PERIODIC SAFETY FACTOR ASSESSMENT
391-3-4-.10(4) AND 40 C.F.R. PART 257.73(e)
PLANT MCDONOUGH ASH POND 1 (AP-1)
GEORGIA POWER COMPANY

The Federal CCR Rule and the Georgia CCR Rule (391-3-4-.10) require the owner or operator of a CCR surface impoundment to conduct initial and periodic safety factor assessments. *See* 40 C.F.R. § 257.73(e); Ga. Comp. R. & Regs. r. 391.3-4-.10(4)(b)[1]. A direct final rule revision to a partial vacatur of the Final Rule became effective on October 4, 2016. This revision eliminated the exemption for inactive CCR surface impoundments and required such units to meet the same requirements as existing CCR surface impoundments. The owner or operator of the CCR unit must conduct an assessment of the CCR unit and document that the minimum safety factors outlined in 40 C.F.R. § 257.73(e)(1)(i) through (iv) for the embankment are achieved. In addition, the Rules require a subsequent assessment be performed within 5 years of the previous assessment. *See* 40 C.F.R. § 257.73(f)(3); Ga. Comp. R. & Regs. r. 391.3-4-.10(4)(b) 1.

The CCR surface impoundment known as Ash Pond 1 (AP-1), owned, and operated by Georgia Power Company, is located at Plant McDonough-Atkinson (Plant McDonough) in Cobb County, Georgia. AP-1 no longer receives CCR or other waste streams and no longer functions as a CCR surface impoundment and is in the process of obtaining a solid waste permit under the Georgia Rules for Solid Waste Management, 391-3-4-.10. Installation of the final cover system for Plant McDonough AP-1 was substantially completed Q1 2017, and AP-1 is undergoing additional closure construction in the near term in accordance with 40 C.F.R. § 257.102(d), including the installation of a fully encompassing subsurface barrier wall and adjacent associated closure system upgrades.

AP-1 currently consists of 31 acres of drainage area, and stormwater is routed over the closure system through a system of downslope and perimeter channels to two outfall points: the Northwest and the South outfalls. The current conditions were evaluated for stability under four loading conditions as per 40 CFR §257.73(e):

- Storage Pool (40 C.F.R. § 257.73(e)(i))
- Surcharge Pool (40 C.F.R. § 257.73(e)(ii))
- Seismic Loading Conditions (40 C.F.R. § 257.73(e)(iii))
- Post-Seismic Liquefaction Conditions (when liquefaction susceptible materials are present; 40 C.F.R. § 257.73(e)(iv)).

Engineering analysis of AP-1 in its current condition were evaluated for each loading condition. Stability safety factors were evaluated for each of the loading scenarios using the computer program SLIDE (2018). As required by the EPA rule, a general limit equilibrium (GLE) method (Morgenstern and Price) was used to calculate factors of safety, and the factors of safety were calculated by dividing the resisting forces by the driving forces along the calculated critical slip surface of a given slope.

[1] In a typographical error, 391.3-4.10(4)(b) references the "structural integrity criteria in 40 CFR 247.73," when the reference to such criteria should be 40 CFR 257.73.

WSP USA Inc.
5170 Peachtree Road Bldg 100 Suite 300 Atlanta, Georgia, USA 30341 T: +1 770 496-1893 | F: +1 770 934-9476

Stability was evaluated along three cross-sections for AP-1 as shown in Figure 1. Subsurface stratigraphy at each cross-section was developed based on a combination of historical site data and subsurface investigations by WSP. Material properties were developed for the dike, foundation, and impounded materials from this data. The conditions modeled in the stability analyses are reflective of the conditions for AP-1 from 2018 through the date of this submittal.

For the surcharge pool scenario, WSP considered the effects of the 100-year 24-hour rain event. This event was calculated to cause temporary water flow on top of the pond cap in drainage channels. Factors of safety for stability under seismic loading conditions were calculated based on the earthquake hazard corresponding to a probability of exceedance of 2% in 50 years (2,475-year return period). WSP used the Bray and Travasarou displacement-based seismic slope stability screening method (Bray and Travasarou 2009) to evaluate the seismic stability. Additionally, an evaluation of the liquefaction susceptibility of the site soils which will remain saturated in the long term was completed and the results incorporated into the post liquefaction stability assessments.

The table below summarizes the results of the slope stability analyses for the current conditions at AP-1, with figures displaying the stability analysis results attached to this demonstration.

2018 to Current Conditions (November 2022 Survey) Stability Analysis Results				
Analysis Case	Storage Pool	Surcharge Pool	Seismic	Post Liquefaction
Rule Section	§ 257.73(e)(i)	§ 257.73(e)(ii)	§ 257.73(e)(iii)	§ 257.73(e)(iv)
Target Factor of Safety	1.5	1.4	1.0	1.2
Cross-Sections	**Factor of Safety**			
A-A	1.6	1.6	1.5	1.6
B-B	1.6	1.6	1.3	1.6
C-C	1.5	1.5	1.4	1.5

For all cases analyzed, the calculated factors of safety are in excess of those required in Sections § 257.73(e)(i) to (iv) of the EPA Rule.

I certify that the safety factor assessment for AP-1 was conducted in accordance with 40 C.F.R. § 257.73(e).

Gregory L. Hebeler, PhD, P.E.

Georgia Licensed Professional Engineer No. 034749

WSP USA Inc.

LEGEND

EXISTING CONTOURS

SOUTHERN COMPANY BOREHOLES

REFERENCES

1. THE EXISTING TOPOGRAPHY SHOWN EVERYWHERE ELSE WAS PROVIDED BY SOUTHERN COMPANY SERVICES AS AN INTERIM CONSTRUCTION PROGRESS SURVEY. FLOWN ON 04-15-17 USING LiDAR.

2. SOUTHERN COMPANY BOREHOLES COMPLETED IN JANUARY 2009.

0 100 200
1" = 100' FEET

CLIENT
GEORGIA POWER COMPANY

Georgia Power

PROJECT
PLANT MCDONOUGH
SAFETY FACTOR ASSESSMENT

TITLE
CCR UNIT AP-1 - STABILITY SECTIONS PLAN

CONSULTANT

wsp

YYYY-MM-DD	2023 APRIL
DESIGNED	LJ
PREPARED	RMS
REVIEWED	JGM/ HJ / LS
APPROVED	GLH

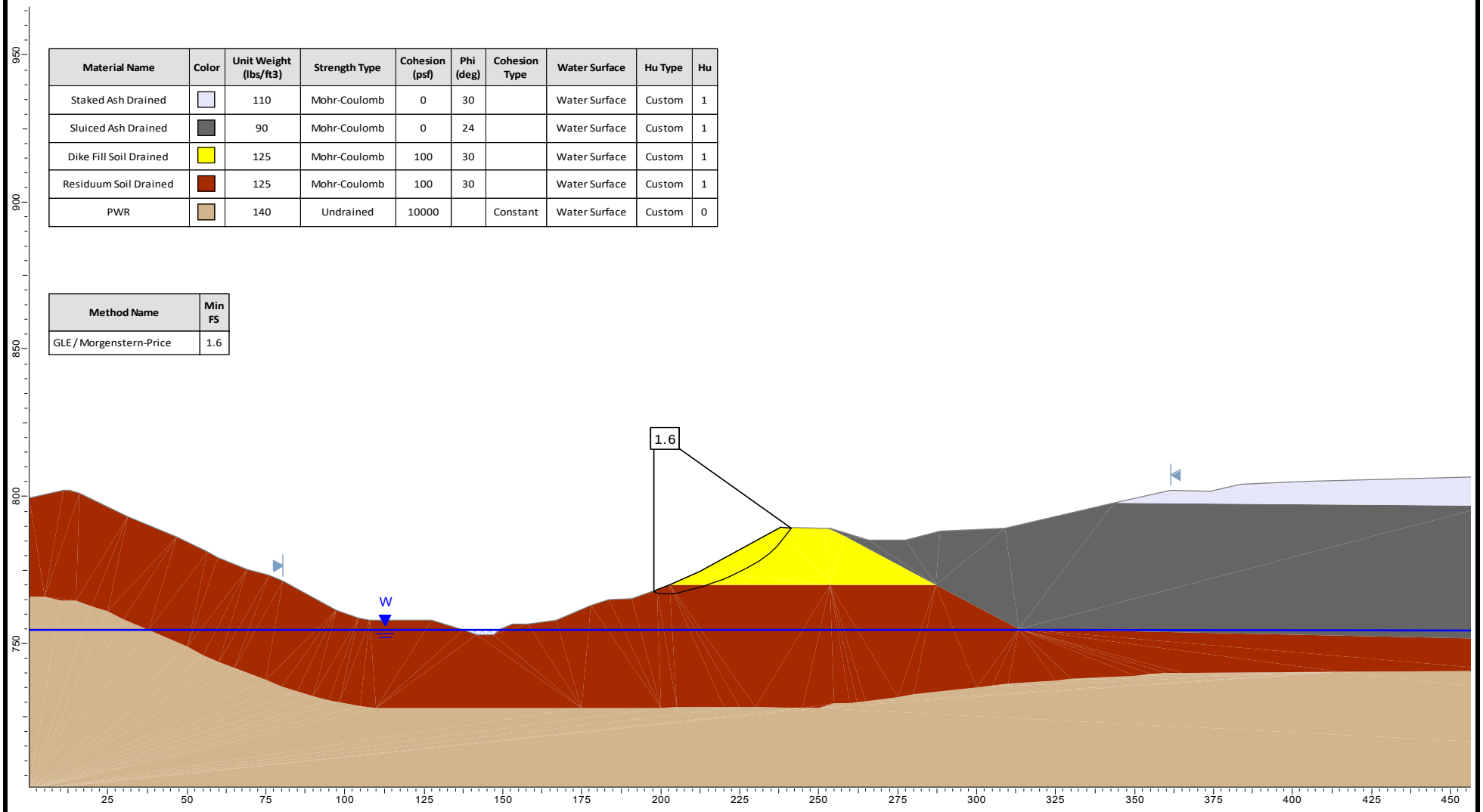
PROJECT NO. 1777449 REV. SHEET 1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D

Path: \\atlanta\Cadd\Southern Company\1777449 Plant McDonough Permitting\COMPLIANCE BOUNDARY\CLOSURE PERMIT\PRODUCTION\ | File Name: 1777449 AP 01-02 CLOSURE PERMIT.dwg

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion Type	Water Surface	Hu Type	Hu
Staked Ash Drained		110	Mohr-Coulomb	0	30		Water Surface	Custom	1
Sluiced Ash Drained		90	Mohr-Coulomb	0	24		Water Surface	Custom	1
Dike Fill Soil Drained		125	Mohr-Coulomb	100	30		Water Surface	Custom	1
Residuum Soil Drained		125	Mohr-Coulomb	100	30		Water Surface	Custom	1
PWR		140	Undrained	10000		Constant	Water Surface	Custom	0

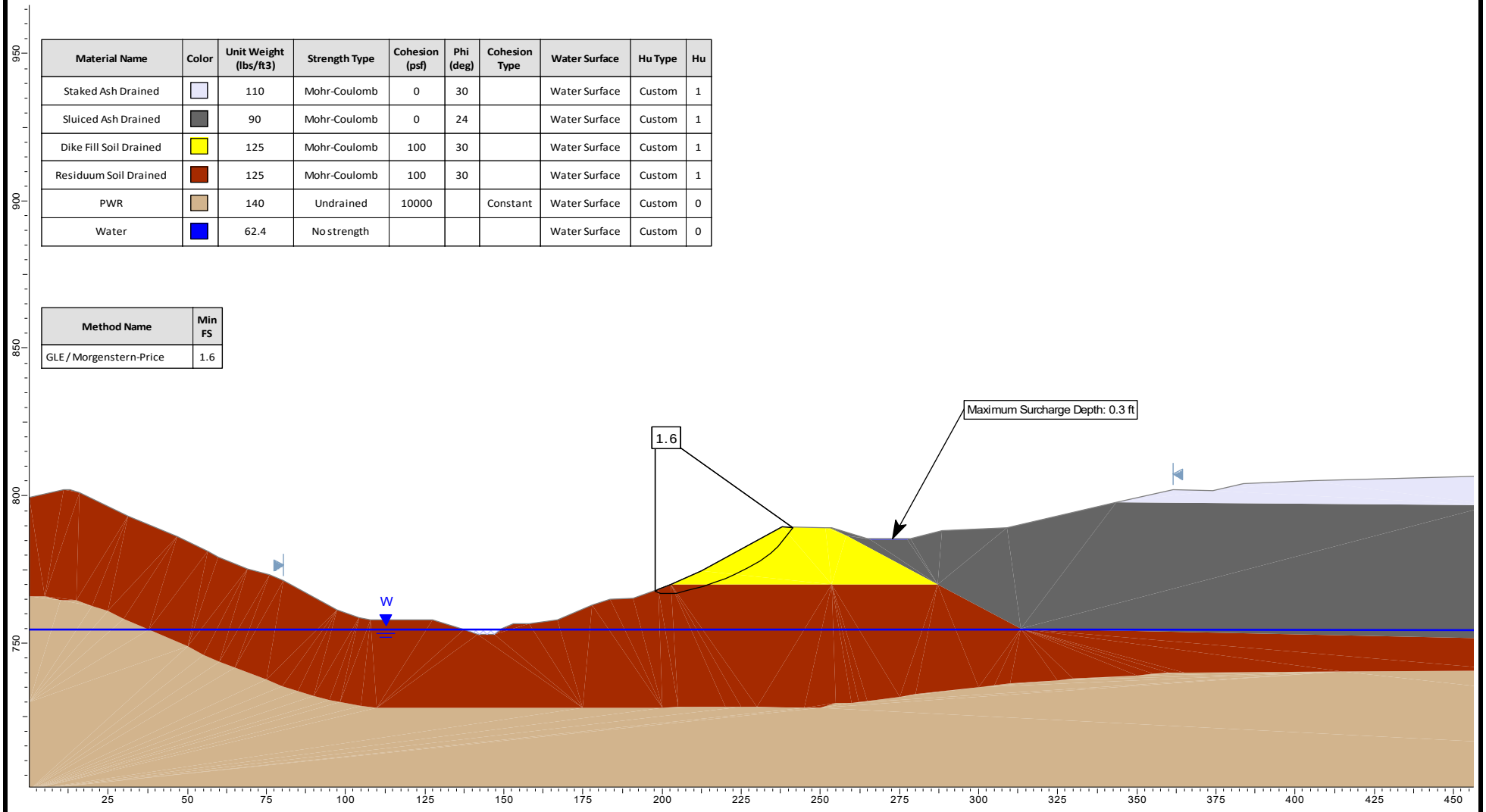
Method Name	Min FS
GLE / Morgenstern-Price	1.6



wsp	SCALE: AS SHOWN	PROJECT: State CCR Permitting Services - MCD Pond 1	
	DATE: April 2023	TITLE: Section A-A Long Term, Storage Pool	
	MADE BY: LJ		
	CAD: -		
FILE: STABILITY	CHECK: HJ	CLIENT: Georgia Power Company	FIGURE: 2(a)
PROJECT No.: 1777449 REV.: 0	REVIEW: GLH		

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion Type	Water Surface	Hu Type	Hu
Staked Ash Drained		110	Mohr-Coulomb	0	30		Water Surface	Custom	1
Sluiced Ash Drained		90	Mohr-Coulomb	0	24		Water Surface	Custom	1
Dike Fill Soil Drained		125	Mohr-Coulomb	100	30		Water Surface	Custom	1
Residuum Soil Drained		125	Mohr-Coulomb	100	30		Water Surface	Custom	1
PWR		140	Undrained	10000		Constant	Water Surface	Custom	0
Water		62.4	No strength				Water Surface	Custom	0

Method Name	Min FS
GLE / Morgenstern-Price	1.6



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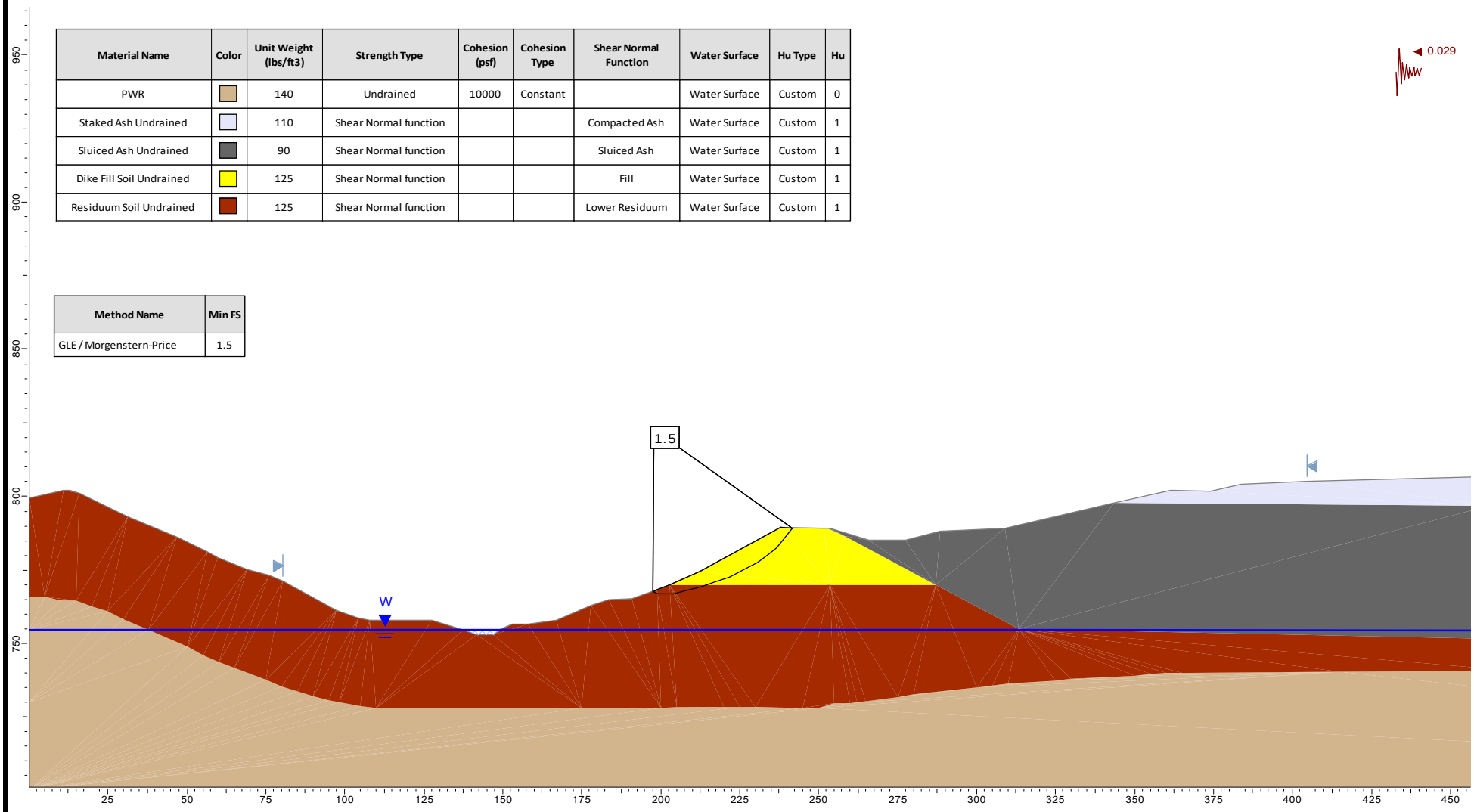
	DATE: April 2023	TITLE: Section A-A Surchage Pool	
	MADE BY: LJ		
	CAD: -		
FILE: STABILITY	CHECK: HJ	CLIENT: Georgia Power Company	FIGURE: 2(b)
PROJECT No.: 1777449 REV.: 0	REVIEW: GLH		

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Cohesion Type	Shear Normal Function	Water Surface	Hu Type	Hu
PWR		140	Undrained	10000	Constant		Water Surface	Custom	0
Staked Ash Undrained		110	Shear Normal function			Compacted Ash	Water Surface	Custom	1
Sluiced Ash Undrained		90	Shear Normal function			Sluiced Ash	Water Surface	Custom	1
Dike Fill Soil Undrained		125	Shear Normal function			Fill	Water Surface	Custom	1
Residuum Soil Undrained		125	Shear Normal function			Lower Residuum	Water Surface	Custom	1

Method Name	Min FS
GLE / Morgenstern-Price	1.5



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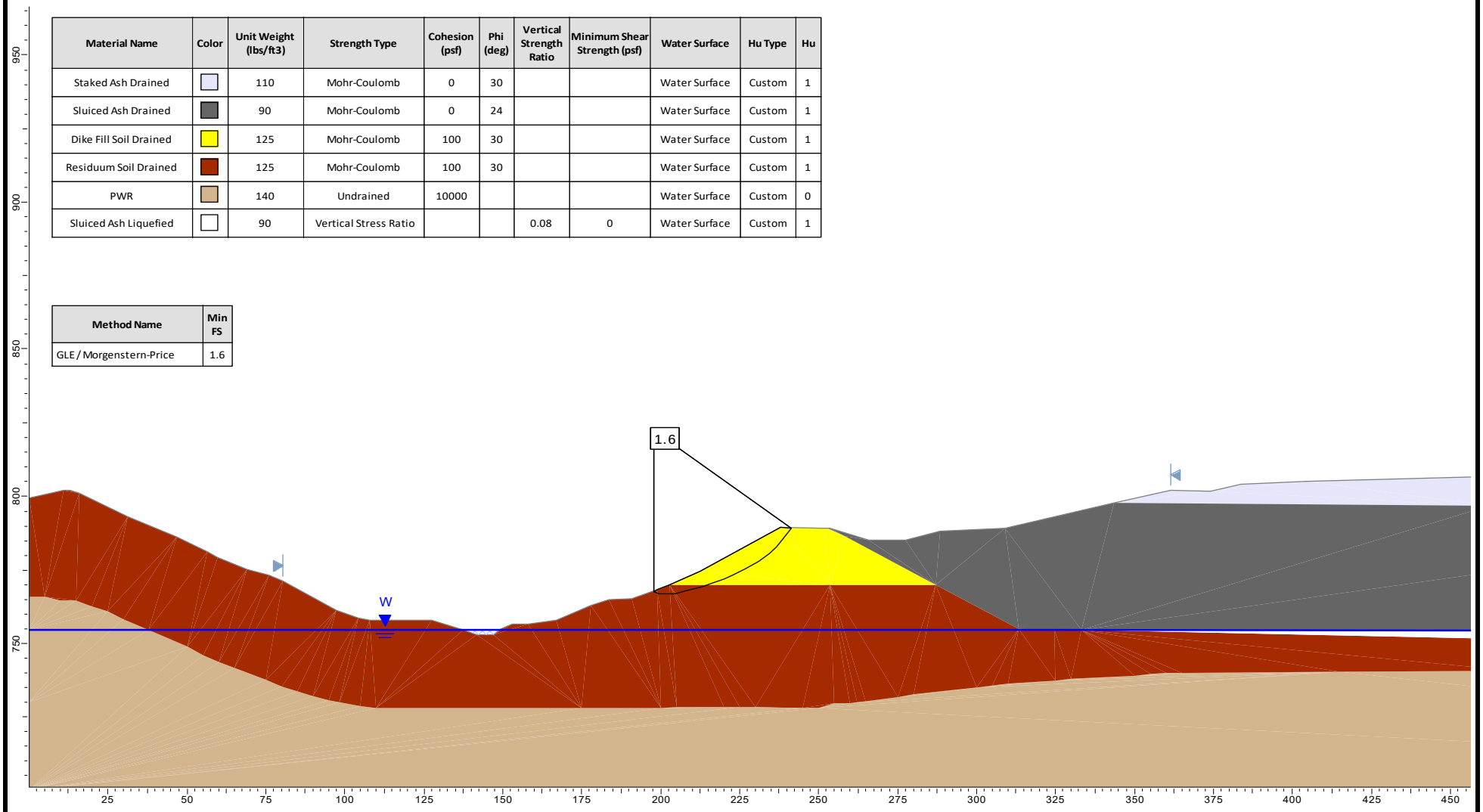
	DATE: April 2023	TITLE: Section A-A Seismic Screening	
	MADE BY: LJ		
	CAD: -		
FILE: STABILITY	CHECK: HJ	CLIENT: Georgia Power Company	FIGURE: 2(c)
PROJECT No.: 1777449 REV.: 0	REVIEW: GLH		

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Vertical Strength Ratio	Minimum Shear Strength (psf)	Water Surface	Hu Type	Hu
Staked Ash Drained		110	Mohr-Coulomb	0	30			Water Surface	Custom	1
Sluiced Ash Drained		90	Mohr-Coulomb	0	24			Water Surface	Custom	1
Dike Fill Soil Drained		125	Mohr-Coulomb	100	30			Water Surface	Custom	1
Residuum Soil Drained		125	Mohr-Coulomb	100	30			Water Surface	Custom	1
PWR		140	Undrained	10000				Water Surface	Custom	0
Sluiced Ash Liquefied		90	Vertical Stress Ratio			0.08	0	Water Surface	Custom	1

Method Name	Min FS
GLE / Morgenstern-Price	1.6

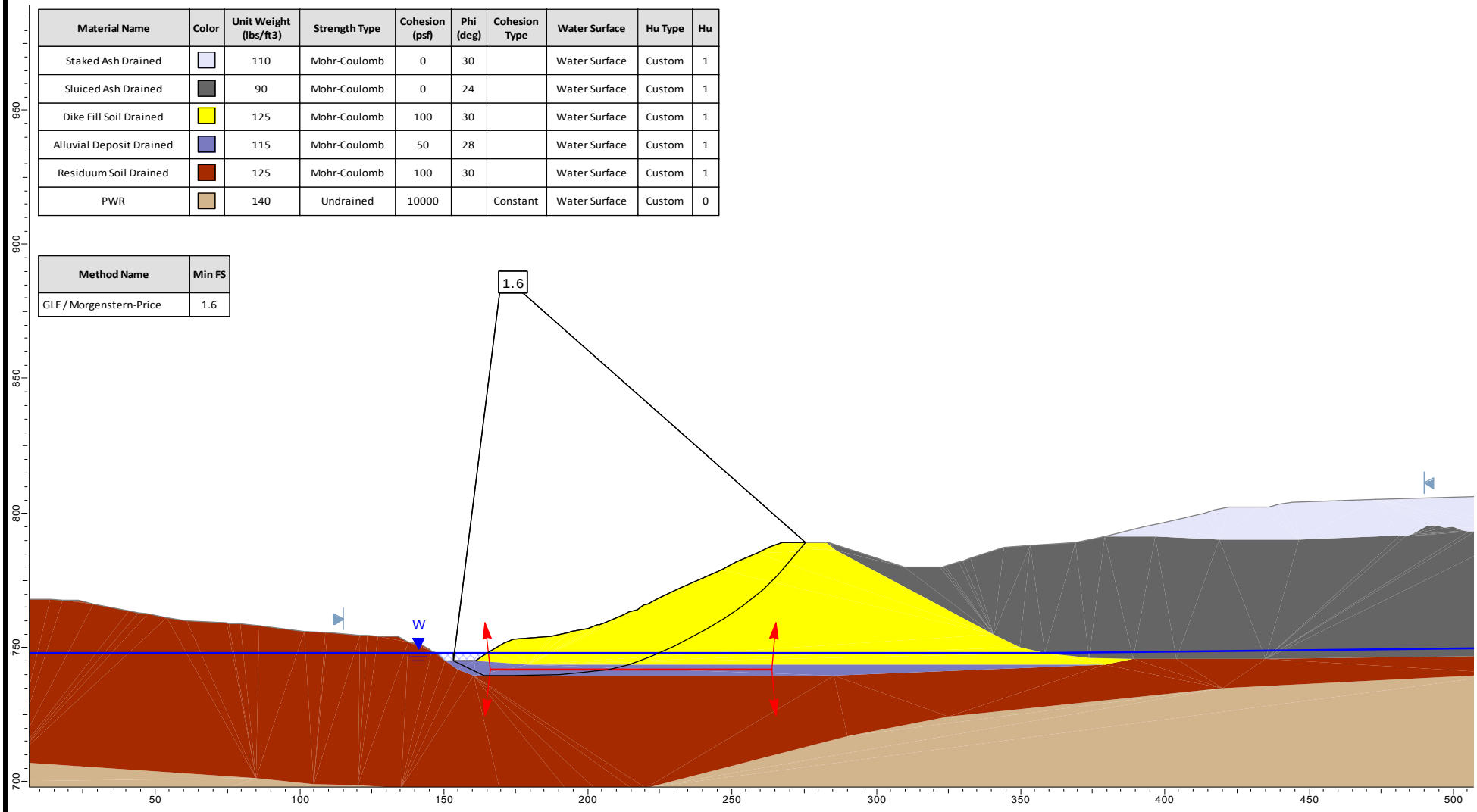


wsp

SCALE	AS SHOWN	PROJECT	State CCR Permitting Services - MCD Pond 1
DATE	April 2023	TITLE	Section A-A Post Liquefaction
MADE BY	LJ		
CAD	-		
FILE	STABILITY	CLIENT	Georgia Power Company
CHECK	HJ		
PROJECT No.	1777449	REV. 0	
REVIEW	GLH	FIGURE	2(d)

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion Type	Water Surface	Hu Type	Hu
Staked Ash Drained		110	Mohr-Coulomb	0	30		Water Surface	Custom	1
Sluiced Ash Drained		90	Mohr-Coulomb	0	24		Water Surface	Custom	1
Dike Fill Soil Drained		125	Mohr-Coulomb	100	30		Water Surface	Custom	1
Alluvial Deposit Drained		115	Mohr-Coulomb	50	28		Water Surface	Custom	1
Residuum Soil Drained		125	Mohr-Coulomb	100	30		Water Surface	Custom	1
PWR		140	Undrained	10000		Constant	Water Surface	Custom	0

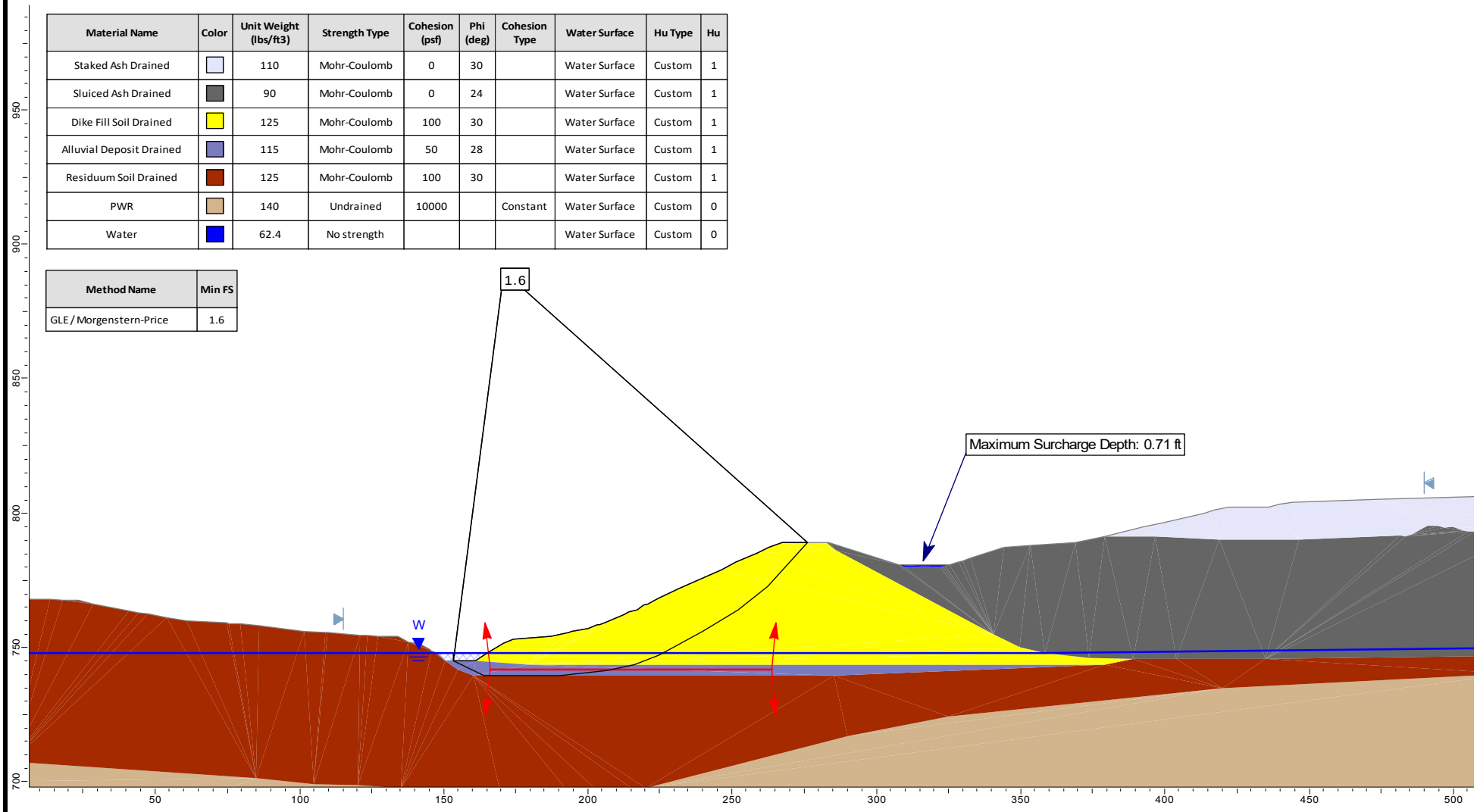
Method Name	Min FS
GLE / Morgenstern-Price	1.6



wsp	SCALE: AS SHOWN	PROJECT: State CCR Permitting Services - MCD Pond 1	
	DATE: April 2023	TITLE: Section B-B Long Term, Storage Pool	
	MADE BY: LJ		
	CAD: -		
FILE: STABILITY	CHECK: HJ	CLIENT: Georgia Power Company	FIGURE: 3(a)
PROJECT No.: 1777449 REV.: 0	REVIEW: GLH		

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion Type	Water Surface	Hu Type	Hu
Staked Ash Drained		110	Mohr-Coulomb	0	30		Water Surface	Custom	1
Sluiced Ash Drained		90	Mohr-Coulomb	0	24		Water Surface	Custom	1
Dike Fill Soil Drained		125	Mohr-Coulomb	100	30		Water Surface	Custom	1
Alluvial Deposit Drained		115	Mohr-Coulomb	50	28		Water Surface	Custom	1
Residuum Soil Drained		125	Mohr-Coulomb	100	30		Water Surface	Custom	1
PWR		140	Undrained	10000		Constant	Water Surface	Custom	0
Water		62.4	No strength				Water Surface	Custom	0

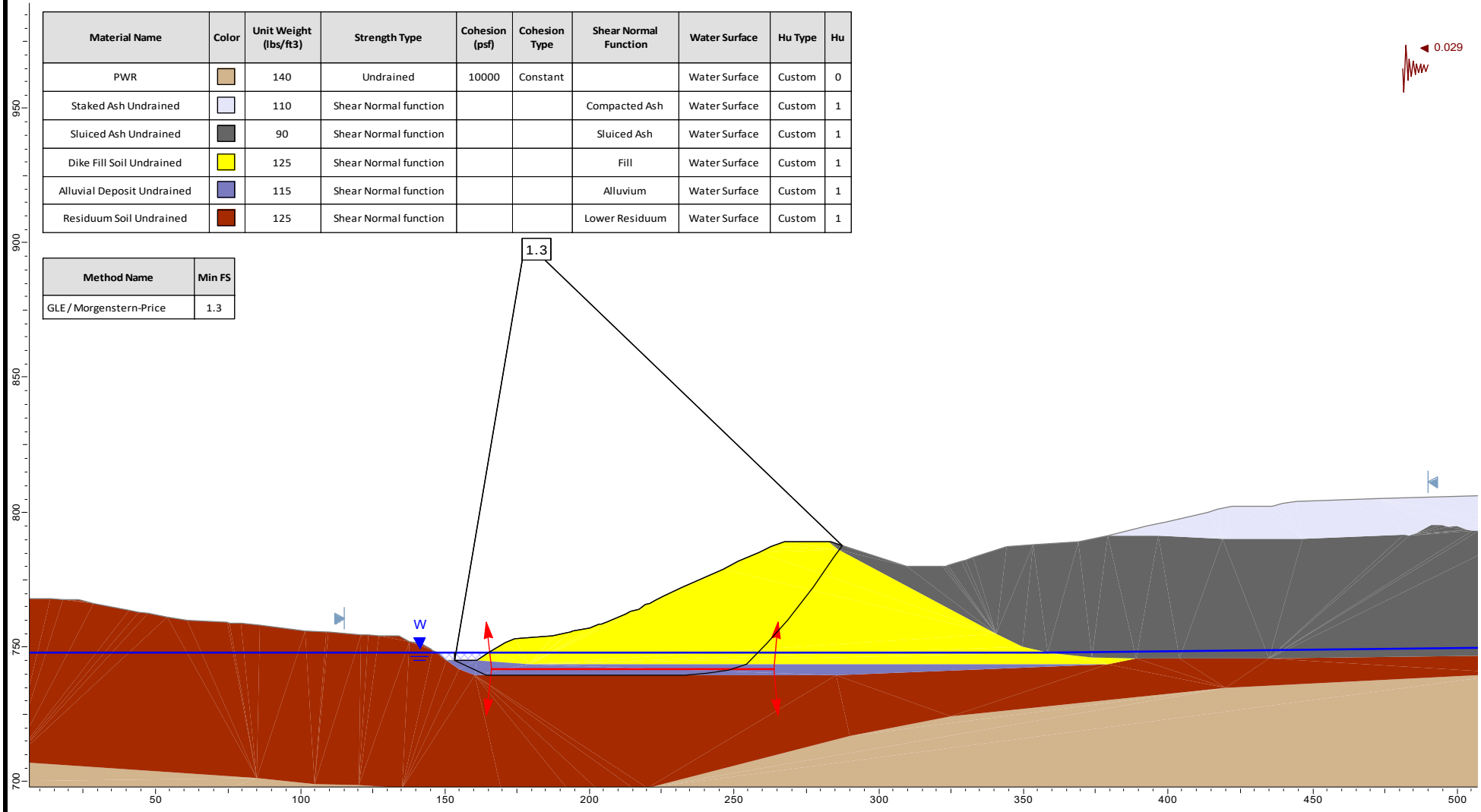
Method Name	Min FS
GLE / Morgenstern-Price	1.6



wsp	SCALE: AS SHOWN	PROJECT: State CCR Permitting Services - MCD Pond 1	
	DATE: April 2023	TITLE: Section B-B Surchage Pool	
	MADE BY: LJ		
	CAD: -		
FILE: STABILITY	CHECK: HJ	CLIENT: Georgia Power Company	FIGURE: 3(b)
PROJECT No.: 1777449 REV.: 0	REVIEW: GLH		

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Cohesion Type	Shear Normal Function	Water Surface	Hu Type	Hu
PWR		140	Undrained	10000	Constant		Water Surface	Custom	0
Staked Ash Undrained		110	Shear Normal function			Compacted Ash	Water Surface	Custom	1
Sluiced Ash Undrained		90	Shear Normal function			Sluiced Ash	Water Surface	Custom	1
Dike Fill Soil Undrained		125	Shear Normal function			Fill	Water Surface	Custom	1
Alluvial Deposit Undrained		115	Shear Normal function			Alluvium	Water Surface	Custom	1
Residuum Soil Undrained		125	Shear Normal function			Lower Residuum	Water Surface	Custom	1

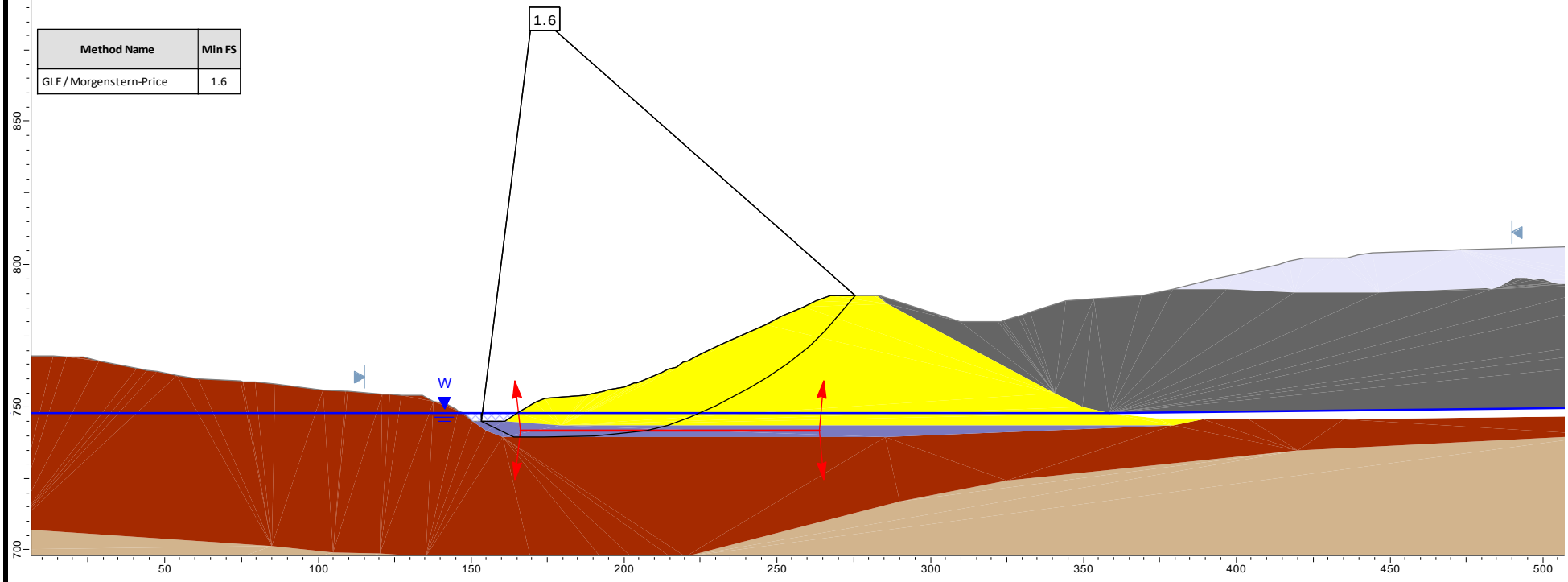
Method Name	Min FS
GLE / Morgenstern-Price	1.3



wsp	SCALE AS SHOWN	PROJECT	State CCR Permitting Services - MCD Pond 1
	DATE April 2023	TITLE	Section B-B Seismic Screening
	MADE BY LJ		
	CAD -		
FILE STABILITY	CHECK HJ	CLIENT	Georgia Power Company
PROJECT No. 1777449 REV. 0	REVIEW GLH		FIGURE 3(c)

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion Type	Vertical Strength Ratio	Minimum Shear Strength (psf)	Water Surface	Hu Type	Hu
Staked Ash Drained		110	Mohr-Coulomb	0	30				Water Surface	Custom	1
Sluiced Ash Drained		90	Mohr-Coulomb	0	24				Water Surface	Custom	1
Dike Fill Soil Drained		125	Mohr-Coulomb	100	30				Water Surface	Custom	1
Alluvial Deposit Drained		115	Mohr-Coulomb	50	28				Water Surface	Custom	1
Residuum Soil Drained		125	Mohr-Coulomb	100	30				Water Surface	Custom	1
PWR		140	Undrained	10000		Constant			Water Surface	Custom	0
Sluiced Ash Liquefied		90	Vertical Stress Ratio				0.08	0	Water Surface	Custom	1

Method Name	Min FS
GLE / Morgenstern-Price	1.6



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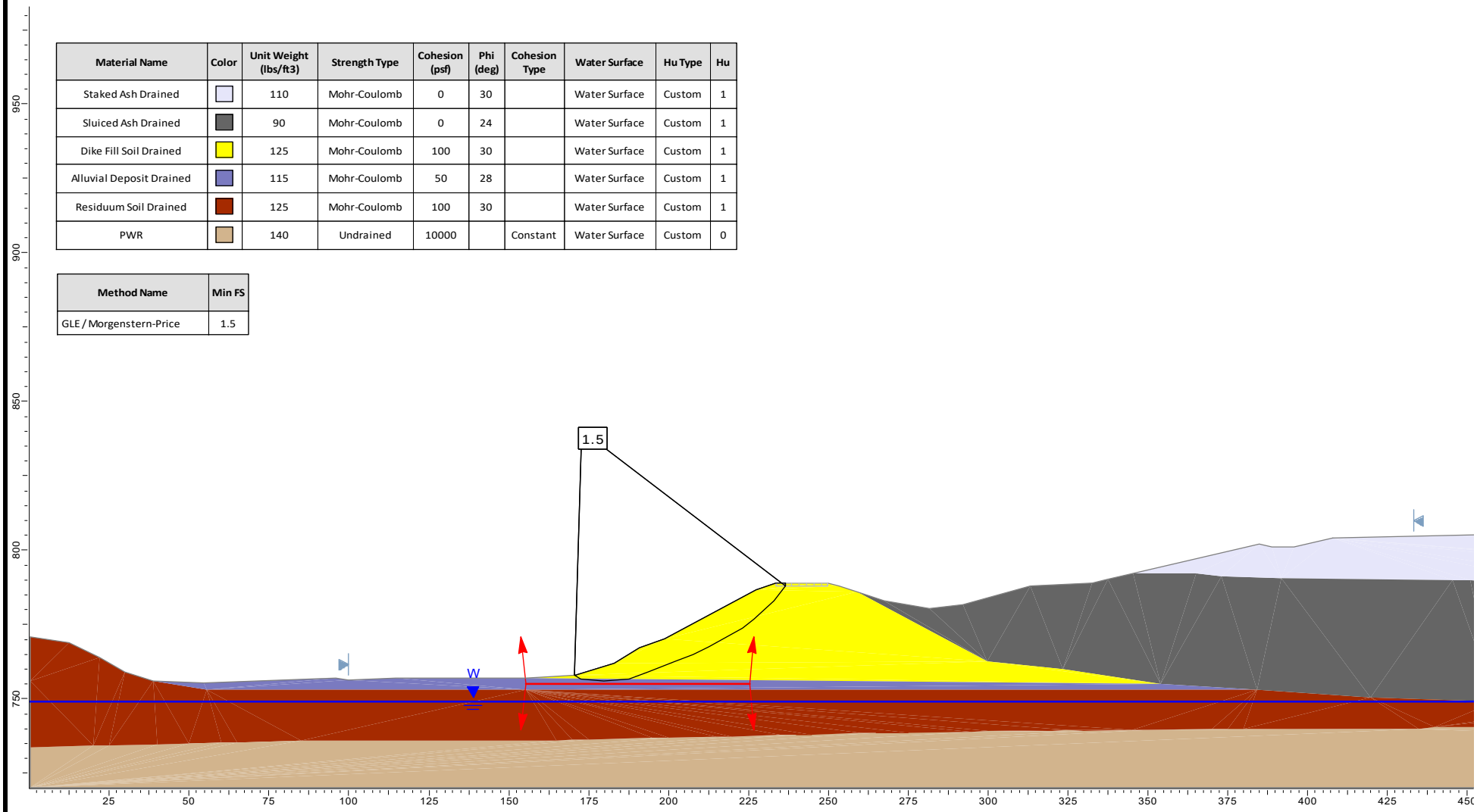
SCALE	AS SHOWN	PROJECT	State CCR Permitting Services - MCD Pond 1
DATE	April 2023	TITLE	Section B-B Post Liquefaction
MADE BY	LJ		
CAD	-		
FILE	STABILITY	CLIENT	Georgia Power Company
CHECK	HJ		
PROJECT No.	1777449	REV. 0	
REVIEW	GLH	FIGURE	3(d)

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion Type	Water Surface	Hu Type	Hu
Staked Ash Drained		110	Mohr-Coulomb	0	30		Water Surface	Custom	1
Sluiced Ash Drained		90	Mohr-Coulomb	0	24		Water Surface	Custom	1
Dike Fill Soil Drained		125	Mohr-Coulomb	100	30		Water Surface	Custom	1
Alluvial Deposit Drained		115	Mohr-Coulomb	50	28		Water Surface	Custom	1
Residuum Soil Drained		125	Mohr-Coulomb	100	30		Water Surface	Custom	1
PWR		140	Undrained	10000		Constant	Water Surface	Custom	0

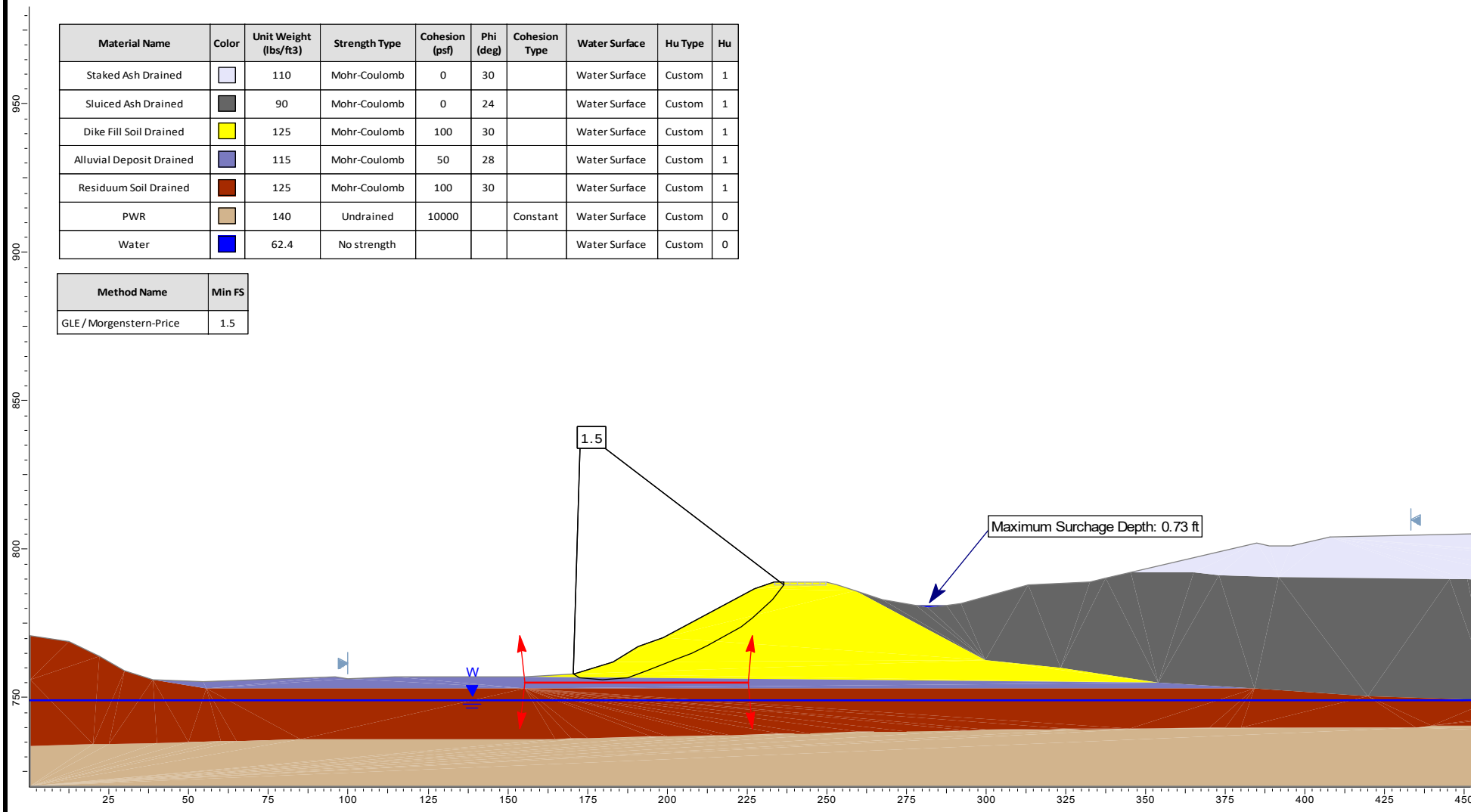
Method Name	Min FS
GLE / Morgenstern-Price	1.5



SCALE	AS SHOWN	PROJECT	State CCR Permitting Services - MCD Pond 1
DATE	April 2023	TITLE	Section C-C Long Term, Storage Pool
MADE BY	LJ		
CAD	-		
FILE	STABILITY	CHECK	HJ
PROJECT No.	1777449	REV. 0	REVIEW GLH
CLIENT	Georgia Power Company	FIGURE	4(a)

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Cohesion Type	Water Surface	Hu Type	Hu
Staked Ash Drained		110	Mohr-Coulomb	0	30		Water Surface	Custom	1
Sluiced Ash Drained		90	Mohr-Coulomb	0	24		Water Surface	Custom	1
Dike Fill Soil Drained		125	Mohr-Coulomb	100	30		Water Surface	Custom	1
Alluvial Deposit Drained		115	Mohr-Coulomb	50	28		Water Surface	Custom	1
Residuum Soil Drained		125	Mohr-Coulomb	100	30		Water Surface	Custom	1
PWR		140	Undrained	10000		Constant	Water Surface	Custom	0
Water		62.4	No strength				Water Surface	Custom	0

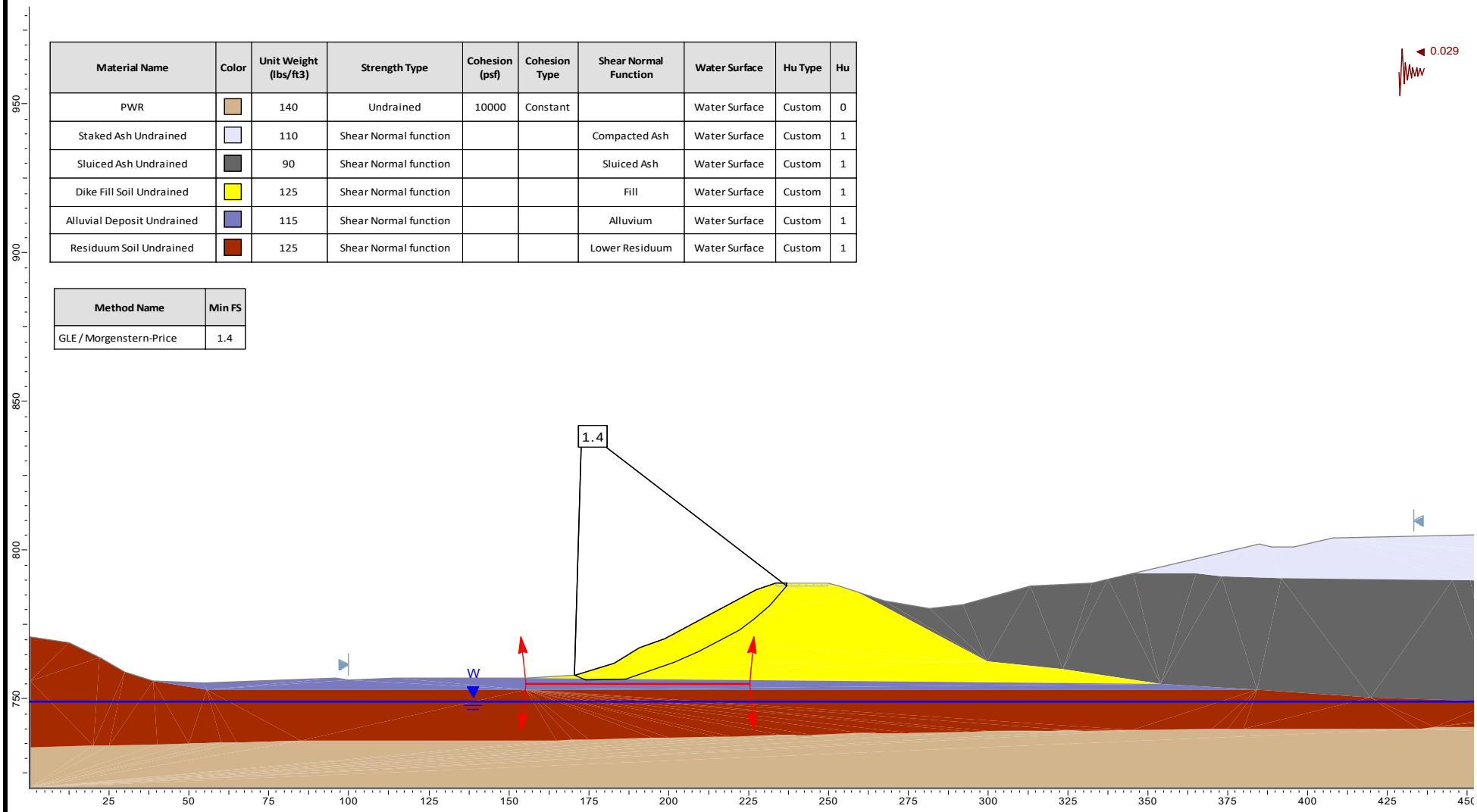
Method Name	Min FS
GLE / Morgenstern-Price	1.5



wsp	SCALE: AS SHOWN	PROJECT: State CCR Permitting Services - MCD Pond 1	
	DATE: April 2023	TITLE: Section C-C Surchage Pool	
	MADE BY: LJ		
	CAD: -		
FILE: STABILITY	CHECK: HJ	CLIENT: Georgia Power Company	FIGURE: 4(b)
PROJECT No.: 1777449 REV.: 0	REVIEW: GLH		

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Cohesion Type	Shear Normal Function	Water Surface	Hu Type	Hu
PWR		140	Undrained	10000	Constant		Water Surface	Custom	0
Staked Ash Undrained		110	Shear Normal function			Compacted Ash	Water Surface	Custom	1
Sluiced Ash Undrained		90	Shear Normal function			Sluiced Ash	Water Surface	Custom	1
Dike Fill Soil Undrained		125	Shear Normal function			Fill	Water Surface	Custom	1
Alluvial Deposit Undrained		115	Shear Normal function			Alluvium	Water Surface	Custom	1
Residuum Soil Undrained		125	Shear Normal function			Lower Residuum	Water Surface	Custom	1

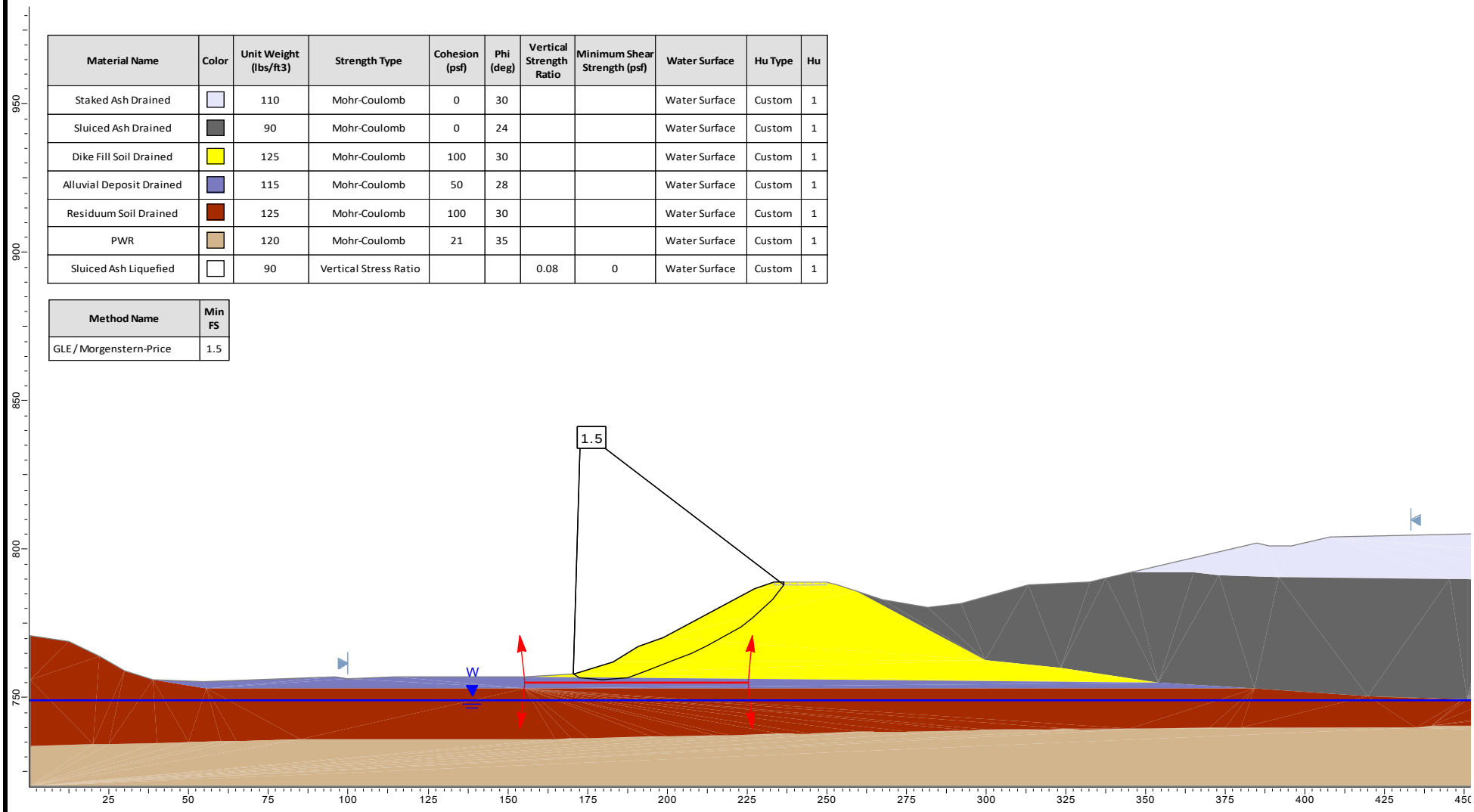
Method Name	Min FS
GLE / Morgenstern-Price	1.4



wsp	SCALE: AS SHOWN	PROJECT: State CCR Permitting Services - MCD Pond 1	
	DATE: April 2023	TITLE: Section C-C Seismic Screening	
	MADE BY: LJ		
	CAD: -		
FILE: STABILITY	CHECK: HJ	CLIENT: Georgia Power Company	FIGURE: 4(c)
PROJECT No.: 1777449 REV.: 0	REVIEW: GLH		

Material Name	Color	Unit Weight (lbs/ft3)	Strength Type	Cohesion (psf)	Phi (deg)	Vertical Strength Ratio	Minimum Shear Strength (psf)	Water Surface	Hu Type	Hu
Staked Ash Drained		110	Mohr-Coulomb	0	30			Water Surface	Custom	1
Sluiced Ash Drained		90	Mohr-Coulomb	0	24			Water Surface	Custom	1
Dike Fill Soil Drained		125	Mohr-Coulomb	100	30			Water Surface	Custom	1
Alluvial Deposit Drained		115	Mohr-Coulomb	50	28			Water Surface	Custom	1
Residuum Soil Drained		125	Mohr-Coulomb	100	30			Water Surface	Custom	1
PWR		120	Mohr-Coulomb	21	35			Water Surface	Custom	1
Sluiced Ash Liquefied		90	Vertical Stress Ratio			0.08	0	Water Surface	Custom	1

Method Name	Min FS
GLE / Morgenstern-Price	1.5



wsp	SCALE: AS SHOWN	PROJECT: State CCR Permitting Services - MCD Pond 1	
	DATE: April 2023	TITLE: Section C-C Post Liquefaction	
	MADE BY: LJ		
	CAD: -		
FILE: STABILITY	CHECK: HJ	CLIENT: Georgia Power Company	FIGURE: 4(d)
PROJECT No.: 1777449 REV.: 0	REVIEW: GLH		