PERIODIC RUN-ON AND RUN-OFF CONTROL PLAN
391-3-4-.10(5) and 40 C.F.R. PART 257.81
HUFFAKER ROAD (PLANT HAMMOND) PRIVATE INDUSTRIAL LANDFILL
(HUFFAKER ROAD LANDFILL)
GEORGIA POWER COMPANY

The Federal CCR Rule, and, for Existing CCR Landfills where applicable, the Georgia CCR Rule (391-3-4-.10) require the owner or operator of an existing or new CCR landfill or any lateral expansion of a CCR landfill to prepare a run-on and run-off control system plan to document how these control systems have been designed and constructed to meet the applicable requirements of this section of the Rule. *See* 40 C.F.R. § 257.81; Ga. Comp. R. & Regs. r. 391.3-4-.10(5)(a). In addition, the Rules require periodic run-on and run-off control system plans every five years. *See* 40 C.F.R. § 257.81(c)(4**);** Ga. Comp. R. & Regs. r. 391.3-4-.10(4)(b).

The CCR landfill known as the Huffaker Road Landfill is located in Floyd County, west of Rome, Georgia on Plant Hammond property. Huffaker Road Landfill is comprised of Active Cells A, B and E. Cells A & B were retrofitted with composite liners in 2014/15. Cell E was permitted and constructed with a minimum 2-ft. compacted clay liner. The facility consists of the CCR storage cells, a leachate pond for Cells A & B, and separate storm water runoff ponds and clear pools.

The storm water flows have been calculated using the Natural Resources Conservation Service (NRCS) method (also known as the Soil Conservation Service (SCS) method) using the 25-yr, 24-hr storm event. The storm water detention system has been designed in accordance with the Georgia Soil and Water Conservation Commission requirements as well as other local, city, and government codes. The post developed storm water discharge was designed to be less than the pre-developed storm water discharge in accordance with the requirements of the State of Georgia.

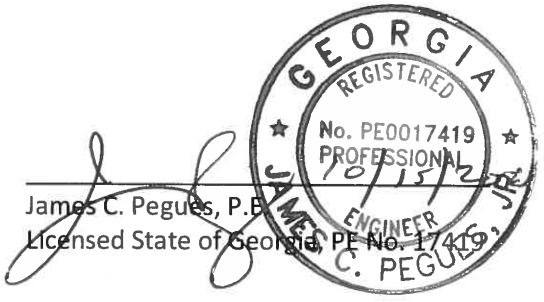
Storm basin calculation data was determined from the existing topography and from the Urban Hydrology for Small Watersheds (TR-55). In accordance with TR-55, a Type II Rainfall Distribution was determined to be appropriate for this site. Precipitation values were determined from National Oceanic and Atmospheric Administration (NOAA) Atlas 14.

The NRCS provides information on soil characteristics and hydrologic groups present at the site. It was determined that the hydrological group "B" should be used to best reflect the characteristics of the soils on site. This information was placed into Storm and Sanitary Sewer Analysis 2019 and used to generate appropriate precipitation curves, runoff curve numbers and storm basin runoff values.

Huffaker Road Landfill Cells are designed and constructed with perimeter berms and drainage ditches around the cells that prevent stormwater run-on during the peak discharge of a 24-hr, 25-yr storm from flowing onto the active portion of the landfill. The leachate pond collects and controls the anticipated amount of leachate generated from the leachate collection system of Cells A&B over a period of 7 days as well as the quantity of rainfall from a 24-hr, 100-yr storm event (original facility design) that falls directly into the leachate pond. Storm water run-off from Cells A & B and Cell E is routed through their respective sedimentation/clarifying ponds, also designed originally to convey the run-off from a 24-hr, 100-yr storm event, without overtopping. This plan is supported by appropriate engineering calculations which are attached to show compliance with the 24-hr, 25-yr storm event.

The facility is operated subject to and in accordance with § 257.3-3 of EPA's regulations.

I hereby certify that the run-on and run-off control system plan meets the requirements of 40 C.F.R. § 257.81.



James C. Pegues, P.E.
Licensed State of Georgia, PE No. 17419

Run-on and Run-off Control System Plan for Landfills:
Calculation Summary

for

Plant Hammond Huffaker Road Parcels A and B

Prepared by:

Southern Company Services
Technical Services

Originator: _____ 10/8/21
Jim W. Minor, P.E. Date

Reviewer: _____ 10/11/21
Curtis R. Upchurch, P.E. Date

Approval: _____ 10/11/21
James C. Peeples, P.E. Date

1.0 Purpose of Calculation

The Federal CCR Rule, and, for Existing CCR Landfills where applicable, the Georgia CCR Rule (391-3-4-.10) require the owner or operator of an existing or new CCR landfill or any lateral expansion of a CCR landfill to prepare a run-on and run-off control system plan to document how these control systems have been designed and constructed to meet the applicable requirements of this section of the Rule.

The purpose of this report is to provide data that demonstrates the Plant Hammond Combustion By-Product (CCB) Storage Facility for Cells A and B is designed to meet the requirements in the rules listed above from a 24-hour, 25-year storm.

2.0 Summary of Conclusions

2.1 Site Overview

The Huffaker Road CCB Storage Facility is located on GPC property approximately 4 miles northeast of the Plant. This facility was constructed in 2004-05 and was retrofitted from a clay liner to a less permeable clay liner with 60 mil HDPE liner, geo-composite drainage net and leachate collection system and leachate storage pond in 2014-15. Ash that was in these cells was relocated to Parcel E to the south and after retrofitting A & B, they have been receiving ash.

The landfill is sited in an area covering approximately 46 acres and Parcels A & B are now combined into one storage cell with a drainage area of approximately 33.1 acres. There are no off-site areas draining into the parcels or the sediment pond and clear pool downstream and only stormwater runoff from rain falling directly in the cell, ponds and aggregate surfaced perimeter roads must be collected and controlled. Approximately 17.1 acres of the cell area is currently covered with a 30 mil HDPE rain flap to prevent excess runoff from entering the leachate collection system requiring containment for reuse/treatment. The remainder of the area is an active area that is receiving ash and covers approximately 12.8 acres.

Runoff from the cell, perimeter roads, and perimeter ditch drains into the sediment pond via a concrete spillway. The sediment pond is hydraulically connected to a clear pool with 48” diameter riser structures and 36” diameter principal spillway culverts. Both ponds also have an auxiliary (emergency) spillway.

An overview of Huffaker Road Landfill Parcels A and B is provided in Table 1 below.

Table 1 – Huffaker Road Landfill Parcels A and B Site Characteristics

Pond Description	Storage Cells	Sedimentation Pond	Clear Pool
Size (Acres)	33.1	5.2	0.7
Outlet Type	12’ trapezoidal channel	48” Riser with 36” dia. outlet pipe CMP & 20’ trapezoidal channel	48” Riser w/ 36” dia. outlet pipe CMP & 20’ trapezoidal channel
Outlets To	Sedimentation Pond	Clear Pool	Ditch to Smith Creek

2.2 Run-on Control System Plan

There is no stormwater run-on into Parcels A and B due to the construction of perimeter berm/roads at the outer boundaries. Any run-off that was directed to the parcel areas was diverted by the initial design which now prevents any water encroachment. For further information on this hydraulic design, see SCS Calculation No. C-HM-01208-01, Plant Hammond, Huffaker Road Coal Combustion By-Products Storage Site, 9/27/04.

2.3 Run-off Control System Plan

A hydrologic and hydraulic model was developed for the Huffaker Road Landfill Parcels A and B to determine the hydraulic capacity of the parcels. The design storm for the purposes of run-off control system plans is the 24-hour, 25-year rainfall event. The results of routing the design storm event through the landfill are presented in Table 2 below:

Table 2-Flood Routing Results for Huffaker Road Landfill Parcels A and B

Storage Pond Name	Normal Pool Elevation* (feet, NAVD88)	Maximum 25-year pool elevation (feet, NAVD88)	Spillway/Top of Dike Elevation (feet, NAVD88)	Freeboard (feet)	Peak Inflow (cfs)	Peak Outflow (cfs)
Sedimentation Pond	647.50	649.44	648.50/650.00	0.56	234.97	96.51
Clear Pool	645.53	648.40	648.00/650.00	1.6	112.33	76.65

*Freeboard is measured from the top of embankment to the peak water surface elevation.

2 Methodology

2.4 Hydrologic Analyses

The design storm for all run-on/run-off analyses is a 24-hour, 25-year rainfall event. A summary of the design storm parameters and rainfall distribution methodology for these calculations is summarized below in Table 3.

Table 3. Huffaker Road Landfill Parcels A and B Design Storm Distribution

Return Frequency (years)	Storm Duration (hours)	Rainfall Total (Inches)	Rainfall Source	Storm Distribution
25	24	6.29	NOAA Atlas 14	SCS Type II

The drainage area for the Huffaker Road Landfill Parcels A and B was delineated based on survey data acquired for the Plant in December of 2020. Run-off characteristics were developed based on the Soil Conservation Service (SCS) methodologies as outlined in TR-55. An overall SCS curve number for the drainage area was developed based on methods prescribed in TR-55. Soil types were obtained from the Natural Resources Conservation Service. Land use areas were delineated based on aerial photography. Time of Concentration calculations were also developed based on methodologies prescribed in TR-55.

A table of the pertinent basin characteristics of the landfill is provided below in Table(s) 4(a) through 4(c).

Table 4(a) - Landfill Hydrologic Information (Parcels A and B)

Drainage Basin Area (acres)	33.1 Acres
Hydrologic Curve Number, CN	96 (rain flap area) and 86 (active cell)
Hydrologic Methodology	SCS Method
Time of Concentration (minutes)	20.11
Hydrologic Software	Autodesk SSA (Storm and Sanitary Sewer Analysis) 2019

Table 4(b) - Landfill Hydrologic Information (Perimeter Road & Ditches)

Drainage Basin Area (acres)	2.2
Hydrologic Curve Number, CN	85
Hydrologic Methodology	SCS Method
Time of Concentration (minutes)	21.3
Hydrologic Software	Autodesk SSA (Storm and Sanitary Sewer Analysis) 2019

Table 4(c) - Landfill Hydrologic Information (Sediment Pond & Clear Pool Areas)

Drainage Basin Area (acres)	8.9
Hydrologic Curve Number, CN	98
Hydrologic Methodology	SCS Method
Time of Concentration (minutes)	6.00
Hydrologic Software	Autodesk SSA (Storm and Sanitary Sewer Analysis) 2019

Run-off characteristics were developed based on the Soil Conservation Service (SCS) methodologies as outlined in TR-55.

Time of Concentration calculations were developed based on the Soil Conservation Service (SCS) methodologies as outlined in TR-55.

Run-off values were determined by importing the characteristics developed above into a hydrologic model in Autodesk SSA (Storm and Sanitary Sewer Analysis) 2019.

2.5 Hydraulic Analyses

Storage values for the sediment pond and clear pool were determined by developing a stage-storage relationship utilizing contour data. The spillway systems for both the sediment pond and the clear pool consist of a primary spillway and an auxiliary/emergency spillway. The primary spillways are 48" diameter vertical risers and have a sharp crested weir length of 12.6-feet. Each riser has a 36-inch diameter outlet pipe. The auxiliary spillways are trapezoidal spillways in the dikes lined with concrete and outfall either to existing ground or a riprap lined ditch. A summary of spillway information is presented below in Tables 5(a) and 5(b).

Table 5(a)—Sediment Pond Spillway Attribute Table

Spillway Component	Riser Top El. (ft)	US Invert El (ft)	DS Invert El (ft)	Dimension	Slope (ft/ft)	Length (ft)	Spillway Capacity (cfs)
Primary	648.00	643.00	642.70	36" Dia. HDPE (48" Dia. riser)	0.006	50.0	133.40
Auxiliary	n/a	648.50	648.42	Trapezoidal Crest L=20', 3:1 S.S.	0.01	8.0	263.46

Table 5(b)—Clear Pool Spillway Attribute Table

Spillway Component	Riser Top El. (ft)	US Invert El (feet)	DS Invert El (feet)	Dimension	Slope (ft/ft)	Length (ft)	Spillway Capacity (cfs)
Primary	647.00	642.7	641.35	36" Dia. CMP (48" Dia. riser)	0.021	65.0	54.55
Auxiliary	n/a	648.0	647.87	Trapezoidal Crest L=20', 3:1 S.S.	0.01	13.0	263.46

3 Supporting Information

4.1 Curve Number

Table 6. Curve Number Data

Location	Terrain type	Area	Curve Number
Cell	ash and rain flap	12.8	86 and 96
Roads	gravel	17.1	85
Perimeter ditch	grass	1	61
Sedimentation Pond	Water	5.2	100
Clear Pool	Water	0.7	100

4.2 Stage Storage Tables

Sediment Pond			
Depth	Elevation	Area (s.f.)	Volume (c.f.)
0	642	3,113	0
1	643	30,855	16,984
2	644	80,928	72,876
3	645	137,926	182,303
4	646	162,280	332,406
5	647	168,474	497,783
6	648	174,708	669,374
7	649	180,981	847,218
8	650	187,294	1,031,356

Clear Pool			
Depth	Elevation	Area (s.f.)	Volume (c.f.)
0	642	1,268	0
1	643	15,306	8,287
2	644	17,082	24,481
3	645	18,464	42,254
4	646	19,885	61,429
5	647	21,345	82,044
6	648	22,845	104,139
7	649	24,384	127,753
8	650	25,962	152,926

4.3 Time of Concentration

Time of Concentration (Tc) for the sedimentation pond and clear pool is the minimum Tc of 6 minutes. The Time of Concentration for the cell area is shown below.

Subbasin : CellAandB

Input Data

Area (ac)	33.10
Weighted Curve Number	90.34
Rain Gage ID	DesignStorm

Composite Curve Number

Soil/Surface Description	Area (acres)	Soil Group	Curve Number
Ash	12.80	-	86.00
Rainflap	17.10	-	96.00
Gravel roads	2.20	B	85.00
> 75% grass cover, Good	1.00	B	61.00
Composite Area & Weighted CN	33.10		90.34

Time of Concentration

TOC Method : SCS TR-55

Sheet Flow Equation :

Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

Where :

Tc = Time of Concentration (hr)
n = Manning's roughness
Lf = Flow Length (ft)
P = 2 yr, 24 hr Rainfall (inches)
Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation :

V = 16.1345 * (Sf^0.5) (unpaved surface)
V = 20.3282 * (Sf^0.5) (paved surface)
V = 15.0 * (Sf^0.5) (grassed waterway surface)
V = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
V = 9.0 * (Sf^0.5) (cultivated straight rows surface)
V = 7.0 * (Sf^0.5) (short grass pasture surface)
V = 5.0 * (Sf^0.5) (woodland surface)
V = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
Tc = (Lf / V) / (3600 sec/hr)

Where:

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)

Channel Flow Equation :

V = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
R = Aq / Wp
Tc = (Lf / V) / (3600 sec/hr)

Where :

Tc = Time of Concentration (hr)
Lf = Flow Length (ft)
R = Hydraulic Radius (ft)
Aq = Flow Area (ft^2)
Wp = Wetted Perimeter (ft)
V = Velocity (ft/sec)
Sf = Slope (ft/ft)
n = Manning's roughness

Sheet Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	0.10	0.00	0.00
Flow Length (ft) :	70	0.00	0.00
Slope (%) :	1.4	0.00	0.00
2 yr, 24 hr Rainfall (in) :	3.80	0.00	0.00
Velocity (ft/sec) :	0.21	0.00	0.00
Computed Flow Time (min) :	5.64	0.00	0.00

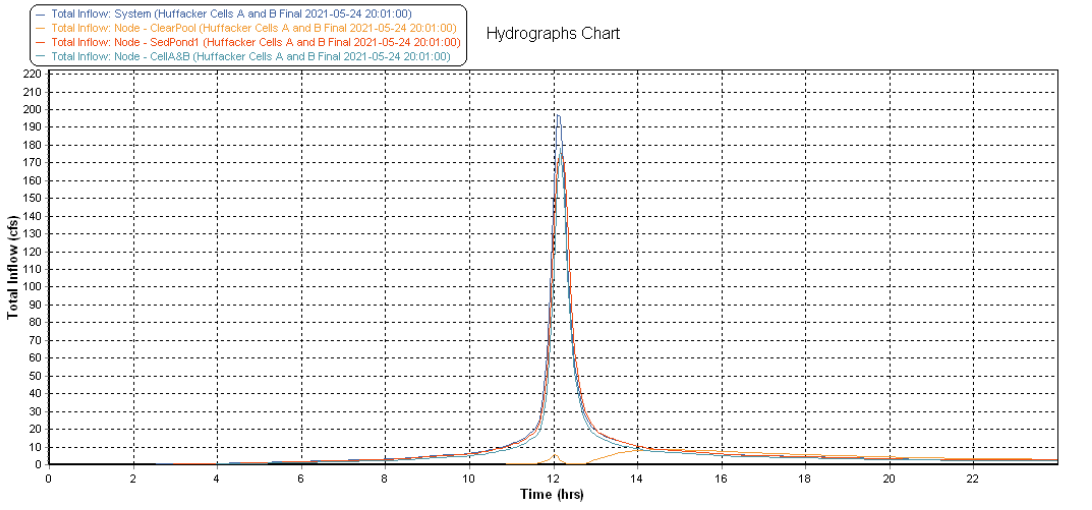
Channel Flow Computations	Subarea A	Subarea B	Subarea C
Manning's Roughness :	.030	0.00	0.00
Flow Length (ft) :	2336	0.00	0.00
Channel Slope (%) :	1.4	0.00	0.00
Cross Section Area (ft²) :	1.75	0.00	0.00
Wetted Perimeter (ft) :	5.65	0.00	0.00
Velocity (ft/sec) :	2.69	0.00	0.00
Computed Flow Time (min) :	14.47	0.00	0.00

Total TOC (min) 20.11

Subbasin Runoff Results

Total Rainfall (in)	6.29
Total Runoff (in)	5.17
Peak Runoff (cfs)	178.47
Weighted Curve Number	90.34
Time of Concentration (days hh:mm:ss)	0 00:20:07

4.4 Results



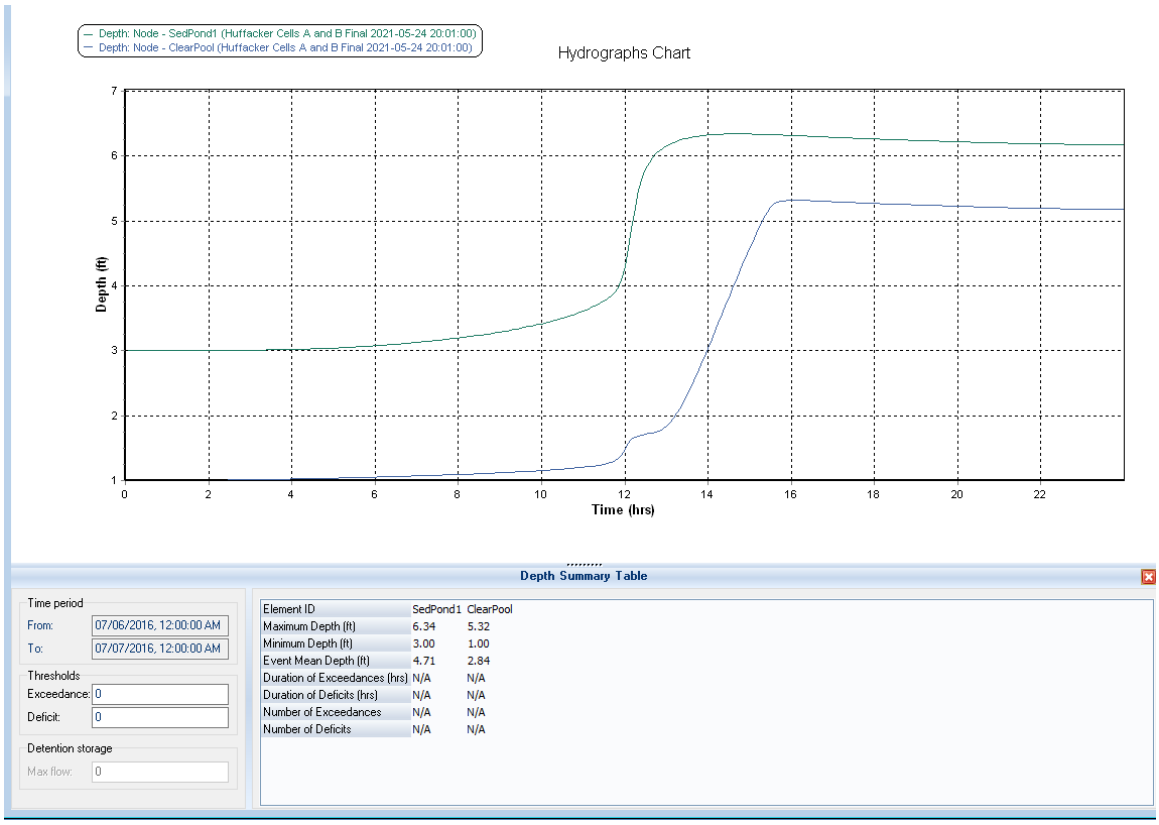
Total Inflow Summary Table

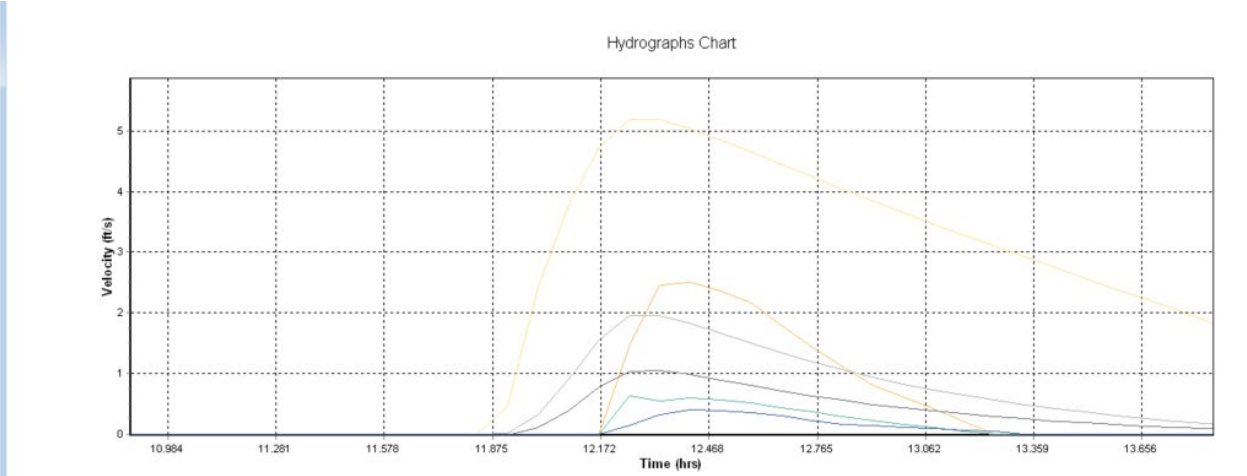
Time period
From: 07/06/2016, 12:00:00 AM
To: 07/07/2016, 12:00:00 AM

Thresholds
Exceedance: 0
Deficit: 0

Detention storage
Max flow: 0

Element ID	System	ClearPool	SedPond1	CellA&B
Maximum Total Inflow (cfs)	196.91	8.45	176.21	178.40
Minimum Total Inflow (cfs)	0.00	0.00	0.00	0.00
Event Mean Total Inflow (cfs)	8.69	2.66	8.49	7.18
Duration of Exceedances (hrs)	N/A	N/A	N/A	N/A
Duration of Deficits (hrs)	N/A	N/A	N/A	N/A
Number of Exceedances	N/A	N/A	N/A	N/A
Number of Deficits	N/A	N/A	N/A	N/A
Volume of Exceedance (ft³)	N/A	N/A	N/A	N/A
Volume of Deficit (ft³)	N/A	N/A	N/A	N/A
Total Inflow Volume (ft³)	748092.4	228926.38	730718.6	618229.33
Detention Storage (ft³)	N/A	N/A	N/A	N/A


Depth: Node - SedPond1 (Huffacker Cells A and B Final 2021-05-24 20:01:00)
Depth: Node - ClearPool (Huffacker Cells A and B Final 2021-05-24 20:01:00)
Hydrographs Chart
Depth (ft)
Time (hrs)
Depth Summary Table
Time period
From: 07/06/2016, 12:00:00 AM
To: 07/07/2016, 12:00:00 AM
Thresholds
Exceedance: 0
Deficit: 0
Detention storage
Max flow: 0
Element ID SedPond1 ClearPool
Maximum Depth (ft) 6.34 5.32
Minimum Depth (ft) 3.00 1.00
Event Mean Depth (ft) 4.71 2.84
Duration of Exceedances (hrs) N/A N/A
Duration of Deficits (hrs) N/A N/A
Number of Exceedances N/A N/A
Number of Deficits N/A N/A



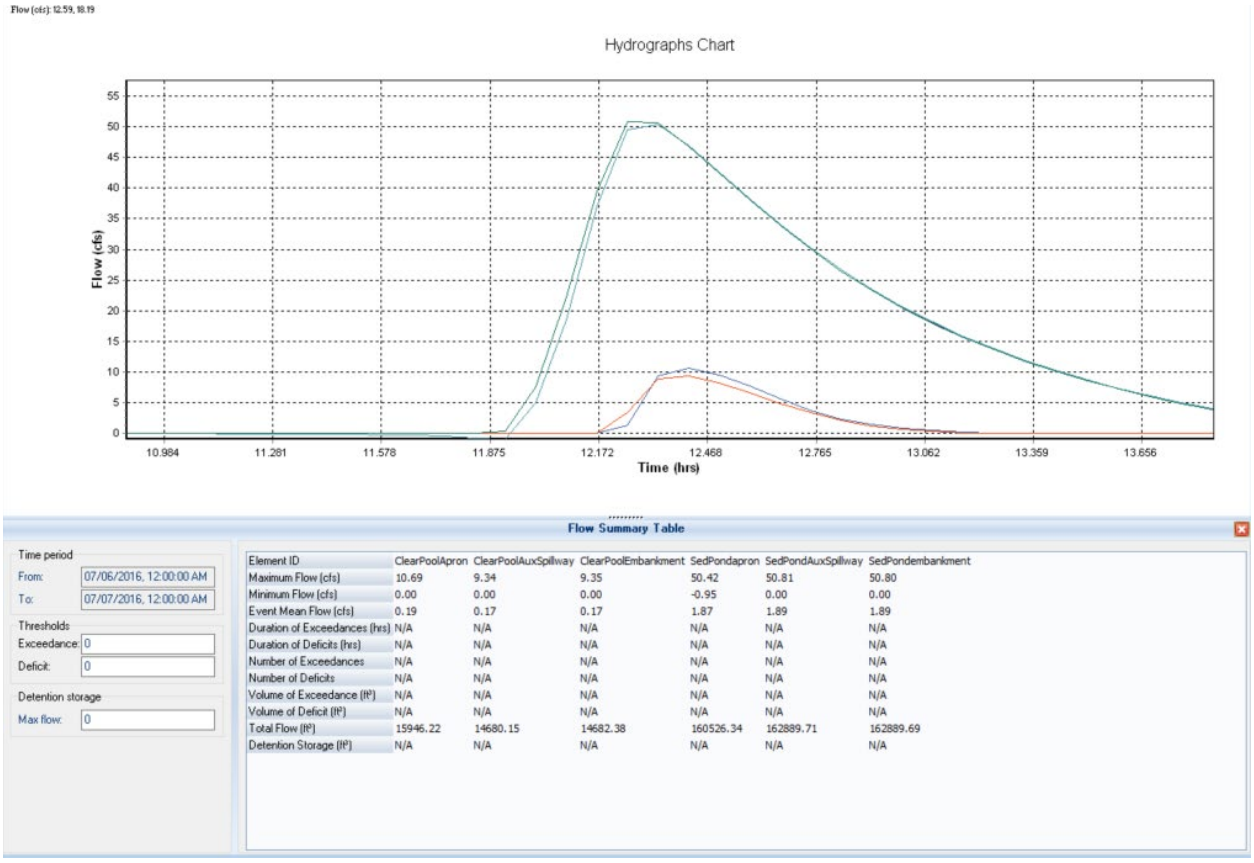
Velocity Summary Table

Time period
From: 07/06/2016, 12:00:00 AM
To: 07/07/2016, 12:00:00 AM

Thresholds
Exceedance: 0
Deficit: 0

Detention storage
Max flow: 0

Element ID	ClearPoolAuxSpillway	ClearPoolEmbankment	SedPondapron	SedPondAuxSpillway	SedPondembankment	ClearPoolApron
Maximum Velocity (ft/s)	2.50	0.62	1.05	5.19	1.96	0.40
Minimum Velocity (ft/s)	0.00	0.00	-0.02	0.00	0.00	0.00
Event Mean Velocity (ft/s)	0.06	0.02	0.04	0.32	0.08	0.01
Duration of Exceedances (hrs)	N/A	N/A	N/A	N/A	N/A	N/A
Duration of Deficits (hrs)	N/A	N/A	N/A	N/A	N/A	N/A
Number of Exceedances	N/A	N/A	N/A	N/A	N/A	N/A
Number of Deficits	N/A	N/A	N/A	N/A	N/A	N/A



Element ID	ClearPoolApron	ClearPoolAuxSpillway	ClearPoolEmbankment	SedPondapron	SedPondAuxSpillway	SedPondembankment
Maximum Flow (cfs)	10.69	9.34	9.35	50.42	50.81	50.80
Minimum Flow (cfs)	0.00	0.00	0.00	-0.95	0.00	0.00
Event Mean Flow (cfs)	0.19	0.17	0.17	1.87	1.89	1.89
Duration of Exceedances (hrs)	N/A	N/A	N/A	N/A	N/A	N/A
Duration of Deficits (hrs)	N/A	N/A	N/A	N/A	N/A	N/A
Number of Exceedances	N/A	N/A	N/A	N/A	N/A	N/A
Number of Deficits	N/A	N/A	N/A	N/A	N/A	N/A
Volume of Exceedance (ft³)	N/A	N/A	N/A	N/A	N/A	N/A
Volume of Deficit (ft³)	N/A	N/A	N/A	N/A	N/A	N/A
Total Flow (ft³)	15946.22	14680.15	14682.38	160526.34	162889.71	162889.69
Detention Storage (ft³)	N/A	N/A	N/A	N/A	N/A	N/A

4.5 Drainage Basin

Drainage Map Sketch

Run-on and Run-off Control System Plan for Landfills:
Calculation Summary

for

Plant Hammond Huffaker Road Parcel E

Prepared by:

Southern Company Services
T&PS Environmental Solutions

Originator: _____ 10/11/21
Curtis R. Upchurch Date

Reviewer: Jonathan J Martin 10/12/21
J. Grant Martin Date

Approval: _____ 10/12/2021
James C. Pegues, P.E. Date

1.0 Purpose of Calculation

The Federal CCR Rule, and, for Existing CCR Landfills where applicable, the Georgia CCR Rule (391-3-4-.10) require the owner or operator of an existing or new CCR landfill or any lateral expansion of a CCR landfill to prepare a run-on and run-off control system plan to document how these control systems have been designed and constructed to meet the applicable requirements of this section of the Rule.

The purpose of this report is to provide data that demonstrates the Plant Hammond Combustion By-Product (CCB) Storage Facility for Cell E is designed to meet the requirements in the rules listed above from a 24-hour, 25-year storm.

2.0 Summary of Conclusions

2.1 Site Overview

The Huffaker CCB Storage Facility is located on GPC property approximately 4 miles northeast of the Plant. This facility was constructed in 2004-05 and is currently active to receive ash from the Plant. Parcels A & B were retrofitted in 2013-14 with a new liner and leachate collection system and ash that was in these cells was relocated to Parcel E. The stack is currently filled to elevation 660 (approx.) with intermediate cover and grassed slopes.

The landfill is sited in an area covering approximately 42.2 acres and the Parcel E cell area is approximately 21.1 acres. There are no off-site areas draining into the cell or the sediment pond and clear pool downstream and only stormwater run-off from rain falling directly in the cell, ponds and aggregate surfaced perimeter roads must be collected and controlled.

An overview of Parcel E is provided in Table 1 below.

Table 1—Landfill site characteristics

Pond Description	Parcel E Cell	Sediment Pond No. 3	Clear Pool No. 3
Size (Acres)	23.42	2.87	1.09
Outlet Type	12’ Flat bottom ditch, S=4.0%, w/2.5:1 S.S.	48” Riser with 36” dia. outlet pipe (CMP) & 20’ auxiliary spillway	48” Riser with 36” dia. outlet pipe (CMP) & 20’ auxiliary spillway
Outlets To	Sediment Pond	Clear Pool	Ditch to Smith Creek

2.2 Run-on Control System Plan

There is no contributory stormwater run-on into Parcel E because a series of perimeter ditches, spillways, and roadways prevent overland flow from migrating into the Parcel E Cell, Sediment Pond No. 3, and Clear Pool No. 3. For further information on this hydraulic design, see SCS Calculation No. C-HM-01208-01, Plant Hammond, Huffaker Road Coal Combustion By-Products Storage Site, 9/27/04.

2.3 Run-off Control System Plan

A hydrologic and hydraulic model was developed for Plant Hammond Parcel E to determine the hydraulic capacity of the Cell. The design storm for the purposes of run-off control system plans is the 24-hour, 25-year rainfall event. The results of routing the design storm event through the landfill are presented in Table 2 below:

Table 2-Flood Routing Results for Huffaker Road Landfill Parcel E

Storage Area	Normal Pool Elevation (feet, NAVD88)	Maximum 25-year WSEL elevation (feet, NAVD88)	Spillway/Top of Dike Elevation (feet, NAVD88)	Freeboard (feet, NAVD88)*	Peak Inflow (cfs)	Peak Outflow (cfs)
Parcel E riprap Outfall Flume	No pool	634.3	635.0	0.7	113	113
Sediment Pond	626.0 (dry pond)	630.4	633.0	2.6	126.6	8.2
Clear Pool	623.0 (dry pond)	629.2	633.0	3.8	19.7	2.6

*Freeboard is measured from the top of embankment to the peak water surface elevation

3.0 Methodology

3.1 HYDROLOGIC ANALYSES

The design storm for all run-on/run-off analyses is a 24-hour, 25-year rainfall event. A summary of the design storm parameters and rainfall distribution methodology for these calculations is summarized below in Table 3.

Table 3. Plant Hammond CCR Landfill Design Storm Distribution

Return Frequency (years)	Storm Duration (hours)	Rainfall Total (Inches)	Rainfall Source	Storm Distribution
25	24	6.29	NOAA Atlas 14	SCS Type II

The drainage area for Plant Hammond Parcel E was delineated based on survey data acquired for the Plant in December of 2020. Runoff characteristics were developed based on the Soil Conservation Service (SCS) methodologies as outlined in TR-55. An overall SCS curve number for the drainage area was developed based on methods prescribed in TR-55. Soil types were obtained from the Natural Resources Conservation Service. Land use areas were delineated based on aerial photography. A conservative time of concentration was assumed as there are not any contributory drainage areas or overland flow beyond simply the footprint of the Parcel E Cell, Sediment Pond No. 3 and Clear Pool No. 3.

A table of the pertinent basin characteristics of the landfill is provided below in Table(s) 4(a) through 4(c).

Table 4(a) - Landfill Hydrologic Information (Parcel E Cell)

Drainage Basin Area (acres)	23.42 Acres
Hydrologic Curve Number, CN	86.0
Hydrologic Methodology	SCS Method
Time of Concentration (minutes)	25.3
Hydrologic Software	Autodesk SSA (Storm and Sanitary Sewer Analysis) 2019

Table 4(a) - Landfill Hydrologic Information (Sediment Pond No. 3 Area)

Drainage Basin Area (acres)	2.87
Hydrologic Curve Number, CN	96.6
Hydrologic Methodology	SCS Method
Time of Concentration (minutes)	6.0
Hydrologic Software	Autodesk SSA (Storm and Sanitary Sewer Analysis) 2019

Table 4(c) - Landfill Hydrologic Information (Clear Pool No. 3 Area)

Drainage Basin Area (acres)	1.09
Hydrologic Curve Number, CN	95.6
Hydrologic Methodology	SCS Method
Time of Concentration (minutes)	6.0
Hydrologic Software	Autodesk SSA (Storm and Sanitary Sewer Analysis) 2019

Run-off characteristics were developed based on the Soil Conservation Service (SCS) methodologies as outlined in TR-55.

Time of Concentration calculations were developed based on the Soil Conservation Service (SCS) methodologies as outlined in TR-55.

Run-off values were determined by importing the characteristics developed above into a hydrologic model in Autodesk SSA (Storm and Sanitary Analysis) 2019.

3.2 HYDRAULIC ANALYSES

Storage values for the landfill were determined by developing a stage-storage relationship utilizing contour data. The spillway system at the Plant Hammond Huffaker Road CCB Storage Facility – Parcel E consists of a spillway from the Parcel E Cell proper draining into Sediment Pond No. 3. The spillway is a trapezoidal riprap weir that drains the Cell's perimeter ditch into Sediment Pond No. 3.

The Sediment Pond No. 3 drainage system consists of a principal 48" diameter corrugated metal riser (with trash rack) with a top elevation of 630.00. This riser is drained by a 61.7-ft long, 36" diameter corrugated metal culvert that discharges into Clear Pool No. 3. A 20-foot wide trapezoidal auxiliary spillway also handles overflow from Sediment Pond No. 3 into Clear Pool No. 3.

The Clear Pool No. 3 drainage system consists of a principal spillway with 48" diameter corrugated metal riser (and trash rack) with a top elevation of 629.00. This riser is drained by a 87.3 foot long - 36" diameter corrugated metal culvert that discharges into a swale that feeds into Smith Creek. A 20-foot wide auxiliary trapezoidal spillway also handles overflow from Clear Pool No. 3 into the same swale that feeds into Smith Creek.

A summary of spillway information is presented below in Table 5.

Table 5—Spillway Attribute Table*

Spillway Component	US Invert El (feet)	DS Invert El (feet)	Dimension (ft)	Slope (%)	Length (ft)
Parcel E Cell Spillway	633.00	632.00	12	6.2	16
Sed. Pond No. 3 riser (principal spillway)	630.00	623.59	4 ft (diameter) 6.4 ft (height)	0.00	N/A
Sed. Pond No. 3 culvert (principal spillway)	623.59	622.62	3 ft (diameter)	1.57	61.7
Sed. Pond No. 3 auxiliary spillway	631.00	631.00	32 ft (Top width) 20 ft (Bottom width)	0.00	15.5
Clear Pool No. 3 riser (principal spillway)	629.00	621.68	4 ft (diameter) 7.3 ft (height)	0.00	N/A
Clear Pool No. 3 culvert (principal spillway)	621.68	618.34	3 ft (diameter)	3.83	87.3
Clear Pool No. 3 auxiliary spillway	631.00	631.00	32 ft (Top width) 20 ft (Bottom width)	0.00	20.5

*All spillway design information can be found on Drawing H9155 and As-built Survey 3553HAM Rev. 1, 4/2/2008.

Based on the spillway attributes listed above, a rating curve was developed and inserted into Auto Desk's Storm and Sanitary Sewer Analysis software, Version 2019 to analyze performance during the design storm. Results are shown in Table 2.

4.0 Supporting Information

4.1 Curve Number

Table 6. Curve Number Data

Location	Terrain type	NRCS Soil	Curve No.
Cell	Ash	N/A	86
Roads	Gravel	B	85
Perimeter ditch	Grass	B	61
Pond	Water/Grass Slopes	B	98

4.2 Stage-Storage Tables

Sediment Pond			
Depth	Elevation	Area (s.f.)	Volume (c.f.)
0	623	71,298	0
1	624	74,669	72,984
2	625	78,111	148,374
3	626	81,597	229,228
4	627	85,123	312,588
5	628	88,967	399,633
6	629	92,444	490,339
7	630	95,882	584,502
8	631	99,413	682,150
9	632	103,004	783,359
10	633	106,634	888,178

Clear Pool			
Depth	Elevation	Area (s.f.)	Volume (c.f.)
0	622	19,749	0
1	623	21,414	20,582
2	624	23,091	42,835
3	625	24,591	66,676
4	626	26,143	92,043
5	627	27,789	119,009
6	628	29,543	147,675
7	629	31,379	178,136
8	630	33,283	210,467
9	631	35,295	244,756
10	632	37,246	281,027
11	633	39,238	319,269

4.3 Time of Concentration

Time of concentration (Tc) for the sediment pond and clear pool is the minimum Tc of 6 minutes. The time of concentration for the cell area is shown below.

```
**************************************************
SCS TR-55 Time of Concentration Computations Report
**************************************************

Sheet Flow Equation
-------------------

        Tc = (0.007 * ((n * Lf)^0.8)) / ((P^0.5) * (Sf^0.4))

        Where:

        Tc = Time of Concentration (hrs)
        n  = Manning's Roughness
        Lf = Flow Length (ft)
        P  = 2 yr, 24 hr Rainfall (inches)
        Sf = Slope (ft/ft)

Shallow Concentrated Flow Equation
----------------------------------

        V  = 16.1345 * (Sf^0.5) (unpaved surface)
        V  = 20.3282 * (Sf^0.5) (paved surface)
        V  = 15.0 * (Sf^0.5) (grassed waterway surface)
        V  = 10.0 * (Sf^0.5) (nearly bare & untilled surface)
        V  = 9.0 * (Sf^0.5) (cultivated straight rows surface)
        V  = 7.0 * (Sf^0.5) (short grass pasture surface)
        V  = 5.0 * (Sf^0.5) (woodland surface)
        V  = 2.5 * (Sf^0.5) (forest w/heavy litter surface)
        Tc = (Lf / V) / (3600 sec/hr)

        Where:

        Tc = Time of Concentration (hrs)
        Lf = Flow Length (ft)
        V  = Velocity (ft/sec)
        Sf = Slope (ft/ft)

Channel Flow Equation
---------------------

        V  = (1.49 * (R^(2/3)) * (Sf^0.5)) / n
        R  = Aq / Wp
        Tc = (Lf / V) / (3600 sec/hr)

        Where:

        Tc = Time of Concentration (hrs)
        Lf = Flow Length (ft)
        R  = Hydraulic Radius (ft)
        Aq = Flow Area (ft²)
        Wp = Wetted Perimeter (ft)
        V  = Velocity (ft/sec)
        Sf = Slope (ft/ft)
        n  = Manning's Roughness
```

Subbasin Cell E Basin

Sheet Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.15	0.00	0.00
Flow Length (ft):	200.00	0.00	0.00
Slope (%):	1.50	0.00	0.00
2 yr, 24 hr Rainfall (in):	3.80	3.80	3.80
Velocity (ft/sec):	0.19	0.00	0.00
Computed Flow Time (minutes):	17.56	0.00	0.00

Shallow Concentrated Flow Computations

	Subarea A	Subarea B	Subarea C
Flow Length (ft):	307.00	0.00	0.00
Slope (%):	4.20	0.00	0.00
Surface Type:	Unpaved	Unpaved	Unpaved
Velocity (ft/sec):	3.31	0.00	0.00
Computed Flow Time (minutes):	1.55	0.00	0.00

Channel Flow Computations

	Subarea A	Subarea B	Subarea C
Manning's Roughness:	0.03	0.00	0.00
Flow Length (ft):	1950.00	0.00	0.00
Channel Slope (%):	1.20	0.00	0.00
Cross Section Area (ft^2):	11.51	0.00	0.00
Wetted Perimeter (ft):	12.02	0.00	0.00
Velocity (ft/sec):	5.29	0.00	0.00
Computed Flow Time (minutes):	6.15	0.00	0.00

Total TOC (minutes):	25.26

4.4 Results

Runoff Summary

****
Subbasin Runoff Summary
****

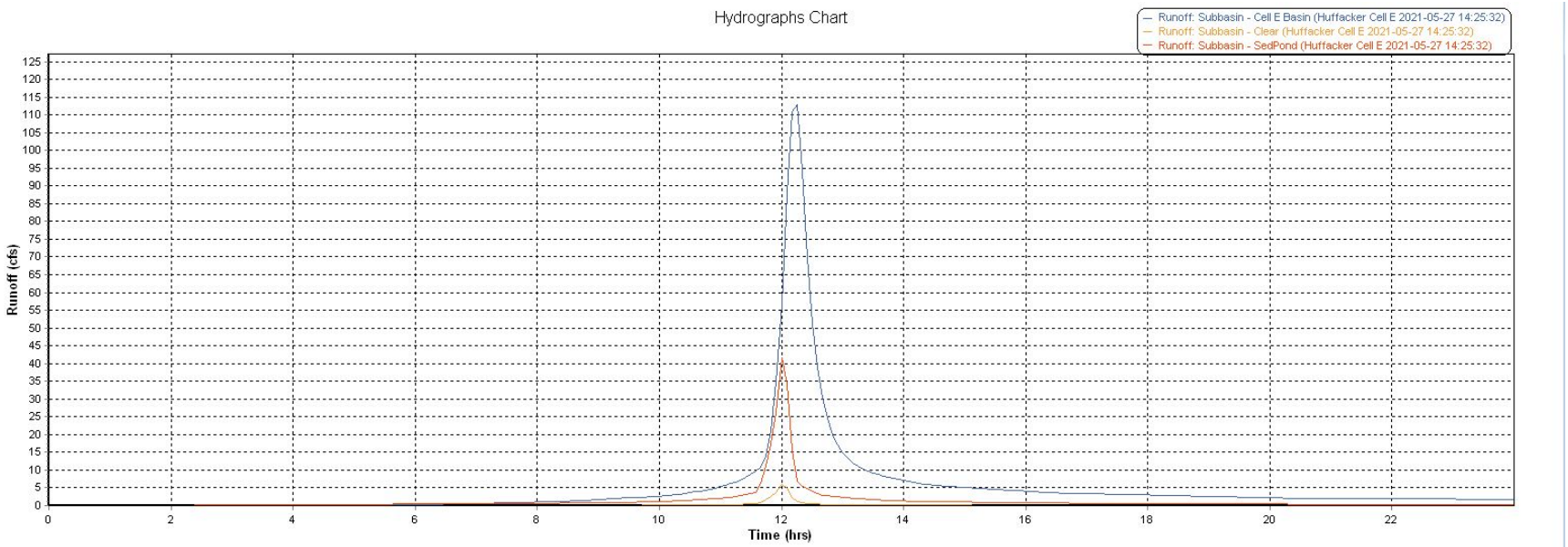
Subbasin ID	Total Precip in	Total Runoff in	Peak Runoff cfs	Weighted Curve Number	Time of Concentration days	Time of Concentration hh:mm:ss
Cell E Basin	6.29	4.51	115.24	84.430	0	00:25:15
Clear	6.29	5.77	6.00	95.610	0	00:06:00
SedPond	6.29	5.88	41.81	96.550	0	00:06:00

Maximum WSEL's

****
Node Depth Summary
****

Node ID	Average Depth Attained ft	Maximum Depth Attained ft	Maximum HGL Attained ft	Time of Max Occurrence days	Time of Max Occurrence hh:mm	Total Flooded Volume acre-in	Total Time Flooded minutes	Retention Time hh:mm:ss
Jun-16	0.19	1.29	634.29	0	12:15	0	0	0:00:00
Jun-17	0.09	0.62	632.62	0	12:15	0	0	0:00:00
Riser1	1.77	5.57	629.16	0	22:02	0	0	0:00:00
Riser2	0.05	1.32	623.00	0	00:00	0	0	0:00:00
Out-04	0.05	0.77	619.11	0	00:00	0	0	0:00:00
Out-06	0.00	0.00	631.00	0	00:00	0	0	0:00:00
ClearPool	3.09	7.16	629.16	0	22:04	0	0	0:00:00
SedPond1	5.25	7.34	630.34	0	14:02	0	0	0:00:00

Hydrographs



Runoff Summary Table

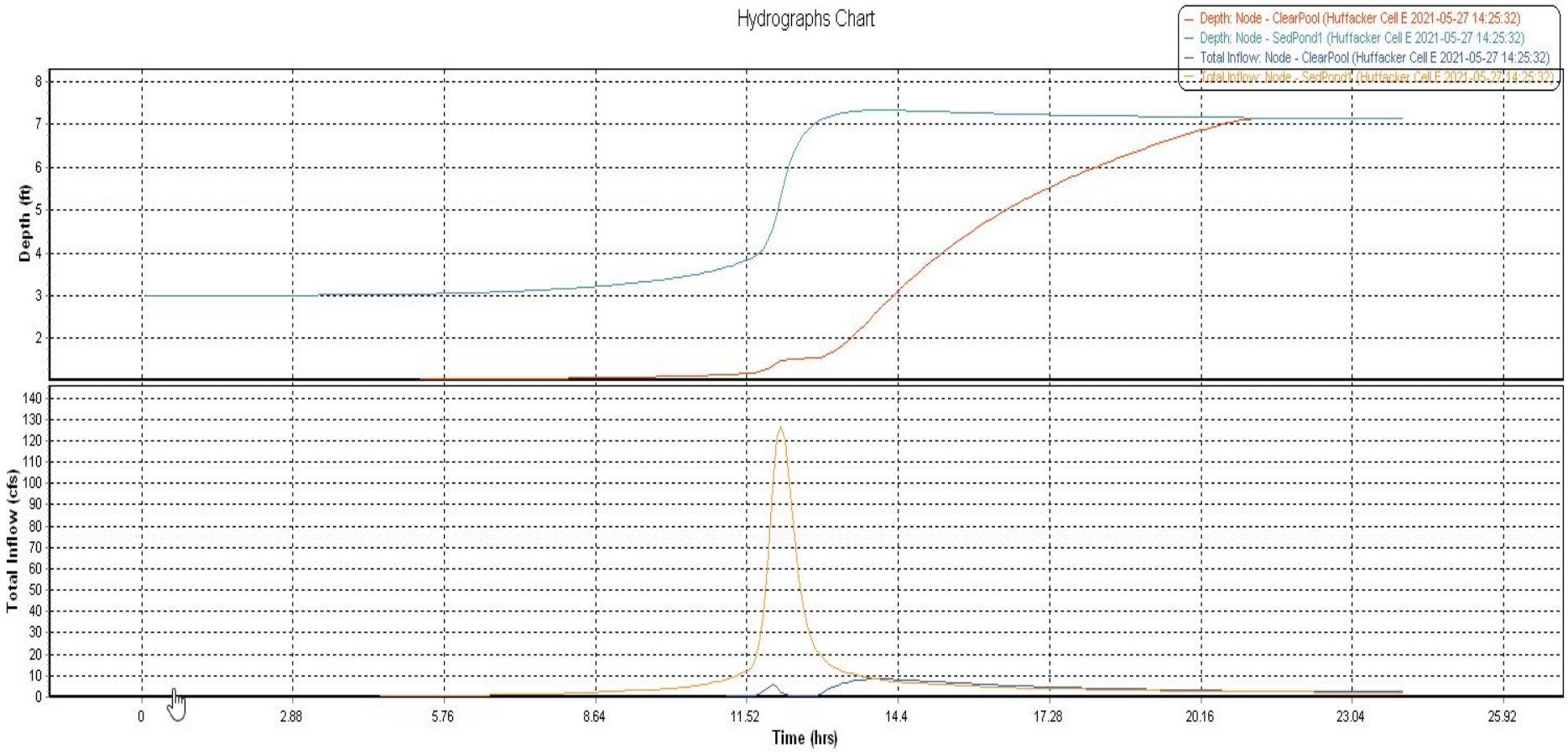
Time period
From: 07/06/2016, 12:00:00 AM
To: 07/07/2016, 12:00:00 AM

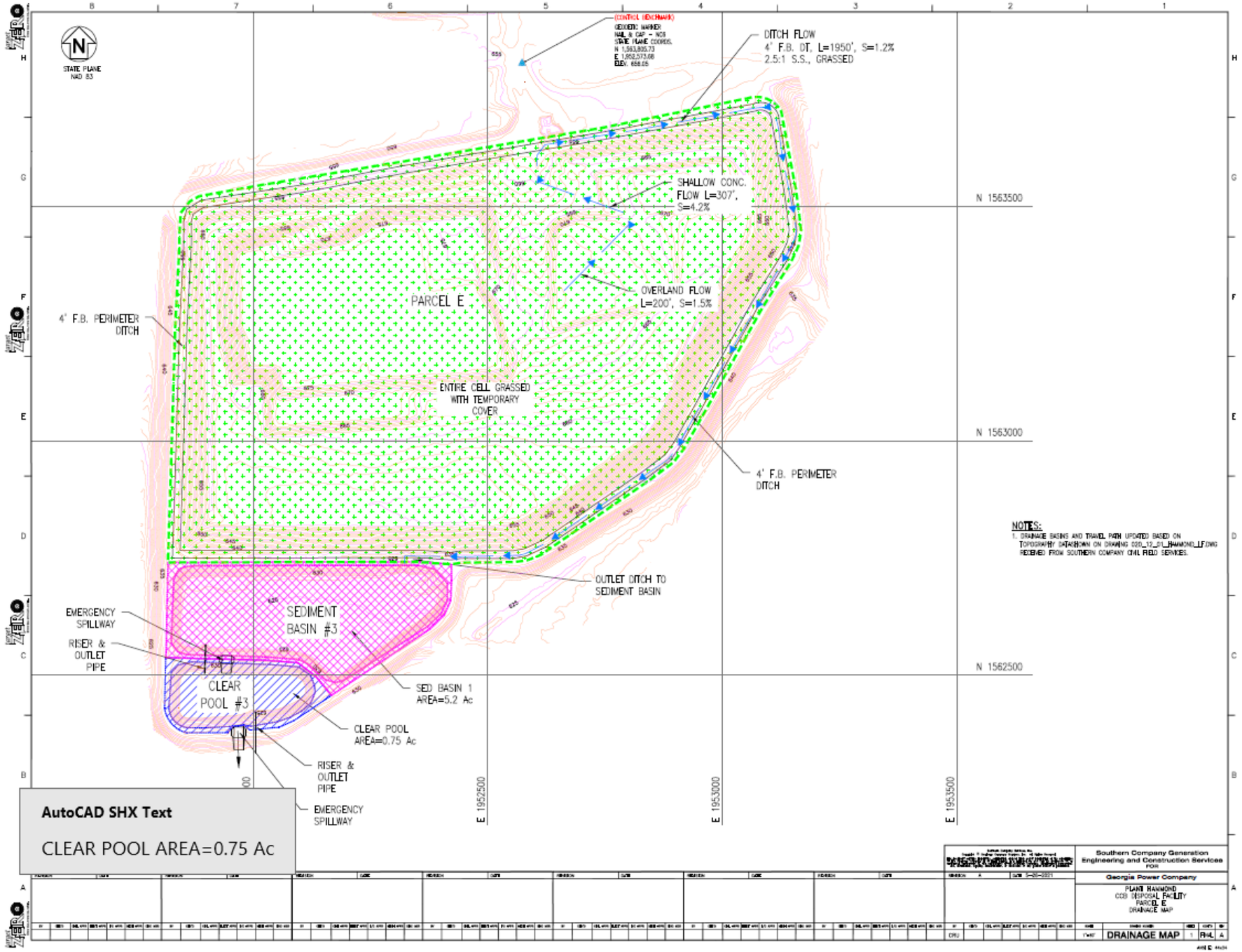
Thresholds
Exceedance: 0
Deficit: 0

Detention storage
Max flow: 0

Element ID	Cell E Basin	Clear	SedPond
Maximum Runoff (cfs)	113.00	5.96	41.64
Minimum Runoff (cfs)	0.00	0.00	0.00
Event Mean Runoff (cfs)	5.03	0.18	1.29
Duration of Exceedances (hrs)	N/A	N/A	N/A
Duration of Deficits (hrs)	N/A	N/A	N/A
Number of Exceedances	N/A	N/A	N/A
Number of Deficits	N/A	N/A	N/A
Volume of Exceedance (ft³)	N/A	N/A	N/A
Volume of Deficit (ft³)	N/A	N/A	N/A
Total Runoff (ft³)	432463.42	15765.95	111227.79
Detention Storage (ft³)	N/A	N/A	N/A

Pond Inflows/Depths




STATE PLANE
NAD 83
CONTROL (BENCHMARK)
GEODETIC MARKER
NAIL IN CAP = NGS
STATE PLANE COORDS.
N 1,563,805.73
E 1,952,573.68
ELEV. 658.65
DITCH FLOW
4' F.B. DT, L=1950', S=1.2%
2.5:1 S.S., GRASSED
SHALLOW CONC.
FLOW L=307',
S=4.2%
OVERLAND FLOW
L=200', S=1.5%
4' F.B. PERIMETER
DITCH
PARCEL E
ENTIRE CELL GRASSED
WITH TEMPORARY
COVER
4' F.B. PERIMETER
DITCH
OUTLET DITCH TO
SEDIMENT BASIN
SEDIMENT
BASIN #3
EMERGENCY
SPILLWAY
RISER &
OUTLET
PIPE
CLEAR
POOL #3
SED BASIN 1
AREA=5.2 Ac
CLEAR POOL
AREA=0.75 Ac
RISER &
OUTLET
PIPE
EMERGENCY
SPILLWAY
N 1563500
N 1563000
N 1562500
E 1952500
E 1953000
E 1953500
NOTES:
1. DRAINAGE BASINS AND TRAVEL PATH UPDATED BASED ON
TOPOGRAPHY DATA SHOWN ON DRAWING 020_12_01_HAMMOND_LF.DWG
RECEIVED FROM SOUTHERN COMPANY CIVIL FIELD SERVICES.
AutoCAD SHX Text
CLEAR POOL AREA=0.75 Ac
Southern Company Generation
Engineering and Construction Services
FOR
Georgia Power Company
PLANT HAMMOND
CCR DISPOSAL FACILITY
PARCEL E
DRAINAGE MAP
DRAINAGE MAP
REV
A