



Class Three Landfill Run-on and Run-off Control System Plan

**Wateree Station
Richland County, South Carolina**

October 2021

A handwritten signature in black ink that reads "Jonathan Hotstream".

Jonathan Hotstream
Senior Scientist

Prepared For:

Dominion Energy of South Carolina
142 Wateree Station Road
Eastover, South Carolina 29044

Prepared By:

TRC
50 International Drive, Suite 150
Greenville, South Carolina 29615

A handwritten signature in blue ink that reads "Nakia Addison".

Nakia Addison, P.E.
Project Manager



TABLE OF CONTENTS

REVISION HISTORY	II
1.0 BACKGROUND	1
1.1 Purpose	1
2.0 FEDERAL REGULATIONS.....	2
3.0 RUN-ON CONTROL	3
4.0 RUN-OFF CONTROL.....	5
5.0 CONCLUSION	7
6.0 CERTIFICATION.....	8
7.0 REFERENCES.....	9

FIGURES

Figure 1: Site Location Map

APPENDICES

Appendix A: Select Permit to Construct Drawings
Appendix B: Run-on Calculations
Appendix C: Run-off Calculations

Revision History

Revision Number	Revision Date	Section Revised	Summary of Revisions
0	07/15/2016		Initial Issue, developed by others
1	10/14/2021	1 through 7	Update for periodic revision

1.0 Background

Dominion Energy of South Carolina (DESC) owns and operates the Wateree Station (Station), located on the Wateree River in Richland County, South Carolina, near the Town of Eastover, see Figure 1. This generating station includes an on-site Class Three CCR Landfill (Landfill). The Landfill is subject to the requirements of the United States Environmental Protection Agency's (USEPA) final coal combustion residual (CCR) rule Title 40 Code of Federal Regulations (40 CFR) Part 257 Subpart D - "Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments." The initial run-on and run-off control system plan was developed and placed into the Station's operating record on October 17, 2016. A periodic revision to the run-on and run-off control system plan is required every 5 years pursuant to 40 CFR 257.81(c)(4).

The on-site Class Three landfill is located within the property boundaries of the Station. The landfill facility is comprised of 18 landfill cells, planned for development in multiple phases and encompassing a total of 141 future lined acres. The current landfill facility has constructed Cells 1 through 9. Cells 1 through 5, encompassing 34 acres, were placed into operation in accordance with an operational approval issued by the South Carolina Department of Health and Environmental Control (SC DHEC) in 2010. Cells 6 through 9, encompassing an additional 37 acres, were placed into operation in accordance with an operation approval issued by SC DHEC in 2015.

1.1 Purpose

The purpose of this report is to document that the Wateree Station Class Three Landfill run-on and run-off controls meet the requirements of 40 CFR 257.81 – *Run-on and Run-off Controls for CCR Landfills*.

TRC performed the periodic revision of the run-on and run-off control system plan (Plan) by performing a site visit to observe conditions, reviewing the initial run-on and run-off control system plan, reviewing design criteria, and updating calculations.

2.0 Federal Regulations

Pursuant to 40 CFR 257.81, landfills that manage CCR are subject to the following requirements:

- (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:
 - 1. 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
 - 2. 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 40 CFR 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 every five years. 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.

3.0 Run-on Control

CCR landfills are required to have a run-on control system designed, constructed and operated to prevent flow onto the active portion of the CCR unit during peak discharge from a 24-hour, 25-year storm.

The Wateree Class Three Landfill has run-on controls consisting of an interphase run-on diversion ditch and stormwater diversion ditches that collect and convey stormwater and surface water upgradient of the landfill to stormwater management ponds. In addition to the ditches, a perimeter berm is constructed around the landfill to prevent run-on from entering the active portion of the landfill. Within the landfill footprint, diversion berms, slopes, and grade control are used to divert stormwater collected on areas with intermediate cover away from active areas of the landfill.

Appendix A presents design drawings for the Class Three Landfill (Garrett & Moore, 2016). Within Appendix A, Sheet 2 presents the permitted footprint of the Wateree Station Class Three Landfill considering future lateral expansions; Sheet 4 presents the construction plans for Cells 6 through 9; and Sheet D-1 presents the interphase diversion ditch geometry. An interphase diversion ditch is constructed along the west perimeter of Cell 9, an interphase diversion ditch collects stormwater and conveys it to the downgradient stormwater management ponds.

The temporary interphase run-on diversion ditch design is summarized below and supporting calculations are provided in Appendix B. The stormwater modeling software HydroCAD, was utilized to estimate peak flow rates and associated velocities in ditches for the design 24-hour, 25-year storm event. HydroCAD is largely based on the United States Department of Agriculture Soil Conservation Service's, Technical Release 55 (TR-55) and TR-20 hydrology methods.

Based on the HydroCAD analyses, the interphase ditch is sized appropriately for the 24-hour, 25-year storm and manages the peak flow from this storm event with freeboard. TRC performed the analysis considering the following:

- TRC assumed that the drainage area utilized for the 2016 analysis (Garret & Moore, 2016) remains representative. TRC checked the drainage area using the United States Geological Survey StreamStats application and confirmed the approximate drainage area of 22 acres, see the Drainage Area Map in Appendix B.
- The precipitation volume for the 24-hour, 25-year storm event increased since the 2016 Plan. The calculations presented in the appendices reflect the current design precipitation of 6.66 inches.

Appendix B presents the open channel performance of the interphase diversion ditch evaluating the suitability of vegetative lining. The estimated peak flow rates in the interphase diversion ditch are within the permissible velocity for vegetated lining.

Run-on collected in the interphase ditch is routed to permitted stormwater detention basins that do not receive run-off from active CCR management areas.

Run-on Control Summary:

- Interphase Run-on Diversion Ditch:
 - Maximum Design Peak Flow, 24-hour 25-year Storm: 125 cubic feet per second (cfs)
 - Maximum Design Capacity, Interphase Ditch as sized on Sheet D-1, Detail 5, see Appendix A: 199 cfs
 - Peak Velocity: 4.9 feet per second (ft/s), Permissible Velocity: 5 ft/s

Based on the existing drainage features and perimeter ditches, run-on controls are sufficient to manage the peak discharge from a 24-hour, 25-year storm.

For future lateral expansions, the interphase ditch has the same geometry as the existing condition. Construction of the lateral expansions will reduce the drainage area flowing to the interphase diversion ditch. Therefore, the run-on controls for future phases of development are anticipated to manage the peak discharge from a 24-hour, 25-year storm.

4.0 Run-off Control

CCR landfills are required to have a run-off control system designed, constructed and operated to collect and control at least the water volume resulting from a 24-hour, 25-year storm.

The Wateree Class Three Landfill manages run-off with diversion berms, downslope flumes, and a perimeter ditch. The perimeter ditch is protected from scour with a fabric formed concrete lining system. The perimeter ditch discharges to the lined Wastewater Pond located at the southern perimeter of the Landfill.

Discharge from the Wastewater Pond is regulated in accordance with a National Pollutant Discharge Elimination System (NPDES) permit issued by the SC DHEC. The permit grants the Station permission to discharge from the facility to the Wateree River in accordance with effluent limitations, monitoring requirements, and other conditions. The NPDES permit is issued in accordance with the provisions of the Federal Clean Water Act. Therefore, by complying with the NPDES permit, the discharge from the Wastewater Pond is also being handled in accordance with the applicable surface water requirements.

The perimeter ditches and Wastewater Pond are designed to manage the volume resulting from the 24-hour, 25-year storm. The perimeter ditch hydraulic capacity and lining requirements were evaluated using the computer software HydroCAD. Below is a summary of the hydraulic capacity of the perimeter ditch. Supporting calculations are provided in Appendix C.

The run-off drainage area for the Landfill is provided in Appendix C which presents the existing grades based on a topographic survey performed in July 2021. The time of concentration path and length was developed using this topographic data for the HydroCAD analysis.

The lining requirements and permissible shear stress for the fabric formed lining system were estimated. The calculations provided in Appendix C demonstrate that the perimeter ditch is sufficiently designed to convey the peak flow from the 24-hour, 25-year storm event and the shear stress of the water flowing within the perimeter ditch does not exceed the maximum permissible shear stress of the lining.

The Wastewater Pond which receives discharge from the perimeter ditch was evaluated to confirm that it has sufficient capacity. Appendix C provides calculations demonstrating that the Wastewater Pond is sufficiently sized for the Landfill. The existing Wastewater Pond sizing was estimated using the survey performed in July 2021 and assuming a high-water elevation of 114-ft (MSL).

Run-off Control Summary:

- Perimeter Ditches
 - Maximum Design Peak Flow from 24-hr, 25-yr storm: 250 cfs
 - Maximum Design Capacity, Perimeter Ditch as sized on Sheet D-1, Detail 4, see Appendix A: 808 cfs

- Wastewater Pond
 - Berm Crest Elevation: 123.7 ft
 - 24-hour, 25-year water surface elevation: 117.7 ft
 - Freeboard: 6 ft

The perimeter ditches and the downstream receiving Wastewater Pond exceed the required capacity requirements to collect and control the run-off volume resulting from a 24-hour, 25-year storm.

5.0 Conclusion

The constructed Class Three Landfill adequately manages run-on and run-off in accordance with the requirements of 40 CFR 257.81. Run-off is collected in a lined Wastewater Pond, and treated prior to discharge through an NPDES permitted outfall satisfying the requirements of 40 CFR 257.3-3.

This Plan has been completed in compliance with the requirements set forth in 40 CFR 257.81. This document has been placed in the operating record, posted to the publicly accessible website, and government notifications have been provided.

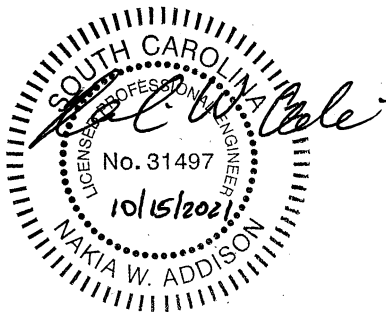
A Run-On and Run-Off Control System Plan must be revised every 5 years. The next periodic revision is required by October 2026.

The Plan must be amended whenever the periodic review period is reached or if changes in site conditions, either intentionally or unintentionally, occur that will sustainably impact the current written plan in effect.

6.0 Certification

I, the undersigned South Carolina Professional Engineer, hereby certify that I am familiar with the technical requirements of 40 CFR 257 Subpart D. I also certify that it is my professional opinion that, to the best of my knowledge, information, and belief, that the information in this demonstration is in accordance with current good and accepted engineering practice(s) and standard(s) and meets the requirements of 40 CFR 257.81.

For the purpose of this document, “certify” and “certification” shall be interpreted and construed to be a “statement of professional opinion.” The certification is understood and intended to be an expression of my professional opinion as a Licensed Professional Engineer, based upon knowledge, information, and belief. The statement(s) of professional opinion are not and shall not be interpreted or construed to be a guarantee or a warranty of the analysis herein.

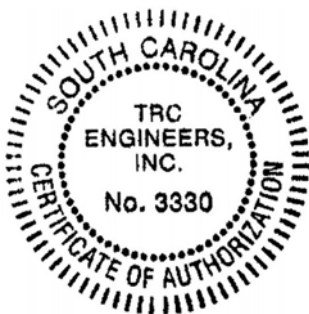


Nakia Addison, P.E.

31497
Engineer License Number

Nakia W. Addison
Signature of Professional Engineer

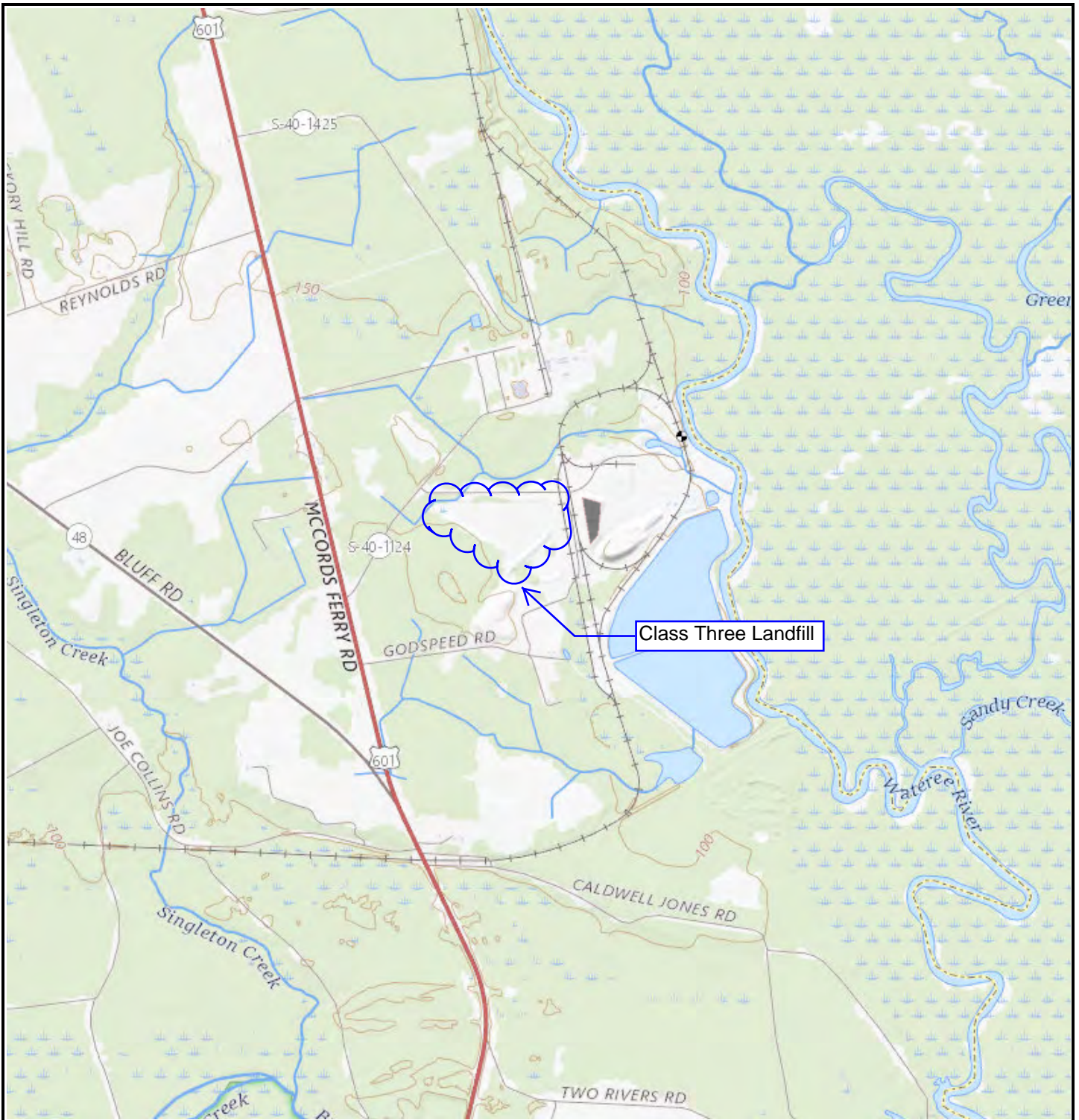
10/15/2021
Date



7.0 References

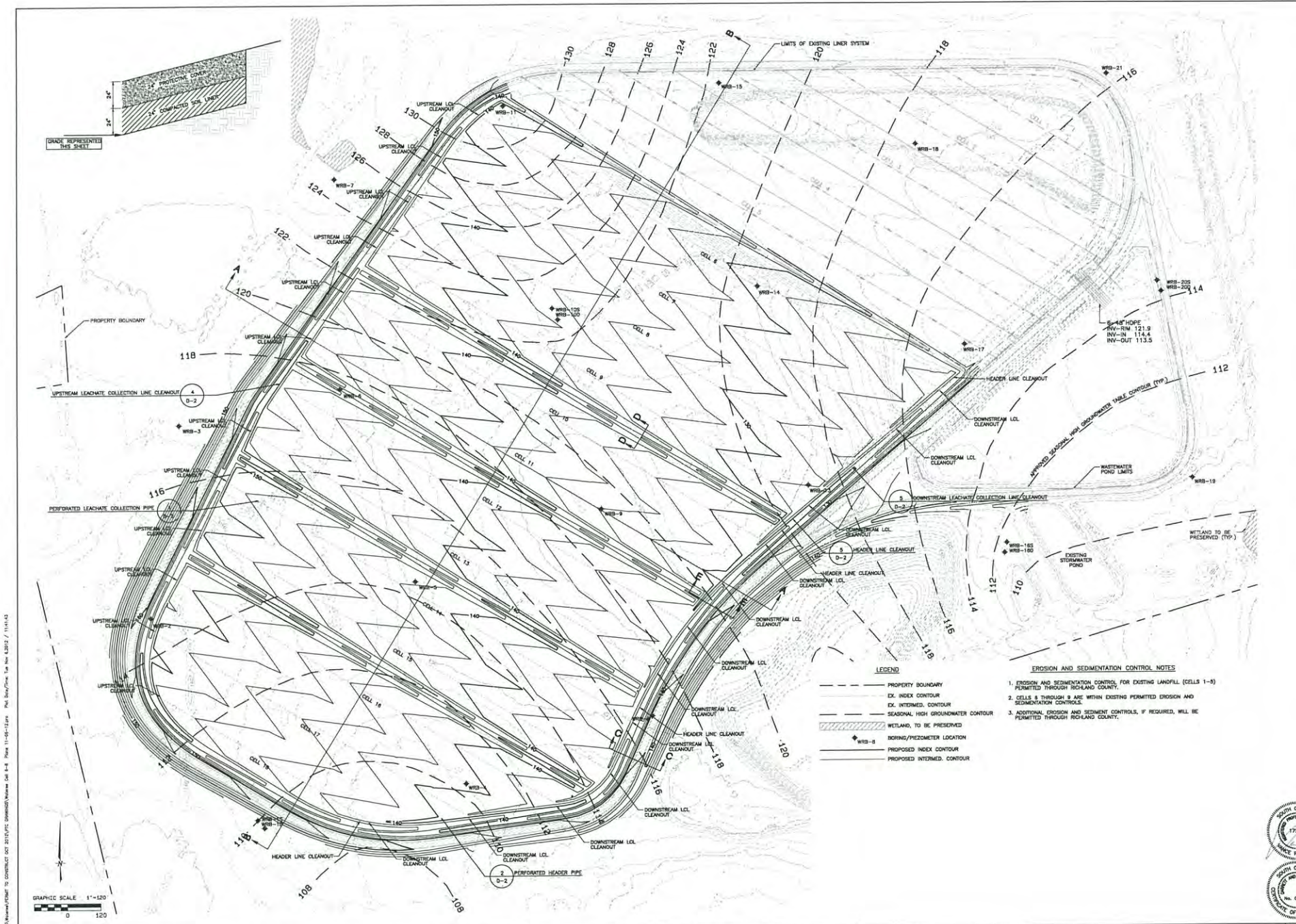
Garrett & Moore. 2016. Inflow Design Flood Control System Plan for the Wateree Station FGD Pond. Richland County, South Carolina. July 2016.

United States Geological Survey. 2021. StreamStats. Vers. 4.6.2. <http://streamstats.usgs.gov/ss/>.



	 0 0.5 mile 33.8218, -80.6295	DOMINION WATEREE STATION	
		SITE LOCATION	
	DRAWN BY: S. EDWARDS PROJ. NO.: 447435.0000	FIGURE 1	
	CHECKED BY: J. HOTSTREAM APPROVED BY: N. ADDISON DATE: OCT. 2021		
Base Map: USGS/TNM Topo Data Sources: TRC, Fulcrum		 50 INTERNATIONAL DRIVE SUITE 150 GREENVILLE, SOUTH CAROLINA 29615 FILE: 2CA261A7-0947-484C-9FCC-60C09FC02EBF	

Appendix A: Select Permit to Construct Drawings



Plan 11-03-11-14-13
 11/14/13
 17350
 63371

GRAPHIC SCALE 1"=120'

NO.	REVISION	DATE
1		
2		
3		

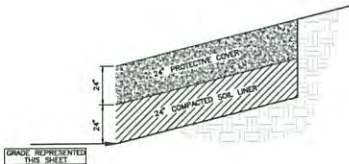
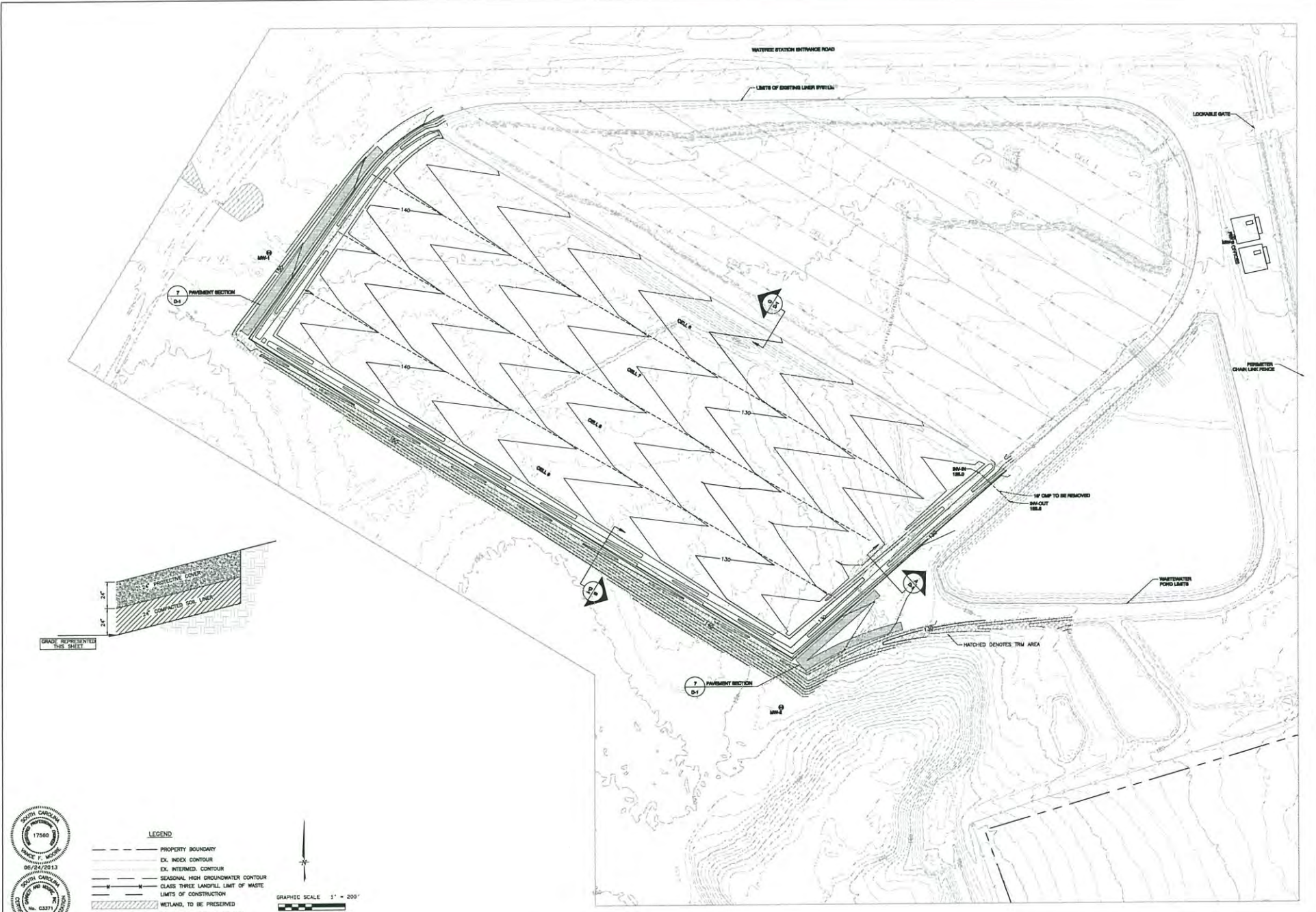
GARRETT & MOORE
 ENGINEERS AND ARCHITECTS
 1000 WEST 10TH AVENUE
 DENVER, CO 80202
 TEL: 303.733.1000
 FAX: 303.733.1001
 WWW.GMARCH.COM

**SCE & G - WATERREE STATION - CLASS THREE LANDFILL
 CELLS 6-18 PERMIT MODIFICATION DRAWINGS**

SUBGRADE PLAN



Path: V:\SCE&G\WATEREE\PROJECTS\CLASS 3-3\Plan\WSP_2013\DWG.dwg Plot Date/Time: Tue, Jan 22, 2013 / 4:54:17



LEGEND	
	PROPERTY BOUNDARY
	EX. INDEX CONTOUR
	EX. INTERMED. CONTOUR
	SEASONAL HIGH GROUNDWATER CONTOUR
	CLASS THREE LANDFILL LIMIT OF WASTE
	LIMITS OF CONSTRUCTION
	WETLANDS, TO BE PRESERVED
	GROUNDWATER MONITORING WELL



REVISION	DATE
1)	
2)	
3)	
4)	

GARRETT & MOORE
 ENGINEERING & ARCHITECTURE
 100 BRANCH ROAD
 DURHAM, NC 27609
 TEL: 919.286.1800
 FAX: 919.286.1800
 www.garrettandmoore.com

SCE&G - WATEREE STATION
CLASS THREE LANDFILL CELLS 6 - 9 CONSTRUCTION PROJECT

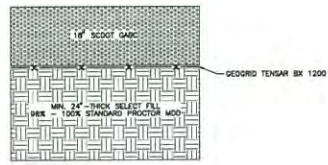
SUBGRADE PLAN



24" LOW PERMEABILITY SOIL LINER - OPTION #1
 24" SOIL LINER 1x10-7 CM/SEC
 N.T.S.

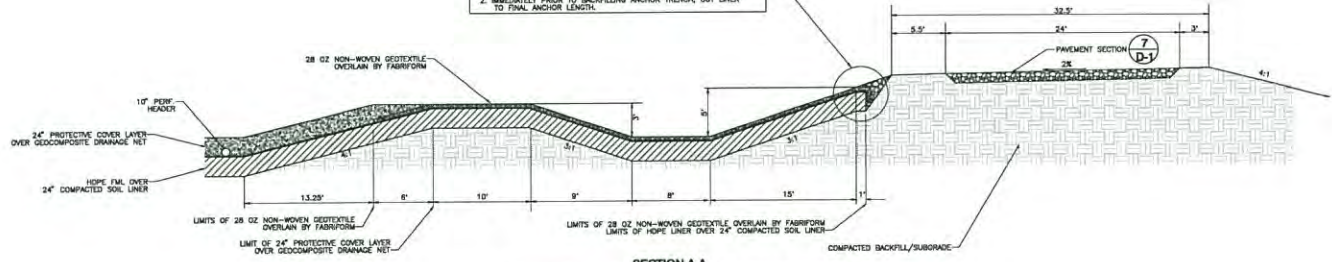


24" LOW PERMEABILITY SOIL LINER - OPTION #2
 GCL UNDERLAIN BY 24" SOIL LINER 1x10-5 CM/SEC
 N.T.S.

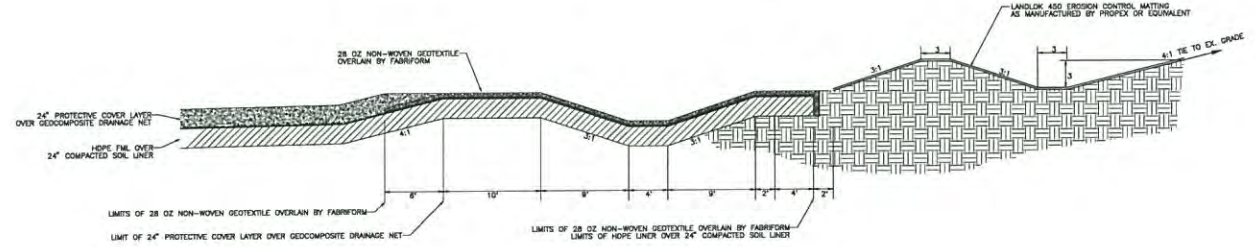


PAVEMENT SECTION
 N.T.S.

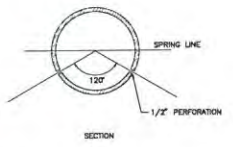
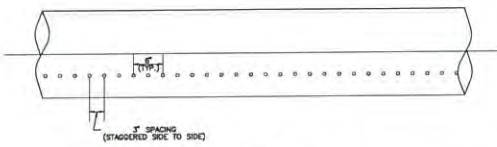
ANCHOR TRENCH NOTES:
 1. THE DETAIL REPRESENTS FINAL ANCHOR TRENCH CONSTRUCTION. LINER MAY BE ACTUALLY INSTALLED WITH MORE THAN ONE FOOT LINER IN THE ANCHOR TRENCH AND TRIMMED PRIOR TO BACKFILLING ANCHOR TRENCH. THIS WILL PERMIT LINER TO STRETCH AND SHRINK PRIOR TO BACKFILLING ANCHOR TRENCH.
 2. IMMEDIATELY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



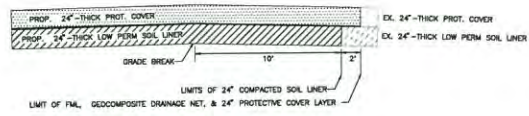
SECTION A-A
LANDFILL BERM/PERIMETER ACCESS ROAD CROSS-SECTION
 N.T.S.



SECTION B-B
INTERPHASE DITCH/BERM SECTION
 N.T.S.



PERFORATED LEACHATE COLLECTION PIPE
 N.T.S.



SECTION C-C
EX. TO PROPOSED CELL TIE-IN
 N.T.S.



REVISION	DATE
1)	
2)	
3)	



SCE&G - WATEREE STATION - CLASS THREE LANDFILL
CELLS 6 - 9 CONSTRUCTION DRAWINGS

DETAILS

D-1

File: V:\L2008\WaterEE\PIE LF CONSTRUCTION\Water Cell 6-9_Plan With 2013 27M.dwg Plot Date/Time: Tue Jun 23 2015 / 10:51:17

Appendix B: Run-on Calculations

- Drainage Area Map
- HydroCAD Calculations
- Ditch Capacity

Drainage Area Map

11/17 -- US2E_C:\msw... ATTACHED XREFS: Wateree Drainage Area Map.dwg --- PLOT DATE: October 13, 2021 - 2:43PM --- LAYOUT: run-on
DRAWING NAME: J:\CAD\Domino\447435 - CCR Five Year Assessment\0000 Wateree Drainage Area Map.dwg



LEGEND:

----- RUN-ON SUBCATCHMENT AREA



PROJECT:

**WATEREE STATION CLASS III LANDFILL
RUN-ON/RUN-OFF CONTROL PLAN
RICHLAND COUNTY, SOUTH CAROLINA**

TITLE:

DRAINAGE AREA MAP

DRAWN BY:

C. ALONSO

CHECKED BY:

J. HOTSTREAM

APPROVED BY:

N. ADDISON

DATE:

10/14/2021

PROJ. NO.:

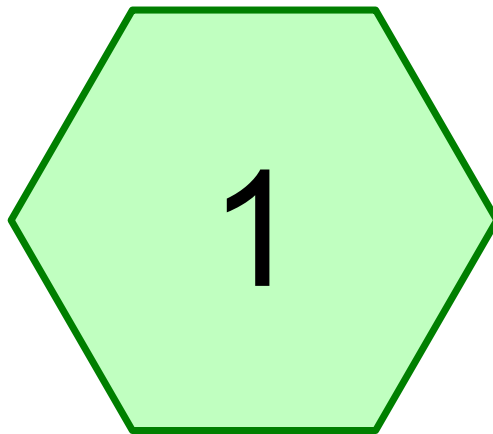
447435

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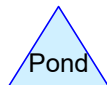
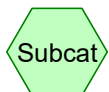
Wateree Drainage Area Map.dwg

FIGURE A

HydroCAD Calculations



Interphase Diversion Ditch (Run-on) Control



Wateree Run-on Interphase Ditch

NOAA 24-hr B 25-Year Rainfall=6.66"

Prepared by TRC

Printed 9/8/2021

HydroCAD® 10.00-24 s/n 01402 © 2018 HydroCAD Software Solutions LLC

Page 2

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1: Interphase Diversion Runoff Area=22.000 ac 0.00% Impervious Runoff Depth>4.88"
Flow Length=2,134' Tc=12.6 min CN=87 Runoff=125.43 cfs 8.948 af

Total Runoff Area = 22.000 ac Runoff Volume = 8.948 af Average Runoff Depth = 4.88"
100.00% Pervious = 22.000 ac 0.00% Impervious = 0.000 ac

Wateree Run-on Interphase Ditch

Prepared by TRC

HydroCAD® 10.00-24 s/n 01402 © 2018 HydroCAD Software Solutions LLC

NOAA 24-hr B 25-Year Rainfall=6.66"

Printed 9/8/2021

Page 3

Summary for Subcatchment 1: Interphase Diversion Ditch (Run-on) Control

Runoff = 125.43 cfs @ 12.20 hrs, Volume= 8.948 af, Depth> 4.88"

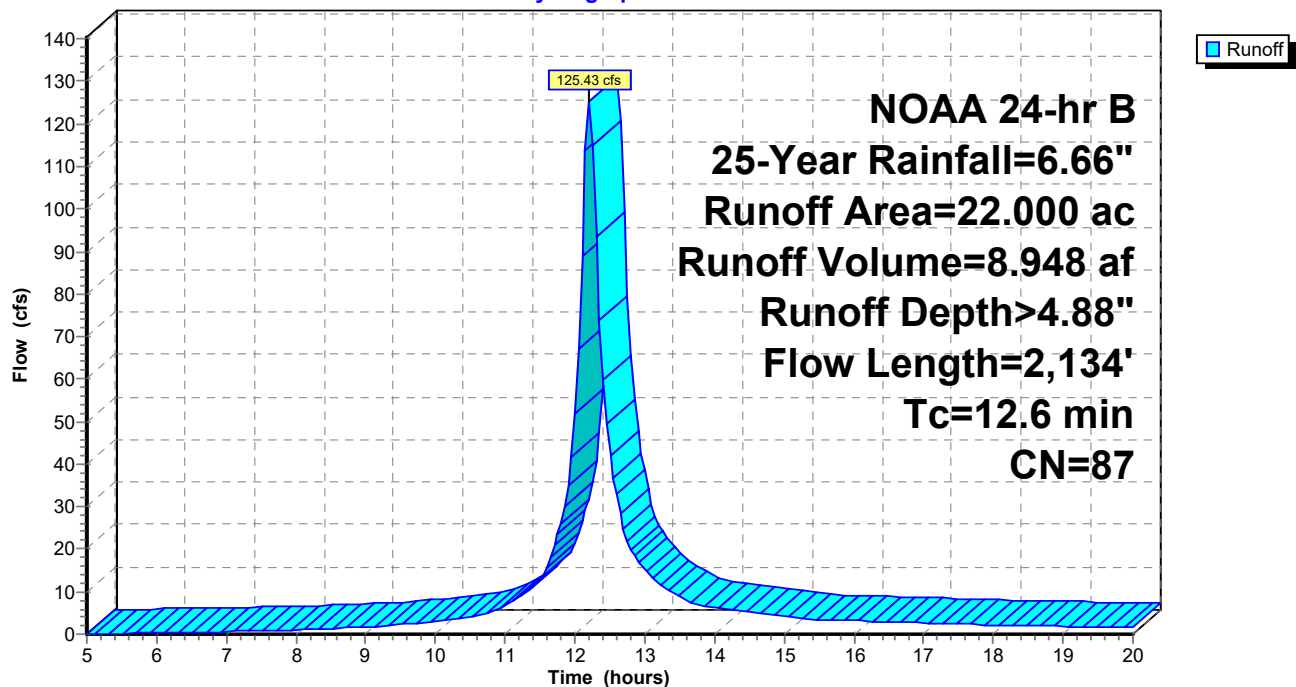
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
NOAA 24-hr B 25-Year Rainfall=6.66"

Area (ac)	CN	Description
* 22.000	87	MATCH 2016 REPORT-assume same
22.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.6	2,134		2.82		Direct Entry, From 2016 Report, assume to be the same

Subcatchment 1: Interphase Diversion Ditch (Run-on) Control

Hydrograph



Ditch Capacity



PROJECT: CCR Five Year Assessment - 447435
 SUBJECT: Wateree Run-on/Run-off Calculations
 COMPUTED BY: C. Alonso CHECKED BY: N. Addison
 DATE:

Channel Section Designation: Interphase Channel Run-on Control
 Channel Section Description: Maximum Runoff and Velocity Check

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

Input Data

max depth of flow (ft), y: 3
 longitudinal slope (ft/ft), S: 0.007
 bottom width (ft), b: 3
 channel side slope (z:1): 3.5
 design Q (cfs): 199

PERMANENT LINING: Tall Fescue
 roughness coefficient, n: 0.035
 max. velocity of lining (ft/s): 5
 retardance class for lining: D (From NCDEQ Design Manual Table 8.05c)
 VR (max velocity X R): 6.8 (including one retardance class increase)

Permanent lining flow capacity, Q (cfs) = 199

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)
40.5000	24.84	1.63	0.007	199	4.92

Velocity OK

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

Discharge (cfs), Q: NA Section B is for temporary linings, not applicable.
 longitudinal slope (ft/ft), S: 0.007
 bottom width (ft), b: 3
 channel side slope (m:1): 3.5

Input

TEMPORARY LINING:
 roughness coefficient, n: 0.035
 max. shear stress (psf), Td: 0

Iterate y to make Zav = Zreq

Td EXCEEDED

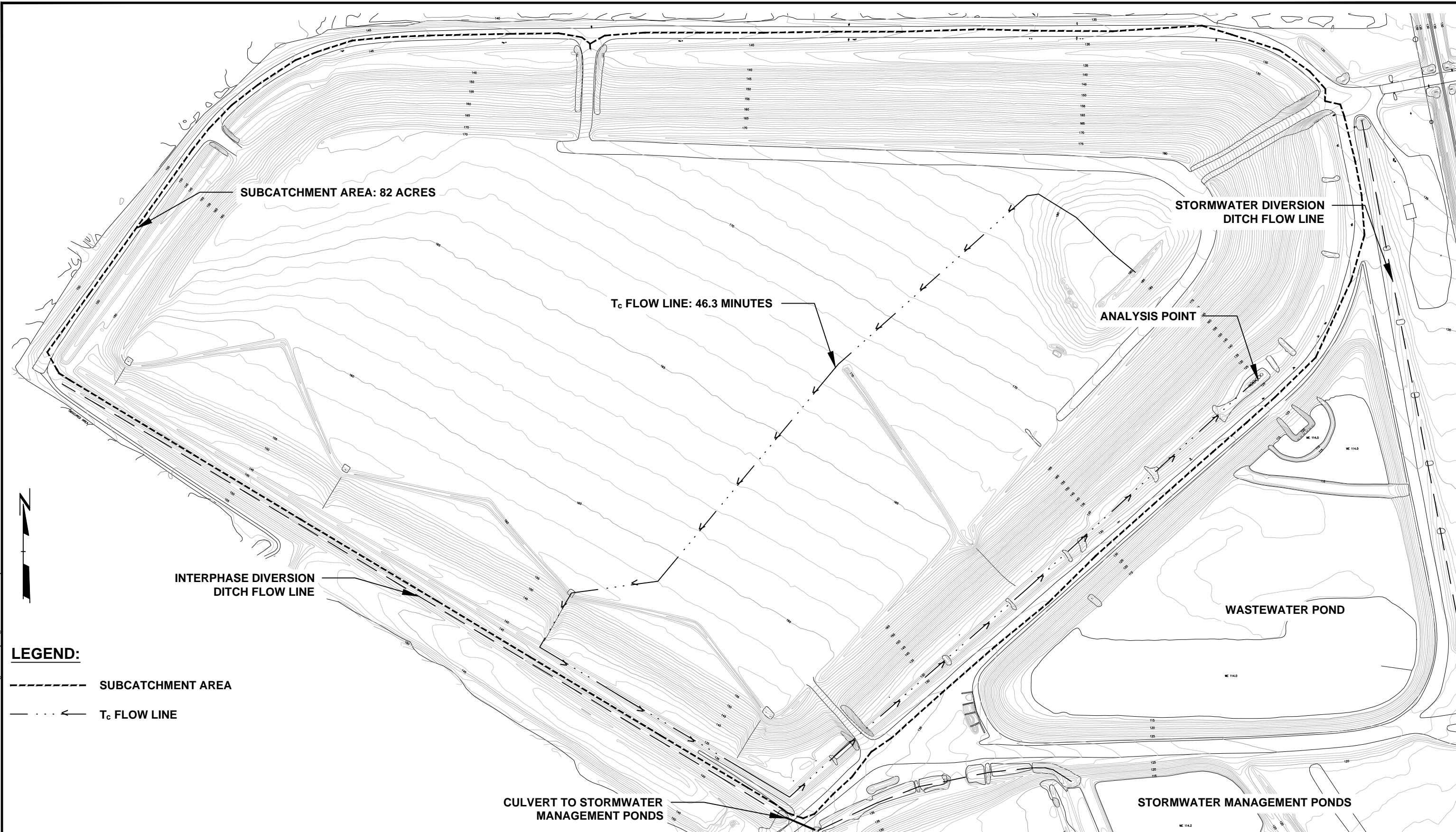
Temp. Lined	y-var (ft)	A (ft)	P (ft)	R (ft)	Zav	Zreq	V (ft/s)	Td (psf)
Channel:		0.0000	3.00	0.00	0.00	#VALUE!	#####	0.00

Appendix C: Run-off Calculations

- Drainage Area Map
- HydroCAD Calculations
- Ditch Capacity
- Wastewater Pond HydroCAD Calculation

Drainage Area Map

11/17 - USSE, Alonso - ATTACHED XREFS: Wateree Drainage Area Map.dwg --- PLOT DATE: September 28, 2021 - 8:57AM --- LAYOUT: 11X17L
DRAWING NAME: J:\CAD\Dominion\47435 - CCR Five Year Assessment\0000 Wateree Drainage Area Map.dwg



- LEGEND:**
- SUBCATCHMENT AREA
 - - - - - T_c FLOW LINE



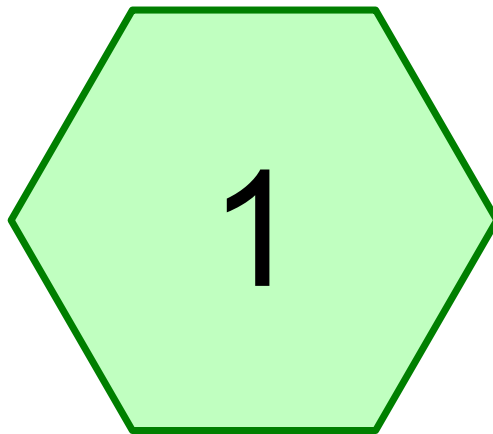
PROJECT: **WATEREE STATION CLASS III LANDFILL
RUN-ON/RUN-OFF CONTROL PLAN
RICHLAND COUNTY, SOUTH CAROLINA**

TITLE: **DRAINAGE AREA MAP**

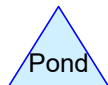
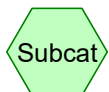
DRAWN BY:	C. ALONSO
CHECKED BY:	J. HOTSTREAM
APPROVED BY:	N. ADDISON
DATE:	9/14/2021
PROJ. NO.:	447435
FILE:	Wateree Drainage Area Map.dwg

FIGURE B

HydroCAD Calculations



PHASE 1-2 LANDFILL MAX RUNOFF



Wateree Run-off Perimeter Ditch

NOAA 24-hr B 25-Year Rainfall=6.66"

Prepared by TRC

Printed 9/8/2021

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Page 2

Time span=5.00-20.00 hrs, dt=0.05 hrs, 301 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment1: PHASE 1-2 LANDFILL Runoff Area=82.000 ac 0.00% Impervious Runoff Depth>4.84"
Flow Length=3,904' Tc=46.3 min CN=87 Runoff=249.09 cfs 33.073 af

Total Runoff Area = 82.000 ac Runoff Volume = 33.073 af Average Runoff Depth = 4.84"
100.00% Pervious = 82.000 ac 0.00% Impervious = 0.000 ac

Wateree Run-off Perimeter Ditch

Prepared by TRC

HydroCAD® 10.00-24 s/n 01402 © 2018 HydroCAD Software Solutions LLC

NOAA 24-hr B 25-Year Rainfall=6.66"

Printed 9/8/2021

Page 3

Summary for Subcatchment 1: PHASE 1-2 LANDFILL MAX RUNOFF

Runoff = 249.09 cfs @ 12.62 hrs, Volume= 33.073 af, Depth> 4.84"

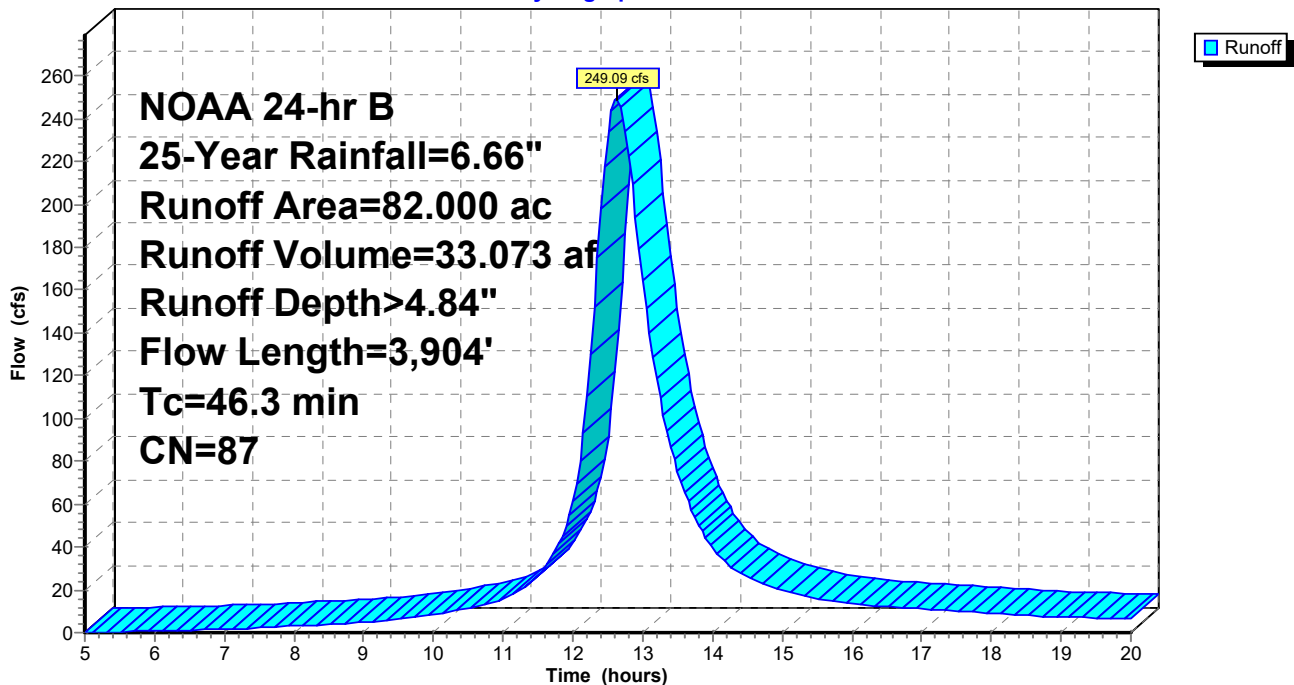
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
 NOAA 24-hr B 25-Year Rainfall=6.66"

Area (ac)	CN	Description
* 82.000	87	MATCH 2016 REPORT
82.000		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.1	100	0.0416	0.16		Sheet Flow, SHEET FLOW Grass: Dense n= 0.240 P2= 3.54"
34.1	1,651	0.0133	0.81		Shallow Concentrated Flow, SHALLOW Short Grass Pasture Kv= 7.0 fps
0.1	150	0.1395	17.48	54.92	Pipe Channel, PIPE SLOPE DRAIN 24.0" Round Area= 3.1 sf Perim= 6.3' r= 0.50' n= 0.020
0.6	632	0.0085	16.72	652.19	Channel Flow, INTERPHASE (FABRIFORM) Area= 39.0 sf Perim= 22.0' r= 1.77' n= 0.012
1.4	1,371	0.0066	15.76	803.98	Channel Flow, PERIMETER DITCH RUNOFF Area= 51.0 sf Perim= 26.0' r= 1.96' n= 0.012
46.3	3,904	Total			

Subcatchment 1: PHASE 1-2 LANDFILL MAX RUNOFF

Hydrograph



Ditch Capacity



PROJECT: CCR Five Year Assessment - 447435
 SUBJECT: Wateree Run-on/Run-off Calculations
 COMPUTED BY: C. Alonso CHECKED BY: N. Addison
 DATE: _____

Channel Section Designation: Perimeter Diversion Run-off Control
 Channel Section Description: Maximum Runoff and Maximum Shear Stress Check

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

Input Data	
max depth of flow (ft), y:	3
longitudinal slope (ft/ft), S:	0.007
bottom width (ft), b:	8
channel side slope (z:1):	3
design Q (cfs):	808

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

Permanent lining flow capacity, Q (cfs) = 808

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)
51.0000	26.97	1.89	0.007	808	15.84

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

Discharge (cfs), Q: 808.00 (design max. Q of controlling lining system, from above)
 longitudinal slope (ft/ft), S: 0.007
 bottom width (ft), b: 8
 channel side slope (m:1): 3

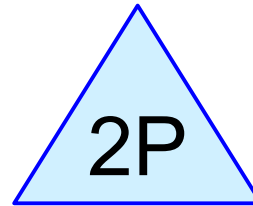
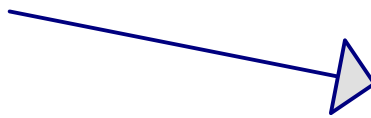
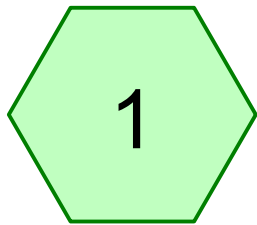
TEMPORARY LINING: _____
 roughness coefficient, n : 0.012
 max. shear stress (psf), T_d : 4

Iterate y to make $Z_{av} = Z_{req}$

OK

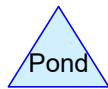
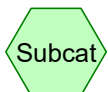
Temp. Lined	y-var (ft)	A (ft)	P (ft)	R (ft)	Z _{av}	Z _{req}	V (ft/s)	T _d (psf)
Channel:	3	51.0000	26.97	1.89	77.98	77.99	15.84	1.31

Wastewater Pond HydroCAD Calculation



PHASE 1-2 LANDFILL
MAX RUNOFF

Wastewater Pond



Wateree Run-off Perimeter Ditch

NOAA 24-hr B 25-Year Rainfall=6.66"

Prepared by TRC

Printed 10/13/2021

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Page 2

Summary for Subcatchment 1: PHASE 1-2 LANDFILL MAX RUNOFF

Runoff = 249.09 cfs @ 12.62 hrs, Volume= 33.073 af, Depth> 4.84"

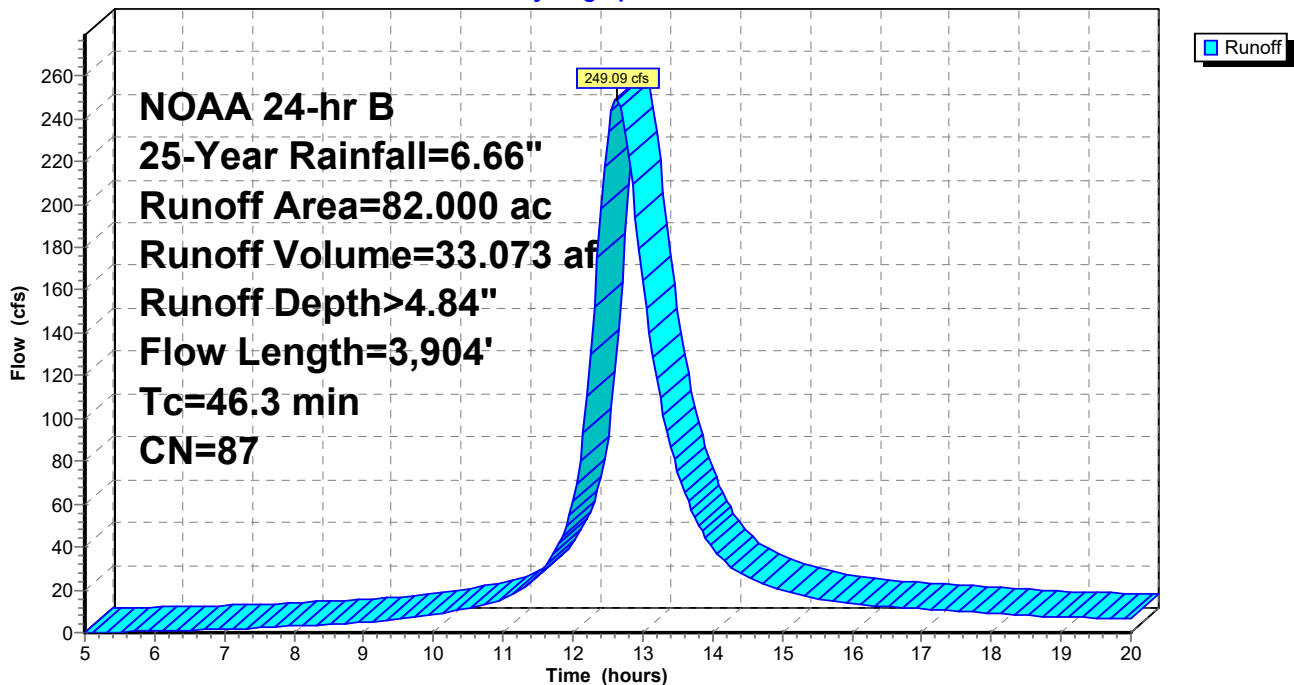
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46.3	3,904	Total			

Subcatchment 1: PHASE 1-2 LANDFILL MAX RUNOFF

Hydrograph



Wateree Run-off Perimeter Ditch

NOAA 24-hr B 25-Year Rainfall=6.66"

Prepared by TRC

Printed 10/13/2021

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Page 3

Summary for Pond 2P: Wastewater Pond

Inflow Area = 82.000 ac, 0.00% Impervious, Inflow Depth > 4.84" for 25-Year event
Inflow = 249.09 cfs @ 12.62 hrs, Volume= 33.073 af
Outflow = 0.00 cfs @ 5.00 hrs, Volume= 0.000 af, Atten= 100%, Lag= 0.0 min

Routing by Stor-Ind method, Time Span= 5.00-20.00 hrs, dt= 0.05 hrs
Peak Elev= 117.69' @ 20.00 hrs Surf.Area= 413,535 sf Storage= 1,440,072 cf

Plug-Flow detention time= (not calculated: initial storage exceeds outflow)
Center-of-Mass det. time= (not calculated: no outflow)

Volume	Invert	Avail.Storage	Storage Description
#1	114.00'	4,264,825 cf	Custom Stage Data (Prismatic) Listed below

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
114.00	366,720	0	0
116.00	389,617	756,337	756,337
118.00	417,864	807,481	1,563,818
120.00	439,125	856,989	2,420,807
122.00	461,022	900,147	3,320,954
124.00	482,849	943,871	4,264,825

Pond 2P: Wastewater Pond

Hydrograph

