DOMINION ENERGY

PERIODIC INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN

POSSUM POINT POWER STATION INACTIVE CCR SURFACE IMPOUNDMENT: POND ABC

APRIL 2023

TABLE OF CONTENTS

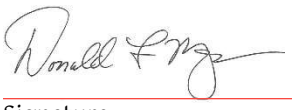
APPENDICES

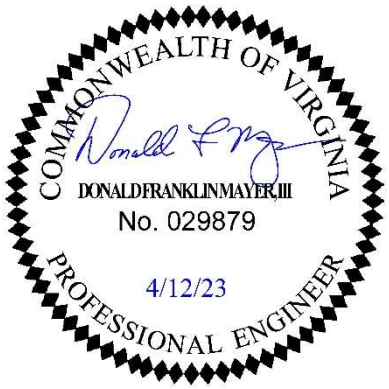
1 CERTIFICATION

This periodic Inflow Design Flood Control System Plan for the Possum Point Power Station's Pond ABC was prepared by WSP USA Inc. (WSP; formerly d/b/a Golder Associates USA Inc.). The document and Certification/Statement of Professional Opinion are based on and limited to information that WSP has relied on from Dominion Energy and others, but not independently verified, as well as work products previously produced by Golder.

On the basis of and subject to the foregoing, it is my professional opinion as a Professional Engineer licensed in the Commonwealth of Virginia that this document has been prepared in accordance with good and accepted engineering practices as exercised by other engineers practicing in the same discipline(s), under similar circumstances, at the same time, and in the same locale. It is my professional opinion that the document was prepared consistent with the requirements in §257.82 of the United States Environmental Protection Agency's "Standards for the Disposal of Coal Combustion Residuals in Landfills and Surface Impoundments," published in the Federal Register on April 17, 2015, with an effective date of October 19, 2015 (40 CFR §257.82), as well as with the requirements in §257.100 resulting from the EPA's "Hazardous and Solid Waste Management System: Disposal of Coal Combustion Residuals from Electric Utilities; Extension of Compliance Deadlines for Certain Inactive Surface Impoundments; Response to Partial Vacatur" published in the Federal Register on August 5, 2016, with an effective date of October 4, 2016 (40 CFR §257.100).

The use of the word "Certification" and/or "certify" in this document shall be interpreted and construed as a Statement of Professional Opinion and is not and shall not be interpreted or construed as a guarantee, warranty, or legal opinion.

Donald Mayer, PE	Vice President
Print Name	Title
	4/12/2023
Signature	Date



2 INTRODUCTION

This periodic Inflow Design Flood Control System (PIDFCS) Plan was prepared for the Possum Point Power Station's (Station) Coal Combustion Residuals (CCR) inactive surface impoundment known as Pond ABC. This PIDFCS Plan was prepared in accordance with 40 CFR Part §257, Subpart D and is consistent with the requirements of 40 CFR §257.82.

The Station, owned and operated by Virginia Electric and Power Company d/b/a Dominion Energy Virginia (Dominion Energy), is in Prince William County at 19000 Possum Point Road, east of Route 1 (Jefferson Davis Highway), and bounded to the south and east by Quantico Creek and the Potomac River. The Station includes an existing, inactive CCR surface impoundment, Pond ABC, as defined by the Disposal of Coal Combustion Residuals from Electric Utilities; Final Rule and Direct Final Rule (40 CFR §257; the CCR Rule). Pond ABC has historically also been regulated as an impounding structure by the Virginia Department of Conservation and Recreation (DCR), with Inventory Number 153001.

Dominion Energy performed closure by removal activities in Pond ABC by removing the stored CCR and over-excavating soil pursuant to its solid waste permit closure plan (SWP 617). The Virginia Department of Environmental Quality (DEQ) verified removal activities in August 2019. The Pond remains subject to the CCR Rule requirements due to observed groundwater impacts that prevent full closure of the unit under the rule even though the Pond no longer impounds CCR materials. In addition, the Pond is no longer regulated by DCR as an impounding structure. Currently, the pond footprint has been regraded and prepared for future use as a wastewater treatment facility for the Pond D closure. Two small portions of pond in the southeast and southwest corners respectively collect stormwater and pump it to Pond D for future treatment prior to discharge.

3 PURPOSE

This PIDFCS plan is prepared pursuant to 40 CFR §257.82(c) of the CCR Rule [40 CFR §257.82(c)]. The initial IDFCS plan was completed in April 2018 and is required to be reviewed every five (5) years pursuant to 40 CFR §257.82(c)(4). Pond ABC remains subject to the CCR rule requirements, including this PIDFCS plan update, even though all CCR materials have been removed.

4 PERIODIC INFLOW DESIGN FLOOD CONTROL SYSTEM PLAN

As required by §257.82(c)(1), this PIDFCS plan includes documentation of how the inflow design flood control system for Pond ABC has been designed, constructed, operated, and maintained to:

- Adequately manage flow into Pond ABC during and following the peak discharge of the inflow design flood [40 CFR §257.82(a)(1)];
- Adequately manage flow from Pond ABC to collect and control the peak discharge resulting from the inflow design flood [40 CFR §257.82(a)(2)]; and
- Adequately handle discharge from Pond ABC in accordance with the surface water requirements under 40 CFR §257.3-3 [40 CFR §257.82(b)].

4.1 HAZARD POTENTIAL CLASSIFICATION

As indicated in WSP's Periodic Hazard Potential Classification Assessment (WSP, 2023), Pond ABC is assigned a "Low" hazard potential rating per 40 CFR §257.73.

4.2 INFLOW DESIGN FLOOD

In accordance with 40 CFR §257.82(a)(3)(ii), a CCR impoundment with a low hazard potential must collect and control the peak discharge resulting from a 100-year flood. Per National Oceanic and Atmospheric Administration (NOAA) Atlas-14, the 100-year, 24-hour precipitation depth is 8.3 inches in Dumfries, Virginia. Evaluation of Pond ABC's inflow design flood control system during the 100-year, 24-hour storm event is provided in Appendix A.

4.3 INFLOW CONTROL

As required by §257.82(a)(1), a control system must be in place for Pond ABC that is designed, constructed, operated, and maintained to adequately manage flow into Pond ABC during and following the peak discharge of the inflow design flood.

Inflow to Pond ABC is primarily stormwater runoff from within the units (16 acres) and approximately 23 acres from north of the ponds. The total drainage area to the ponds is approximately 39 acres. The majority of stormwater arrives through overland flow. The natural conveyance systems adequately manage and control run-on into Pond ABC during the inflow design flood.

4.4 OUTFLOW CONTROL

As required by §257.82(a)(2), an inflow design flood control system must be in place for Pond ABC that is designed, constructed, operated, and maintained to adequately manage flow from the pond to collect and control the peak discharge resulting from the inflow design flood.

Pond ABC currently does not discharge to the environment, and water collected within the pond is pumped to Pond D. Water within the pond would discharge over the embankment crest at approximately elevation 16.0 feet above mean sea level (ft amsl). Pond ABC has approximately 28 acre-feet of available water storage volume at the embankment crest.

The Pond ABC stormwater system was modeled in the U.S. Army Corps of Engineers Hydrologic Engineering Center's Hydraulic Modeling System (HEC HMS), and the analysis is included in Appendix A. Pond ABC inflow design flood control system is capable of adequately managing the inflow from the design flood event without overtopping the embankment.

4.5 SURFACE WATER REQUIREMENTS

As required by §257.82(b), a control system must be in place for Pond ABC that is designed, constructed, operated, and maintained to meet the requirements of § 257.3-3. Pond ABC is not currently permitted to discharge surface water into the environment. Surface water within the pond is periodically pumped to Pond D and managed in the active CCR unit.

Pond ABC is operated under a Local Land Disturbance Permit, Stormwater Management Plan, and Stormwater Pollution Prevention Plan (SWPPP). The site is routinely inspected and monitored by Dominion Energy personnel in accordance with the before mentioned plans to minimize potential surface water impacts.

5 CONCLUSIONS

Pond ABC is subject to a PIDFCS plan update (due every 5 years from the original assessment performed in April 2018). The pond remains subject to the CCR Rule requirements, even though it no longer impounds CCR materials, due to observed groundwater impacts that prevent full closure of the unit under the rule. In addition, the pond is no longer regulated by DCR as an impounding structure.

Based on known site conditions, information in this PIDFCS Plan, as well as work performed by WSP, it is WSP's opinion that the existing Pond ABC inflow design flood control system complies with the requirements of 40 CFR §257.82 of the CCR Rule for a low hazard potential impoundment.

REFERENCES

- Golder Associates. Inflow Design Flood Control System Plan, Possum Point Power Station Inactive CCR Surface Impoundment: Pond ABC. April 2018.
- National Oceanic and Atmospheric Administration's National Weather Service. NOAA Atlas 14 Point Precipitation Frequency Estimates: VA. Accessed February 3, 2023. Available online: https://hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=va
- WSP USA Inc. Periodic Hazard Potential Classification Assessment. Possum Point Power Station Inactive CCR Surface Impoundment: Pond ABC. April 2023.

APPENDIX

A Pond ABC Inflow Design Flood Analysis

CALCULATIONS

Date	April 2023	**Made by:**	HNE
Reference No.	21466315	**Checked by:**	BJP
Site Name	Dominion Energy - Possum Point Pond E Dumfries, Virginia	**Approved by:**	ELH

POSSUM POINT POWER STATION POND E INFLOW DESIGN FLOOD ANALYSIS

1.0 OBJECTIVES

The purpose of this evaluation is to determine the hydraulic performance of Pond E at the Possum Point Power Station, resulting from the 100-year, 24-hour design storm event. This evaluation is in support of the Inflow Design Flood Control System Plan and is based on a "Low" hazard potential classification as defined in §257.53 of the *CCR Rule*. Pond ABC has been closed by removal of Coal Combustion Residuals (CCR), and stormwater entering the pond is currently pumped into an active CCR impoundment at the Station (Pond D).

2.0 CALCULATIONS

2.1 Pond Storage Volume

Pond E storage volume was computed based on the topography of the pond following removal of CCR material and regrading of the pond, surveyed in 2021. The maximum available storage below the discharge point on the berm at elevation 14.0 feet above mean sea level (ft amsl) is approximately 41 acre-feet. Attachment 1 contains the stage-storage rating table for Pond E.

2.2 Outlet Design Capacity

Currently, no surface water is permitted to discharge from Pond E. Water within the pond is intermittently pumped to Pond D. This analysis assumes that the starting water level in Pond E is at the top of the southern basin within the pond (Elevation 5.0 ft amsl), which was the approximate water surface elevation during the 2021 survey.

2.3 Storm Routing Calculations

The Pond E stormwater system analysis was performed using the US Army Corps of Engineers Hydrologic Engineering Center's Hydraulic Modeling System (HEC-HMS) software package (Ref 1). The drainage area to the pond is approximately 53 acres from north of the pond, and 50 acres from direct precipitation into the pond.

Design Storm

Per §257.82(a)(3)(ii), the impoundment is required to adequately manage flow resulting from the 24-hour, 100-year storm event. The 100-year, 24-hour storm event precipitation depth was obtained from the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 Precipitation Frequency Data Server (PFDS, Ref 2) for Dumfries, Virginia, and amounts to 8.3 inches. The design storm is distributed in time as an SCS Type II synthetic distribution.

HMS Model Input

Figure 1 illustrates the connectivity of the stormwater elements and the data inputs as modeled in HEC-HMS. The predominant soil types in the area are Hydrologic Soil Group (HSG) 'B' soils. The acreage, curve number (CN), and lag time for each sub-basin area are provided in the attached worksheet.

The time of concentration for each basin was estimated using the TR-55 time of concentration method (NRCS, ref #3), which divides the longest hydraulic flow path into sheet flow, shallow concentrated flow, and open channel flow, and considers a minimum time of concentration of 6 minutes. The lag time was estimated as 60% of the time of concentration. The maximum length of sheet flow was assumed to be 100 feet.

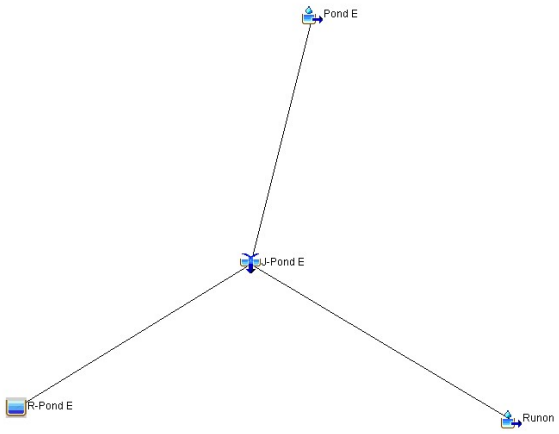


Figure 1: Pond E HEC HMS Model Routing

HMS Model Output

The following table summarizes the results of the HEC-HMS analysis, using a starting water surface elevation of 5.0 ft amsl. Note that the computed high water (Max Hw) elevations are at the top of the berm (Elevation 14.0 ft amsl), but not expected to overtop the berm. The inflow volume and pool elevation are shown in Attachment 1.

Table 1: Pond E HEC-HMS Results

Q_{in} (CFS)	V_{in} (acre-ft)	Max Hw (Ft El*)
674.8	40.8	14.0

3.0 CONCLUSIONS

Based on the calculations presented herein, Pond E at the Possum Point Power Station can accept and store the 100-year, 24-hour storm event without discharging to the environment.

4.0 REFERENCES

1) USACE (United States Army Corps of Engineers). 2020. HEC-HMS Hydrologic Engineering Center – Hydrologic Modeling System (HEC-HMS) [computer software]. Version 4.10. September 2020.

2) Precipitation Frequency Data Server (NOAA Atlas 14). https://hdsc.nws.noaa.gov/hdsc/pfds/

3) NRCS. 2010. National Engineering Handbook. Part 630 Hydrology, Chapter 15 Time of Concentration.

5.0 ATTACHMENTS

1) Possum Point Pond E H&H Calculations

ATTACHMENT 1

Possum Point Pond E H&H Calculations

Pond ABC Stage Storage	
Contour Elevation (ft)	**Volume (Acre-ft)**
8.0	-
9.0	1.19
10.0	2.57
11.0	4.20
12.0	6.33
13.0	9.32
14.0	13.57
15.0	19.55
16.0	27.77

Notes:
1. Pond ABC stage-storage is evaluated for storage above El. 8 feet, which was the water level measured in the pond during the 2021 as-built survey.

Client: Dominion
Project: Bremo Pond ABC CCR Inflow Design
Project Number: 21466315

Date:	3/9/23
By:	HNE
Chkd:	BJP
Apprvd:	ELH

Design Storm **100 -Year Reccurence Interval**

Storm Duration (hours)	2-Year Depth (inches)	100 -Year Depth (inches)	Storm Distribution
24	3.1	8.3	II

Subbasin ID	Subbasin Area (ft^2)	Subbasin Area (acres)	Subbasin Area (sq mile)	CN = 98 Pond Area (acres)	CN = 58 Grass (acres)	CN = 82 Bare Soil (acres)	Composite SCS Curve No.	$S = \frac{1000}{CN} - 10$	Unit Runoff Q (in)	Runoff Volume (ac-ft)	Runoff Volume (ft^3)
Pond ABC	676,592	15.53	0.0243	5.29		10.24	CN = 87	1.49	6.77	8.76	381,784
Runon	1,014,294	23.28	0.0364		23.28		CN = 58	7.24	3.35	6.51	283,431
		0.00	0.0000								
		0.00	0.0000								
Total:	1,690,886	38.82	0.06							15.27	665,215

Client: Dominion
Project: Bremo Pond ABC CCR Inflow Design
Project Number: 21466315

					Flow Segment 1						Flow Segment 2					
Subbasin ID	Subbasin Area (sq mile)	Composite Curve Number	Total Lag (0.6*Tc) (min)	Total Travel Time (min)	Type of Flow	Length (ft)	Slope (ft/ft)	Roughness Condition[1]		Travel Time (min)	Type of Flow	Length (ft)	Slope (ft/ft)	Roughness Condition[1]		Travel Time (min)
Pond ABC	0.0243	87	3.6	6.0												
Runon	0.0364	58	5.2	8.7	Sheet	100	0.050	E	Short Grass	6.9	Shallow	885	0.250	U	Unpaved	1.8

Notes:
(1) Refer to Attachment A for Roughness Condition descriptions and Tc Coeffiecients.
(2) The minimum lag time for each sub-basin is 3.6 min.

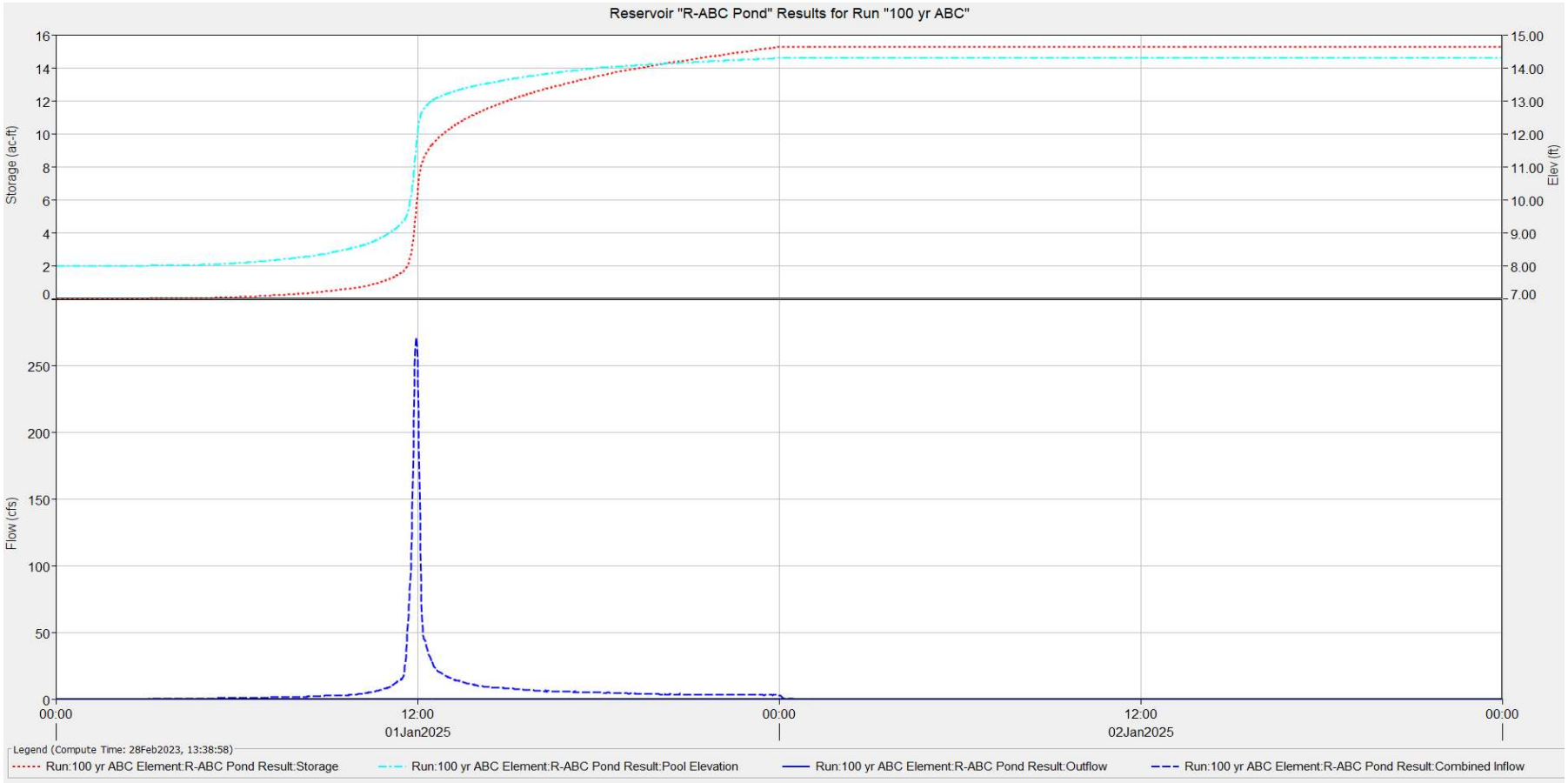
Client: Dominion
Project: Bremo Pond ABC CCR Inflow Design
Project Number: 2146631 0

Date:	3/9/23
By:	HNE
Chkd:	BJP
Apprvd:	ELH

HEC-HMS Basin Model:	East Pond
HEC-HMS Met. Model:	1000yr,24-hr
HEC-HMS Control Specs:	48 hour, 1 min

Hydrologic Element	Drainage Area (sq mile)	Peak Discharge (cfs)	Time of Peak	Total Volume (ac-ft)
Runon	0.036	118.8	01Jan2025, 11:59	6.5
Pond ABC	0.024	159	01Jan2025, 11:56	8.8
J-ABC Pond	0.061	271.3	01Jan2025, 11:58	15.3
R-ABC Pond	0.061	0	01Jan2025, 00:00	0

Pond ABC Storage Analysis



Attachment A
Time of Concentration and Mannings Flow Coefficients

TR-55 (1986)

Sheet Flow Travel time (SCS Upland Method)

$$T_t = \frac{0.007\ (n'\ L)^{0.8}}{(P_2)^{0.5}\ S^{0.4}}$$

Where: T_t = travel time (hr); n' = roughness coefficient; L = flow length (ft);

P_2 = 2-yr storm depth (inches); s = slope (ft/ft)

flow velocity = $L/(60T_t)$

Flow Type	Surface Type	roughness n	Surface Description	Short Description
Sheet/Overland Flow	A	0.011	Smooth surfaces (concrete, asphalt, gravel, bare soil)	Smooth
	B	0.05	Fallow (no residue)	Fallow
	C	0.06	Cultivated soils: Residue cover <= 20%	Cover<20%
	D	0.17	Cultivated soils: Residue cover > 20%	Cover>20%
	E	0.15	Grass: Short grass prairie	Short Grass
	F	0.24	Grass: Dense grasses	Dense Grass
	G	0.41	Grass: Bermuda grass	Bermuda Grass
	H	0.13	Range (natural)	Range
	I	0.40	Woods: Light underbrush	Light woods
	J	0.80	Woods: Heavy underbrush	Heavy Woods

Shallow Concentrated Flow Velocity (SCS Upland Method)

$v = mS^{0.5}$

Where: v = velocity (fps); m = roughness coeffient; S = slope (ft/ft)

Flow Type	Surface Type	Roughness m	Surface Description	Short Description
Shallow Conc. Flow	P	20.3282	Paved Surfaces	Paved
	U	16.1345	Unpaved Surfaces	Unpaved

Channel Flow Velocity (Mannings Velocity)

$v = 1.49/n\ Rh^{2/3}S^{1/2}$ Where: v = velocity (fps); n = roughness coeffient; Rh = Hydraulic Radius (ft), S = slope (ft/ft)

Lining Type	Mannings n for Depth	Mannings n for Velocity	Material	Maximum Velocity	Maximum Shear Stress
A	0.026	0.026	ACB	25	
C	0.024	0.022	CSP	50	
E	0.025	0.022	Earth-lined	3	
G	0.035	0.030	Grass-lined	5	
I	0.017	0.013	Ductile Iron	50	
P	0.012	0.009	Plastic	25	
R	0.040	0.035	Riprap	16	
T	0.035	0.030	Turf Reinf.	10	1.5
Z	0.060	0.005	Other	25	