIS WILL PERMIT LINER TO SHRINK AND SWELL PRIOR TO BACKFILLING ANCHOR TRENCH.
2. IMMEDIATELY PRIOR TO BACKFILLING ANCHOR TRENCH, CUT LINER TO FINAL ANCHOR LENGTH.



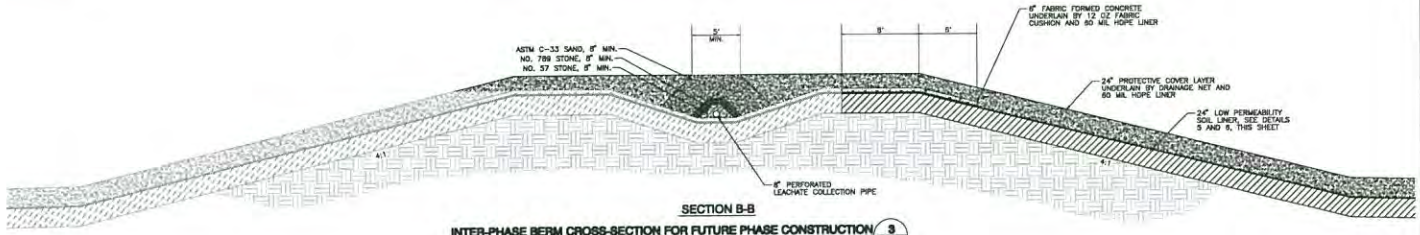
SECTION A-A
LANDFILL BERM/PERIMETER ACCESS ROAD CROSS-SECTION (1 / D-1)
1"=5'

24" LOW PERMEABILITY SOIL LINER - ALT #1 (5 / D-1)
24" SOIL LINER 1x10-7 CM/SEC
N.T.S.

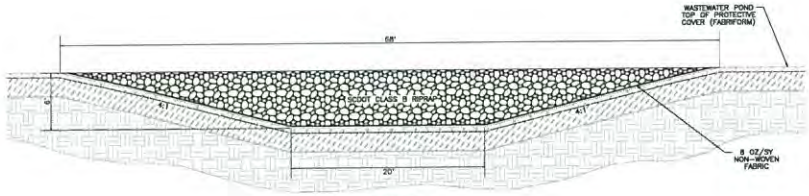


SECTION B-B
INTER-PHASE BERM CROSS-SECTION FOR INITIAL PHASE CONSTRUCTION (2 / D-1)
1"=5'

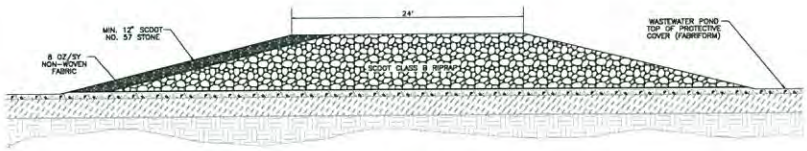
24" LOW PERMEABILITY SOIL LINER - ALT #2 (6 / D-1)
GCL UNDERLAIN BY 24" SOIL LINER 1x10-5 CM/SEC
N.T.S.



SECTION B-B
INTER-PHASE BERM CROSS-SECTION FOR FUTURE PHASE CONSTRUCTION (3 / D-1)
1"=5'



PROFILE



SECTION

FOREBAY ROCK DAM (7 / D-1)

REVISION	DATE
1)	
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COPE STATION
CLASS THREE LANDFILL PROJECT

DETAILS

JOB NUMBER

SHEET
D-1

ATTACHMENT 3

Hydrograph Plot

Hydraflow Hydrographs by Intelisolve

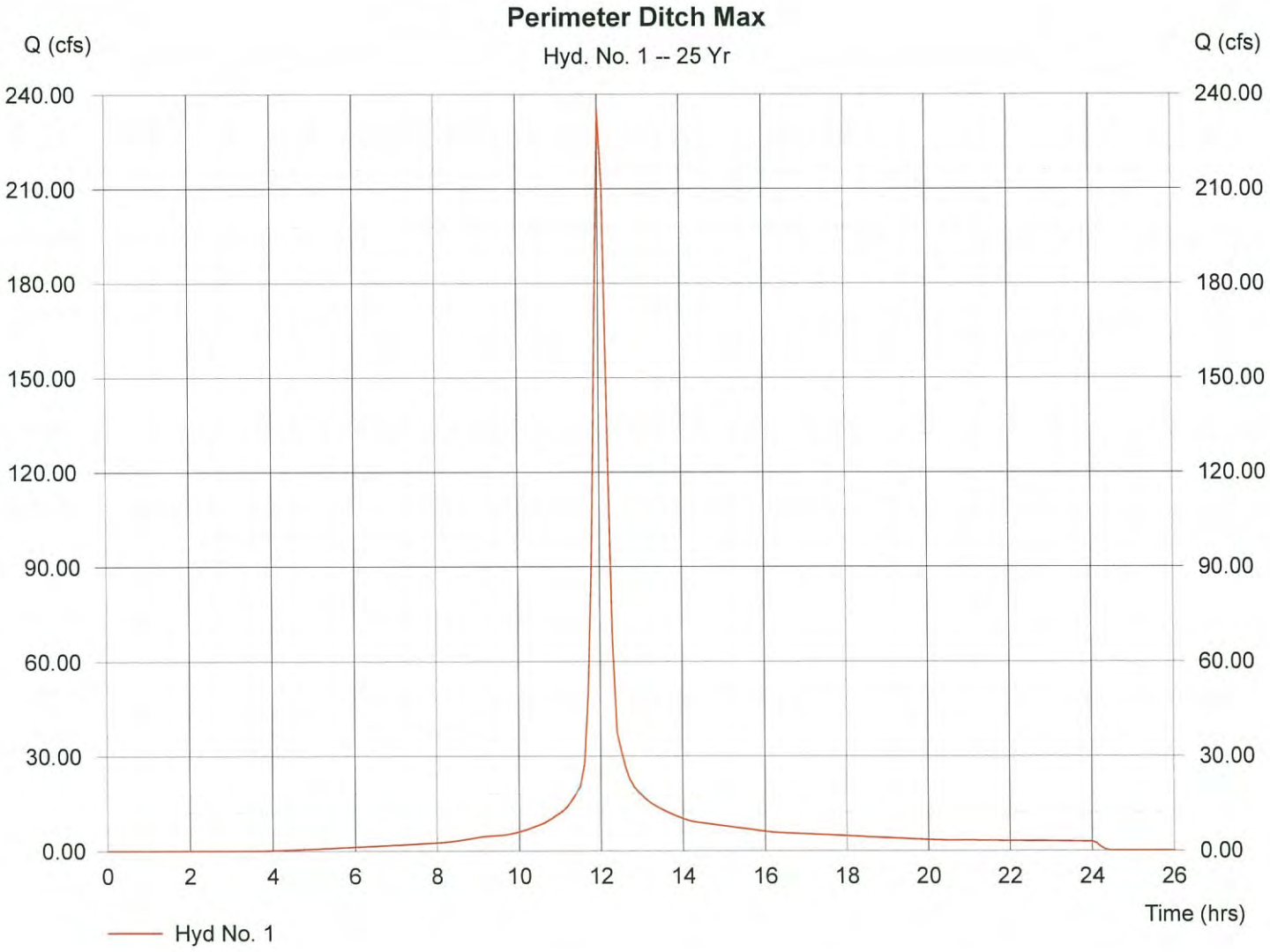
Tuesday, Jul 12 2016, 12:56 PM

Hyd. No. 1

Perimeter Ditch Max

Hydrograph type	= SCS Runoff	Peak discharge	= 234.67 cfs
Storm frequency	= 25 yrs	Time interval	= 6 min
Drainage area	= 39.000 ac	Curve number	= 87
Basin Slope	= 3.8 %	Hydraulic length	= 3571 ft
Tc method	= KIRPICH	Time of conc. (Tc)	= 14.95 min
Total precip.	= 7.10 in	Distribution	= Type II
Storm duration	= 24 hrs	Shape factor	= 484

Hydrograph Volume = 740,064 cuft



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1258 Benson Road, Garner, NC 27529

PROJECT	Cope Station Class Three Landfill
SUBJECT	Perimeter Ditch Evaluation
COMPUTED BY	C Fortner **CHECKED BY** V Moore
DATE	9/5/2012

Channel Section Designation: Perimter Ditch - Fabric Formed Concrete
Channel Section Descritption: Maximum Runoff

A. Discharge,Q, using Manning Equation with assigned maximum depth of flow, y.

Input Data

max depth of flow (ft), y:	2.40377951
longitudinal slope (ft/ft), S:	0.007
bottom width (ft), b:	4
channel side slope (m:1):	3
design Q (cfs):	350

PERMANENT LINING: Fabriform Concrete
roughness coefficient, *n*: 0.012
max. shear stress (psf), Td: 4

Permanent lining flow capacity, Q (cfs) = 350.00

Channel design controlled by permanent lining flow capacity.

A, area (sf)	P, wetted perimeter (ft)	R, hydraulic radius (ft)	S, slope (ft/ft)	Q, flow (cfs)	V, velocity (ft/s)
26.94958575	19.20	1.40	0.007	350.00	12.99

B. Normal Depth and Shear Stress using Normal-Depth Procedure (known Q)

Discharge (cfs), Q: 350.00 (design max. Q of controlling lining system, from above)
longitudinal slope (ft/ft), S: 0.007
bottom width (ft), b: 4
channel side slope (m:1): 3

Input

TEMPORARY LINING: Fabriform Concrete
roughness coefficient, *n*: 0.012
max. shear stress (psf), Td: 4

Iterate y to make Zav = Zreg

Temp. Lined Channel:	y-var. (ft)	A (ft)	P (ft)	R (ft)	Zav	Zreq	V (ft/s)	Td (psf)
	2.400873119	26.8960677	19.18	1.40	33.69	33.69	13.01	1.05

OK

Referenced Tables and Figures from *North Carolina Erosion and Sediment Control Planning and Design Manual (1988).*

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1258 Benson Road, Garner, NC 27529

PROJECT Cope Class Three Landfill
SUBJECT Wastewater Pond Treatment Volume and Routing Summary
COMPUTED BY CMF **CHECKED BY** LBG
DATE 7/12/2016

Purpose: Determine the amount of wastewater storage required for the proposed Cope Class Three Landfill Wastewater Ponds, and corresponding permanent pool elevation.

Methodology: Additional guidance set by "Guidance for Co-Treatment Facilities at Steam Electric Power Plants," (USEPA) is met in the pond design. Specifically, the Wastewater Ponds are designed to retain the runoff volume resulting from the 10-year, 24-hour storm.

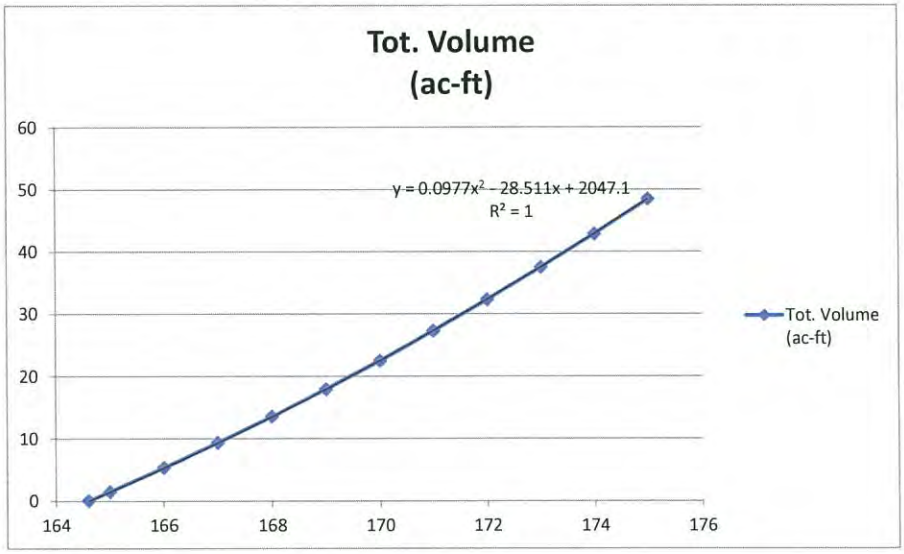
10-yr, 24-hour storm **5.8 in., Orangeburg Co. (East)**

Wastewater Pond #1

Drainage Area: 61 ac
Min. Volume: 1,284,294 cf
47,566 CY
29.5 ac-ft

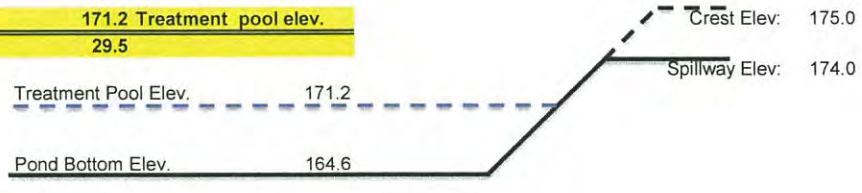
Stage/Storage Curve

Elev	Depth (ft)	Area (ac)	Area (sf)	Inc. Volume (ac-ft)	Tot. Volume (ac-ft)	Tot. Volume (CY)
164.6	0	3.67	159,865	0	0	0
165	0.4	3.75	163,350	1.484	1.484	2,394
166	1.4	3.93	171,191	3.84	5.324	8,589
167	2.4	4.11	179,032	4.02	9.344	15,075
168	3.4	4.27	186,001	4.19	13.534	21,835
169	4.4	4.48	195,149	4.375	17.909	28,893
170	5.4	4.67	203,425	4.575	22.484	36,274
171	6.4	4.93	214,751	4.8	27.284	44,018
172	7.4	5.1	222,156	5.015	32.299	52,109
173	8.4	5.27	229,561	5.185	37.484	60,474
174	9.4	5.46	237,838	5.365	42.849	69,130
175	10.4	5.68	247,421	5.57	48.419	78,116



Interpolation of Stage/Storage Curve

Elevation: **171.2 Treatment pool elev.**
Min. Vol: **29.5**



Routing Summary (refer to attached StormNet analysis)

	Elev.	Qpeak (cfs)	Freeboard (ft)
Starting Water Surface Elev.	166.6	0	8.4
10-yr, 24-hour Water Surface Elev.	171.9	0	3.1
25-yr, 24-hour Water Surface Elev.	173.12	0	1.9
100-yr, 24-hour Water Surface Elev.	174.12	11.28	0.9

GARRETT & MOORE
1258 Benson Road, Garner, NC 27529

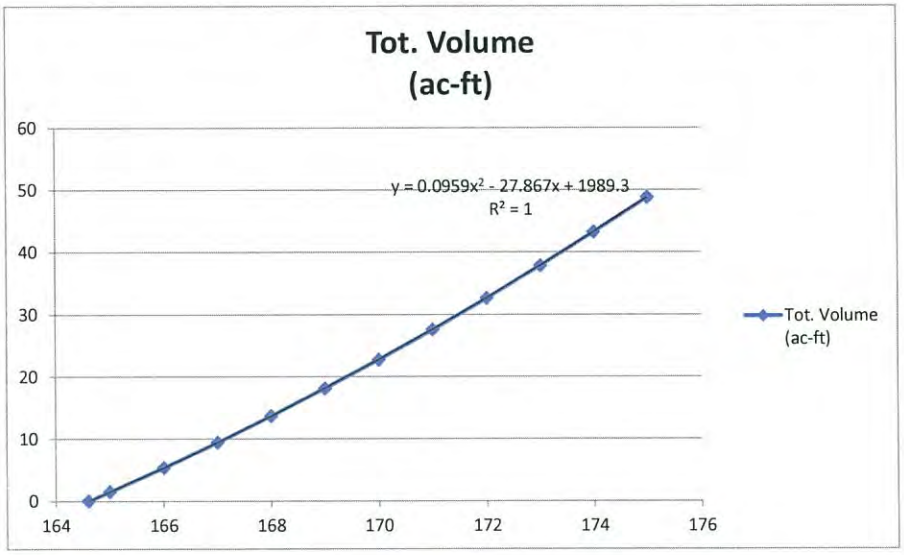
PROJECT	Cope Class Three Landfill
SUBJECT	Wastewater Pond Treatment Volume and Routing Summary
COMPUTED BY	CMF **CHECKED BY** LBG
DATE	7/12/2016

Wastewater Pond #2

Drainage Area: 52 ac
Min. Volume: 1,094,808 cf
40,548 CY
25.1 ac-ft

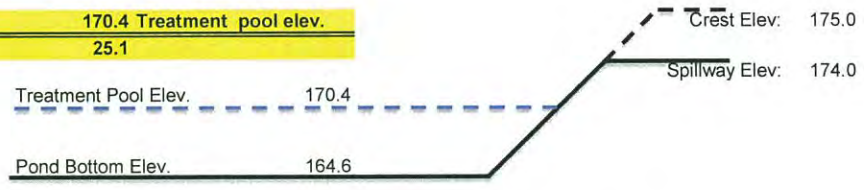
Stage/Storage Curve

Elev	Depth (ft)	Area (ac)	Area (sf)	Inc. Volume (ac-ft)	Tot. Volume (ac-ft)	Tot. Volume (CY)
164.6	0	3.72	162,043	0	0	0
165	0.4	3.79	165,092	1.502	1.502	2,423
166	1.4	3.97	172,933	3.88	5.382	8,683
167	2.4	4.15	180,774	4.06	9.442	15,233
168	3.4	4.34	189,050	4.245	13.687	22,082
169	4.4	4.52	196,891	4.43	18.117	29,229
170	5.4	4.71	205,168	4.615	22.732	36,674
171	6.4	4.96	216,058	4.835	27.567	44,475
172	7.4	5.13	223,463	5.045	32.612	52,614
173	8.4	5.31	231,304	5.22	37.832	61,036
174	9.4	5.48	238,709	5.395	43.227	69,740
175	10.4	5.64	245,678	5.56	48.787	78,710



Interpolation of Stage/Storage Curve

Elevation: 170.4 Treatment pool elev.
Min. Vol: 25.1



Routing Summary (refer to attached StormNet analysis)

	Elev.	Qpeak (cfs)	Freeboard (ft)
Starting Water Surface Elev.	166.6	0	8.4
10-yr, 24-hour Water Surface Elev.	170.88	0	4.1
25-yr, 24-hour Water Surface Elev.	171.88	0	3.1
100-yr, 24-hour Water Surface Elev.	173.63	0	1.4

GARRETT & MOORE
1258 Benson Road, Garner, NC 27529

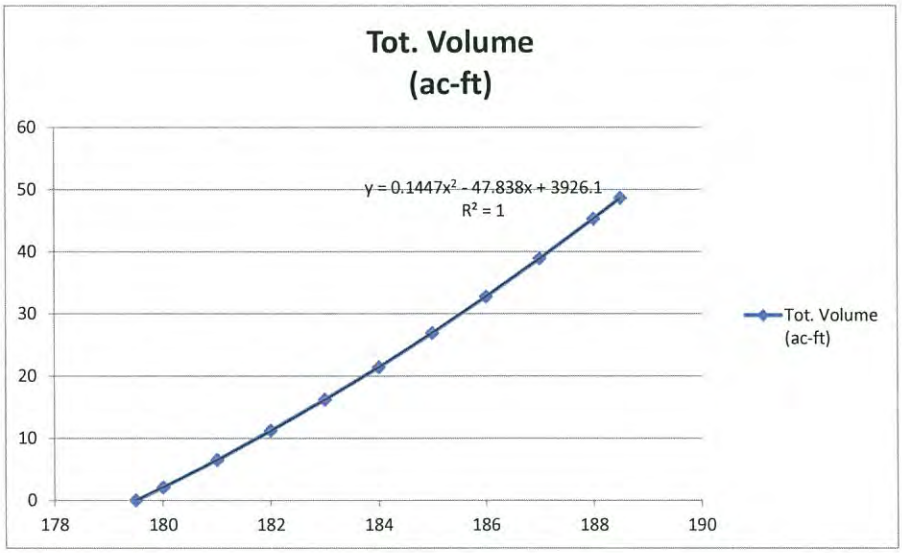
PROJECT	Cope Class Three Landfill
SUBJECT	Wastewater Pond Treatment Volume and Routing Summary
COMPUTED BY	CMF **CHECKED BY** LBG
DATE	7/12/2016

Wastewater Pond #3

Drainage Area: 76 ac
Min. Volume: 1,600,104 cf
59,263 CY
36.7 ac-ft

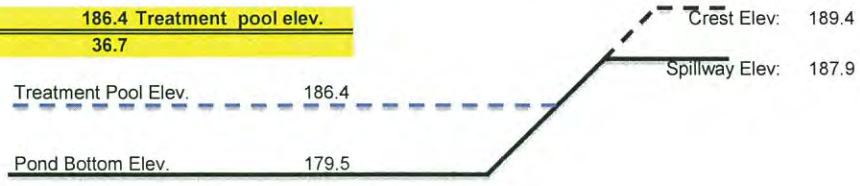
Stage/Storage Curve

Elev	Depth (ft)	Area (ac)	Area (sf)	Inc. Volume (ac-ft)	Tot. Volume (ac-ft)	Tot. Volume (CY)
179.5	0	4.15	180,774	0	0	0
180	0.5	4.28	186,437	2.1075	2.1075	3,400
181	1.5	4.55	198,198	4.415	6.5225	10,523
182	2.5	4.82	209,959	4.685	11.2075	18,081
183	3.5	5.09	221,720	4.955	16.1625	26,076
184	4.5	5.36	233,482	5.225	21.3875	34,505
185	5.5	5.63	245,243	5.495	26.8825	43,370
186	6.5	6.02	262,231	5.825	32.7075	52,768
187	7.5	6.27	273,121	6.145	38.8525	62,682
188	8.5	6.59	287,060	6.43	45.2825	73,056
188.5	9	6.76	294,466	3.3375	48.62	78,440



Interpolation of Stage/Storage Curve

Elevation: 186.4 Treatment pool elev.
Min. Vol: 36.7



Routing Summary (refer to attached StormNet analysis)

	Elev.	Qpeak (cfs)	Freeboard (ft)
Starting Water Surface Elev.	181.5	0	7.9
10-yr, 24-hour Water Surface Elev.	186.58	0	2.8
25-yr, 24-hour Water Surface Elev.	187.83	0	1.6
100-yr, 24-hour Water Surface Elev.	188.17	23.32	1.2

Project Description

Project File Name :	2012 REVISED ROUTING 25-yr.SPF
Project Description :	SCE&G Cope Station Class Three Landfill Wastewater Pond Routing 25-year, 24-hour Storm

Project Options

Flow Units	CFS
Elevation Type	Elevation
Hydrology Method	SCS TR-55
Time of Concentration (TOC) Method	Kirpich
Link Routing Method	Hydrodynamic
Enable Overflow Ponding at Nodes	YES
Skip Steady State Analysis Time Periods	NO

Analysis Options

Start Analysis On	Sep 06, 2012	00:00:00
End Analysis On	Sep 08, 2012	00:00:00
Start Reporting On	Sep 06, 2012	00:00:00
Antecedent Dry Days	0	days
Runoff (Dry Weather) Time Step	0 01:00:00	days hh:mm:ss
Runoff (Wet Weather) Time Step	0 00:05:00	days hh:mm:ss
Reporting Time Step	0 00:05:00	days hh:mm:ss
Routing Time Step	30	seconds

Number of Elements

	Qty
Rain Gages	1
Subbasins	3
Nodes	6
Junctions	0
Outfalls	3
Flow Diversions	0
Inlets	0
Detention Ponds	3
Links	3
Channels	0
Pipes	0
Pumps	0
Orifices	0
Weirs	3
Outlets	0
Pollutants	0
Land Uses	0

Subbasin Summary

SN	Subbasin ID	Area (ac)	Weighted Curve Number	Average Slope (%)	Equivalent Width (ft)	Total Rainfall (in)	Total Runoff (in)	Total Runoff Volume (ac-in)	Peak Runoff (cfs)	Time of Concentration (days hh:mm:ss)
1	Sub-1	61.00	87.08	3.5000	690.00	7.10	5.59	340.69	392.17	0 00:16:21
2	Sub-2	52.00	87.27	4.2000	676.00	7.10	5.61	291.56	355.94	0 00:13:41
3	Sub-3	76.00	87.03	5.0000	1060.00	7.10	5.58	424.00	536.01	0 00:12:08

Node Summary

SN	Element ID	Element Type	Invert Elevation (ft)	Ground/Rim (Max) Elevation (ft)	Initial Water Elevation (ft)	Surcharge Elevation (ft)	Ponded Area (ft^2)	Peak Inflow (cfs)	Max HGL Elevation Attained (ft)	Max Surcharge Depth Attained (ft)	Min Freeboard Attained (ft)	Time of Peak Flooding Occurrence (days hh:mm)	Total Flooded Volume (ac-in)	Total Time Flooded (min)
1	Out-1	OutFall	0.00					0.00	0.00					
2	Out-2	OutFall	0.00					0.00	0.00					
3	Out-3	OutFall	0.00					0.00	0.00					
4	Pond-1	Pond	164.60	175.00	166.60		0.00	378.40	173.12				0.00	0.00
5	Pond-2	Pond	164.50	175.00	166.60		0.00	352.67	171.88				0.00	0.00
6	Pond-3	Pond	179.50	188.50	181.50		0.00	535.23	187.83				0.00	0.00

Link Summary

SN	Element ID	Element Type	From (Inlet) Node	To (Outlet) Node	Length	Inlet Invert Elevation	Outlet Invert Elevation	Average Slope	Diameter or Height	Manning's Roughness	Peak Flow	Design Flow Capacity	Peak Flow/ Design Flow Ratio	Peak Flow Velocity	Peak Flow Depth	Peak Flow Depth/ Total Depth Ratio	Total Time Surcharged
					(ft)	(ft)	(ft)	(%)	(in)		(cfs)	(cfs)		(ft/sec)	(ft)		(min)
1	Weir-1	Weir	Pond-1	Out-1			0.00				0.00						
2	Weir-2	Weir	Pond-2	Out-2			0.00				0.00						
3	Weir-3	Weir	Pond-3	Out-3			0.00				0.00						

Subbasin Hydrology

Subbasin : Sub-1

Input Data

Area (ac) 61.00
Weighted Curve Number 87.08
Average Slope (%) 3.5000
Equivalent Width (ft) 690.00
Rain Gage ID Gage-1

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	55.50	-	86.00
Permanent Pool Water	5.50	D	98.00
Composite Area & Weighted CN	61.00		87.08

Time of Concentration

TOC Method : Kirpich

Sheet Flow Equation :

Tc = (0.0078 * ((Lf^0.77) * (Sf^-0.385)))

Where :

Tc = Time of Concentration (min)
Lf = Flow Length (ft)
Sf = Slope (ft/ft)

Flow Length (ft) 3850.97
Slope (%) 3.5
Computed TOC (min) 16.35

Subbasin Runoff Results

Total Rainfall (in) 7.10
Total Runoff (in) 5.59
Peak Runoff (cfs) 392.17
Weighted Curve Number 87.08
Time of Concentration (days hh:mm:ss) 0 00:16:21

Subbasin : Sub-2

Input Data

Area (ac)	52.00
Weighted Curve Number	87.27
Average Slope (%)	4.2000
Equivalent Width (ft)	676.00
Rain Gage ID	Gage-1

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	46.50	-	86.00
Permanent Pool Water	5.50	D	98.00
Composite Area & Weighted CN	52.00		87.27

Time of Concentration

Flow Length (ft)	3350.78
Slope (%)	4.2
Computed TOC (min)	13.69

Subbasin Runoff Results

Total Rainfall (in)	7.10
Total Runoff (in)	5.61
Peak Runoff (cfs)	355.94
Weighted Curve Number	87.27
Time of Concentration (days hh:mm:ss)	0 00:13:41

Subbasin : Sub-3

Input Data

Area (ac)	76.00
Weighted Curve Number	87.03
Average Slope (%)	5.0000
Equivalent Width (ft)	1060.00
Rain Gage ID	Gage-1

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
-	69.50	-	86.00
Permanent Pool Water	6.50	D	98.00
Composite Area & Weighted CN	76.00		87.03

Time of Concentration

Flow Length (ft)	3123.18
Slope (%)	5
Computed TOC (min)	12.13

Subbasin Runoff Results

Total Rainfall (in)	7.10
Total Runoff (in)	5.58
Peak Runoff (cfs)	536.01
Weighted Curve Number	87.03
Time of Concentration (days hh:mm:ss)	0 00:12:08

Detention Ponds

Detention Pond : Pond-1

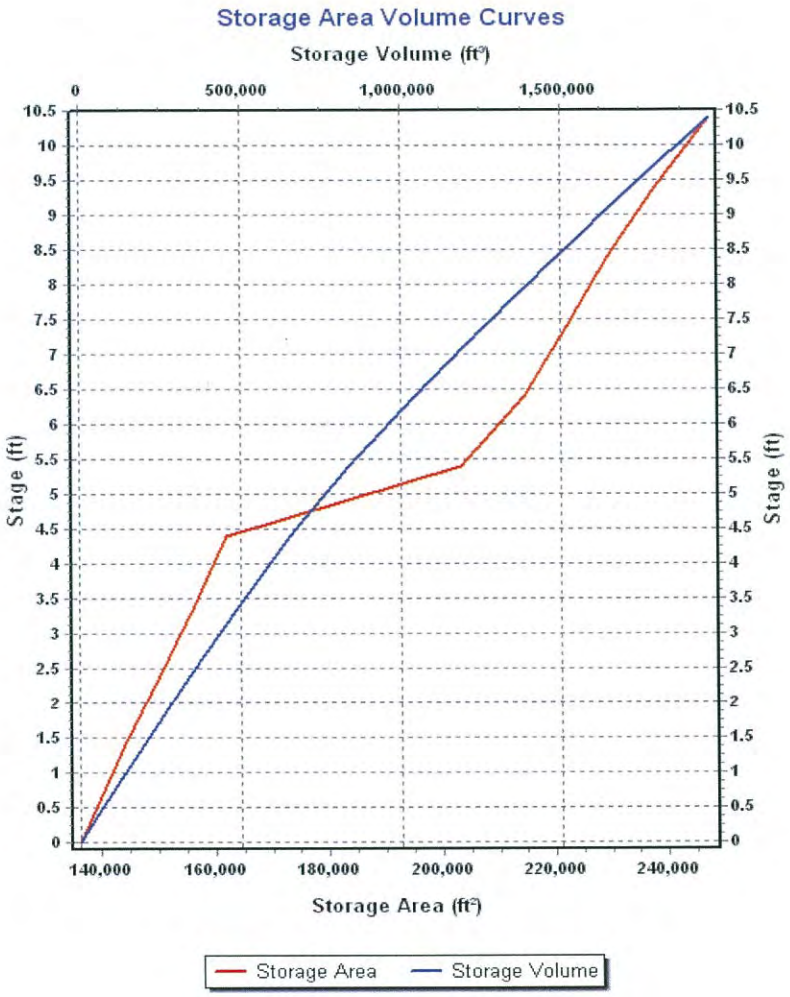
Input Data

Invert Elevation (ft)	164.60
Max (Rim) Elevation (ft)	175.00
Max (Rim) Offset (ft)	10.40
Initial Water Elevation (ft)	166.60
Initial Water Depth (ft)	2.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : DPSC-1

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	136343	0.000
0.4	138521	54972.80
1.4	144184	196325.30
2.4	150282	343558.30
3.4	156380	496889.30
4.4	162043	656100.80
5.4	203425	838834.80
6.4	214751	1047922.80
7.4	222156	1266376.30
8.4	229561	1492234.80
9.4	237838	1725934.30
10.4	247421	1968563.80


Storage Area Volume Curves
Storage Volume (ft³)
0
500,000
1,000,000
1,500,000
Stage (ft)
Stage (ft)
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
140,000
160,000
180,000
200,000
220,000
240,000
Storage Area (ft²)
Storage Area
Storage Volume

Detention Pond : Pond-1 (continued)

Outflow Weirs

SN	Element ID	Weir Type	Flap Gate	Crest Elevation (ft)	Crest Offset (ft)	Length (ft)	Total Height (ft)	Discharge Coefficient
1	Weir-1	Trapezoidal	No	174.00	9.40	75.00	1.00	3.37

Output Summary Results

Peak Inflow (cfs)	378.40
Peak Lateral Inflow (cfs)	378.40
Peak Outflow (cfs)	0.00
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	173.12
Max HGL Depth Attained (ft)	8.52
Average HGL Elevation Attained (ft)	171.36
Average HGL Depth Attained (ft)	6.76
Time of Max HGL Occurrence (days hh:mm)	1 00:55
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Detention Pond : Pond-2

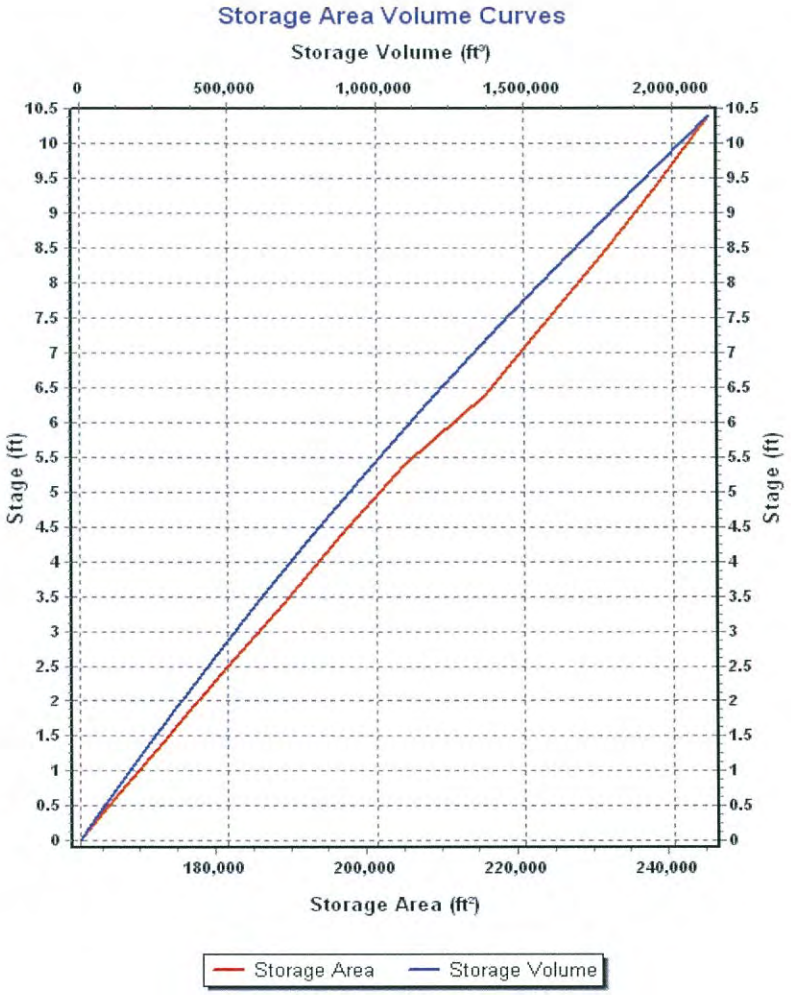
Input Data

Invert Elevation (ft)	164.50
Max (Rim) Elevation (ft)	175.00
Max (Rim) Offset (ft)	10.50
Initial Water Elevation (ft)	166.60
Initial Water Depth (ft)	2.10
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : DPSC-2

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	162043	0.000
0.4	165092	65427.00
1.4	172933	234439.50
2.4	180774	411293.00
3.4	189050	596205.00
4.4	196891	789175.50
5.4	205168	990205.00
6.4	216058	1200818.00
7.4	223463	1420578.50
8.4	231304	1647962.00
9.4	238709	1882968.50
10.4	245678	2125162.00


Storage Area Volume Curves
Storage Volume (ft²)
0
500,000
1,000,000
1,500,000
2,000,000
Stage (ft)
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
180,000
200,000
220,000
240,000
Storage Area (ft²)
Storage Area
Storage Volume

Detention Pond : Pond-2 (continued)

Outflow Weirs

SN	Element ID	Weir Type	Flap Gate	Crest Elevation (ft)	Crest Offset (ft)	Length (ft)	Total Height (ft)	Discharge Coefficient
1	Weir-2	Trapezoidal	No	174.00	9.50	75.00	1.00	3.37

Output Summary Results

Peak Inflow (cfs)	352.67
Peak Lateral Inflow (cfs)	352.67
Peak Outflow (cfs)	0.00
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	171.88
Max HGL Depth Attained (ft)	7.38
Average HGL Elevation Attained (ft)	170.44
Average HGL Depth Attained (ft)	5.94
Time of Max HGL Occurrence (days hh:mm)	1 00:50
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Detention Pond : Pond-3

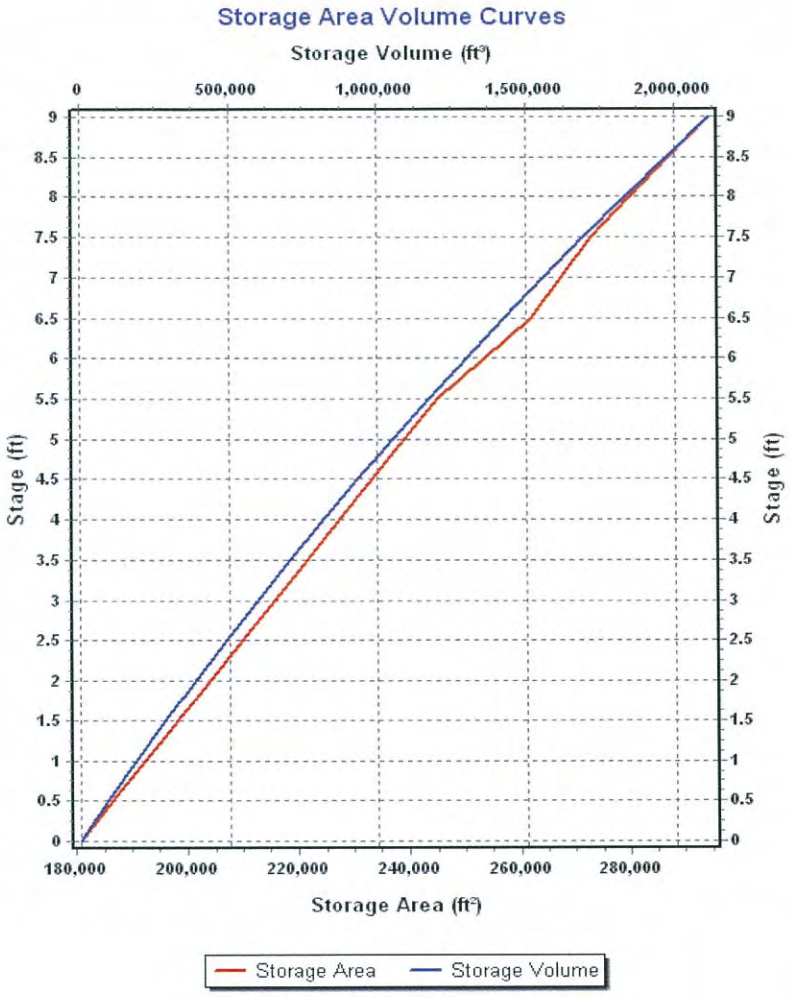
Input Data

Invert Elevation (ft)	179.50
Max (Rim) Elevation (ft)	188.50
Max (Rim) Offset (ft)	9.00
Initial Water Elevation (ft)	181.50
Initial Water Depth (ft)	2.00
Ponded Area (ft²)	0.00
Evaporation Loss	0.00

Storage Area Volume Curves

Storage Curve : DPSC-3

Stage (ft)	Storage Area (ft²)	Storage Volume (ft³)
0	180774	0.000
0.5	186437	91802.75
1.5	198198	284120.25
2.5	209959	488198.75
3.5	221720	704038.25
4.5	233482	931639.25
5.5	245243	1171001.75
6.5	262231	1424738.75
7.5	273121	1692414.75
8.5	287060	1972505.25
9	294466	2117886.75


Storage Area Volume Curves
Storage Volume (ft³)
0
500,000
1,000,000
1,500,000
2,000,000
Stage (ft)
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
180,000
200,000
220,000
240,000
260,000
280,000
Storage Area (ft²)
Storage Area
Storage Volume

Detention Pond : Pond-3 (continued)

Outflow Weirs

SN	Element ID	Weir Type	Flap Gate	Crest Elevation (ft)	Crest Offset (ft)	Length (ft)	Total Height (ft)	Discharge Coefficient
1	Weir-3	Trapezoidal	No	187.90	8.40	50.00	1.00	3.37

Output Summary Results

Peak Inflow (cfs)	535.23
Peak Lateral Inflow (cfs)	535.23
Peak Outflow (cfs)	0.00
Peak Exfiltration Flow Rate (cfm)	0.00
Max HGL Elevation Attained (ft)	187.83
Max HGL Depth Attained (ft)	8.33
Average HGL Elevation Attained (ft)	186.12
Average HGL Depth Attained (ft)	6.62
Time of Max HGL Occurrence (days hh:mm)	1 00:45
Total Exfiltration Volume (1000-ft³)	0.000
Total Flooded Volume (ac-in)	0
Total Time Flooded (min)	0
Total Retention Time (sec)	0.00

Perimeter Ditches

Maximum Design Flow:	235 cfs
Maximum Design Capacity:	300 cfs

Wastewater Ponds

Wastewater Pond #1	
Berm Crest Elevation:	175.0
24-hour, 25-year water surface elevation:	173.12
Freeboard:	1.9 ft
Wastewater Pond #2	
Berm Crest Elevation:	175.0
24-hour, 25-year water surface elevation:	171.88
Freeboard:	3.1 ft
Wastewater Pond #3	
Berm Crest Elevation:	189.4
24-hour, 25-year water surface elevation:	187.83
Freeboard:	1.6 ft

As indicated above, the perimeter ditches and the downstream receiving wastewater pond exceed the required capacity requirements to collect and control the water volume resulting from a 24-hour, 25-year storm.

6 CONCLUSION

The existing Phase 1 Class Three Landfill and all future phases of Class Three Landfill Development meet the requirements of **§ 257.81(a)**. As demonstrated above, 1) run-on to the active disposal unit is prevented by elevation of the landfill grades relative to existing topography, and 2) the stormwater management system consisting of perimeter ditches and wastewater ponds is designed to collect and control the volume resulting from a 24-hour, 25-year storm.